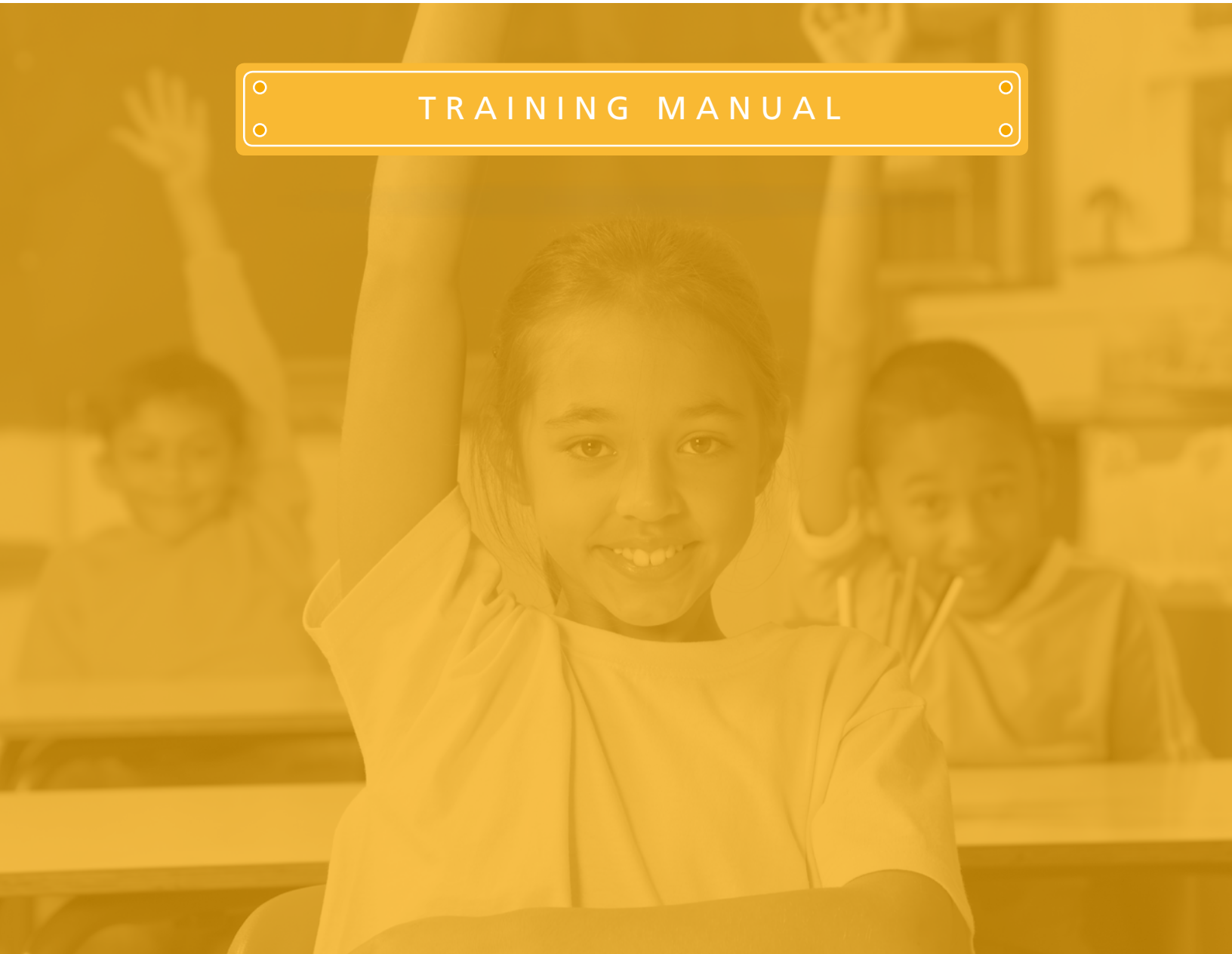
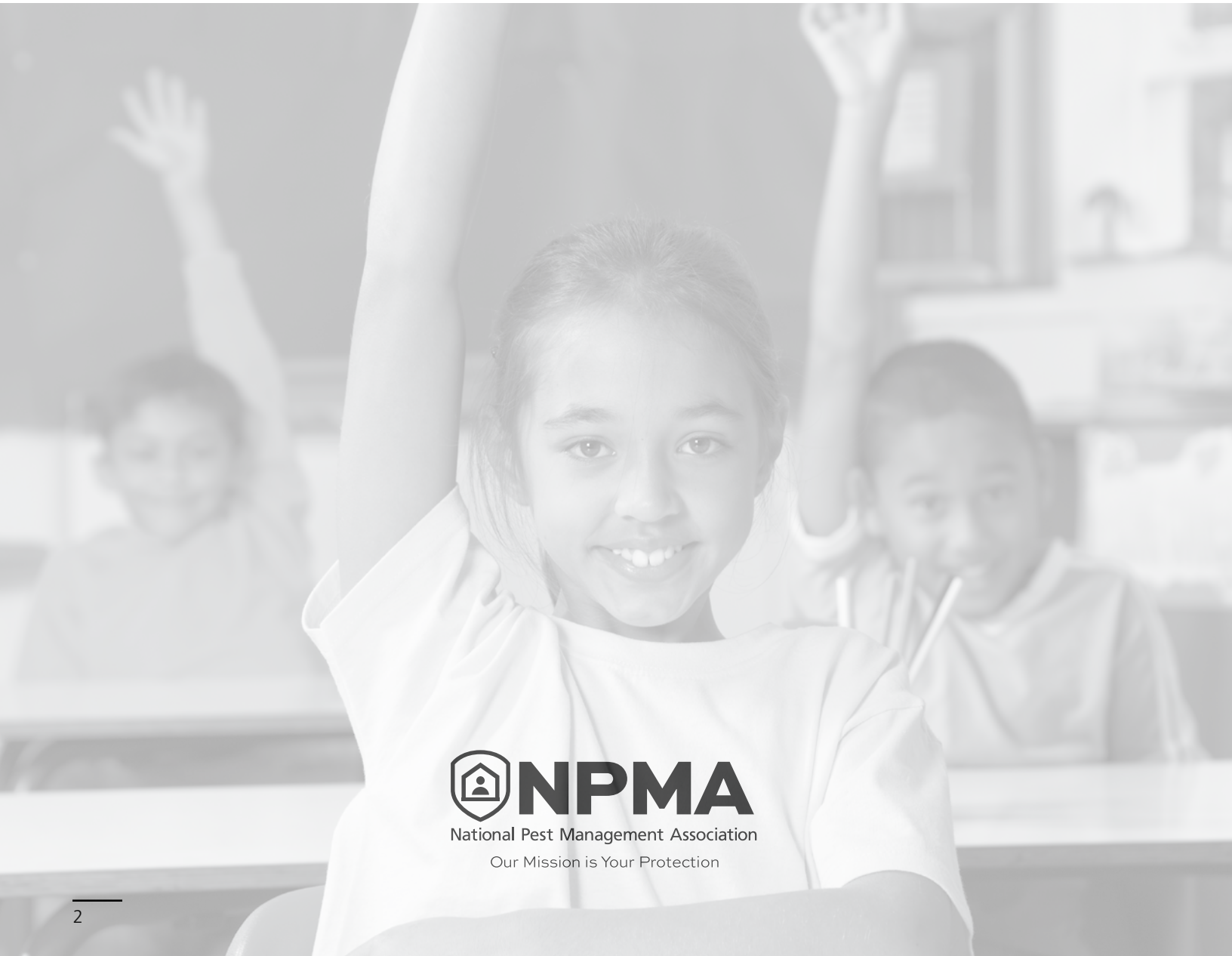
QualityPro SCHOOLS



TRAINING MANUAL

THE MARK OF EXCELLENCE IN PEST MANAGEMENT



NPMA
National Pest Management Association
Our Mission is Your Protection

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This is the training manual for the QualityPro Schools technician and salesperson exam. QualityPro Schools is a service certification available exclusively to QualityPro accredited companies. One of the requirements of the QualityPro Schools service certification is that every employee that performs work in or sells service to schools has passed this exam. After passing the QualityPro Schools Exam at www.npmatesting.org, you will receive a certificate of completion.

There are five chapters in this manual, each focusing on aspect of school pest management. Each chapter is broken down into three sections. The first part of each chapter is a discussion of the topic to help you review for the exam. The second part is the actual test questions — these are the questions that will appear on the QualityPro Schools exam, although the exam will only have a fraction of the number of these questions. The third part of each chapter is explanations about the answers, and why the other answers are incorrect.

If you have any questions, please feel free to contact us at qualitypro@pestworld.org.

[version 07.17]

study guide

Chapter 1

INTRODUCTION TO IPM IN SCHOOLS

1.1 WHAT IS IPM?

The term IPM stands for Integrated Pest Management. IPM is a process for achieving long-term management of pests through the use of many different tools and practices, and using pesticides only when necessary. IPM differs from traditional pest management in that it does not depend on automatic or calendar-based applications of pesticides. Rather, it depends on the prevention of pests before they become a problem. This is accomplished through various methods including pest proofing (exclusion), habitat modification, inspection, monitoring, and upgrading sanitation. IPM also depends on gaining control of existing pests though the use of non-chemical techniques such as traps, vacuums and moisture management, to name a few. Further, when pesticides do need to be used, technicians must begin a new decision-making process in order to choose products and application methods that minimize risks to people and the environment, especially children in schools.

WHEN TO TAKE ACTION

IPM often uses "action thresholds," which is the number of pests at which an IPM technician will take action to reduce the number of pests present; a limit below the threshold indicates that no direct control action should be taken. It is important for the client and the pest management company to work together to establish "action thresholds" to ensure everyone is aware of when action will be taken. IPM clients should take non-chemical recommendations seriously and implement them as long as they are economical and practical, (e.g., installing door sweeps, fixing torn screens, etc.).

IPM DEFINED DIFFERENTLY

Different people define IPM in different ways and so the details of IPM programs can vary widely depending on the site and the philosophy of the parties involved. One thing IPM does NOT mean is pesticide-free; there are times when pesticides are necessary. Therefore, pesticides are a legitimate tool for use in IPM; they just are not always in the first line of defense. When pesticide use is necessary, it is not as simple as using any pesticide the technician chooses. Instead, the pesticide and application methods should be chosen based upon which ones will be effective and minimize risks to students and staff. The label directions and all safety precautions must always be followed. The risks of using pesticides include the potential for injury from the pesticide under a given set of conditions. Risk depends on exposure to the pesticide and the toxicity of the pesticide. Risk, sometimes also referred to as hazard, is often illustrated with the following equation:

Risk = Exposure x Toxicity.

Lastly, IPM is also NOT, as some believe, the casual use of two or more methods of pest management, such as pest exclusion and baits. It is a science-based decision-making process leading to effective and efficient pest management.

FOUR MAIN THEMES AT THE HEART OF IPM:

1. **Prevention** – the management of pests before they become a problem. This is accomplished through pest proofing (exclusions), habitat modification, inspections, monitoring, and upgrading sanitation.
2. **Monitoring** and continuous use of non-chemical control methods.
3. **Choosing low risk methods** – If pests do become a problem, choosing the control method and materials that pose low risk to people and the environment while providing long-term, effective control, thus reducing the risk from the pest and the treatment.
4. **Partnership** – IPM is a partnership between pest management vendors and clients.

IPM VS TRADITIONAL PEST MANAGEMENT

IPM can be more complex than traditional pest management. In a school setting, IPM requires institutional coordination and staff cooperation, and a different "mindset" on the part of both technicians and school staff. IPM is proactive meaning that those who practice IPM act preemptively to prevent pest problems, rather than solely reacting to a pest problem that already exists.

IPM programs place a different emphasis on the various actions and tactics used in pest management than traditional pest management programs do. Monitoring for pests and conditions contributing to pests is of critical importance and far more time will be spent by an IPM technician inspecting and checking monitoring traps in a school than in applying pesticides.

In IPM, nonchemical control measures are prioritized. The application of pesticides take place most often after non-chemical efforts have been deemed to be insufficient. Even when applications are based on need and are justified, they are often used in combination with non-chemical methods and low hazard products are given priority. Traditional pest management programs allow pesticides to be used as the first line of defense without consideration of non-chemical management tactics and do not necessarily give priority to low hazard products. In general, pesticide exposure risk is lower for all parties in an IPM program, and traditional pest control has a variable risk of pesticide exposure.

IPM requires that clients implement technician recommendations in order to solve or prevent pest problems. Traditional pest control does not emphasize client cooperation. IPM is dependent on the client being an actively participating partner in the program. Traditional pest control is more of a customer-supplier relationship, meaning that the pest management is a service provided with little to no input from the customer.

Education and training are important and necessary for implementing effective IPM programs as well as traditional pest management programs. IPM reporting and transparency requirements are extensive (e.g., logbooks, service reports, summary reports, etc.). Traditional pest control reporting requirements can be limited to a few basic comments or a service ticket.

IPM programs require a good communication system between the pest control provider and the client. In IPM programs, regular two-way communication about current conditions and periodic formal reviews/evaluations are needed. Traditional pest control does not require periodic formal reviews/evaluations. IPM program communication is far more detailed and more time-consuming than in some traditional forms of pest management, which means there is detailed recordkeeping, various types of reports and logs, education of school personnel, and sometimes, even students.

1.2 WHY IPM IN SCHOOLS?

As a society, we have become less willing to accept health risks, even very small ones, from contaminants in the food and water we consume, air we breathe, and buildings we occupy. Further, the public has a special concern about children's health and well-being, as children are a vulnerable population. Parents, medical professionals, and policy makers want children's exposure to pesticides to be minimal. The scheduled or routine use of pesticide sprays, dusts, and other formulations around children, or in areas where children play or study, is troubling to many parents, medical professionals, and policy makers. In fact, the medical community believes children may be more sensitive to pesticides. Therefore, the Environmental Protection Agency (EPA) takes care to evaluate pesticide risks to children before approving the use of such chemicals in areas such as schools or homes.

Young children, in particular, are more likely to be exposed to pesticide residues due to activities such as crawling on the floor or by transferring pesticide residues from treatment surfaces into their mouths. Though the EPA has evaluated the risk of using pesticides for each location listed as a use site on the label, IPM further reduces exposure risk by focusing on controlling pests before they become a problem, which thereby minimizes pesticide usage and reduces potential exposure to pesticides in the school environment.

IPM programs provide more effective, efficient and long-lasting pest solutions. The pest management industry has been transitioning to IPM in many sensitive accounts, especially schools, hospitals, and food processing facilities. Pest management companies that have adopted IPM programs not only report a reduction in their use of pesticides, but a significant improvement in their level of pest control. Many school districts currently, have IPM programs in their schools, and the numbers are increasing due to support from groups such as the EPA, land-grant universities, eXtension, environmental health advocate organizations and the National Pest Management Association.

BENEFITS OF IPM IN SCHOOLS:

1. Reduction of environmental impacts from pesticides.
2. Reduction of pesticide exposure for students, teachers, other school staff, and contractors.
3. Effective, long-term control of pests.
4. Prevention of pests from becoming a problem in the first place.
5. Identification of structural, sanitation, and operational problems at schools and thus, helping schools prevent other problems, such as heat loss, food contamination, poor trash management, and security breaches.Resistance management resulting in the preservation of pesticides as effective tools.
6. Reduced liability for both pest management providers and school environment.

1.3 BARRIERS TO IPM IN SCHOOLS

Certain barriers may complicate a successful transition from traditional pest management in a school to an effective IPM program. IPM programs require careful coordination and collaboration between many parties, including pest management professionals, school administration, custodial staff, food service staff, maintenance staff, principals, teachers, and even students. This can prove to be difficult with so many parties involved.

A fairly common shortcoming of IPM programs is that problems are identified, but the required corrective actions are not undertaken by custodians, maintenance staff, or other school personnel. An administrative mechanism is often needed to ensure that sanitation or structural problems contributing to pests are corrected. School administrators and principals must properly budget for IPM services and supplies and also must actively cooperate with IPM plans and insist on staff cooperation. Also, school administrators and staff must be willing to upgrade sanitation, repair structural problems, and follow other recommendations to prevent pest problems. Otherwise, the IPM program will not be as effective. To coordinate all of the people involved in a school IPM program, many schools or districts will designate an IPM coordinator.

Further, the various groups and individuals affected by an IPM program in a school may have different ideas of what IPM means. A common problem when IPM programs start up is that some individuals or groups believe that pesticides should not be allowed in IPM programs, or that only “organic” materials are acceptable. Other individuals or groups do not accept the concept of “action thresholds” -- that there are levels of certain pests that are acceptable and which do not require immediate or direct action. Others may feel that IPM does not work and is a waste of time, and that pesticides are the only effective method to control pest problems. For example, when pest problems arise, school staff may insist that technicians “fog” or “spray” the infested area rather than follow IPM guidelines.

Most technicians will need additional training and technical resources to become proficient in IPM strategies, particularly relating to inspection and monitoring techniques, non-chemical treatment tactics, low-exposure pesticide application methods, communications and recordkeeping. To the last point, technicians are required to have better communication skills than are typically required in traditional pest management. Good communication between the technician and lead custodial, maintenance and food service staff in schools is very important to ensure the technician is well informed about concerns that may need action, and that school staff are

aware of actions they can take to improve pest prevention. Recordkeeping requirements are extensive and many technicians resist doing the paperwork necessary for effective IPM programs. However, record keeping, including actions taken in response to pest complaints, and recommendations to prevent recurrence, is one of the most important aspects of IPM programs. Record keeping requirements may also increase the need for computer resources and support staff.

Lastly, IPM programs require a wider range of equipment and supplies than traditional pest management because many more alternative methods of inspection and pest management are used. IPM programs often require a more in-depth understanding of pest biology and behavior in order to assist in determining which non-chemical measures are likely to be effective.

1.4 ROLES AND RESPONSIBILITIES FOR IPM IN SCHOOLS

There are specific roles and responsibilities for all parties involved in IPM. IPM requires commitment, communication, and cooperation from the school, including administrators, faculty, staff, and even parents and students in order to succeed. Together with the pest management company, each group has certain responsibilities in order for IPM to be successful at the school.

The responsibilities of the pest management company are:

1. proposing the IPM program; essentially creating a contract that covers all aspects of the IPM program;
2. supervising the inspection and monitoring of schools for pests and conditions contributing to pests, as well as the performance of pest management, both non-chemical and with pesticides when necessary;
3. ensuring that good records are maintained;
4. overall communication strategy for information related to pest management to both IPM technicians and the school staff;
5. explicitly stating in the contract which party will be responsible for implementing non-chemical repairs and other school maintenance related to IPM tactics;
6. performing quality assurance (QA) audits to make sure IPM plans are properly implemented;
7. providing training to IPM technicians and school staff, as necessary, for successful implementation of IPM programs.

The responsibilities of the IPM technicians are:

1. inspection proficiency; identification of pests, their remnants and conditions that contribute to a thriving pest population; pest biology as well as typical IPM tools and tactics;
2. knowledge of good IPM tactics for managing pests typically present in a school;
3. management of pest reduction and mitigating potential hazards of pests and pesticide exposure to students and staff;
4. protection of the environment;
5. communication with school staff about IPM-related issues; they may need to communicate to their supervisor if school staff is not adhering to IPM principles;
6. posting notices concerning pesticide application, if required;
7. maintaining detailed records;
8. regularly reevaluating the success of IPM activities; and
9. pesticide resistance management through product choice and use.

The responsibilities of school administrators are to:

1. provide the financial and personnel commitments necessary for IPM to succeed, including time for learning about IPM;
2. provide leadership and encouraging buy-in to their staff; if administrators do not demonstrate support for the switch to IPM, school staff is not likely to cooperate primarily because it takes more effort on their part when pests are managed through IPM than through traditional pest management;
3. take action when persistent sanitation and/or habitat modification problems are not being corrected, or requests for building repairs (“pest-proofing”) are repeatedly ignored;
4. review reports and information, and otherwise staying informed about IPM activities at the school;
5. appoint an IPM coordinator or liaison to act for school administration if necessary.

The responsibilities of the IPM coordinator or liaison are:

1. regular review and evaluation of IPM policies and procedures to ensure that IPM service is meeting the needs of the school system;
2. coordination with other staff to provide IPM-related information to faculty and staff throughout the school system;
3. ensuring that each school is performing the housekeeping, sanitation, and repair actions necessary to reduce or prevent pest problems;
4. oversight of public notification procedures related to pesticide application;
5. coordination with principals and administration to educate students, parents and staff about IPM;
6. addressing conflicts and complaints related to the IPM program and pesticide use.

The responsibilities of teachers are to:

1. practice and encouraging good sanitation practices: ensuring that eating takes place ONLY in designated food areas, cleaning up leftover food and food debris, and minimizing clutter to help prevent pest problems;
2. report in the log any sightings of pest, problems, or conditions that might favor pests;
3. communicate the principles, objectives, and tactics of IPM to students. This may include the incorporation of IPM in their classroom lessons because IPM relates to environmental studies and public health.

The responsibilities of students are to:

1. cooperate with the IPM program by eating only in assigned areas, cleaning up food debris from tables and lockers, and putting trash in proper trash receptacles;
2. learn about IPM, and reporting pest problems to their teachers or other staff members;

The responsibilities of school custodians are to:

1. understand the connection between pest problems and food, standing water, and clutter;
2. respond to requests from IPM technicians for housekeeping or trash management action;
3. report any pest problems noticed, by writing in a log, and if possible by direct communication with an IPM technician.

Parents are their children's natural advocates and may seek information about the school IPM program. They also may request advance notification of certain pesticide applications. Further, they may participate in advisory committees that address pest-related issues.

The responsibilities of the school maintenance staff are to:

1. make repairs and correcting structural problems that are, or could be, contributing to pests;
2. report any pest problems observed;
3. pest-proof walls, doors, windows, and other areas that may allow pests to enter the building or move from room to room;
4. correct leaks or condensation problems contributing to pests.

The responsibilities of cafeteria managers are to:

1. respond to sanitation improvement requests from IPM technicians;
2. report any pest problems observed;
3. store personal belongings accordingly to ensure they do not take pests home with them.

study questions

Chapter 1

INTRODUCTION TO IPM IN SCHOOLS

1.1 WHAT IS IPM?

1) The "I" in the acronym IPM stands for:
   a) Insect
   b) Integrated
   c) Insecticide

2) Which of the following statements are NOT a theme of an IPM program?
   a) Manage pests before they become a problem.
   b) Choose methods and materials that pose low risk to people and the environment while providing long-term, effective control.
   c) All pesticide applications are eliminated without exception.

3) IPM differs the from traditional pest control service in that:
   a) the active ingredients of the pesticides used in an IPM program are always on EPA's 25b list.
   b) it only uses vacuums and traps.
   c) it does not depend on regularly-scheduled application of pesticides.

4) Which of the following tactics is NOT a preferred way to prevent pests in an IPM program?
   a) Weekly perimeter treatment
   b) Exclusion
   c) Upgrading sanitation

5) Which of the following is a chemical control method?
   a) Vacuuming
   b) Applying insecticide
   c) Trapping

6) Which statement is TRUE?
   a) IPM bans the use of all pesticides.
   b) Bait is the only pesticide formulation allowed in an IPM program.
   c) An IPM program minimizes risk associated with pesticides.

7) Which of the following statements accurately describe an IPM program?
   a) IPM is simpler than traditional pest control.
   b) IPM requires no special training.
   c) IPM is proactive in preventing pest problems.

8) In a school IPM program, technicians will spend most of their time:
   a) monitoring and inspecting for pests.
   b) applying pesticides.
   c) completing paperwork.

9) In a school IPM program, the _____ is involved in the decision-making process of pest management. This is also the person who decides, based on monitoring and other techniques, when to implement controls.
   a) principal
   b) IPM technician
   c) head of maintenance

10) If pesticide use for German cockroaches is necessary, which one of the following pesticide formulations is often the best choice for controlling insects in a school IPM program?
   a) Fan spray
   b) Fog
   c) Bait

11) The risk of pesticide exposure in a school is often higher than the risk of pesticide exposure in other commercial accounts.
   a) TRUE
   b) FALSE

12) IPM requires specialized training and different supplies than traditional pest management.
    a) TRUE
    b) FALSE

13) Which of the following statements best illustrates the differences between IPM in schools and traditional pest management?
    a) IPM philosophy is to react to pest problems; traditional pest management philosophy is to prevent pest problems.
    b) IPM only uses natural products; traditional pest management uses synthetic products.
    c) In IPM, a priority is to look at all approaches, while traditional pest management typically gives a higher priority to pesticide application.

14) Which statement about IPM in schools is TRUE?
    a) IPM technicians apply baits in the same locations at every service visit.
    b) Pesticides are only used to prevent pests.
    c) IPM encourages institutional coordination and staff cooperation.

15) One of the main concepts of IPM is that:
    a) only organic pesticides may be used.
    b) only non-chemical controls are permitted.
    c) certain pests may be acceptable at low levels.

1.2 WHY IPM IN SCHOOLS?

1) Which of the following statements is TRUE?
    a) Children have a higher tolerance to pesticide exposure.
    b) People today are more willing to accept health risks from contaminants in food and water than they were in the early 1900's.
    c) Exposure to pesticides is a greater risk to young children than it is to adults.

2) Which of the following is NOT true about IPM in schools?
    a) IPM identifies sanitation problems in schools.
    b) IPM means that pesticides are applied on a regular schedule regardless of evidence of infestation.
    c) IPM means that people are exposed to fewer pesticides.

3) Why are younger children more likely than older children to be exposed to insecticide sprays in their school?
    a) Young children have more-developed immune systems.
    b) The classrooms of young children are sprayed more often while they are present.
    c) Young children are more likely to transfer residues from treated surfaces to their mouths.

4) Which would be most concerning to medical professionals related to pest management in schools?
    a) The use of pesticides where children play and study.
    b) The presence of pavement ants in classrooms.
    c) The high cost of pest management.

5) What effect does switching to IPM typically have on how well pests are controlled in a school?
    a) Does not make any difference.
    b) Increased infestations.
    c) Improved sanitation.

6) Besides reducing pesticide exposure and improving control, what positive effects can IPM programs have on school operations?
    a) Exclusion measures weatherize the building.
    b) Improves sanitation.
    c) Reduces food contamination.
    d) All of the above.

1.3 BARRIERS TO IPM IN SCHOOLS

1) One of the advantages of a school IPM program, as opposed to a traditional pest management program, is that an IPM program can be successfully executed with almost no input from school staff.
    a) TRUE
    b) FALSE

2) The reason school administrators are involved in an IPM program is to:
    a) put out sticky traps.
    b) ensure problems contributing to pests are corrected.
    c) decide when and where pesticides will be used.

3) IPM programs require a wider range of equipment than traditional pest control programs.
    a) TRUE
    b) FALSE

4) Which of the following statements is TRUE about IPM in schools?
   a) Only organic pesticides can be used.
   b) Pesticides are the most effective method of control.
   c) School administrators must insist on staff cooperation.

5) A common barrier to IPM success in schools is that:
   a) some staff members will insist that technicians "spray" whenever a pest problem arises.
   b) reduced use of pesticides in IPM means less effective control.
   c) too much time is spent on paperwork.

6) In which areas do pest management professionals typically need additional training in order to become proficient at IPM?
   a) Inspection and monitoring techniques.
   b) Communication and reporting.
   c) Reading and following pesticide labels.
   d) All of the above.

1.4 ROLES AND RESPONSIBILITIES IN SCHOOL IPM

1) In a school IPM program, it is the job of the _____ to maintain written records about pest problems, actions taken, and notes.
   a) custodian
   b) IPM technician
   c) teacher
   d) principal

2) In a school IPM program, it is the job of the _____ to provide the financial and personnel commitments necessary for IPM to succeed.
   a) custodian
   b) IPM technician
   c) teacher
   d) school administrator

3) Which of these is NOT typically a responsibility of the pest management company in a school IPM program?
   a) Proposing the program.
   b) Inspecting and monitoring.
   c) Communicating with school staff.
   d) Repairing structural deficiencies.

4) In a school IPM program, it is the job of the _____to make sure that all school staff cooperate with the program.
   a) custodian
   b) IPM technician
   c) teacher
   d) principal

5) Students are the only part of the school community that does not play an active role in a school IPM program.
   a) TRUE
   b) FALSE

6) The staff person that has primary responsibility for sanitation and trash management in most areas of a school is the:
   a) custodian.
   b) head of maintenance.
   c) teacher.
   d) cafeteria manager.

7) The primary job of a school's IPM coordinator is to provide the financial backing for the IPM program.
   a) TRUE
   b) FALSE

8) Which of the following is a typical role for school custodians in an IPM program?
   a) Coordinating IPM-related information with faculty.
   b) Notification about pesticide application.
   c) Responding to sanitation reports from the IPM technician.
   d) All of the above.

9) Which of the following is the best role for parents in a school IPM program?
   a) Coordinating IPM-related information with faculty.
   b) Participating in advisory committees.
   c) Reporting pest problems.
   d) All of the above.

10) Which of the following is a typical role for school maintenance personnel in an IPM program?
   a) Fixing leaks.
   b) Pest-proofing openings that allow pest entry or movement.
   c) Reporting pest problems.
   d) All of the above.

11) Which of the following is a typical role for an IPM technician in an IPM program?
    a) Communicating with school staff.
    b) Fixing leaks.
    c) Cleaning up spilled food.
    d) All of the above.

12) Who is the primary contact for conflicts and complaints related to pesticide use in an IPM program?
    a) IPM technician
    b) IPM coordinator
    c) head custodian
    d) All of the above.

13) Who typically oversees the public notification procedures related to pesticide application in an IPM program?
    a) IPM technician
    b) IPM coordinator
    c) head custodian
    d) Any of the above.

14) Who typically reports pest sightings or problems in the IPM log?
    a) IPM technician
    b) teacher
    c) head custodian
    d) Any of the above.

15) Who has primary responsibility for reducing the hazards of pests and pesticide exposure in a school IPM program?
    a) IPM technician
    b) IPM coordinator
    c) head custodian
    d) Any of the above.

answers

Chapter 1

INTRODUCTION TO IPM IN SCHOOLS

1.1 WHAT IS IPM?

1) Answer b) is correct.
Various methods and tactics are integrated together to achieve long-term, effective control while posing low risk to people and the environment.

Answer a) is incorrect because IPM is not limited to insects, but deals with all pests. Answer c) is incorrect because insecticides may be used in IPM, but they are only one tool among many, and the proper name of IPM is Integrated Pest Management

2) Answer c) is correct.
All pesticide applications are not eliminated in IPM programs.

Answer a) is incorrect because it is a theme of IPM to manage pests before they become a problem. Answer b) is incorrect because IPM technicians should choose methods and materials that pose low risk to people and the environment while providing long-term, effective control.

3) Answer c) is correct.
Regularly-scheduled application of pesticides is in total conflict with the philosophy of IPM which requires that you only use pesticides when necessary.

Answer a) is incorrect because in IPM you still have all legal pesticide tools available. Answer b) is incorrect because in IPM you may use vacuums and traps, but you may also do so in traditional pest management (especially traps), and you can theoretically conduct an IPM program without using vacuums or traps.

4) Answer a) is correct.
Weekly perimeter treatment is not a preferred way to prevent pests because it is an automatic application of a pesticide, because non-chemical techniques such as pest-proofing (exclusion) should be a first choice, and because perimeter treatment puts a great deal of insecticide around the outside perimeter of the building, which is an area that children could access.

Answer b) is incorrect because exclusion is a preferred tactic in IPM because it requires no pesticide and it results in long-term control and pest prevention. Answer c) is incorrect because upgrading sanitation is also a primary tactic to achieve long-term control and pest prevention.

5) Answer c) is correct.
Insecticide application is a chemical control method.

Answer a) is incorrect because vacuuming is a useful non-chemical control. Answer b) is incorrect because traps are a non-chemical control tool.

6) Answer c) is correct.
This is the true statement because an IPM practitioner minimizes the risk of a pesticide application by assessing the toxicity of the product and the risk of exposure at the proposed application site.

Answer a) is not true because pesticides can still be used in an IPM program if other control measures are not effective. Answer b) is not true because baits may be a part of an IPM program, but other pesticides can be used as well.

7) Answer c) is correct.
An IPM program works to prevent pest problems in the first place rather than simply responding to the problem after it has occurred.

Answer a) is incorrect because IPM is more complex than traditional pest management because it requires special training, ongoing monitoring, data evaluation and decision making, and record keeping, in addition to implementation of various control measures. Answer b) is incorrect because an IPM technician needs special training and education above and beyond that of a traditional pest management technician.

8) Answer a) is correct.
An IPM technician should spend most of the time at the school inspecting for pests and problems contributing to pests.
Answer b) is incorrect because pesticides may be used in an IPM program, but they are used only when necessary and as a result of continuous monitoring. Answer c) is incorrect because although more paperwork is required than in a traditional pest management program, a technician should spend far more time monitoring for pest problems and implementing non-chemical controls.

9) Answer b) is correct.
The IPM technician is involved in the decision-making process of pest management. The technician uses identification, inspection findings, monitoring data, and their knowledge of pest biology and habits at the site in order to make decisions in an IPM program.

Answer a) is incorrect because the principal might be consulted, but pest management decisions should be left to the IPM technician. Answer c) is incorrect because maintenance staff plays an important role in an IPM program, but the IPM technician has the necessary knowledge to manage the pests.

10) Answer c) is correct.
An insecticide bait application greatly reduces the amount of insecticide applied. Baits are often applied inside of an enclosed space, such as inside a cabinet, or true crack or crevice, where pests are hiding, but that is out of the reach of children. It minimizes the amount of airborne pesticide.

Answer a) is incorrect because a fan spray is not targeted to areas where pests hide. Answer b) is incorrect because fogging applies large amounts of pesticides in the air and only kills pests that are out in the open.

11) Answer a) is correct.
This statement is true because schools are full or children who will likely touch all surfaces of the building, increasing the risk of exposure.

12) Answer a) is correct.
Pest management technicians new to IPM typically require specialized training in monitoring, non-chemical tactics, low exposure pesticide application methods, communications, and IPM record keeping.

13) Answer c) is correct.
IPM seeks to prevent pests and minimize pesticide exposure risk so that technicians consider all approaches, both non-chemical and chemical, while traditional pest management gives priority to pesticide application because that tends to be easy, quick, and responsive to complaints.

Answer a) is incorrect because IPM is not primarily reactive but proactive, meaning that it tries to prevent pest problems in the first place, or addresses them very early before a pest problem becomes serious. Answer b) is incorrect because both IPM and traditional pest management may involve both natural and synthetic pesticide products.

14) Answer c) is correct.
This statement is true because IPM in a school encourages institutional coordination and staff cooperation to correct structural deficiencies, improve sanitation, and follow the various other recommendations that help prevent or minimize pests; without these improvements the benefits of IPM are rarely gained.

Answer a) is not true because IPM technicians change their actions based on pest levels and current conditions. Answer b) is not true because pesticides are rarely used in a preventive way. Instead, they are used when necessary to control existing pests over the action threshold level.

15) Answer c) is correct.
Depending on the pest, low pest levels may not require any control action at all. The action threshold for the particular pest determines when control will be implemented.

Answer a) is incorrect because various types of pesticides may be used when needed. It is important, however, to select pesticides that pose the least risk. Answer b) is incorrect because pesticides are allowed in an IPM program if there is a demonstrated need and if other non-chemical controls have not been effective.

1.2 WHY IPM IN SCHOOLS?

1) Answer c) is correct.
This statement is true because young children crawl on the floor and touch many surfaces and then put their hands in their mouths, which transfers pesticide residues.

Answer a) is not true because children have less body weight and less ability to detoxify contaminants and so they are more likely to become ill from pesticide exposure. Answer b) is not true because people are less willing today to accept even small health risks from contaminants in their environment.

2) Answer b) is correct.
Regular application of pesticides is not a benefit of an IPM program. IPM's goal is to reduce the amount of pesticide used in a school.

Answer a) is incorrect because an IPM program does identify structural, sanitation, and operational problems through regular monitoring. Answer c) is incorrect because an IPM program does reduce pesticide exposure for students, teachers, and other school staff.

3) Answer c) is correct.
Young children often crawl around at floor level where most insecticides are applied and they commonly put their hands in their mouths.

Answer a) is incorrect because their immune system does not affect how much they are exposed to an insecticide, only to what degree exposure affects their health. The younger the child, the less developed the immune system. Answer b) is incorrect because classrooms should never be sprayed with pesticides when children are present, regardless of their age.

4) Answer a) is correct.
Medical professionals want children's exposure to pesticides to be minimal and they worry about the use of pesticide sprays, dusts, and other formulations around children, or in areas where children play or study.

Answer b) is incorrect because the presence of any pest can pose a health concern, but most medical professionals see far more of a health threat to students from pesticides. Answer c) is incorrect because the cost of pest management services is of little interest to medical professionals.

5) Answer c) is correct.
It often surprises those not familiar with IPM, but switching to a school IPM program nearly always results in a significant improvement in sanitation at the school.

Answers a) and b) are incorrect because pests almost never stay the same or get worse if a real IPM program is undertaken.

6) Answer d) is correct.
IPM identifies structural, sanitation, and operational problems at schools and thus, helps schools to prevent other problems, such as heat loss, food contamination, poor trash management, and security breaches. Most schools are pleasantly surprised to discover these unexpected benefits.

1.3 BARRIERS TO IPM IN SCHOOLS

1) Answer b) is correct.
This statement is false because an IPM program requires even more input and cooperation from staff. Typically, the school administration, custodial staff, food service staff, maintenance staff, and teachers need to be involved in the program.

2) Answer b) is correct.
School principals and other administrative staff must see that recommendations for corrective action are followed through by maintenance staff, custodians, and others.

Answer a) is incorrect because it is the job of the IPM technician to apply all pest management measures, whether chemical or non-chemical. Answer c) is incorrect because, again, it is the job of the IPM technician to evaluate the situation through monitoring and to decide if pesticides are necessary.

3) Answer a) is correct.
This statement is true because an IPM program uses many different types of controls and more extensive inspections; it requires a wider range of equipment and supplies.

4) Answer c) is correct.
This statement is true because without staff cooperation of sanitation issues, structural problems, and other pest management issues, IPM cannot be successful.

Answer a) is incorrect because the choice of pesticides in schools is based on a pesticide's potential exposure risk to students and others, not on whether or not it is "organic." Answer b) is incorrect because pesticides are only a short-term solution to pest problems.

5) Answer a) is correct.
In every school there will be certain staff members, sometimes the principal, who may not embrace IPM tactics and insist that any pest infestation requires intensive pesticide applications and "fogging" or "fumigating."

Answer b) is incorrect because reduced use of pesticides does not mean less effective control; IPM programs typically improve the level of control in schools significantly. Answer c) is incorrect because paperwork is part of the communication process in IPM, which improves school cooperation and the success of pest management.

6) Answers a & b are correct.
IPM programs emphasize different tactics and require different skills from technicians. Most technicians will need additional training and technical resources to become proficient in IPM strategies, particularly in those subjects that are emphasized in IPM such as inspection and monitoring techniques, non-chemical management tactics (from pest-proofing to trapping strategy), low exposure pesticide application methods, and communications and record keeping. Technicians need much better communication skills than are typically required in traditional pest management.

Answers c & d are incorrect because one area that technicians should be proficient at, regardless of the type of pest management service, is how to read and follow a pesticide label.

1.4 ROLES AND RESPONSIBILITIES IN SCHOOL IPM

1) Answer b) is correct.
Most recordkeeping is the responsibility of the IPM technician and includes records such as IPM service reports, sanitation reports, corrective action notices, SDS and label files, and log entries.

Answer a) is incorrect because the primary record keeping responsibility of the custodian is to make pest reporting entries in the log and to note when corrective actions have been taken. Answer c) is incorrect because the primary record keeping responsibility of a teacher is to make pest reporting entries in the log. Answer d) is incorrect because typically, the primary record keeping responsibility of the principal is to report to the pest management company any shortcomings of the program, from the school's perspective.

2) Answer d) is correct.
Administrators are responsible for providing the financial and personnel commitments necessary for IPM to succeed. If administrators do not show support for the switch to IPM, staff is not likely to cooperate simply because it takes more effort on their part when pests are managed through IPM than through traditional pest management.

Answer a) is incorrect because school custodians have the primary responsibility for sanitation and trash management in most school areas. Answer b) is incorrect because the IPM technician is responsible for the technical operations of the program. Answer c) is incorrect because teachers have three possible responsibilities related to the IPM program: (1) practice and encourage good sanitation practices, (2) report in the log any pest sightings, problems, or conditions that might favor pests, (3) explain IPM principles, objectives, and tactics to students.

3) Answer d) is correct.
The pest management company should point out structural problems and make recommendations, but the actual repairs are the responsibility of the school unless the pest management company has been contracted to do the recommended repairs..

Answer a) is incorrect because proposing the IPM program is the responsibility of the pest management company. Answer b) is incorrect because the company is responsible for inspecting and performing ongoing monitoring of conditions at the school. Answer c) is incorrect because the company and the IPM technician must communicate information related to pest management.

4) Answer d) is correct.
It is up to principal to make sure that school staff cooperates. The IPM technician can seek that cooperation, but it can only be enforced by the principal or other senior school administrator.

Answer a) is incorrect because the custodian can ensure that the maintenance staff cooperates, but cannot oversee the entire school staff. Answer b) is incorrect because while the IPM technician can encourage cooperation, he or she does not have the authority to demand it. Answer c) is incorrect because teachers are responsible for encouraging cooperation from their classroom and their students, but not from the entire staff.

5) Answer b) is correct.
This statement is false because students have a role in learning about IPM, reporting pest problems, cleaning food out of lockers, eating only in designated areas, and putting trash into the proper containers.

6) Answer a) is correct.
The school custodian is the individual who generally responds to requests from the IPM technician for school-wide improvements in housekeeping and/or trash management.

Answer b) is incorrect because the maintenance department generally is responsible for repairing structural problems. Answer c) is incorrect because teachers are responsible for trash management only in their individual classrooms. Answer d) is incorrect because the cafeteria manager is responsible for sanitation only in the cafeteria area.

7) Answer b) is correct.
This is a false statement because the IPM coordinator is a school staff person who acts as a liaison between school administration and the pest management company. He or she reviews the program, coordinates with staff, educates staff, ensures that recommendations are followed, reports problems, etc., but is not directly responsible for financing the program.

8) Answer c) is correct.
School custodians have the primary responsibility for sanitation and trash management in most school areas.

Answer a) is incorrect because coordinating IPM information with the faculty is the responsibility of the IPM coordinator. Answer b) is incorrect because notification of pesticide application is the responsibility of the IPM coordinator. Answer d), all of the above, is incorrect because a) and b) are incorrect.

9) Answer b) is correct.
Parents are their children's natural advocates. They may seek information about the school's IPM program, participate in advisory committees that address pest-related issues, and request to be notified in advance of certain pesticide applications.

Answer a) is incorrect because coordinating IPM-related information with faculty is the responsibility of the IPM coordinator. Answer c) is incorrect because reporting pest problems is the responsibility of those in the school. Answer d) is incorrect because a) and c) are incorrect.

10) Answer d) is correct.
School maintenance staff has the responsibility of making repairs and correcting structural problems that are, or could be, contributing to pests, and reporting any pest problems they observe.

11) Answer a) is correct.
IPM technicians have a long list of operational responsibilities, one of which is to communicate with school staff about IPM-related issues, both by word-of-mouth and through written reports.

Answer b) is incorrect because fixing leaks is the responsibility of maintenance. Answer c) is incorrect because cleaning up spilled food is the responsibility of those spilling the food, or of the custodial department. Answer d) is incorrect because answers b) and c) are incorrect.

12) Answer b) is correct.
The IPM coordinator has the primary responsibility for addressing conflicts and complaints related to pesticide use because he or she is the liaison between the school and the pest management company.

Answer a) is incorrect because the IPM technician cannot address a pesticide conflict because he or she is the one applying the pesticides. Answer c) is incorrect because the head custodian does not serve in an oversight role. Answer d) is incorrect because answers a) and c) are incorrect.

13) Answer b) is correct.
The procedures involved in the notification of pesticide application are most often the responsibility of the IPM coordinator, who typically acts as liaison for school administration.

Answer a) is incorrect because notification should never be the responsibility of the pest management company or its staff, although notice posting, as necessary, will be. Answer c) is incorrect because the head custodian has no role in notification procedures. Answer d) is incorrect because answers a) and c) are incorrect.

14) Answer d) is correct.
All parties present in the school have a responsibility to report pest sightings and problems in the IPM log.

15) Answer a) is correct.
It is the IPM technician's ultimate responsibility for the use of pesticides and reducing their hazards in a school.

Answer b) is incorrect because the IPM coordinator should not be directly involved in pesticide application or the choice of products and formulations. Answer c) is incorrect because the head custodian should not be directly involved in pesticide application or the choice of products and formulations. Answer d) is incorrect because answers b) and c) are incorrect.

study guide

Chapter 2

INSPECTIONS AND MONITORING

2.1 VISUAL INSPECTIONS OF SCHOOLS

MONITORING

Visually monitoring and inspecting a school for pests is an important first step in IPM. Monitoring consists of regular and thorough inspections, accurate identification of pests, and assessment of conditions at the school. Monitoring includes:

- identifying and locating pests, identifying areas of critical sensitivity such as classrooms, food preparation/storage areas, teacher lounges, etc.,
- estimating the size of pest populations,
- identifying factors contributing to the pest problem such as poor sanitation, improper storage, holes in walls, etc.,
- reporting management practices affecting pest populations or pest management activities such as trash pickup, lighting, construction, etc.,
- identifying non-target species that could be killed or injured, assessing natural enemies and potential secondary pests, and
- assessing environmental conditions such as temperature, humidity, weather or seasonal changes.

Certain areas in a school are more prone to pests than others and will require more intensive inspections. An effective inspection is the most valuable service a contracted pest management professional can offer a school client because it helps identify means of preventing pests in the first place, or of managing pests in the safest and most effective way, and it enables technicians to minimize pesticide use.

PROPER IDENTIFICATION OF PESTS

Additionally, proper identification of pests is essential to IPM because different pests have different habits and food requirements; and what works to manage one pest may not work against another similar pest. For example, one species of ant may feed on a particular type of bait, while a very similar looking ant may not; and one stored product moth may be attracted to a pheromone trap while another similar moth is not. Sometimes identification to a group is adequate; sometimes it will be necessary to identify a pest to a species. For example, it may not be essential to know which species of ground beetle, cricket, or spider is appearing in sticky traps because your management action would be the same regardless. However, it is essential to identify to species infestations or recurring activity of ants, cockroaches, small flies, rodents and other pests whose closely-related species might be found in different locations and might require different actions for successful management. If there is any doubt about the proper identification of a pest, specimens should be brought back to the office for further identification.

There are three ways to collect information in an IPM monitoring program at a school:

1. by speaking with school personnel, or reading their comments in the IPM log;
2. by conducting a walk-through visual inspection of all areas of the building, including outside the building; and
3. by using various types of monitoring traps.

COORDINATED COMMUNICATION

Technicians should always check with staff at the school regarding any pest sightings or “complaints” since the last visit. Proper protocol is to first contact the person who is designated as the official IPM contact, liaison, or coordinator, and check any IPM log containing pest sightings in order to identify locations where pests have been seen or are suspected. Then speak with custodians, the maintenance team, cafeteria workers, teachers and others who may have seen or heard

about pest problems. IPM log can be hard copy or electronic, e.g., many school districts incorporating pest reporting into their electronic work order system. Multiple log books may be present, e.g., one in each school, or additional logbooks in food service areas. An electronic system that includes email notification to the IPM technician can be particularly efficient and effective.

INDOOR INSPECTION

During an indoor inspection, technicians should use a bright flashlight. Do not merely look for the pests themselves, but also look for other evidence of pests such as droppings, especially from cockroaches, bed bugs and rodents; frass from wood borers, ants, etc.; evidence of gnawing, tracks, and grease marks from rodents; damage such as from powder post beetle exit holes or termites; and insect sheddings. Also, technicians should carry a magnifying glass (e.g., hand lens). The presence of cockroach egg cases, feeding debris or frass can be an indication of infestation.

Further, technicians should examine areas prone to infestations by pests more commonly found in schools. To this point, window sills should be examined regularly because many pests fly or crawl towards light. Also check inside ceiling light fixtures. Additionally, many pests can be found behind posters, pictures, baseboards, under furniture, behind moldings, in cracks in floors and walls, behind radiators, or in air ducts. Check around door jambs or in corners for cockroaches and spider webs. Spiders often spin their webs across gaps around doors or in corners in order to capture other insects. Lastly, check for new rodent droppings in likely areas such as at the floor/wall junction throughout all food preparation, eating, and storage areas, in the base of stoves, refrigerators, and dishwashers, inside drop ceilings and cooler tops (the storage space above walk-in coolers), basements, attics, storage and/or boiler areas. Keep in mind, rodent droppings are commonly found in areas where there is little human activity and stored items create harborage areas.

Also, look for conditions that might lead to pest problems. Check for moisture problems, both indoors and outdoors, which may lead to moisture-related pests such as carpenter ants, termites, or mold. Look for damaged screens, doors, and walls, which could allow pest entry. Make note of any sanitation or maintenance problems. Be on the lookout for cut old flowers, overwatered potted plants, food items like beans used for classroom activities, and improperly stored food. Plants indoors can be the source of insects such as spider mites, fungus gnats, and aphids.

OUTDOOR INSPECTION

The areas outside of the school should also be inspected. Heavy landscaping near the foundation and plants such as ivy growing on walls increases the risk of outdoor pests moving inside. Also, moisture problems around the foundation such as broken gutters, gutters draining too close to the school, or leaky air conditioning units can favor moisture-related pests. Bright exterior lights may attract insects to the outside of the building, and these insects may be finding their way indoors. Lastly, poor management of trash may attract rodents, flies and ants, which could find their way inside through utility lines or other openings.

Some IPM programs also address pests of lawns and landscape plants. If so, you may need information about target pest and their stage of development, damage evaluation (e.g., percent defoliation, scarring, etc.); overall plant condition; natural enemies of the pest; other pests that might cause a secondary outbreak; grounds maintenance activities; current weather and predicted weather; current and future human activity such as an athletic event. Secondary pest outbreaks can result from pesticide use for a primary pests which disrupts parasites or predators of the secondary pest, giving it a break from effective, natural biological controls and allowing the pest to thrive.

ABC APPROACH

Many school IPM monitoring programs take an "ABC" approach to inspections. There are "A" sites, which are the most vulnerable to pests, "B" sites, which are moderately vulnerable to pests, and "C" sites, which are the least vulnerable to pests.

Vulnerable sites on the "A" list might include the following (depending on the particular school):

1. kitchens.
2. loading docks.
3. food storage rooms/closets.
4. cafeteria dining rooms.
5. concession stands/snack bars.
6. food vending machines.
7. exterior dumpster and trash areas.
8. science classrooms with animals.
9. classrooms with food preparation such as home economics or food science, or kindergarten/elementary schools where snacks and other food are served in the classroom.
10. teachers' lounges and hospitality areas.
11. custodial closets.
12. nursing area/wellness centers.
13. swimming pool/locker rooms.
14. Horticulture and agriculture programs.

REQUIRED COURSE OF ACTION FOR A, B, AND C SITES.

"A" SITES	"B" SITES	"C" SITES
(1) Visual inspection of these sites at each service visit.	(1) Installation and maintenance of pest monitors and checking them periodically.	(1) Inspection periodically.
(2) Installation and maintenance of pest monitors.	(2) Checking pest sightings logs and talking with staff.	(2) Checking the pest sightings logs.
(3) Checking the pest sighting log and talking to staff.		
(4) Inspection of trap stations for mice.		

Moderately vulnerable sites on the "B" list might include the following (depending on the particular school):

1. mechanical/boiler rooms and basements.
2. lavatories.
3. classrooms (especially exterior-wall rooms).
4. shop rooms.
5. non-food storage rooms.
6. attics.

Low vulnerability sites on the "C" list might include the following (depending on the particular school):

1. hall lockers (assuming a no-food policy).
2. assembly halls.
3. gymnasiums.
4. office areas (assuming a no-food policy).

Similarly, school grounds can be designated as high to low profile. For example, areas at the main entrance are high profile and may be high priority for pest management, including weeds which detract from appearance. Lawns and landscapes in less visible areas may have a higher tolerance. Athletic competition fields are also typically high profile and high priority for pest management, vs. practice fields or playgrounds. Some pests, e.g., fire ants, may be high priorities for management in all areas.

2.2 USING MONITORING TOOLS

The extensive use of monitoring tools is one way to separate IPM programs from traditional pest management programs. Monitoring tools have certain advantages over visual inspections such as:

- working 24 hours per day, seven days a week, ALL year round;
- ability to pinpoint focus areas and at times, precise areas of pest activity, even if pests are only active late at night;
- can be used with action thresholds to determine when management action is needed; can capture pests, making accurate identification easier;
- can help assess the size of the infestation, and whether it is increasing or decreasing though time, enabling a technician to gauge program effectiveness by comparing trap results before and after pest management action; and
- provide for collection of numerical data as part of IPM recordkeeping requirements.

TYPES OF MONITORING TOOLS

The types of monitoring tools available include sticky traps/glue boards, which use an adhesive to capture pests; pheromone traps, which use chemical attractants to draw certain species of pests into the trap; Insect Light Traps (ILTs), which use ultraviolet light to lure and capture certain flying insects; rodent detection or monitoring blocks; pitfall traps that lure insects into a container. These types of traps will be discussed in greater detail in section 5.1 CONTROL TOOLS.

STICKY TRAPS

Sticky traps are simply comprised of paper, cardboard, or other materials with one or more surfaces covered with glue. They are a simple and inexpensive way to monitor cockroaches, ants, flies, and other pests. These traps can be flat, triangular, box-like, or hanging tape for flying insects. Some sticky traps are available with lures to attract pests, most particularly cockroaches, stored product pests (e.g., moths and beetles) and flies. Sticky traps are good measuring tool for action thresholds and are positive indicators of an infestation, but are not a guarantee that the area is pest-free. To be sure that the trapping trends are reflecting actual pest populations, use the same brand of trap in the same places over the same time periods. Otherwise, trap catches may be affected more by differences between traps than by changes in pest populations.

PLACEMENT OF STICKY TRAPS

By placing traps in various locations, an IPM technician can locate focus areas (sites of high pest populations) or pest entry points. Prioritize sticky trap locations based on knowledge of the pest and the site and emphasize sites where food is available, or with potential pest entry points. Avoid placing sticky traps out in the open because cockroaches and other crawling pests usually do not travel in the open. Further, it keeps the traps out of the view and reduces interference from students and staff. To ensure good records are being kept, the traps should be numbered and dated, and if possible, the IPM technician initials should also be indicated on the traps. Whenever possible, place traps horizontally against the edges of a wall or other vertical surface, near corners and sites where there has been cockroach spotting. In food storage areas, place sticky traps on or under shelves, and on different levels. Additionally, try to create a matrix in storage areas that will pinpoint a new infestation and help you identify the infested goods. The quantity of sticky traps placed is dependent upon the school size, condition, and pest pressure. Sticky traps should be placed in all the possible pest vulnerable areas for the particular pest. To facilitate re-location and regular checking, sticky trap placements can be marked on a map, indicated with stickers placed in visible locations, such as the wall above the trap, and in electronic systems including those with barcoding.

MONITORING AND REPLACING STICKY TRAPS

It is important for the IPM technician to check traps at every regular service visit, preferably every month, in order to catch pest problems before they escalate. The distribution and direction of pests on a trap can help determine a site of infestation and provide other information about the pest population, though this trick does not work with flying insects that are attracted to light. With cockroaches, for example, a bunch of cockroaches on one side of the trap essentially indicates they are coming from that direction. If all stages of the cockroach are captured, there is likely a large, long-standing population. If only adults or large nymphs are captured, there may be a new infestation that has moved in from a cockroach focus nearby. If mostly small nymphs have been captured, there will be a pocket of infestation within a few feet.

When you capture cockroaches or other pests in a sticky trap, you have confirmed the presence of pests, and can identify the pest. If sticky traps are empty, the area may be pest-free. On the other hand, the traps could be located in the wrong place, or the infestation could be in an unusual place, or the pests have not encountered the trap. For example, there could be an isolated heavy infestation 15 feet away, but there is no sticky trap there, so you missed it entirely.

IPM technicians should replace traps as needed, not just leave them in place permanently. Replace traps that have already captured a pest, and record the capture information. Also, replace any trap that has glue that has become dusty or dirty. Follow the manufacturer's recommendations on a regular replacement schedule. Three months is probably as long as you can stretch a sticky trap's useful life; even though it can appear sticky, the glue may have lost its stickiness or holding power.

KEY SITES TO PLACE STICKY TRAPS

- Cabinets and pantries
- Food storage shelves
- Under sinks
- Under kitchen equipment and in kitchen drawers
- Next to trash cans
- Behind or under vending machines
- In custodial closets under slop sinks and shelves
- In classrooms with animals or food
- Bathrooms
- Nurses Stations
- Employee lounges/break-rooms
- Cafeteria manager offices
- In/under serving lines
- Under prep tables where they are not likely to get wet

PHEROMONE TRAPS

Pheromones are the natural scents that insects produce to communicate with each other. Scientists have isolated some of these scents and synthesized and incorporated them into lures that can be used in traps to attract certain insect pests. Some are sex attractant pheromones that draw only the male insect. Other pheromone traps use aggregation pheromones that attract both males and females of the same species.

Pheromone traps are valuable tools for monitoring certain pests, particularly stored product pests such as cigarette beetles and Indian meal moths, and outdoor pests such as gypsy moths, Japanese beetles, and many pests of field crops and fruit trees. A pheromone will only attract one species of pest or only a few closely related species. For example, beetle pheromones will not attract moths or cockroaches, and vice versa. In schools, pheromone traps are most commonly used for monitoring Indian meal moth, flour beetles, sawtoothed grain beetle, and the German cockroach, mostly in areas and rooms where food is stored.

STYLES OF PHEROMONE TRAPS

There are many different styles of pheromone traps including hanging traps which have a sticky surface and a lure incorporated into the glue, or a small lure containing the pheromone to attract certain flying insect pests; pitfall traps which lure crawling insects into a container trap that may be filled with oil or another substance that is attractive to the pest; and the German cockroach pheromone trap which combines a sticky trap with the pheromone attractant.

PLACEMENT OF PHEROMONE TRAPS

Placement of pheromone traps is dependent on the insect, the style of trap, and the site. In general traps should be placed in areas where there have been pest problems and in hard-to-clean areas where there could be product spillage. Traps should be placed in a grid pattern, 20 to 60 feet apart or as specified by the manufacturer. They also should be placed in areas away from air currents and moisture. Further, consideration should be made for the insects' habits, e.g., traps will catch more moths and beetles that can fly near the ceiling and more beetles that cannot fly at floor level. Hanging traps should only be used for flying insects. Cockroach pheromone traps should be placed as you would sticky traps. Do not place pheromone traps near doors, windows, vents, or loading docks where they could attract insects from outside. If trapped insects might be entering from outdoors, place traps around the outside of the school, but not near doors or windows, in order to check outdoor populations. This will also intercept migrating insects before they enter the school.

MONITORING AND REPLACEMENT OF PHEROMONE TRAPS

Once insects have been captured in a trap, visually inspect to find the source of infestation. If that is not possible, tighten the grid to pinpoint the source of the infestation. For example, place traps every five feet around the trap with the catch. Number each trap and mark on a map of the room where you have placed the traps. Keep a monitoring record of each trap's location in the grid, the date it was placed, and its catch at each inspection. Some IPM technicians record this information directly on the trap.

Traps should be checked on a regular basis. Many factors are considered in determining intervals of a monitoring program. Assess each monitoring program on an ongoing basis and change the trap check frequency if needed. Traps may need to be checked more often if an infestation is suspected. It is recommended that pheromone traps be checked monthly. Replace traps when they are dusty, dirty, or loaded with insects. Remove and discard used traps. Replace pheromone lures according to the manufacturer's directions.

INSECT LIGHT TRAPS (ILT)

An insect light trap (ILT) not only kills flies and other flying insects, it is an effective pest monitoring tool and "early warning system" to indicate a breakdown in sanitation or control procedures before a pest problem gets out of control. Collecting trays and glue boards should be checked at each service visit. As you empty the tray or remove the glue board, also brush out the dead insects from behind the tray/board and from cracks and crevices and examine the insects found. If large numbers of house flies suddenly are found in the trap, you can be fairly sure that there is a nearby breeding source either inside, or if outside, then a window or door is being left open. If the trap contains dermestid beetles in the winter, there is probably an infested site inside the building. At this point you would try to pinpoint the infested location by using pheromone traps. If the trap contains winged ants, there is a nearby nest or someone is probably leaving a door open. If the trap suddenly captures mosquitoes and other flying occasional invaders that are attracted to light, someone is probably leaving a door open at twilight or there may be an access point close by.

Use insect light traps indoors only and place them where they are not visible from the outside, as this may attract insects inside the school. The grid lines on sticky trap boards in ILTs help to quickly estimate pest infestation numbers. Do not place ILTs outdoors. When placed outdoors, they mostly draw non-pest insects close to the building. These may be subsequently captured in the ILTs, or may enter the building.

OTHER MONITORING TOOLS

There are other monitoring tools besides traps. Rodent detection and monitoring blocks look like rodenticide bait blocks but are nontoxic. The blocks are very attractive to both rats and mice. The blocks can be placed in bait stations in and around a building and checked at each service visit. If a monitoring block is gnawed on or eaten, this indicates rodent activity, and further management action can then be taken.

Rodent detection blocks can be useful monitoring tools in and around schools. They allow you to confirm rodent activity before you apply toxic baits. Also, they can be used inside stations just like a rodenticide and in other locations where rodenticides cannot be used. Rodent detection blocks enable you to identify the species feeding by the presence of gnaw marks and droppings) before you place a toxic bait, thereby minimizing non-target wildlife exposure to the rodenticide in a baiting area. They can overcome a rat's hesitancy to enter a bait station, and accustom rodents to feeding at preselected locations, which improves the kill when rodenticide or traps are then used. Additionally, large roaches (e.g., American roaches) may eat rodent detection blocks and bait. You can avoid mistaking a roach infestation for rodents by inspecting for roach droppings when you do not see gnaw marks on the bait.

Ant monitors are another monitoring tool. They include a sugar-based or protein-based nontoxic bait to identify ant feeding and foraging areas. Simple ant monitors are small plastic containers for bait and are used mostly indoors. More sophisticated ant monitors are designed to be used outside. Lastly, if permitted by your state, wood or other cellulose termite monitors can be installed around a building in order to detect termite activity, at which point further action may be taken in order to control termites.

2.3 ACTION THRESHOLDS

One key difference between school IPM and traditional pest management is that school IPM often uses "action thresholds." As previously mentioned in section 1.1, an action threshold is the point at which an IPM pest management professional takes action to reduce a pest's numbers. Anything below the determined action threshold requires no direct control action to be taken, although action may be taken to correct sanitation, clutter, and other problems that can lead to pests. It is only if a pest reaches its predetermined action threshold that an IPM technician takes action to control that pest. As an example, a single cricket found in a hallway might not be justification for control action. A reasonable action threshold might be three crickets in a hallway or other public area.

Sometimes, action thresholds are set in numbers, but sometimes they are not set in absolute numbers and fall more along the lines of, "whenever staff members complain;" "whenever pests are causing a nuisance;" "noticeable infestation;" "whenever people or health are threatened." The action threshold for pests that can transmit disease organisms and pose a food safety risk is often set at one individual pest. Under this action threshold, if a single pest is present (e.g., a German cockroach sighting in the cafeteria kitchen during daytime hours), the technician would take appropriate action. An action threshold of "1" still provides a real contrast to traditional pest management, because pesticides are never automatically applied.

ACTION THRESHOLD EXAMPLE

- 1 german cockroach anywhere indoors
- 2 yellowjackets at a trash can
- 3 ants in a kitchen

Action thresholds are determined by the specific pest, in the specific area where the pest is seen. In other words, action thresholds vary by pest, site, season, an individual's pest tolerance, as well as other factors.

FIVE FACTORS USED TO SET ACTION THRESHOLDS

1. **Health and safety** – Action thresholds are set low when health or safety is at stake. For example, the action threshold for ticks present near, or on, a school athletic field would be set much lower if Lyme disease, or other tick-borne diseases, are common in the area; mosquito action thresholds would be lowered if there was an outbreak of West Nile virus; and the action threshold for poisonous black widow spiders would be much lower than for garden spiders.
2. **Economics** – An action threshold may be set to trigger action if a pest could cause economic damage. For example at some level of carpenter bee activity the risk of damage to trim or structural wood justifies action. The action threshold might, for example, be set at an average of one carpenter bee per five linear feet of wood trim. If 10 carpenter bees were seen along a 40-foot stretch, which exceeds the action threshold, the IPM technician would propose sealing the unfinished wood, and would propose other treatment if necessary.
3. **Aesthetics** – Aesthetic damage occurs when the appearance of something is degraded. For example, aesthetic damage includes things such as spider webs under an exterior canopy. People often disagree on aesthetics; what is acceptable to one person may not be to another.
4. **Public opinion** – Certain pests are seen as more disgusting, threatening, or otherwise worse than other pests, and action thresholds are set to reflect this. Most people are less willing to tolerate a cockroach than a cricket, a tick than a beetle, a mouse than a pigeon. As with aesthetic damage, people often disagree on what level of a particular pest is tolerable. Some people, for example, are terribly frightened of spiders, and want every last one dead. Others view spiders as beneficial and are willing to tolerate them even in an occupied room. Some people are unwilling to accept any level of any pest, while others are willing to be overrun by pests before they feel pest management action is necessary. IPM technicians can sometimes change a person's pest tolerance by providing information on pests, beneficial organisms, and the risks and benefits of pest management.
5. **Legal issues** – Legal concerns sometimes mandate low action threshold levels. Under health codes, there is little tolerance for cockroaches, ants, mice, and other pests anywhere food is stored, prepared, or served in schools, so action thresholds are typically low. Safety and building standards may determine when action is necessary to control termites, rats, flies, and other pests. During public health emergencies, government agencies may legally mandate control of certain pests such as raccoons or skunks during rabies outbreaks or mosquitoes during West Nile virus outbreaks.

DIFFERENT RESPONSES TO DIFFERENT ACTION THRESHOLDS

There can be different action threshold levels that trigger different responses. For example, two German cockroaches in a classroom might trigger an IPM technician to place some sticky traps for increased monitoring, while five German cockroaches would require the placement of cockroach baits, and 20 cockroaches would require that the room be cleaned, desks emptied, harborages vacuumed, and more aggressive baiting performed. Two yellowjackets at a dumpster might trigger the IPM technician to reinforce eating and drinking restrictions outdoors (some districts only allow water outside with the exception of athletic fields where electrolyte drinks may be permitted); 30 yellowjackets might require that the dumpster be cleaned and moved away from the school, when possible.

study questions

Chapter 2

INSPECTIONS AND MONITORING

2.1 VISUAL INSPECTIONS OF SCHOOLS

1) Which of the following is NOT part of regular monitoring in an IPM program?
   a) Identifying pests.
   b) Identifying factors contributing to pests.
   c) Reporting sanitation problems.
   d) Placing bait.

2) Ant baits are not species-specific and will work on all types of ants.
   a) TRUE
   b) FALSE

3) Why is it important to identify some pests to the species level?
   a) To impress your customer.
   b) Because controls may be different for closely related pests.
   c) Identifying to the species level is easier than identifying to the family level.

4) If you are not sure about the correct identification of a pest, you should:
   a) Bring it back to the office and seek an expert opinion.
   b) Identify it to the best of your ability before implementing controls.
   c) Use a management method that works against any type of pest.

5) The three basic components of an IPM monitoring program at a school are: a) information from school personnel, b) visual inspections of all areas, and c):
   a) Pesticide application.
   b) Use of monitoring traps.
   c) Annual reports.

6) A thorough and effective inspection can reduce the amount of pesticide used in a school.
   a) TRUE
   b) FALSE

7) At each school visit, you should first check in with the _____ to find out about pest sightings or complaints.
   a) Head custodian.
   b) Head of maintenance.
   c) IPM coordinator.
   d) Cafeteria manager.

8) At the beginning of every inspection, you must:
   a) Check outdoor sites.
   b) Check hall lockers.
   c) Check the IPM log.

9) The presence of shed insect skins in a school cafeteria is always proof of an active infestation.
   a) TRUE
   b) FALSE

10) You should check inside ceiling light fixtures because some insects are attracted to light.
   a) TRUE
   b) FALSE

11) Which one of the following locations is NOT a likely place to find rodent droppings in a school kitchen?
   a) Inside cabinets.
   b) At the wall/floor junction.
   c) Under appliances.
   d) In the center of the floor in an area with a lot of human activity.

12) Which of the following pests would you be most likely to find in an area where there has been a roof leak?
    a) Yellowjacket.
    b) Carpenter ant.
    c) Blow fly.
    d) Cricket.

13) Aphids and spider mites are most likely to be introduced into a school on:
    a) Backpacks.
    b) Pet rabbits.
    c) Potted plants.

14) Pests on the outside of a school building can be a contributing factor to pest problems inside the school.
    a) TRUE
    b) FALSE

15) How does ivy growing on the outside wall of a school affect pest management?
    a) It attracts and harbors pests.
    b) It blocks sunlight.
    c) It requires trimming.

16) Standing water around the foundation of a school is likely to result in a breeding site for which of the following pests?
    a) Ground beetles.
    b) Mosquitoes.
    c) Carpenter ant.

17) Bright exterior lights near doorways help to keep insects away from the outside of a school building.
    a) TRUE
    b) FALSE

18) The EPA has ruled that school IPM programs are for the management of pests inside school buildings only.
    a) TRUE
    b) FALSE

19) Which of the following is NOT important information if you are managing pests on outside plants?
    a) The amount of defoliation on the plant.
    b) The natural enemies of the plant pest.
    c) The current and predicted weather.
    d) The trash pickup schedule.

20) If no pests have been reported, in which of the following school areas should you spend the most time during your inspection?
    a) Gymnasium.
    b) Hallways.
    c) Cafeteria.

21) In a school IPM program that uses the ABC approach to monitoring, the "A" designates sites that are:
    a) The least vulnerable to pests.
    b) Moderately vulnerable to pests.
    c) The most vulnerable to pests.

22) A site that is on the "C" list should be inspected:
    a) at every service visit.
    b) periodically.
    c) never.

23) You should install monitors in all "B" sites in a school.
    a) TRUE
    b) FALSE

24) Which of the following sites would NOT be expected to be on the "A" list?
   a) Food vending machines.
   b) Nurses' stations.
   c) Principals' offices.
   d) Home economics classrooms.

25) Which of the following sites would likely be on the "B" list in a school?
   a) School kitchens.
   b) Shop rooms.
   c) Snack bars.
   d) Animal rooms.

26) An attic space in a school would be on the "C" list when it comes to a monitoring schedule.
   a) TRUE
   b) FALSE

2.2 USING MONITORING TOOLS

1) One advantage monitoring tools has over a visual inspection is:
   a) They show you pest damage.
   b) They capture pests, making identification easier.
   c) They identify factors contributing to the pest problem.

2) Monitoring tools are a helpful indicator to evaluate if control measures are working.
   a) TRUE
   b) FALSE

3) Which one of the following is the most specific monitoring tool for stored product pests?
   a) Sticky traps.
   b) Pheromone traps.
   c) Insect light traps.

4) An insect pheromone trap:
   a) Uses chemical attractant to lure insects.
   b) Uses ultraviolet light to attract insects.
   c) Uses a food bait to lure insects.

5) Sticky traps are used as monitors for many different pests besides cockroaches.
   a) TRUE
   b) FALSE

6) If your sticky traps do not capture any pests, you can assume the area is pest-free.
   a) TRUE
   b) FALSE

7) When you capture insects on a sticky trap, it means that:
   a) The area is now pest-free.
   b) There are insects present.
   c) You should use pesticides.

8) Which of the following is NOT something you can learn from by capturing insects on sticky traps?
   a) The identification of the insect pest.
   b) Where the infestation is centered.
   c) If there has been insect damage.

9) If only adult cockroaches are captured in sticky traps, it gives you a clue that you are dealing with:
   a) A new infestation that has recently moved into the area.
   b) A population of cockroaches that has been in the area for some time.
   c) An area where cockroaches are comfortable enough to breed.

10) If cockroaches are all captured on just one side of a sticky trap, it indicates that the source is on that same side.
   a) TRUE
   b) FALSE

11) Sticky traps are not very effective in controlling a cockroach infestation.
   a) TRUE
   b) FALSE

12) In which of the following situations, could sticky trap monitors be useful as a control method for a pest infestation?
   a) In a sensitive site where pesticides are not permitted.
   b) Around the outside perimeter of a school.
   c) To control flies in a classroom.

13) Which of the following is NOT a good location for a sticky trap monitor?
   a) In pest travel routes.
   b) In sites where there is available food.
   c) Near pest entry points into the school.
   d) On top of outside light fixtures.

14) One of the reasons not to place sticky traps in the open is that pests prefer to avoid open spaces.
   a) TRUE
   b) FALSE

15) In food storage areas, initially place insect sticky trips on or under shelves, and in corners, approximately _____ feet apart.
   a) 3
   b) 10
   c) 20

16) A good place to put cockroach sticky traps is
   a) Vertically on walls.
   b) Horizontally against the edges of a wall or near corners.
   c) In the center of kitchen cabinet shelves.

17) Monitoring sticky traps should be checked every three months for evidence of pests.
   a) TRUE
   b) FALSE

18) Monitoring sticky traps that have not captured any pests should still be replaced:
   a) At every service visit.
   b) Once a month.
   c) According to the manufacturer's recommendation.

19) The number of sticky trap monitors required to monitor a pest infestation in an elementary school will depend on the size of school, condition of school, and pest pressure on the school.
   a. TRUE
   b. FALSE

20) Inside school buildings, pheromone traps are used most often to monitor for:
   a) Pests of stored food products.
   b) Japanese beetles.
   c) House flies.
   d) Crickets.

21) Pheromone traps that use a sex attractant only lure female insects.
   a) TRUE
   b) FALSE

22) Pheromone traps that use an aggregation pheromone will trap:
   a) Only male insects.
   b) Only female insects.
   c) Both sexes.

23) A pheromone trap for Indian meal moths will also attract other stored food pests such as sawtoothed grain beetles.
   a) TRUE
   b) FALSE

24) The best pheromone trap style to capture the sawtoothed grain beetle is the:
   a) Pitfall trap.
   b) Hanging trap.

25) Which of the following is NOT good practice in the placement of insect pheromone traps?
   a) The placement of traps in front of vents.
   b) The placement of traps in hard-to-clean areas.
   c) The placement of traps near the ground.
   d) The placement of traps in a grid pattern.

26) If insects might be entering the school from outside, you should place pheromone traps:
   a) Inside near doors and windows.
   b) Outside near doors and windows.
   c) Outside around the school building, but far away from doors and windows.

27) Once insects have been caught in a pheromone trap, you should subsequently install other traps to:
   a) Tighten the grid around the trap with the catch.
   b) Loosen the grid around the trap with the catch.
   c) Remove nearby traps, leaving only the one that is active.

28) When you place pheromone monitoring traps in a grid pattern, it's most important to record the_____ of each trap in the map or grid.
   a) Price.
   b) Model and size.
   c) Location.

29) In a food storage room that is suspected to have an Indian meal moth infestation, you should check pheromone monitoring traps:
   a) At least once per week.
   b) Every two weeks.
   c) Once a month.

30) An insect light trap (ILT) performs all of the following functions except:
   a) It kills flying insects.
   b) It attracts only male insects.
   c) It serves as a monitoring tool.
   d) It may indicate a breakdown in procedures, like a door being left open.

31) If you capture dermestid beetles in an insect light trap in the winter, what should you do next to pinpoint the source of the problem?
   a) Install another light trap.
   b) Install pheromone traps.
   c) Do a crack and crevice insecticide treatment around the trap.

32) If an insect light trap inside a school cafeteria contains large numbers of winged ants, there must be a colony nearby.
   a) TRUE
   b) FALSE

33) Insect light traps are useful for management of flying insects around the outside of a school.
   a) TRUE
   b) FALSE

34) Which of the following statements is NOT true about rodent monitoring blocks?
   a) They are attractive to mice.
   b) Rodents gnaw on the blocks.
   c) They are usually placed in bait stations.
   d) They kill rodents after a single feeding.

35) How do rodent monitoring blocks help to identify the species of rodent that is present?
   a) Through gnaw marks and droppings.
   b) By carcasses found in or near the bait station.
   c) Only certain rodents will feed on the blocks.

36) One way to monitor for the presence or activity of termites around the exterior of a school is to use:
   a) Insect light traps.
   b) Wood or cellulose monitors.
   c) Sticky traps.

37) Ant monitors contain food bait and can be used either indoors or outside.
   a) TRUE
   b) FALSE

2.3 ACTION THRESHOLDS

1) What is an "action threshold"?
a) The point at which a school agrees to institute an IPM program.
b) The point at which a technician takes action to reduce a pest's numbers.
c) The point above which no pesticides may be applied.

2) What happens when a pest level is below an action threshold?
   a) No direct control action is taken.
   b) The technician institutes direct control action.
   c) Sticky traps are removed.

3) A reasonable action threshold for crickets in a school hallway would be what number?
   a) 0
   b) 3
   c) 10

4) An action threshold could be established:
   a) As a number (e.g., three yellowjackets at a garbage can).
   b) By description (e.g., whenever staff members complain).
   c) By either a) or b).
   d) By none of the above.

5) Pests are present, but they have not reached the action threshold. What action(s) may be taken/recommended before pest numbers reach the action threshold?
   a) Recommend the school correct sanitation, clutter, and other problems that create an environment that pests thrive in and become established.
   b) Automatic application of pesticides to ensure the pest population is wiped out.
   c) Install monitoring devices and schedule a follow-up service.
   d) Both a) and c)

6) An action threshold of one means:
   a) action is taken whether or not pests are present.
   b) action is taken if one or more pests are seen.
   c) no action is taken.

7) Action thresholds may vary by:
   a) Pest.
   b) Season.
   c) Site.
   d) All of the above.

8) If the action threshold for carpenter bees at the building perimeter is set at one bee per five linear feet, you would begin to take control action only when the number of bees along a 40 foot section of siding reaches:
   a) Five carpenter bees.
   b) Eight carpenter bees.
   c) 20 carpenter bees.

9) The action threshold for ticks by a school athletic field would be set _____ if Lyme disease was common in the area.
   a) Higher.
   b) Lower.
   c) The same.

10) The action threshold for black widow spiders would be _____ than for garden spiders.
   a) Higher.
   b) Lower.
   c) The same.

11) IPM technicians can sometimes change a person's pest tolerance by providing information on pests, beneficial organisms, and the risks and benefits of control.
   a) TRUE
   b) FALSE

12) Which of the following would be an example of an action threshold mandated by legal concerns?
   a) German cockroaches in a cafeteria.
   b) Pavement ants in a schoolyard.
   c) Aphids feeding on ornamental plants at the school entrance.

answers

Chapter 2

INSPECTIONS AND MONITORING

2.1 VISUAL INSPECTIONS OF SCHOOLS

1) Answer d) is correct.
Placing bait stations is not a part of monitoring. This is a control measure that might be implemented based on the findings during monitoring.

Answer a) is incorrect because identifying and locating pests is part of the monitoring process. Answer b) is incorrect because identifying factors that contribute to pests such as holes in walls or loose screens is part of the monitoring process. Answer c) is incorrect because reporting sanitation problems such as poor trash handling is part of the monitoring process.

2) Answer b) is correct.
Different ant species have different food preferences and many baits are designed to target specific species. In addition, sometimes food preferences change with the seasons and conditions. Some ants prefer protein-based baits; some like sugar-based baits, etc..

3) Answer b) is correct.
Some closely related species must be managed differently. For example, the roof rat and the Norway rat are in the same genus but are different species and are controlled in different ways and in different sites.

Answer a) is incorrect because it is your ability to prevent and manage pests that is most likely to impress your customer. Answer c) is incorrect because identifying pests to species requires more effort than simply identifying them to the family level.

4) Answer a) is correct.
If there is any doubt as to the proper identification of a pest, collect several specimens and bring them back to the office where someone on staff or an outside expert can help with the identification.

Answer b) is incorrect because you need to know the pest before you can start control measures. Closely related pests may need to be managed in different ways. Answer c) is incorrect because in an IPM program your controls should be tailored to the specific pest. Very few controls work equally well against all pests. In fact, depending on the identification, the pest may not need to be managed at all.

5) Answer b) is correct.
Various types of monitoring traps are used to pinpoint areas of infestation, gauge the size of the infestation, and identify the pests involved.

Answer a) is incorrect because pesticide application might be part of an IPM program, but it is not part of the monitoring process. Answer c) is incorrect because annual reports are a way to summarize and assess the IPM program, but are not part of ongoing monitoring.

6) Answer a) is correct.
This statement is true because a good inspection will tell you whether pests are present and whether they are in high enough numbers to warrant control with pesticides. The inspection can find specific infested sites where pesticides should be applied, avoiding a general application.

7) Answer c) is correct.
The school appointed IPM coordinator or contact is your liaison. Pest-related complaints from staff or students should go through this person to simplify the communication process.

Answers a), b), and d) are incorrect because these people may also be important contacts, but they should not be your first and primary contact unless one of them has also been designated as the IPM coordinator.

8) Answer c) is correct.
The IPM log, which includes a pest sighting log, will help you identify locations where pests have been seen or suspected since your last site visit. It tells you where to concentrate your efforts.

Answers a) and b) are incorrect because while these are sites that should be checked, referring to the IPM log at the beginning points you directly toward important problem areas.

9) Answer b) is correct.
This statement is false because the presence of shed insect skins may be from an old, inactive infestation. That's why it's important to clean up old evidence so that new skins or droppings will indicate an active infestation.

10) Answer a) is correct.
This statement is true because many insects fly or crawl toward natural or artificial light and will end up inside light fixtures or on window sills.

11) Answer d) is correct.
The center of the floor is not a likely place to find rodent droppings because rodents travel along edges and avoid moving across large spaces like the center of a room. They defecate in areas where they feed, travel, and nest.

Answer a) is incorrect because rodents do nest and feed inside cabinets where it is dark, food is often available, and they are protected. Answer b) is incorrect because rodents travel from place to place along edges such as the wall/floor junction, so this is a likely place for droppings. Answer c) is incorrect because rodents do like to hide and nest under appliances.

12) Answer b) is correct.
Carpenter ants usually infest wood that has been softened and decayed due to extreme moisture.

Answer a) is incorrect because yellowjackets might nest in an attic void, but they are not particularly attracted to wet areas. Answer c) is incorrect because blow flies are attracted to animal carcasses and feces. Answer d) is incorrect because crickets are found around the foundation level of a building.

13) Answer c) is correct.
Potted plants and flowers may be sources of plant feeding pests such as these.

Answer a) is incorrect because students may bring in cockroaches, ants, or some other pests in backpacks, but they would not introduce plant-feeding pests. Answer b) is incorrect because pet rabbits might carry fleas or mites, but they would not introduce plant-feeding pests.

14) Answer a) is correct.
This statement is true because pests on the outside of a school can move into the school if they are not managed or if conditions allowing them inside are not corrected.

15) Answer a) is correct.
Ivy growing on a building wall attracts pests, both those that feed on the ivy and others that use the protection of the ivy for shelter.

Answers b) and c) are incorrect because both can be maintenance problems, but they are not the reason ivy affects pest management.

16) Answer b) is correct.
Mosquitoes lay their eggs and develop in standing water.

Answer a) is incorrect because ground beetles may be found around a school foundation, but they do not develop in water. Answer c) is incorrect because carpenter ants are attracted to moisture-damaged wood, but they do not develop in water.

17) Answer b) is correct.
This statement is false because many types of lights on the outside of a school building will attract certain insects, particularly flying insects, to the building where they then may find their way inside, especially if there is an opening nearby such as a doorway.

18) Answer b) is correct.
This statement is false because many school IPM programs include management of outside pests as well, including pests of lawns and landscape plants.

19) Answer d) is correct.
The trash pickup schedule is not an important factor in controlling plant-feeding pests, although it may be a factor in controlling other outside pests.

Answer a) is incorrect because it is important to know the amount of damage to the plant because it helps determine when controls will be implemented. Answer b) is incorrect because you may decide to use the pest's natural enemies as a control method. Answer c) is incorrect because the predicted weather may influence whether or not you can apply pesticides.

20) Answer c) is correct.
Some school areas, like the cafeteria, are considered to be "pest vulnerable" because of the potential risks of a pest infestation. A cafeteria is more susceptible to pests because of the availability of food and therefore requires a more thorough inspection.

Answer a) is incorrect because the gymnasium is an area that would not be expected to have heavy pest pressure. Answer b) is incorrect because hallways may have occasional pests but are not considered to be high-risk sensitive sites.

21) Answer c) is correct.
Sites on the "A" list are those that are most likely to be infested, such as dumpster areas.

Answer a) is incorrect because these are "C" designated sites and are the least likely to be infested. Answer b) is incorrect because these are "B" designated sites and are at moderate risk of being infested

22) Answer b) is correct.
"C" sites should be inspected periodically.

Answer a) is incorrect because "C" sites do not require inspection at every visit. You should, however, check the pest sighting log at every visit to see if there have been any reports from these sites. Answer c) is incorrect because no site in a school should go uninspected for long periods.

23) Answer a) is correct.
Both "A" sites (most vulnerable to pests) and "B" sites (moderately vulnerable to pests) should have pest monitors in place.

24) Answer c) is correct.
The principal's office is only moderately vulnerable to pests because it is not considered a sensitive site and does not have heavy food pressure.

Answer a) is incorrect because food vending machines are attractive to pests and would be on the "A" list. Answer b) is incorrect because the nurse's station is considered to be a sensitive site and is, therefore, highly vulnerable to pests. Answer d) is incorrect because a home economics classroom could have food debris and would, therefore, be on the "A" list.

25) Answer b) is correct.
A shop room in a school is not considered to be a sensitive site and would have little or no food available for pests, so it would be considered moderately vulnerable to pests.

Answers a), c), and d) are incorrect because these are all "A" list sites because they either provide food service (a and c) or they are sensitive sites (d) because they contain animals.

26) Answer b) is correct.
This statement is not true because an attic is a moderately vulnerable site and may have pest pressure, requiring periodic inspection.

Attics may have stored items creating harborage areas. Periodic inspections will ensure that you find rodent or squirrel droppings (and in Southern areas, large roach activity) before pest populations become an issue.

2.2 USING MONITORING TOOLS

1) Answer b) is correct.
Monitoring tools trap pests, so that in most cases, you are able to get a positive identification. In visual inspections you may not be able to capture the pest.

Answer a) is incorrect because monitoring tools cannot show you the damage done by pests, only a visual inspection can do that. Answer c) is incorrect because only a visual inspection can find problems such as poor sanitation that are contributing to the pest problem.

2) Answer a) is correct.
This is a true statement because the use of certain monitoring traps allows you to gauge the success of the program by comparing trap results from before and after controls were implemented.

3) Answer b) is correct. Pheromone traps are often used to detect and control stored product pests.

Answer a) is incorrect because sticky traps are not designed specifically for stored product pests. Answer c) is incorrect because insect light traps (ILTs) are monitoring tools that use ultraviolet lure to lure flying insects.

4) Answer a) is correct.
A pheromone trap uses chemical attractants that mimic insect pheromones to lure insects. Some pheromone traps then capture the insect on a sticky surface.

Answer b) is incorrect because insect light traps, not pheromone traps, use ultraviolet light to attract insects. Answer c) is incorrect because there are some insect traps that use food as a lure, but these are not true pheromone traps.

5) Answer a) is correct.
This statement is true because sticky traps are used to check for the presence of various other pests such as ants, flies, mites, and stored product pests.

6) Answer b) is correct.
This statement is false because the area may be pest-free, but it is also possible that there are pests nearby which simply did not come across the sticky traps.

7) Answer b) is correct.
When you find insects recently captured on a sticky trap, you know you are dealing with some level of pest infestation.

Answer a) is incorrect because you almost never capture all of the insects in the area on sticky traps. Assume that there are more insects present. Answer c) is incorrect because whether or not pesticides are used depends on many factors, including the estimated size of the pest population and the utility of non-chemical methods. A few insects on a sticky trap may not warrant the use of pesticides or any other action.

8) Answer c) is correct.
A sticky trap catch will not tell you whether insects have damaged food or property. From the size of the catch you may assume that there has been damage, but to actually determine that you will need to conduct a further inspection.

Answer a) is incorrect because a sticky trap does allow you to identify the pests captured. Answer b) is incorrect because comparing the catch on various sticky traps does help you to close in on the area where pest levels are greatest.

9) Answer a) is correct.
If only adult cockroaches are captured, it indicates that it may be a new infestation that has recently moved in and has not had time to reproduce and produce nymphs.

Answer b) is incorrect because a well-developed population that has been breeding in the area for some time will have all stages of cockroaches (adults and nymphs of several sizes). Answer c) is incorrect because nymphs are often caught near where cockroaches are hiding and breeding.

10) Answer a) is correct.
This statement is true because cockroaches all on one side of a trap indicates that the cockroaches are entering the trap from that direction. It is on that side that you are likely to find the source of the infestation.

11) Answer a) is correct.
This statement is true because sticky traps are excellent monitoring tools, but they only capture a portion of the active pest population.

12) Answer a) is correct.
Sticky traps can be an alternative control measure in certain sensitive areas, such as an insect rearing room where the use of pesticides might be prohibited.

Answer b) is incorrect because sticky traps are not very effective outdoors due to dust, dirt, rain, and temperature extremes. Answer c) is incorrect because sticky trap monitors are most effective at capturing crawling pests and would not be very effective at capturing flies in a classroom.

13) Answer d) is correct.
Sticky traps should not be placed on top of light fixtures or in any other hot location because the heat may cause the glue to run and the trap could pose a fire hazard.

Answer a) is incorrect because sticky traps should be placed along pests' travel routes where they are likely to come across them. Answer b) is incorrect because sticky traps should be placed in sites where there could be food debris and spillage that attracts pests. Answer c) is incorrect because sticky traps should be placed near doorways, vents, utility line openings, and other sites where pests could enter a building.

14) Answer a) is correct.
This statement is true because pests travel along edges and in out-of-the-way locations, not across large open areas. Another reason to place traps in hidden areas is to keep them out of the view of students and staff.

15) Answer b) is correct.
Sticky traps should be placed about 10 feet apart in food storage areas. If any trap catches cockroaches, then move the trap placement closer to try to narrow in on the site of the infestation.

Answer a) is incorrect because this placement is closer than necessary in the beginning. If you have found a problem, traps may be moved closer together. Answer c) is incorrect because traps should be closer than this in a food storage area.

16) Answer b) is correct.
Place sticky traps for cockroach monitoring wherever you see cockroach spotting. The spots contain natural aggregation pheromones that draw other cockroaches to the location.

Answer a) is incorrect because cockroach sticky traps should be placed horizontally on surfaces against edges. Answer c) is incorrect because cockroach sticky traps should be placed along edges and in corners, not in the middle of open spaces.

17) Answer b) is correct.
This statement is false because sticky traps should be checked at every service visit. It is important to find a pest infestation as soon as possible so that action can be taken if needed.

18) Answer c) is correct.
Follow the manufacturer's recommendations as to when to replace sticky traps. Generally, they should be replaced after three months of use.

Answers a) and b) are incorrect because it is not necessary to replace sticky traps at every service visit, or even monthly, unless they have captured pests or have become dusty or dirty.

19) Answer a) is correct.
The number depends on factors such as school size, design, age, sanitation conditions and pest pressure at the school.

20) Answer a) is correct.
Pheromone traps are used indoors to check for the presence of certain stored product pests such as Indian meal moths and flour beetles. There are also pheromone traps for the German cockroach.

Answer b) is incorrect because Japanese beetles are found outside on plants, not inside school buildings. Answers c) and d) are incorrect because there are no pheromone traps available to monitor for house flies or crickets.

21) Answer b) is correct.
This statement is false; it is just the opposite. Sex attractant lures mimic pheromones given off by the female insect, and therefore only attract the males.

22) Answer c) is correct.
Both male and female insects will respond to an aggregation pheromone lure that is formulated for their species. An example is the German cockroach pheromone trap.

Answer a) is incorrect because it is the sexual attractant pheromone traps that lure only males. Answer b) is incorrect because females are attracted to aggregation pheromone traps, but males are as well.

23) Answer b) is correct.
This statement is false because pheromones are specific to a particular insect or a few closely-related species. A pheromone trap that will lure moths will not lure beetles unless separate lures are used for each.

24) Answer a) is correct.
Pitfall traps lure crawling insects into a container filled with oil and is used for stored product beetle pests.

Answer b) is incorrect because sawtoothed grain beetles cannot fly. Hanging pheromone traps are used mainly for stored product moths that will fly to the lure.

25) Answer a) is correct.
Pheromone traps should not be placed in areas where there are air currents such as near windows, doors, air blowers, or vents.

Answer b) is incorrect because pheromone traps should be placed in hard-to-clean areas where there could be food spillage. Answer c) is incorrect because pheromone traps for crawling insects should be placed low while traps for flying insect should be placed near the ceiling. Answer d) is incorrect because it is good practice to place pheromone traps in a grid pattern in large areas.

26) Answer c) is correct.
Pheromone traps placed outside can monitor outdoor populations of pests and can intercept migrating insects before they can enter the school.

Answers a) and b) are incorrect because placing pheromone traps near doors and windows, either inside or outside, can draw the pests to these openings where they can then enter the building.

27) Answer a) is correct.
You should tighten the grid around the trap with the capture by installing new traps about every five feet near this trap so that you can pinpoint the infestation.

Answer b) is incorrect because moving traps farther away from the trap with the catch will not help you narrow in on the source of the problem. Answer c) is incorrect because removing all nearby traps would not help you locate the infestation.

28) Answer c) is correct.
Keep a monitoring record of each trap location in the grid on a map of the room. Each trap should be given a unique number which is marked on the map.

Answer a) is incorrect because the price might be of interest to others in your company, but it is not important monitoring information. Answer b) is incorrect because it might be useful to have trap manufacturer's information, but it is not considered monitoring information.

29) Answer a) is correct.
In a susceptible site, you should check pheromone traps at least once a week so that you can detect infestations immediately and stop them quickly.

Answer b) and c) are incorrect because every two weeks is too long between visits.

30) Answer b) is correct.
An insect light trap does not attract only male insects. Both sexes are equally attracted to the ultraviolet light.

Answer a) is incorrect because an ILT does kill flies and other flying insects. Answer c) is incorrect because an ILT does aid in monitoring by capturing pests that are flying in the vicinity, which tells you that there is a problem. Answer d) is incorrect because an ILT does serve as an early warning system that may indicate a breakdown in sanitation or control procedures.

31) Answer b) is correct.
Installing pheromone traps (specific for dermestid beetles) in a grid around the light trap can help pinpoint the source of the dermestid infestation.

Answer a) is incorrect because installing more light traps may capture more dermestids but will not help you find the source of the problem. Answer c) is incorrect because you need to find the source of the dermestid problem first, and then try to eliminate it through non-chemical methods before the use of insecticides is considered.

32) Answer a) is correct.
This statement is true because winged ant reproductives are not strong fliers so it is very unlikely that they would have found their way to the trap from outside, and certainly not in large numbers.

33) Answer b) is correct.
This statement is false because insect light traps used outdoors capture mostly non pest insects such as midges. ILTs should be used only indoors.

34) Answer d) is correct.
Rodent monitoring blocks do not kill rodents. They are nontoxic food-based blocks that are used to indicate rodent activity.

Answer a) is incorrect because it is true that the blocks are attractive to mice and also to rats. Answer b) is incorrect because it is true that rodents gnaw on the blocks and that feeding indicates that rodents are present. Answer c) is incorrect because it is true that rodent monitoring blocks are usually placed in and around a building inside rodent bait stations.

35) Answer a) is correct.
The gnaw marks on the blocks are made by the rodent's incisors. With practice, you can tell which rodent has been doing the feeding. The shape and size of droppings in or near the bait station can also identify the rodent.

Answer b) is incorrect because rodent monitoring blocks are nontoxic and do not kill the rodents that feed on them. Answer c) is incorrect because both rats and mice will feed on the food-based blocks.

36) Answer b) is correct.
Wood or cellulose monitors are inserted in the ground around a building to detect termite feeding activity.

Answer a) is incorrect because insect light traps capture flying insects that are attracted to light. Answer c) is incorrect because sticky traps capture crawling insects that are moving out in the open. Termites travel either underground or inside enclosed mud tubes.

37) Answer a) is correct.
This statement is true because ant monitors contain either nontoxic sugar-based or protein-based foods. Some baits are contained inside plastic bait stations for indoor use. Others can be placed inside bait stations designed for outdoor use.

2.3 ACTION THRESHOLDS

1) Answer b) is correct.
An action threshold is the point at which an IPM technician takes action to reduce a pest numbers. Below that action threshold, no direct control action is taken, although action may be taken to correct sanitation, clutter, and other problems that can lead to pests.

Answer a) is incorrect because the answer has absolutely no relation to action thresholds. Answer c) is incorrect because the action threshold is the point above which action is taken, with pesticide application as one of the options.

2) Answer a) is correct.
Below the action threshold, no direct control action is taken, although action may be taken to correct sanitation, clutter, and other problems that can lead to pests.

Answer b) is incorrect, because the technician should NOT be instituting direct control action below the action threshold. Answer c) is incorrect because monitoring should continue no matter the pest level.

3) Answer b) is correct.
Approximately three crickets in a hallway is a reasonable action threshold because one or two probably does not signal a serious enough problem to spend the effort necessary to eliminate them; and three or more probably indicates some kind of a problem with door sweeps or damage allowing cricket entry.

Answer a) is incorrect because an action threshold set at zero would mean that a technician would have to take action of some sort, such as applying a pesticide, whether or not any crickets were seen. This is not typical practice in IPM in most instances. Answer c) is incorrect because some action would be needed at a level less than 10; for example, in most cases, eight crickets would indicate there is some kind of a problem that should to be addressed.

4) Answer c) is correct.
Sometimes action thresholds are set by the number, such as three ants in a kitchen; sometimes they are not in absolute numbers, such as when there is a "noticeable infestation" or whenever "people are threatened."

5) Answer d) is correct.
Because pests have been seen, you should recommend action to correct any existing sanitation/maintenance issues that may be contributing to the pest problem. If monitoring traps are already in the area, you should carefully consider increasing the number of traps, or at least consider expanding the grid.

Answers a) and c) are incorrect when considered alone because both components are needed when pests are seen but remain below the action threshold. Answer b) is incorrect because pesticides are not even considered as a part of the solution until the action threshold is reached.

6) Answer b) is correct.
At its most basic in IPM programs, the action threshold for a pest is set at one, so that if even a single pest is present, a technician takes action. A simple action threshold of "1" still provides a significant contrast to traditional pest management because pesticides are never automatically applied (which would be an action threshold of zero).

Answer a) is incorrect because if action is taken whether or not pests are present, that would be a threshold level of zero. Answer c) is incorrect because an action threshold of one means that action is taken if one or more pests are seen.

7) Answer d) is correct.
Action thresholds may vary by pest, site, season, an individual's pest tolerance, and other factors.

8) Answer b) is correct.
Eight (8) carpenter bees in 40 feet are equal to the threshold level of one bee per five linear feet.

Answer a) is incorrect because five carpenter bees in 40 feet is equal to a threshold level of one bee per eight linear feet, which is less than the predetermined action threshold of one bee per five linear feet. Answer c) is incorrect because 20 carpenter bees in 40 linear feet is equal to a threshold level of one bee per two linear feet, which is far more (two and a half times more) than the predetermined action threshold of one bee per five linear feet.

9) Answer b) is correct.
Action thresholds are set low when health or safety is at stake. The action threshold for ticks by a school athletic field would be set much lower if Lyme disease was common in the area.
Answer a) is incorrect because a higher threshold would mean you would wait until more ticks were present before taking action in Lyme disease areas, which would be counter-productive. Answer c) is incorrect because action thresholds are set low when health or safety are at stake, so it would not make sense to keep the action threshold the same in Lyme disease areas.

10) Answer b) is correct.
Action thresholds are set low when health or safety is at stake. The action threshold for medically important black widow spiders would be much lower than for garden spiders because you want to take action at a lower number in order to minimize the risk of a poisonous spider bite.

Answer a) is incorrect because a higher threshold would mean you would wait until more black widow spiders were seen than if they were garden spiders, which would be the wrong action to take. Answer c) is incorrect because action thresholds are set low when health or safety is at stake, so it would not make sense to keep the action threshold the same for all spiders when some are hazardous to humans and others are not. spiders as for nonpoisonous ones.

11) Answer a) is correct.
IPM technicians can sometimes change a person's pest tolerance by providing information on pests, beneficial organisms, and the risks and benefits of control. This can work both ways, for example by explaining that no one should have to live with so many cockroaches, or by explaining that most spiders are beneficial and a few garden spiders in a bush do not need to be sprayed with a pesticide.

12) Answer a) is correct.
There is little tolerance under health codes for cockroaches, ants, mice, and other pests anywhere food is stored, prepared, or served in schools. So, action thresholds typically have to be set low.

Answer b) is incorrect because pavement ant levels in a school yard would not typically be mandated by law, although fear of a lawsuit might influence the setting of action thresholds low in the case of fire ants. Answer c) is incorrect because weevils on ornamental plants are an aesthetic issue not a legal issue.

13) Answer a) is correct.
This statement is true because there can be different action threshold levels that trigger different responses. For example, two cockroaches in a classroom might trigger an IPM technician to place some sticky traps, while five cockroaches would require the placement of cockroach baits, and 20 cockroaches might require that the room be cleaned, desks emptied, harborages vacuumed, and more aggressive baiting performed.

study guide

Chapter 3

COMMUNICATIONS

3.1 RECORDKEEPING REQUIREMENTS

To be successful, IPM requires good written records. Good records help IPM technicians solve pest problems, create a paper trail to track problems and to document needed improvements in housekeeping and building repair. They are also used to meet legal requirements, and give a historical perspective of pests, and let technicians anticipate or forecast seasonal pest problems. Legal requirements vary greatly by state; IPM technicians must receive training on specifics for the locations they service.

The information that must be recorded in written form includes pest sightings, pesticide applications, other control/management actions, housekeeping problems, structural deficiencies, and other problems contributing to pests. Pest sighting records should include identification of the pest, number of pests sighted, and source of infestation if known. All control/management measures, even non-pesticide tactics, should be recorded. Also, records should not only list problems to be corrected but should also include written recommendations for solutions; solutions that are obvious to a trained technician may be beyond the experience of school staff. Results of the control/management measures should be summarized, noting if the infestation has been abated or if more actions are required.

3.2 PEST SIGHTING LOG

The IPM log, sometimes referred to as the pest sighting log, or the pest-activity log, is the centerpiece of IPM communications. When school staff see a pest, it is reported in the log. When the IPM technician uncovers a pest problem, it is reported in the log. The IPM technician always initials that he or she has responded to the sighting and records the action, or inaction, taken to deal with the sighting. By checking the log at a later time, a staff member can be sure the problem reported has been addressed.

The pest sighting log must be used regularly to be effective. Once a log becomes inactive it serves no purpose and neither school staff members nor the IPM technician looks at it anymore and pest problems tend to get out of control. Staff should be repeatedly encouraged early in the IPM program to use the log to report all pest sightings and should be discouraged from reporting pest problems in other ways. Whenever a technician gets a verbal report of a pest sighting the technician should ask, “Did you record your sighting in the log?” or say, “I did not see that noted in the log.”

The pest sighting log should be located where it is always accessible and convenient for staff to use and should not be kept in offices that are locked regularly or that are out of the way. The typical location is in the front office where most of the staff visit daily. It should also be available for the night custodial staff because they have the opportunity to see pests that are active at night but not during the day. Schools with multiple buildings should have a pest sighting log for each building.

Pest-sighting logs often contain other information about the IPM program in tabbed sections and should include a general information section about the IPM program such as its tactics and goals, IPM concepts, directions for how to use the log, contacts and technical personnel, and a service schedule. This allows interested staff to learn what is to be expected from the program. Also included should be a floor plan showing sensitive areas, trap locations, bait stations, monitoring and control equipment, and pest hotspots or areas that experience regular sanitation problems. All rooms should be labeled (classroom, science lab, bathroom, cafeteria, etc.), room numbers should be noted and hours of use should be noted, if known

Some IPM programs record catches in monitoring traps. This section would contain data sheets listing the trap number and location, date, pest identification, number of pests trapped, etc. Some logbooks may include a reports section inclusive of IPM

service reports, inspection checklists, corrective action notices, and quarterly and annual reports. . In schools, this other information must identify sensitive areas where pesticides and certain other control methods must be used carefully, or not at all. The log may also include a list of pre-approved materials that may be used at the school and pesticide labels and safety data sheets (SDSs) for any pesticide used, unless they are kept in a separate book or location. There may also be a section for miscellaneous information such as educational information on pests and pest management, correspondence, special reports, or other information about the IPM program.

Lastly, the IPM log, or portions of the IPM log, may be electronic. For example, pest sightings may be reported to a computerized work-order system that the technician can access via computer work station, printouts, email or other method. Electronic systems can improve efficiency and effectiveness, increasing the speed with which information is shared, and making that information accessible to both schools and the IPM technician wherever they are located.

3.3 REPORTS

Written reports may document pest activity, control actions, housekeeping problems and corrective actions, building problems and pest-proofing, activities that may be contributing to pests, monitoring data, and other information important to IPM. The "IPM Service Report," or similar report, is a record of what was checked, found, and the action taken by the IPM technician on that service date. If any pesticides were applied, this form would include a description of the product, the treatment, the site, the application rate, and the amount applied. A copy is given to the school and a copy is saved for company records. PMPs should check with their state lead agency on all applicable laws related to posting, notification and recordkeeping for pesticide applications at schools.

Some schools require a separate "Pesticide Application Report" for any pesticide that is applied; this would include a description of the product, the treatment, the site, the application rate, and the amount applied. A copy is given to the school and a copy is saved for company records. Some schools and school systems require an "Intent to Apply Pesticides" form to be filed before applying a pesticide, or before applying a pesticide not on a pre-approved list. The form is typically sent to the IPM coordinator or other designated point of contact in order to provide advanced notice of pesticide application. The form is often used to trigger parental notification requirements. An "Inspection Report" is often filled out when inspecting critical areas such as the school cafeteria. The "Inspection Report" is often in the form of a checklist to ensure all important areas are inspected. The checklists also include notations for problems with sanitation, maintenance, and operations.

Further, some schools require a "Quarterly IPM Report," which is sometimes called a "Status Report," or a "Quality Assurance Report." This report is a summary of IPM activities, successes, problems, and recommendations over the past three months. It may be prepared by the IPM technician but more often by a supervisor with input from the technician. Another possible requirement by some schools is an "Annual IPM Report." The "Annual IPM Report" summarizes all IPM service over the past year and typically includes an assessment of current conditions, program successes, problems solved and problems still existing. The "Annual IPM Report" is used to plan changes for the following year. Lastly, some schools require a "Pesticide Use Summary." Summaries may be required to include the total amount of diluted, as well as total amount of active, ingredient applied for each pesticide used. Summaries may be required to comply with school IPM policies, regulatory agencies, or in response to public request for records.

All IPM programs need some form of "Corrective Action Notice," which can also be called a "Sanitation Report," or similar. A "Corrective Action Notice" is filled out on the spot by the technician and given to the custodial foreman or a cafeteria manager (as applicable). When the problem has been corrected, the foreman or manager shall note the action taken and the date in the IPM log. A copy of the notice should be

saved in a "tickle file" so the technician is reminded to recheck in 30 or 60 days to see that the problem has been corrected. If the problem is not corrected a follow-up notice is sent with copies to the IPM coordinator or principal or other responsible party. Now available handheld data systems automatically track corrective actions and can act as the "tickle file" by sending reminders electronically. Data can then be accessed and reviewed by school staff online.

The state lead agency for pesticide enforcement is the best source for information on legal requirements in the state. This agency may be the state agriculture department, or a separate environmental agency. State laws and regulations can change; it is important to stay in touch with the appropriate agency to learn about and receive training on compliance with the current regulations.

3.4 EDUCATION

Many school administrators, teachers, custodial staff, and cafeteria workers understand the importance of being pest-free, but may believe their pest management responsibilities end once the school contracts with a pest management service. Education for school staff is needed in order to change that view. Poor communication, which leads to poor cooperation, is one of the reasons IPM can fail in a school setting. IPM works best when the school staff, and sometimes even the students, understands what IPM entails and what their roles and responsibilities are in ensuring its success. Technicians cannot force school staff to cooperate but can identify problems in their reports, and to some degree, can assist with educating staff members. IPM programs need school staff and students to be educated about their role in pest management. They must understand the role that food and shelter play in perpetuating pest management problems, as well as their personal role in reporting and minimizing pests. Good cooperation is critical if IPM programs are to succeed. Because school IPM does not depend only upon scheduled pesticide application, people in a school must ensure good sanitation and maintenance of buildings, and make operational changes to create a less attractive environment for pests.

TECHNICIAN'S ROLE IN EDUCATION

An important role for a technician doing IPM in a school is to help educate staff about what they need to do to prevent a pest outbreak. Many people do not understand the connection between the issues that accompany bad sanitation, clutter, cracks, holes in walls, and other maintenance issues and the pests that take advantage of these situations to establish in the school. Anything you can do one-on-one with school staff can assist with IPM success. IPM technicians should talk with the staff at the school during their service visits, usually the principal, custodial foreman, and cafeteria manager. Even if the school administration agrees to cooperate on sanitation and pest-proofing problems, do not assume this information will filter down to the various departments or to staff. Technicians should consider holding a short, on-site meeting with affected employees to explain the pest management program and solicit their support. In these meetings, the technician should describe the responsibilities of each department in the pest management effort, ask for staff cooperation in reporting evidence of pests, teach staff how to recognize key pests, and show them samples of pheromone traps, sticky traps, glue boards, bait stations, and other materials that will be used and ask for their help in seeing that these devices are not disturbed.

EDUCATION FOR ALL SCHOOL STAFF

Custodians and housekeepers have the primary responsibility for sanitation and trash management in schools and they need to be taught the importance of these roles in pest management. Poor sanitation makes life easy for cockroaches, flies, ants, mice, rats, and other pests that need nothing more than a little spilled food, a drippy faucet, and a place to hide. Custodians need to be educated about the connection between pest problems and food, standing water, and clutter. Custodians need to know that they must respond to requests from IPM technicians for housekeeping or trash management action. Custodians also have a responsibility to report any pest problems they notice by writing in the log.

Kitchens are a focus of many pests such as cockroaches, rodents, flies, and stored product insects. Food service workers need to be educated about the connection between inadequate sanitation and pests. Food service workers need to be educated about the importance of their cooperation with the IPM program and should be strongly encouraged to respond to sanitation improvement requests from IPM technicians. Food service workers have a responsibility to report any pest problems they notice by writing in the log.

Building maintenance and grounds personnel should understand pest proofing and other steps they can take to keep pests from entering buildings. School nurses need information on pest hazards and the types and methods of pesticides used. Teachers and students need to understand their roles in preventing pest problems from developing. Bulletins can be

developed and distributed to inform all stakeholders of the important issues related to IPM policies, and their respective roles in reporting pests, improving sanitation, pest prevention, and avoiding pesticide risks. Specific instructions should be provided about student participation in IPM and could include, good housekeeping, keeping windows or screens closed, identifying pest problems, and not disturbing insect monitors. IPM is a scientific and ecologically-based approach to pest management. It is an ideal topic for classes about the environment or ecology, and there are many IPM textbooks and teaching aids available. Therefore, school teachers should consider incorporating IPM into their science, environmental studies, and public health curricula.

3.5 NOTIFICATION AND POSTING

Schools have different policies about notification when a pesticide is to be applied. Schools may require that notices of future pesticide treatment be posted in advance at the school entrance, lobby, and areas to be treated. The process of posting notices of treatment is called "posting." The technician may be required to provide advanced, written notice to the school (usually to the IPM coordinator) before using a pesticide, or before using certain pesticides, or before using pesticides in certain areas. Insect baits, pastes, gels, antimicrobials, or other materials used in ways presenting minimal risk of human exposure are often exempt from notification and posting requirements, but this will be determined by specific school policy. Some schools also send notices home to those parents who wish to be informed before pesticide application; notification to parents and staff is primarily the responsibility of the school. Some schools may have a registry of students and staff who claims to be sensitive to pesticides. Those who are registered as having pesticide sensitivity must be notified before pesticides are applied. Also, notification requirements may be dictated by legislation at the local, state, or federal government level; therefore, it is very important to be familiar with all local laws and requirements as well as all school specific policies.

Signs are also posted on the day the pesticide is to be applied. They typically instruct staff and students not to enter the treated area, and instruct staff not to remove the signs for a period of (1) at least 24 hours, (2) the label-specified reentry period, or (3) the reentry period based upon the requirements of the specific IPM policy or law. When posting notice, use door hangers, warning notices, and instructional sheets to alert staff and students that an area was treated, to identify the pesticide applied, to indicate when they may reenter the room, and to provide other instruction and warnings. The more specific the warnings are, the better. Also, use the pesticide label as your guide, but be sure you are in compliance with the IPM policy for the school and any legislation that may apply. Outdoor notices or markers must be placed around the perimeter of the treatment area. Indoor notices shall be placed on main school doors and near sites of planned applications. Classroom announcements may be made alerting students and staff of indoor and landscape applications, with warnings to avoid posted or flagged areas until signs are removed.

Be prepared to provide additional information on pesticides. Maintain a set of product labels and safety data sheets (SDSs) for all pesticides used. File at least one set in the log, along with telephone numbers of poison control centers (1-800-222-1222) and emergency personnel. This information should be available to any individual upon request.

3.6 EVALUATING SUCCESS OR FAILURE

IPM programs must be reviewed on a regular basis to evaluate the effectiveness and safety of the procedures being used and to provide any needed fine-tuning. By definition, an IPM program is already evaluated on an ongoing basis. The IPM technician must evaluate conditions at every service visit and make management decisions based upon those data. The technician should be evaluating the effectiveness of decisions on an ongoing basis. If persistent pest problems arise, a supervisor must be informed.

IPM programs must also have a more formalized, periodic review process that goes beyond the technician level. The evaluation may occur quarterly, twice a year, or only once per year, but must be on a regular schedule. A summary report is prepared, usually by a supervisor or sometimes by a third party, such as a consultant. Part of the process may be a meeting of those concerned such as an IPM contractor, an IPM coordinator, and various other school representatives. Prior to this meeting, comments should be solicited from interested parties as to the effectiveness of the program at that school and any problems noted. The evaluation should include input from concerned parties, review of inspection reports, sanitation reports, the log, and other records in order to see how the program is working and to identify any changes that are necessary.

QUESTIONS TO BE ANSWERED IN THE IPM EVALUATION

Were the planned procedures implemented? If not, what was different?

Are all pest populations now below action thresholds? If not, why not?

Were pest populations reduced in a timely manner?

Have pest sightings decreased or increased?

Is the monitoring program adequate? Should monitoring be increased?

Can the amount of time and effort spent be reduced without sacrificing effectiveness?

Were there any negative effects from control/management measures used?

Were there any safety concerns with control/management measures used? If so, how were they addressed?

If control/management measures used were ineffective, should they be repeated?

Should other management measures be tried that have not been used?

What problems have been identified? Are they being adequately addressed?

Was there adequate cooperation from the various school departments? If not, how can this be improved?

Were there any communication problems between those responsible for implementing different aspects of the program?

Have all objectives been achieved?

What changes are necessary in the program? Who should be responsible for those changes?

A summary report of the evaluation is prepared in writing and is typically called a "Quarterly IPM Report," or "Status Report," or "Quality Assurance Report." The report notes the current conditions, discusses the progress made against particular pests or conditions, identifies problems, compares the current situation with the original goals of the program, and sometimes offers recommendations for change. It is submitted to the school and is generally available for review by anyone. It is often filed in the log.

study questions

Chapter 3

COMMUNICATIONS

3.1 RECORDKEEPING REQUIREMENTS

1) What do good IPM records have to do with housekeeping and building repair?
   a) Very little.
   b) Records track sanitation and structural problems contributing to pests.
   c) Records provide documentation of needed improvements.
   d) Both b & c.

2) Good IPM records of pest activity at a school over a number of years will permit the technician to do what?
   a) Anticipate seasonal pest problems.
   b) Apply pesticides.
   c) Avoid pesticides based solely on records from last year.

3) Information recorded in IPM log includes which of the following?
   a) Pesticide applications
   b) The level and location of pest infestations
   c) Structural deficiencies
   d) All of the above.

4) Although helpful, it is not necessary to record information other than pesticide application data in the IPM records.
   a) TRUE
   b) FALSE

5) It is important to list specific recommendations for recorded problems as school staff may not be able to formulate effective solutions on their own.
   a) TRUE
   b) FALSE

3.2 PEST SIGHTING LOG

1) Who records information on pest sightings in the pest sighting log?
   a) School staff.
   b) IPM technician.
   c) IPM coordinator.
   d) All of the above.

2) How can a staff member be sure that a pest problem they reported has been addressed?
   a) By checking the log.
   b) If the pest has not been seen for 2 weeks.
   c) By calling the technician.

3) A pest sighting log becomes ineffective?
   a) In the winter.
   b) When custodians keep reporting nighttime pest problems.
   c) When it is not used regularly.
   d) All of the above.

4) The best way for school staff to report pest problems is by speaking directly with the IPM technician.
   a) TRUE
   b) FALSE

5) When a school staff member tells the IPM technician that she has seen a pest, how should the IPM technician respond?
   a) “Did you record your pest-sighting in the log?”
   b) “Have you done anything to control/manage the pest?”
   c) “Please report the problem to the IPM coordinator.”

6) Which of the sites listed below is the best location for a pest sighting log in a school?
   a) In an office that can be locked after school hours.
   b) In the maintenance department.
   c) In the front office.
   d) In the head custodian's office.

7) Why is it important for the log to be available for night staff?
   a) Because some pests are active at night.
   b) Because it avoids negative feelings from the custodial staff.
   c) The log should only be available during school hours.

8) Schools with multiple buildings should have a pest sighting log for each building.
   a) TRUE
   b) FALSE

9) Why do many pest sighting logs include information on IPM and the tactics and goals of the school's IPM program?
   a) To provide interested staff with information about the IPM program.
   b) To guide the IPM technician.
   c) To meet legal requirements for applying pesticides in a school.

10) Which type of information is generally NOT in an IPM log?
   a) Sales brochures about your company.
   b) A floor plan of the school.
   c) Contacts and technical personnel.

11) Logbooks may include a reports section with IPM service reports, inspection checklists, corrective action notices, quarterly and annual reports.
   a) TRUE
   b) FALSE

3.3 REPORTS

1) What is included in an IPM service report?
   a) What action was taken by the technician on that service date.
   b) What pesticides were applied.
   c) What was inspected.
   d) All of the above.

2) What is the purpose of an "Intent to Apply Pesticides" form?
   a) To trigger any parental notification requirements.
   b) To notify a technician's supervisor of application.
   c) To describe the pesticide product that was applied.
   d) All of the above.

3) To ensure all important areas are inspected, an "IPM Inspection Report" is often:
   a) In the form of a checklist.
   b) Filled out by a supervisor.
   c) Reviewed by school personnel.
   d) All of the above.

4) A "Corrective Action Notice," sometimes called a "Sanitation Report," is typically:
   a) Filled out on the spot by the technician.
   b) Given to the custodial foreman or cafeteria manager.
   c) Saved in a "tickle file" to see if the problem is corrected.
   d) All of the above.

5) If a custodian fixes a problem, he or she should first:
   a) Note the action taken and the date in the log.
   b) Send a follow-up notice to the technician.
   c) Report to the principal.
   d) All of the above.

6) Although in some instances, a "Quarterly IPM Report," also called "Status Report" or "Quality Assurance Report," is prepared by the IPM technician more often it is prepared by:
   a) The school principal.
   b) The school IPM coordinator.
   c) The company supervisor.

7) Which of the following is NOT a purpose of the "Annual IPM Report?"
   a) To summarize all IPM service for the past year.
   b) To report problems solved and problems that still exist.
   c) To plan changes for the following year.
   d) To provide advanced notice of pesticide application.

8) "Pesticide Usage Summaries" may be required in order to:
   a) Comply with School IPM Policy.
   b) Comply with regulatory agency requirements.
   c) Respond to public requests for information.
   d) All of the above.

3.4 EDUCATION

1) How do you convince school staff members of the importance of the team approach to IPM?
   a) You cannot convince them otherwise.
   b) Through education about IPM.
   c) By refusing to provide service until they cooperate.
   d) None of the above.

2) IPM programs require that school staff and students be educated about pests, the role of food and shelter in pest management, and:
   a) bait application.
   b) their role in reporting and minimizing pests.
   c) how to place and interpret monitors.
   d) all of the above.

3) Which staff members need to be educated about the IPM program and how it works?
   a) Custodians
   b) Food service workers
   c) Maintenance and grounds
   d) All of the above.

4) Staff should be educated through which means?
   a) One-on-one contact.
   b) Bulletins and reports.
   c) Group meetings.
   d) All of the above.

5) IPM is a scientific and ecologically-based approach to pest management, so:
   a) teachers should consider incorporating IPM into their classes.
   b) you should simplify any discussions of IPM .
   c) IPM is best left to pest management professionals.

3.5 NOTIFICATION AND POSTING

1) Who has the primary responsibility of notifying parents that a pesticide is going to be applied?
   a) The school.
   b) The pest management company.
   c) The technician.
   d) None of the above.

2) What is the technician's primary responsibility in the notification process?
   a) The technician has no responsibility for notification.
   b) The technician must contact parents with children on the pesticide sensitivity register.
   c) The technician may be required to provide advanced, written notice to the school.

3) Insect baits, pastes, gels, antimicrobials, or other materials used in ways that present minimal risk of human exposure are often exempt from notification and posting requirements.
   a) TRUE
   b) FALSE

4) The process of putting up notices that pesticides are going to be applied or have been applied is called:
   a) notification.
   b) posting.
   c) reporting.

5) When schools require that notices of future pesticide treatment be posted in advance, where should the signs typically be posted?
   a) School entrances, lobby, and areas to be treated.
   b) The principal's office, cafeteria kitchen, and areas to be treated.
   c) Custodial office, food service office, and areas to be treated.

6) Notices for outdoor treatments should be posted where?
   a) The principal's office and lobby.
   b) School entrances and perimeter of treatment area.
   c) The grounds office and principal's office.

3.6 EVALUATING SUCCESS OR FAILURE

7) Who normally conducts the periodic reviews of the IPM program to evaluate success?
   a) A technician.
   b) A company supervisor.
   c) School staff.

8) The formal review and evaluation of the IPM program may require a meeting of the IPM contractor, IPM coordinator, and other school representatives.
   a) TRUE
   b) FALSE

9) What are the most important goals of a school IPM program evaluation?
   a) To assign blame for shortcomings and ensure cooperation.
   b) To see how the program is working and identify needed changes.
   c) To report how much pesticide was used.

10) During a school IPM program evaluation the reviewer seeks to answer questions about the program such as, "Were pest populations reduced in a timely manner?" How many questions do you think would be typical for such an evaluation?
   a) 3-5
   b) 6-10
   c) More than 10

11) Who usually gets to read the completed school IPM evaluation report?
   a) All involved parties and anyone else interested.
   b) Senior school staff only.
   c) Company supervisors, the principal, and any designated senior staff.

12) A completed school IPM evaluation report notes the current conditions, discusses the progress made against particular pests or conditions, identifies problems, compares the current situation with the original goals of the program, and sometimes offers recommendations for change.
   a) TRUE
   b) FALSE

answers

Chapter 3

COMMUNICATIONS

3.1 RECORDKEEPING REQUIREMENTS

1) Answer d) is correct.
Good IPM records create a "paper trail" to track sanitation and structural problems contributing to pests, and also to document needed improvements in housekeeping and building repair that will reduce pest problems.

Answer a) is incorrect because good IPM records often address housekeeping and building repair. Answer b) is incorrect because it is only half of the answer. Answer c) is incorrect because it is only half of the answer.

2) Answer a) is correct.
Reviewing IPM records over the past few years will give technicians an historical record of which pest problems appear at the same time from year-to-year, and thus, will assist with the prediction of when a certain pest might appear this year.

Answer b) is incorrect because the decision to apply a pesticide is made based on current conditions at the school, not on the historical record. Answer c) is incorrect because the decision not to apply a pesticide is made based on current conditions at the school, not on the historical record.

3) Answer d) is correct.
IPM records document all aspects of the IPM program including pest sightings, pesticide applications, other control/management actions or considerations, housekeeping problems, structural deficiencies, and other problems contributing to pests..

Answer a) is incorrect because pesticide applications are only part of the information recorded in IPM records. Answer b) is incorrect because pest infestation details are only part of the information recorded in IPM records. Answer c) is incorrect because structural deficiencies are only part of the information recorded in IPM records.

4) Answer b) is correct.
This statement is false. Because IPM solutions integrate non-pesticide methods to solve pest issues, it is absolutely necessary to record non-pesticide tactics in IPM records.

5) Answer a) is correct.
This statement is true. In order for a school to make proper corrections to problems, it is important that technicians provide guidance on how corrections can and should be made to be effective and insure success of the IPM program.

3.2 PEST SIGHTING LOG

1) Answer d) is correct.
Anyone in the school who sees a pest should report the sighting in the log, as should the IPM technician. The more people who are using the log, the more useful it will be.

Answer a) is incorrect because school staff should report pest-sightings in the log, but so should anyone else at the school. Answer b) is incorrect because the IPM technician should report pest-sightings in the log, but so should anyone else at the school. Answer c) is incorrect because the IPM coordinator should report pest- sightings in the log, but so should anyone else at the school.

2) Answer a) is correct.
The IPM technician always initials that he or she has responded to the sighting and records the action taken to deal with the sighting, or that no action was taken. By checking the log later, a staff member can be sure that the problem reported has been addressed.

Answer b) is incorrect because a pest may not be seen by people untrained in pest management even though the pest is still infesting the area. Answer c) is incorrect because it is best to encourage school staff to see the log as the primary source of information about pest conditions and actions at the school.

3) Answer c) is correct.
Once a pest sighting log becomes inactive it serves no purpose and neither school staff members nor the IPM technician looks at it anymore, and then pest problems tend to get out of control.

Answer a) is incorrect because a pest sighting log is just as functional in the winter as any other time of year, even though there may be fewer pests to report. Answer b) is incorrect because the pest sighting log becomes more effective if night workers report pest activity. Answer d) is incorrect because answers a) and b) are incorrect.

4) Answer b) is correct.
This statement is false because to keep the pest sighting log effective, staff should be repeatedly encouraged to use the log to report all pest-sightings, and discouraged from reporting pest problems in other ways.

5) Answer a) is correct.
Because the pest sighting log must be used regularly in order to be effective, whenever a technician gets a verbal report of a pest sighting the technician should ask something such as, "did you record your sighting in the log?" or say, "I did not see that noted in the log."

Answer b) is incorrect because whether or not staff has taken action to control a pest, the technician still has the responsibility to do so. Answer c) is incorrect because pest sightings should be recorded in the log, not reported to the IPM coordinator.

6) Answer c) is correct.
The pest sighting log should be located where it is always accessible and convenient for staff to use. The front office is a good location because most school staff visits it daily.

Answer a) is incorrect because a log cannot be used after hours if it is located behind a locked door. Answer b) is incorrect because most of the school staff does not regularly visit the maintenance department office. Answer d) is incorrect because most of the school staff does not regularly visit the head custodian's office.

7) Answer a) is correct.
Many pests are most active at night and are more likely to be seen then by the night staff.

Answer b) is incorrect because the pest sighting log's availability has nothing to do with the custodial staff's "feelings." Answer c) is incorrect because the log should be available to all staff at all times.

8) Answer a) is correct.
This statement is true because a pest sighting log should be located in each building of a multiple building school or else it will primarily be used by staff in the building where it is located; not many people will walk to another building simply to report a pest.

9) Answer a) is correct.
The pest sighting log often includes general information about the IPM program (e.g., its tactics and goals), IPM concepts, directions on how to use the log, contacts and technical personnel, and a service schedule so that interested staff can learn what is to be expected from the program.

Answer b) is incorrect because the IPM-related information may, at times, be reviewed by the technician to check on a policy or procedure particular to the school, but this information is primarily for school staff. Answer c) is incorrect because legal requirements related to pesticide applications are met through service reports, notification, posting, etc., and not though the general IPM information in the log.

10) Answer a) is correct.
The IPM log is not a proper place for sales information. The information contained in the log should be limited to pest sightings and other materials related to IPM, in general, and the school IPM program in particular.

Answer b) is incorrect because the floor plan of the school is good information for an IPM log, particularly if it shows sensitive areas, the location of traps, bait stations, and other monitoring and control/management equipment, and pest hotspots or areas that experience regular sanitation problems. Answer c) is incorrect because a list of contacts and technical personnel is a useful addition to an IPM log.

11) Answer a) is correct.
This statement is true because the various reports associated with an IPM program provide good information for school staff about the program, particularly as it relates to sanitation, structural deficiencies, and other conditions that increase pest problems.

3.3 REPORTS

1) Answer d) is correct.
The "IPM Service Report," or similar report, is a record of what was checked, found, and what action was taken by the IPM technician on that service date. If any pesticides were applied this form would include a description of the product, the treatment, the site, the application rate, and the amount applied (although some school IPM programs require a separate "Pesticide Application Report.").

Answer a) is incorrect because it is only part of the answer. Answer b) is incorrect because it is only part of the answer. Answer c) is incorrect because it is only part of the answer.

2) Answer a) is correct.
In schools that have parental notification requirements when pesticides are to be used, an "Intent to Apply Pesticides," or similar form, is typically sent to the pesticide coordinator in order to provide advanced notice of pesticide application and trigger parental notification.

Answer b) is incorrect because the "Intent to Apply Pesticides" form is designed to notify the school, staff, parents and guardians (in some school IPM programs) about the pending pesticide application, not the technician's supervisor. Answer c) is incorrect because the "Intent to Apply Pesticides" form reports on the pesticides that will be applied, not what was applied.

3) Answer a) is correct.
An "IPM Inspection Report" is often filled out when inspecting critical areas such as the school cafeteria, and it is often in the form of a checklist to ensure that all important areas are inspected.

Answer b) is incorrect because the inspection report is typically filled out by the technician and not a supervisor. Answer c) is incorrect because school personnel may review the inspection report after it has been completed and submitted, but they do not do so in order "to ensure that all important areas are inspected." Answer d) is incorrect because b) and c) are incorrect.

4) Answer d) is correct.
A "Corrective Action Notice," which can also be called a "Sanitation Report," is filled out on the spot by the technician and given to the custodial foreman or a cafeteria manager (as applicable). A copy of the notice should be saved in a "tickle file" so that the technician is reminded to recheck in 30 or 60 days to see that the problem has been corrected.

Answer a) is incorrect because it is only part of the answer. Answer b) is incorrect because it is only part of the answer. Answer c) is incorrect because it is only part of the answer.

5) Answer a) is correct.
When sanitation, structural, or operational problems have been corrected, the custodian should note the action taken and the date in the IPM log.

Answer b) is incorrect because it is the technician who refers to the log to see corrective measures taken. Answer c) is incorrect because the custodian may be required to file internal reports with the principal, but he or she should first record the action in the log.

6) Answer c) is correct.
A "Quarterly IPM Report," and any similar quality assurance report, provides a summary of IPM activities, successes, problems, and recommendations over the past three months. While it may be prepared by the IPM technician, it is more often prepared by a supervisor with input from the technician.

Answer a) is incorrect because a "Quarterly IPM Report" is prepared by an IPM professional in the company, who understands IPM policies and procedures, not by the school. Answer b) is incorrect because a "Quarterly IPM Report" is prepared by an IPM professional in the company who understands IPM policies and procedures, not by the school.

7) Answer d) is correct.
The "Annual IPM Report" does not provide advanced notice of pesticide application; that is the purpose of an "Intent to Apply Pesticides," or similar form.

Answer a) is incorrect because one of the purposes of the "Annual IPM Report" is to summarize all IPM service for the past year. Answer b) is incorrect because one of the purposes of the "Annual IPM Report" is to report problems solved and problems still existing. Answer c) is incorrect because one of the purposes of the "Annual IPM Report" is to plan changes for the following year.

8) Answer d) is correct.
Compliance with school IPM policy, regulatory agency and response to public request for information are all reasons "Pesticide Use Summaries" may be required.

Answer a) is incorrect because it is only one of the reasons "Pesticide Use Summaries" may be required. Answer b) is incorrect because it is only one of the reasons "Pesticide Use Summaries" may be required. Answer c) is incorrect because it is only one of the reasons "Pesticide Use Summaries" may be required.

3.4 EDUCATION

1) Answer b) is correct.
Technicians cannot force staff to cooperate, but they can identify problems in their reports, and to some degree help educate the staff members they interact with.

Answer a) is incorrect because you can, indeed, help convince staff members of their responsibility in IPM by educating them through reports and verbal communications. Answer c) is incorrect because technicians cannot force staff to cooperate by refusing service (if that were ever thought to be necessary, it would be a decision by company management, not a technician), but they can identify problems in their reports, and to some degree help educate the staff members they interact with. Answer d) is incorrect because a) and c) are incorrect.

2) Answer b) is correct.
School staff and students need to know that they should report any pests they see in the IPM log, and that they can help reduce pest problems by following good sanitation practices to minimize the food available for pests.

Answer a) is incorrect because school staff and students do not need education in bait application because that is the role of the technician. Answer c) is incorrect because school staff and students do not need education about how to place and interpret monitors because that is the role of the technician. Answer d) is incorrect because a) and c) are incorrect.

3) Answer d) is correct.
All school staff members need to understand the basic concepts of IPM, the specifics of the school's IPM program, and their responsibilities in reporting pests and correcting sanitation, structural, and operation problems that favor pests.

Answer a) is incorrect because all staff members need education about the IPM program, not just custodians. Answer b) is incorrect because all staff members need education about the IPM program, not just food service workers. Answer c) is incorrect because all staff members need education about the IPM program, not just maintenance and grounds personnel.

4) Answer d) is correct.
Staff should be educated through all means available including one-on-one contact with the technician and other company personnel, through the various reports and special bulletins provided by the company, and in group meetings about particular aspects of the IPM program.

Answer a) is incorrect because one-on-one contact is only one of the means of education that should be used to educate school staff about the IPM program and how it works. Answer b) is incorrect because the use of bulletins and reports is only one of the means of education that should be used to educate school staff about the IPM program and how it works. Answer c) is incorrect because a group meeting is only one of the means of education that should be used to educate school staff about the IPM program and how it works.

5) Answer a) is correct.
IPM is an ideal topic for classes on the environment or ecology, and there are many IPM textbooks and teaching aids available. School teachers should consider incorporating IPM into their science, environmental studies, and public health curricula.

Answer b) is incorrect because IPM is not all that complicated and anyone can understand its concepts and procedures. Answer c) is incorrect because IPM only works when every affected group participates, e.g., food workers, custodial staff, teachers, administration, etc.

3.5 NOTIFICATION AND POSTING

1) Answer a) is correct.
While schools have differing policies on notification when pesticides are going to be applied, notification to parents and staff is usually the responsibility of the school. Some schools also send notices home to parents who wish to be informed before pesticide application. A school may have a registry of students and staff who are sensitive to pesticides, and the people on that registry must be notified before pesticides are applied, and this also is usually the school's responsibility.

Answer b) is incorrect because the pest management company's responsibility for notification is usually limited to notifying the school and then the school notifies the parents. Answer c) is incorrect because the technician's responsibility for notification is usually limited to notifying the school and then the school notifies the parents. Answer d) is incorrect because notification of parents and staff is usually the responsibility of the school.

2) Answer c) is correct.
In those schools with parental notification of pesticide treatments, or a pesticide sensitivity registry, the technician's responsibility for notification is usually limited to notifying the school with an advanced written notice of a planned pesticide application.

Answer a) is incorrect because in many schools, the technician has a role in the notification process, although that role is usually limited to notifying the school with an advanced written notice. Answer b) is incorrect because the technician is not responsible for contacting parents directly.

3) Answer a) is correct.
The statement is true because most schools are exempt from notification and posting requirements about the use of insect baits, pastes, gels, antimicrobials, or other materials used in ways that present minimal risk of human exposure.

4) Answer b) is correct.
"Posting" is placing a written notice of a pesticide treatment in various locations, including the areas to be treated and common areas where people often congregate and are likely to see the notice, e.g., school entrances and the lobby.

Answer a) is incorrect because notification is the process of notifying parents, and sometimes others, of a pending treatment via mail, e-mail, telephone, or other direct communications. Answer c) is incorrect because reporting in an IPM program is what the technician and pest management company do to report to the school on actions taken, actions needed, etc.

5) Answer a) is correct.
To be the most visible, pesticide application notices (signs) should be placed in the areas to be treated and common areas where people often congregate and are likely to see the notice, e.g., school entrances and the lobby.

Answer b) is incorrect because students and most staff are not likely to see a notice in the principal's office or in the cafeteria kitchen. Answer c) is incorrect because students and most staff are not likely to see a notice in the principal's office or the grounds' office.

6) Answer b) is correct.
To be most likely to be seen, pesticide application notices (signs) for outdoor treatment should be placed around the perimeter of the areas to be treated and at the school entrance where students and staff are most likely to see the notice.

Answer a) is incorrect because students and most staff are not likely to see a notice in the principal's office. Answer c) is incorrect because students and most staff are not likely to see a notice in the principal's office or the grounds' office.

3.6 EVALUATING SUCCESS OR FAILURE

1) Answer b) is correct.
IPM programs must have a more formalized, periodic review process that goes beyond the technician level, usually by a supervisor, or sometimes by a third party such as a consultant.

Answer a) is incorrect because the evaluation needs to go beyond the technician level and the evaluation also looks at the work of the technician. Answer c) is incorrect because school staff is not qualified to conduct an IPM evaluation, which is the responsibility of the company providing the service (or sometimes an outside expert).

2) Answer a) is correct.
This statement is true because a formal review and evaluation process generally requires a meeting of those concerned, including various school department representatives, to solicit input on problems and successes from the school perspective.

3) Answer b) is correct.
The evaluation should include input from concerned parties, review of inspection reports, sanitation reports, the log, and other records in order to see how the program is working and to identify any changes that are necessary to improve the IPM program for the future.
Answer a) is incorrect because assigning blame is not good customer relations unless it can be done in the most diplomatic way. The evaluation can identify the shortcomings of staff in regards to sanitation and other issues without being too aggressive. Answer c) is incorrect because pesticide use is just one small part of an IPM program.

4) Answer c) is correct.
In preparing the IPM program evaluation, the reviewer seeks to answer many questions, actually far more than 10, questions such as: Were the planned procedures implemented? If not, what was different? Are all pest populations now below action thresholds? If not, why not? Were pest populations reduced in a timely manner? Have pest sightings, as recorded in the logbooks, decreased or increased? Is the monitoring program adequate? Should monitoring be increased? Can the amount of time and effort spent now be reduced without sacrificing effectiveness? Were there any negative effects from control/management measures? Were there any safety concerns with control/management measures? If so, how were they addressed? If control measures used were ineffective, should they be repeated? Should other control/management measures be tried that have not been used? What problems have been identified? Are they being adequately addressed? Was there adequate cooperation from the various school departments? If not, how can this be improved? Were there any communication problems between those responsible for implementing different aspects of the program? Have all objectives been achieved? What changes are necessary in the program? Who should be responsible for those changes?

Answer a) is incorrect because the number of questions is far too low. Answer b) is incorrect because the number of questions is still too low.

5) Answer a) is correct.
To be effective, any IPM evaluation report, whether quarterly, annual, or biannual, should be read by as many people in the school as possible.

Answer b) is incorrect because lower level staff is in many ways more important to the program than senior staff, because they deal with day-to-day operations in the school's classrooms, cafeteria, etc. Answer c) is incorrect because it eliminates too many people at the school from reviewing the evaluation report and seeing the programs successes and shortcomings.

6) Answer a) is correct.
This statement is true because a completed school IPM evaluation report notes the current conditions, discusses the progress made against particular pests or conditions, identifies problems, compares the current situation with the original goals of the program, and sometimes offers recommendations for change. The report is submitted to the school and is generally available for review by anyone, is often filed in the log, and is a valuable resource for educating interested parties about the IPM program.

study guide

Chapter 4

PEST PREVENTION

4.1 HOUSEKEEPING AND SANITATION

There are three categories of control in an IPM program: (1) pest prevention, (2) non-chemical pest control, and (3) pesticide and biopesticides control. IPM technicians give preference to those tactics and tools that do not include pesticides whenever possible. The best long-term solution to pest problems is to prevent pests in the first place by limiting resources that encourage pests to thrive (pest conducive conditions). Pest access to resources such as food, water, and harborage opportunities are restricted or eliminated when possible. This can be done by physically blocking them from entering a building and/or by eliminating conditions that attract them.

Poor sanitation and poorly maintained buildings makes life easy for cockroaches, flies, ants, mice, rats, and other pests that need nothing more than a little spilled food, a drippy faucet, and a good hiding place. Removing readily available food for pests is an important way to prevent and reduce pests. Cleaning up clutter is important, too. Stacks of papers or closets jammed full of "stuff" provide harborage (living and hiding places) and limits the ability to inspect those areas for pests. Reducing clutter is especially important if other conditions exist in the area such as food, water, or if the clutter is near frequently open doors. Continually check for clutter in all storage areas and classrooms and make clean-up recommendations to the school.

Pest prevention through improved sanitation and housekeeping is almost always the responsibility of the school. In most cases, the IPM technician's responsibility is to identify the problems, and provide recommendations for how the school staff can best correct them. However, there are exceptions. Some pest management companies provide pest-proofing, steam cleaning or degreasing services and/or will vacuum inside equipment, behind appliances, and other prime sites of pest infestation. IPM technicians should continually educate school staff to assist with the comprehension of the connection between food, standing water, clutter and pest problems. Otherwise, school staff will rarely take the actions necessary to correct poor sanitation and maintenance practices that contribute to pest problems.

SANITATION IN FOOD SERVICE AREAS

Good sanitation is especially important in food service, dishwasher and storage areas. Food preparation surfaces should be cleaned promptly after use, and should never be allowed to remain dirty overnight. Grease should be cleaned regularly from ovens, exhaust filters, and grease traps. Floor drains should be treated regularly with enzyme-based or other biological cleaners. Kitchens should be "deep-cleaned" two to three times per year and should include equipment being moved or disassembled in order to access hidden food debris, grease, and pest harborage, and steam cleaning or pressure washing. Further, garbage cans should always be lined with a heavy plastic trash bags and garbage should be removed daily. The inside of garbage cans, underneath the plastic liner, should not be allowed to accumulate spilled trash and should be inspected each time the can is emptied and cleaned if needed. Catch trays or glue boards in insect light traps should be emptied and/or replaced regularly. In addition, they should be signed and dated by the inspecting technician each time they are inspected. Floors must be cleaned daily, preferably in the evening. Stored packaged foods should be removed from cardboard cases and stacked on industrial grade, steel wire shelves on wheels that allow spilled foods to fall to the floor and make clean-up easier. Shelving should ideally be at least 18 inches away from the wall to allow for inspection and cleaning. Additionally, the policy of "first in, first out," ensures that foods do not remain in storage for too long. Older food products are more likely rot and become infested. Empty boxes, cans, and any damaged packages should be promptly discarded and opened foods should be stored in tightly sealed containers.

SANITATION IN SECONDARY FOOD AREAS

Pests can occur anywhere in a school, so, good housekeeping is important even in areas of the school that are not normally considered a "food area." Good sanitation practices are imperative in secondary food areas such as teachers' lounges, snack areas, and home economics classrooms (stoves, refrigerators, and sinks). The same rules apply for trash management as referenced for cafeteria areas. Leftover food should not be stored for long periods. Spills under and behind vending machines, microwaves, and coffee makers should be cleaned up promptly. No foods should be left overnight in classrooms without being stored in pest-resistant containers. Additionally, art supplies made from food or grain products, such as flour paste or bean mosaics, need to be stored in pest-proof containers. Also, in classrooms, animal cages should be cleaned and bedding replaced regularly; spilled feed and animal feces should also be removed daily. Animal feed should be stored in tightly sealed containers. The area under and around cages should be cleaned at least weekly. If possible, this should include vacuuming.

SANITATION IN OTHER AREAS

Repair leaky plumbing in restrooms, locker room showers, kitchens, and laboratories. Also, repair leaks in the roof, which may attract carpenter ants, moisture-loving ants, fungus beetles, and other moisture-loving pests. In restrooms, locker rooms, and janitorial closets, floor drains and shower drains must be inspected routinely and cleaned and/or water added to P-traps as needed. Mop buckets should be emptied after use and wet mops and rags cleaned and hung upside-down to dry. If school policy permits, lockers and desks can be inspected regularly for conditions that attract pests like forgotten bag lunches, discarded candy wrappers, or wet clothing.

Storage areas need to be free from clutter. Cardboard boxes are a particular problem because they provide hiding and nesting sites for many kinds of pests. Schools should never use cardboard boxes for storage and should not store old cardboard indoors but dispose of it quickly to recycling containers outside. Further, used equipment or donated furniture needs to be inspected for insect and mouse infestations before installation. Items such as used refrigerators, microwaves, couches, overstuffed chairs, and cabinets may be infested with cockroaches, ants, fleas, bed bugs, mice, or other pests.

CLEANING EQUIPMENT

Various types of power-washing, steam cleaning, and foaming equipment is available to remove accumulated debris, grease, and other potential food and harborage for pests. This equipment can be used to clean food carts, tray carts, drains, trash rooms, trash cans, dumpsters, compactors, and loading docks. There are many types of power-washing equipment including hot water or cold water units, built-in or portable units, and gasoline or electric-powered units. Power-washing is usually done by custodial staff, but in some instances may be a separate service provided by the IPM pest management professional. Foaming equipment may be used to remove stubborn grease as well as clean dirty drains and floors; these areas may be the cause of ongoing nuisance fly problems. Foaming devices filled with foaming agents and degreasing chemicals enable the degreasing solution to remain in contact with the greasy incrustation long enough for it to dissolve, at which point it is simple to wash away. Areas that are constantly greasy should have a regular cleaning program. Drains, catch basins and other areas that may breed flies and have bad odors should also have a regular cleaning program.

TRASH MANAGEMENT

Good trash management greatly reduces the number of pests in and around a school. Garbage cans and recycling containers should have lids that close and should be emptied and inspected regularly and cleaned as needed. The trash room should have a concrete floor with a floor drain so that it can be hosed down or power-washed. Trash cans in public areas, on playgrounds, and in other outside areas should be rodent-resistant designs, and emptied and inspected daily and cleaned as needed. Recycling areas need to be inspected and cleaned very five to seven days to remove sugary residues and other food debris.

Leak-proof compactors are far superior to dumpsters for managing trash stored outside of school buildings for contractor pick up. Compactors should be washed out regularly using high pressure and a degreasing solution.

Dumpsters are a prime attractant for rodents and flies, and much more difficult to exclude pests from than leak-proof compactors. Poor dumpster management is the most common cause of rat problems on school grounds. Flies inside a school are often traced to flies attracted to, and breeding around, dumpsters outside. Dumpsters should be located at least 50 feet from outside doors and should be situated on a thick concrete pad that has foundation toes on the outside to keep rodents from burrowing under the pad. It is best to install a gravel barrier around the dumpster pad. If not installed on a pad, small dumpsters can be on wheels to keep them up off the ground. Ideally, the dumpster area should slope to a

sanitary sewer drain to handle runoff from cleaning. Limit the use of shrubbery around dumpster enclosures because thick foundation plants might help conceal the dumpster from view, but they also conceal rodent burrows and accumulated garbage, and make inspection difficult. Especially avoid thorny shrubs like barberry or pyracantha, as well as dense ground cover like ivy, pachysandra, creeping juniper, etc. Further, make sure weeds or grass around a dumpster is trimmed close to the ground. The base of shrubbery or evergreen trees near dumpsters should be trimmed to be at least 12 inches above ground level if they cannot be removed completely.

Lastly, dumpster lids should be kept closed. If there is so much trash that the lid cannot close, then a bigger container is required or the trash service needs to schedule more frequent pickups. Users need to close the doors after they have deposited trash. Dumpsters should be washed out regularly using high pressure and a degreasing solution. Drain holes should never be left open, except during cleaning. Plugs should be in place, or the opening should be screened. Dumpsters should not be damaged, leaking, or rusted, and the lids should close properly. Otherwise, they should be replaced. Dumpsters should be checked by school staff twice daily, and trash that did not end up inside the dumpster should be picked up. Staff should also inspect the area immediately after the dumpster has been emptied or removed. Spilled trash should never be allowed to remain overnight.

Trash on the grounds, especially trash that accumulates around the foundation and under shrubbery, should be picked up. Fruits and vegetables that have fallen from trees and are lying on the ground should be removed to discourage rodents, yellowjackets, and other pests that feed on decaying vegetation. If possible, the trees or bushes contributing to this problem should be removed. Also, roof gutters should be cleaned and stagnant water in containers and playground equipment should be emptied. Drainage of all wet areas must be adequate to prevent standing water.

4.2 PEST-PROOFING

Pest-proofing keeps pests from entering buildings, moving from room to room within buildings, or getting into food. It can be as simple as repairing screens and caulking cracks, or as complex as major building repair. Physical alterations can be expensive and time-consuming but they usually are permanent solutions and often provide other benefits such as improving heat or cool air retention, preventing water damage, and otherwise complementing building maintenance programs. Pest-proofing can be done by school maintenance staff or by the IPM technician, depending on the requirements of the IPM contract. Though, extensive pest-proofing is normally the responsibility of the school and is based on recommendations from the IPM technician; minor pest proofing such as caulking and screening may be done by the IPM technician if allowed by the pest management company. If possible, pest-proofing expectations should be explicit in the pest management contract.

PEST-PROOFING BY EXCLUSION

The three goals of pest-proofing are exclusion, isolation, and harborage elimination. Pest exclusion is most effective against rodents, bats, flying insects, and the larger crawling arthropods such as millipedes and crickets. All exterior doors need to be kept closed; do not permit unscreened doors to remain open for purposes such as ventilation or easy access. Sealing, screening, repairing or stuffing holes, and other methods of manual exclusion on the perimeter can keep pests out of a building. In general, openings larger than 1/4 inch will allow mice entry into a school. Exclusion is less effective against small crawling insects because there are so many small entryways under siding, around windows, and at soffits that small pests, such as ants, can use for entry. Yet even for the smallest pests, sealing the obvious openings provides a measure of control. Some pests may find their way in, but many will not.

Pest-proofing in old buildings can often have remarkable success. Doors leading out of these buildings, for example, are often poorly sealed. Stand on one side of the door in the dark and look to the other side in the light. More often than not you will be surprised at the number and size of the openings you will see. Doors to the outside should be checked to see if they need door sweeps, thresholds, and weather seals. Door sweeps, thresholds, and weather seals are typically easy to install and the benefits of their installation are not only related to pest exclusion, they also reduce heating and air conditioning costs, reduce cleaning costs and wear and tear on floors by keeping dirt out, and result in less sound and light infiltration. A school's utility savings in as little time as one year may cover the cost of the installations and regular inspection and maintenance.

Make other pest-proofing recommendations to the school as needed. Some recommendations may include repairing screens on windows and doors to make sure they fit tightly; screening inside and outside vent openings, but make sure adequate air flow is not prevented; installing air curtains over loading docks and other open doorways; sealing cracks and crevices in exterior walls; screening floor drains; and caulking crevices around doors, windows, vents, plumbing fixtures, equipment, cabinets, and counter tops (use appropriate sealants, e.g., foam sealants are usually not appropriate for rodents because they can easily chew through the foam); installing bird deterrent spikes, pin and wire, or similar commercial products to keep birds from roosting on window ledges and other building surfaces; filling or draining low spots to eliminate standing water that allows for the breeding of mosquitoes and other flies; aligning downspouts so that water drains away from the building; removing piles of wood, stone or other materials, or store them off of the ground and away from building foundations; and repairing grout around wall and floor tiles in kitchens, restrooms, locker rooms, and other sites.

PEST-PROOFING BY ISOLATION

Pest-proofing within a building results in "pest isolation." Pest-proofing inside a building can create separate compartments, like waterproof doors do in a ship. Installing caulk, mesh, and other sealants around pipes, utility lines, and other entries into the voids between rooms can isolate infestations in one area. Pest isolation prevents pests from spreading throughout a facility, and makes them easier to manage. This can be especially useful in food and other high-risk areas for pests. High-risk pest areas, such as the loading dock, receiving, and damaged-goods storage, should be physically isolated from the rest of the facility by installing mesh and other sealants. Further, all conduits must be sealed to keep mice from using them as highways through-out the building, but sealing conduits also keeps mice from chewing on wires, including computer lines.

PEST-PROOFING BY HARBORAGE ELIMINATION

Installing mesh and other sealants can eliminate pest harborage, in some cases reducing pest levels or making them easier to manage by other means. Though, eliminating all pest harborages may not be possible because many buildings have too many inaccessible cracks and crevices behind cabinets and inside equipment, for example. Harborage elimination can work against cockroaches and mice in school kitchens, because food preparation areas should already be fairly tightly sealed and are designed to be accessible for cleaning. Grout and ceramic tiles must be maintained with no cracks or broken pieces. Repairing seals around floor drains to prevent food debris and moisture accumulations and fly breeding sites can help eliminate harborage. Harborage elimination also works against stored product pests feeding on spilled food debris in cracks and crevices in the floor and around equipment.

4.3 LIGHT MANAGEMENT

Schools often have bright security lighting. Bright outdoor lights attract many types of crawling and flying pests. Schools often end up as beacons that attract insects, with high intensity lights at doorways, parking lots, and playgrounds, and lights shining brightly on white exterior walls. Insects attracted to lights at the building perimeter often find their way inside and they also die and accumulate in large numbers under lights and at doorways and windows. Insects at lights may also attract spiders and bats that feed on them. If a school's lights are causing pest problems, a pest management professional should first discuss with the school how to change the lighting to prevent pest problems, while still retaining security and visibility. Well maintained door sweeps are especially important under doors with adjacent exterior lighting.

Insects and lights are a complex issue. Many insects are attracted to high UV (ultraviolet) light, such as in fluorescent bulbs. An insect may be attracted to a particular wavelength of light, but may only be attracted at a certain time of the night or at a certain time of the year or at a certain temperature. Male insects may be attracted but not females. Brightness is also important; all else equal, a 200 watt bulb will attract more insects from a longer distance than a 100 watt bulb. Certain insects are attracted to heat, so lights that generate heat, such as standard incandescent bulbs, halogen bulbs, floodlights, and others using a glowing filament, may need to be moved away from potential pest points of entry. Another factor is competition from other lights. If the only bright light in the area is the one shining on the front entrance to the school, light-attracted insects in the area are more likely to be attracted to that entrance. Insect behavior is complex, and the lighting recommendations you make will depend, to some extent, on the specific types of insects causing trouble. Midges, for example, mostly fly to lights in early evening. Midge problems can be reduced simply by waiting until one to two hours after sunset before turning on lights during a midge outbreak.

There are many lighting alternatives that are less attractive to pests. Replace high wattage bulbs with lower wattage (less bright) bulbs. Lights with a yellowish, pinkish, or orange tint are less likely to attract insects. Moreover, use sodium vapor lamps, LED lamps, or other lamps with low UV output instead of mercury vapor lamps, fluorescent lamps, CFL lamps in high-risk areas, such as loading docks and building entrances. Also, replace bulbs that generate a high amount of heat, such as halogen lamps and incandescent floodlights, where they are creating pest problems. Direct or shield outside lights so that the light shines only where it is needed because indirect lighting is less attractive to insects than direct lighting. When possible, install lights 15 to 20 feet away from the entryway, but facing toward it, rather than placing lights directly above doorways. Avoid bright flood lights shining on a white wall, particularly if near water, because it can attract swarms of midges and other night flying insects. To minimize non-biting midges and other insects that fly only at dusk, set lights so they do not turn on until at least one hour after sunset, preferably two. Use curtains on windows or make sure lights are turned off in unoccupied rooms. Bright lights shining through windows can bring insects directly inside. Also, create a perimeter of bright decoy lights every 100 feet at a distance of 250 feet or so from the building.

Lighting strategies used to reduce insect problems almost always come with trade-offs, but lighting alternatives can often reduce the insect risk without seriously affecting security. It is important to meet with the school safety officer and discuss security concerns before recommending changes in lighting. Some lighting strategy trade-offs include lights that are less attractive to insects, but may also be dimmer and less attractive to people; low-pressure sodium lamps wash out most colors, for example, making them appear yellow or gray, and should be used only where color rendition is not important; high-pressure sodium lights are better at color rendition, but cause reds to appear brown; and color-balanced, high-pressure sodium lights are better for people but may be more attractive to insects.

4.4 LANDSCAPING

Certain types of plants and design favor rodents and other pests. Thick low-growing ground covers such as juniper, ivy, or pachysandra conceal burrows and provide ideal rodent hiding places and runways, especially around dumpsters. When the plants fill in, the ground becomes impossible to inspect. These types of plants also capture food debris and other trash, which is difficult or impossible to remove. Schools should thin or remove dense shrubbery and ground covers around the building's foundation.

Landscapers should avoid mound-shaped, ground-hugging shrubs and instead use plants that have a wineglass shape or that are otherwise open at the base. When rodents are living in large numbers under dense shrubs or ground covers, the plants may need to be removed and replaced by plants less attractive to rodents. Thorny shrubs should also be avoided as they are difficult to inspect and prone to capturing wind-borne trash. Trees should not be close enough to touch a building because ants, squirrels, and rats (roof rats especially), often follow branches to enter a building. The school needs to trim tree branches that touch the building and remove vines on the building. Ivy, bushes, or other plants against school walls should be removed, if possible, because ants, rodents and other pests use them to find entry to school buildings. Fruit trees, nut trees and berry bushes provide rodents food, attract other pests and should not be placed within 300 hundred feet of a building. Large rocks, railroad ties, and similar landscape structures are attractive as rodent burrow sites and should be avoided near the school. Schools also should avoid blooming plants near entryways and public areas to minimize bee and wasp activity in these areas.

WEEDS

Weeds are attractive nest areas for rodents. Make sure the school has no weedy areas that are being ignored by grounds personnel. Weeds along fence lines or around abandoned equipment or debris are particularly attractive to rodents. String trimmers should be used to mechanically manage weeds on a regular basis.

WHAT NOT TO DO WITH MULCH

Mulch along a building foundation can be a source of many pest problems around and inside the school, and can also enable subterranean termites to bypass a termiticide soil barrier. Termites can travel through the protective mulch aboveground and enter the building through foundation cracks, conduits, or weep holes in brick. Because organic mulches are made of plant material that gradually decomposes, they attract millipedes, sowbugs, pillbugs, cockroaches, slugs, earwigs, crickets and other pests that feed on decaying material. Mulch draws pests that are attracted to the moisture and heat, pests that simply like the protected harborage that mulch provides, and pests that are there to feed on other pests. To that point, decomposing mulch tends to hold moisture close to foundations and naturally generates heat due to organic decay. Additionally, pests use a well-mulched foundation as a stepping stone to enter the structure. During temperature extremes, or if the mulch becomes too dry or too wet, these perimeter invaders may try to move inside. In fact, many interior ant infestations can be traced to the exterior mulch. Subsequently, schools should avoid over-mulching.

WHAT TO DO WITH MULCH

If mulch must be used, it is better to use synthetic mulch, made from rubber or other materials because synthetic mulch tends to dry more quickly, provides no food source for pests and does not generate heat as a result of organic decay. A layer of mulch that is deeper than three inches stays damp for too long. Fine textured wood and bark mulches should be no deeper than three inches after settling. Coarser mulches like pine bark nuggets that allow air circulation can be as deep as four inches. Schools should leave a clean, dry, mulch-free border 12 inches wide around the structure. A landscape cloth should be placed over this strip to keep weeds and grass from coming up, then leave the strip bare or cover with gravel. Compost piles, leaf piles, debris piles, stacked wood or building materials should be located away from the foundation and away from mulched areas. Minimize moisture around the foundation and mulched areas but making sure drainpipes, downspouts, or spigots are not emptying onto mulch and keeping it wet; also, schools should use splash blocks and extended downspouts beyond the mulched area.

ADDITIONAL RESOURCES

Pest Prevention by Design is an excellent resource created by a national team of experts to provide guidance to architects, construction engineers and facility managers to build pests out of buildings and landscapes. This resource is available on-line at no cost at XX.

study questions

Chapter 4

PEST PREVENTION

4.1 HOUSEKEEPING AND SANITATION

1) The three categories of control in an IPM program are (1) pest prevention, (2) non-chemical control, and (3) _____.
   a) Monitoring.
   b) Recordkeeping.
   c) Pesticide and biopesticide control.

2) Which statement is TRUE?
   a) Pests avoid areas with a lot of clutter.
   b) Cockroaches and ants do not require a water source.
   c) Removing available food can help prevent pests.

3) School staff members do not need to understand the relationship between food, standing water, clutter and pests.
   a) TRUE
   b) FALSE

4) Good sanitation to prevent pest problems is most important in which of the following school areas?
   a) Kitchens.
   b) Classrooms.
   c) Bathrooms.

5) When is the best time to clean food preparation surfaces?
   a) After each use.
   b) At the end of the school day.
   c) The first thing in the morning.

6) How often should school kitchens be steam cleaned, power washed, or "deep-cleaned" by other methods?
   a) Once a year.
   b) 2-3 times a year.
   c) Every month.

7) When a kitchen is deep-cleaned by steam or power washing, all kitchen equipment should be moved or taken apart.
   a) TRUE
   b) FALSE

8) Which of the following kitchen cleaning chores should be done daily?
   a) Using enzyme cleaner in floor drains.
   b) Emptying insect light traps.
   c) Cleaning floors.

9) Which of the following is NOT true about proper handling of garbage cans?
   a) They should be cleaned regularly.
   b) They should have a plastic bag liner.
   c) They should be emptied once a week.

10) Packaged foods are best stored on:
   a) Wooden shelves.
   b) Steel, wire shelves.
   c) Bare floor.

11) Pallets that are holding stored food products should be 18 inches from the wall.
   a) TRUE
   b) FALSE

12) Stored foods should be used according to the "first in, first out" policy because:
   a) Foods purchased earlier are cheaper.
   b) Older foods are at the back of the shelf.
   c) Older foods are more likely to be infested with pests.

13) Which of the following is NOT considered to be a food handling area in a school?
   a) Teachers' lounge.
   b) Home economics classroom.
   c) Janitor's closet.

14) In a school, recommendations to clean up garbage and food materials apply only to food preparation, food storage, or food service areas.
    a) TRUE
    b) FALSE

15) Animal feed for caged animals in classrooms or science labs should be:
    a) Stored in the original box or bag.
    b) Stored in tightly-sealed containers.
    c) Left in cages only at night.

16) In janitorial closets, wet mops should be:
    a) Left in a dry mop bucket.
    b) Left in a mop bucket with water.
    c) Hung upside-down to dry.

17) The one item that is most attractive to a variety of pests in storage rooms is:
    a) Cardboard boxes.
    b) School supplies.
    c) Textbooks.

18) Which of the following statements is TRUE?
    a) The IPM technician should never inspect student lockers.
    b) Donated computer equipment should be sprayed with a pesticide before installation.
    c) Shower drains in locker rooms should be cleaned regularly.

19) In cafeterias, food carts and tray carts should never be power-washed.
    a) TRUE
    b) FALSE

20) Which of the following statements about power-washing is NOT true?
    a) Power-washing equipment uses only hot water.
    b) Power-washing may be done by the IPM technician.
    c) Trash rooms with floor drains can be power-washed.

21) Degreasing foams can be used to clean drains in food areas.
    a) TRUE
    b) FALSE

22) Full plastic trash bags should be stored _____ while awaiting trash pickup.
    a) In a pile at the pickup site.
    b) In closed containers outside.
    c) In closed containers inside.

23) As long as recycling containers are emptied on a regular basis, they do not need additional cleaning.
    a) TRUE
    b) FALSE

24) The most common cause of Norway rat problems on school grounds is:
    a) Rotting fruit dropped by fruit trees.
    b) Poor dumpster management.
    c) Puddles of water.

25) Dumpsters should be located no closer than ____ feet from outside doors.
    a) 10
    b) 25
    c) 50

26) Which statement is NOT true about proper maintenance of dumpsters?
    a) Dumpsters should be located on flat, dry soil.
    b) Dumpsters should slope toward a sanitary sewer drain.
    c) Dumpster drain openings should be plugged or screened.

27) An alternative to installing a dumpster on a concrete pad, is to:
    a) Surround it with foundation shrubbery.
    b) Use a small dumpster with wheels.
    c) Install it on a bed of gravel.

28) It is best to landscape around a dumpster enclosure with thorny shrubs and bushes.
    a) TRUE
    b) FALSE

29) A school should request a bigger dumpster if:
    a) There is so much trash that the dumpster lid will not close.
    b) Rats are burrowing all over the area.
    c) Trash is picked up only every other week.

30) School staff should check dumpsters:
    a) At least twice a day.
    b) Immediately after the dumpster has been emptied.
    c) Before leaving at the end of the day.
    d) All of the above.

31) Which of these pests are attracted to fruit that has fallen to the ground?
   a) Indian meal moths.
   b) Yellowjackets.
   c) Termites.
   d) All of the above.

4.2 PEST-PROOFING

1) Which of the following is NOT a result of pest-proofing?
   a) It keeps pests out of buildings.
   b) It reduces pest movement inside buildings.
   c) It kills pests trying to enter a building.

2) Which of the following is an example of pest-proofing?
   a) Sealing cracks.
   b) Applying gel bait.
   c) Steam cleaning.
   d) All of the above.

3) Which of the following is a potential benefit of sealing openings as part of pest-proofing in a building?
   a) Saving on heating costs.
   b) Solution is permanent.
   c) Pests cannot easily enter.
   d) All of the above.

4) All pest-proofing in a school should be done by the school maintenance staff.
   a) TRUE
   b) FALSE

5) The three goals of pest-proofing are exclusion, isolation, and:
   a) Sanitation.
   b) Education.
   c) Harborage elimination.

6) Pest exclusion is just as effective against larger pests such as mice as it is against smaller pests such as ants.
   a) TRUE
   b) FALSE

7) The minimum size opening that will allow a mouse to enter a space is:
   a) 1/8-inch.
   b) 1/4-inch.
   c) 1/2-inch.
   d) 1-inch.

8) Which of the following should be added to exterior doors to help keep pests out?
   a) A door sweep.
   b) A locking mechanism.
   c) An outside light.

9) Which of the following is NOT an advantage to adding a weather seal to an outside door?
   a) Less outside noise.
   b) Reduced air conditioning costs.
   c) Exclusion of pests.
   d) Fresh air enters around the door frame.

10) To prevent flying insects from entering through a loading dock door, you should pest-proof by installing:
   a) A pheromone trap.
   b) An air curtain.
   c) Bird spikes.

11) To pest-proof an outside vent, you should:
   a) Fill the opening with foam sealant.
   b) Screen the opening.
   c) Cover the opening with plastic sheeting.

12) The best way to keep pests from entering a building using the space around pipes and conduits is to:
   a) Install screen around the pipes/conduits.
   b) Fill the space with foam sealant.
   c) Stuff the opening with wire mesh and then seal it.

13) Which of the following is the best way to pest-proof for birds roosting on window ledges?
   a) Install bird deterrent spikes.
   b) Place toxic bait on the ledges.
   c) Install an air curtain.

14) Which of the following pest-proofing techniques can result in “pest isolation” within a building?
   a) Installing thresholds under outside doors.
   b) Sealing around conduits.
   c) Repairing exterior screens.

15) Which of the following is NOT a pest-proofing recommendation that an IPM technician might make to a school?
   a) Screen floor drains.
   b) Repair grout around tiles.
   c) Install rodent snap traps in trash rooms.

16) It is possible to eliminate pest harborage sites by implementing pest-proofing measures such as caulking and sealing.
    a) TRUE
    b) FALSE

4.3 LIGHT MANAGEMENT

1) Why do bats come to lights?
    a) To feed on insects.
    b) They are attracted to lights just as moths are.
    c) They are attracted to the heat.
    d) All of the above.

2) If bright security lights are causing large numbers of insects to accumulate on an exterior wall where many find their way inside, the pest management professional should first:
    a) treat the wall with a pyrethroid insecticide.
    b) install light traps.
    c) discuss with the school how to change their lighting.
    d) all of the above.

3) Which statement is true?
    a) LED bulbs are low in UV light.
    b) UV light is attractive to many insects.
    c) Only female insects are attracted to light.

4) An insect may be attracted to a particular wavelength of light, but may only be attracted at a certain time of the night, or at a certain time of the year, or at a certain temperature.
    a) TRUE
    b) FALSE

5) Why is an insect light trap (ILT) less effective at capturing insects when placed near a security light?
    a) Because insects are repelled by high-energy security lights.
    b) Because security lights will out-compete the trap's light.
    c) Because an ILT will trap insects effectively near a security light.

6) Which statement is NOT true about non-biting midges?
    a) Non-biting midges mostly fly to lights in early evening.
    b) Non-biting midges mostly fly to lights near midnight.
    c) Non-biting midge problems can be reduced simply by waiting until one to two hours after sunset before turning on lights during a midge outbreak.

7) Which statement is true regarding a particular light's attractiveness to insects?
    a) High wattage bulbs attract fewer insects than do low wattage bulbs.
    b) Lights with a yellowish, pinkish, or orange tint are more likely to attract insects.
    c) Sodium vapor lamps or others with low UV output are less attractive to insects than are mercury vapor lamps and fluorescent lamps.

8) Which situation is the most attractive to insects?
    a) Indirect landscape lighting.
    b) Sodium vapor security lighting in parking lot.
    c) Floodlight shining from below onto a wall.

9) How can decoy lights be used to reduce insects around lights at the school building's perimeter?
    a) Place bright decoy lights every 100 feet at a distance of 250 feet from the building.
    b) Place bright decoy lights 50 feet from each building corner.
    c) Place bright decoy lights on the roof.

10) What statement about outdoor lighting is correct?
    a) Lighting strategies that reduce insect problems almost always come with trade-offs.
    b) Lights that are less attractive to insects may also be dimmer and less attractive to people.
    c) Low-pressure sodium lamps wash out most colors, for example, making them appear yellow or gray, and should be used only where color rendition is not important.
    d) All of the above.

11) Lighting alternatives can often reduce the insect risk without seriously affecting security.
    a) TRUE
    b) FALSE

4.4 LANDSCAPING

1) What type of foundation plants are least attractive to rodents and other pests?
   a) Thick ground covers.
   b) Wineglass-shaped shrubs.
   c) Mound-shaped shrubs.
   d) All of the above.

2) Why are thick, low-growing ground covers a contributing factor for rodents?
   a) Ground covers provide protected harborage and runs for rodents.
   b) Ground covers capture food and debris.
   c) Ground covers are difficult to inspect.
   d) All of the above.

3) Why are wineglass-shaped shrubs a good choice for minimizing rodent problems?
   a) They are open at the base.
   b) They provide shade.
   c) They have no fruit.
   d) All of the above.

4) What IPM step needs to be done by the school when rodents are living in large numbers under a large area of thick, dense ground-hugging plants?
   a) Institute a mass-trapping program.
   b) Thin or remove the plants.
   c) Use tracking powder to knock down the rodent population.

5) Which type of plants is most likely to capture wind-blown trash?
   a) Thorny shrubs.
   b) Trees.
   c) Wineglass-shaped shrubs.

6) What is the primary pest management concern when trees are located close to a school building?
   a) Branches touching the building.
   b) Trees shading the building.
   c) Unraked leaves.

7) Fruit and nut trees should be _____ feet away from a school building.
   a) 25
   b) at least 300
   c) no closer than 1,000

8) Where do low-growing, dense shrubs at schools pose the most frequent problems related to rats?
   a) Along foundations.
   b) Near play areas.
   c) Around dumpsters.

9) What is the primary reason schools should avoid blooming plants near entryways and public areas?
   a) To minimize bee and wasp stings.
   b) To minimize the attractiveness of the area to rodents.
   c) To avoid competition with insect baits.

10) Why is a string trimmer a good tool for rodent management?
   a) The noise of the trimmer drives rodents out of their burrows.
   b) It can be used to reduce weeds along fence lines and abandoned equipment.
   c) It can create flat application sites for secured, tamper-resistant bait stations.

11) What is the primary reason millipedes, sowbugs, and crickets are found in high numbers in organic mulch?
   a) Their eggs are delivered with the mulch.
   b) Their prey breeds in the mulch.
   c) They feed on decaying mulch.

12) A heavy layer of wood mulch that is right up against the building can also enable subterranean termites to bypass a termiticide soil barrier.
   a) TRUE
   b) FALSE

13) Fine textured wood and bark mulches should be no deeper than _____ inches after settling.
   a) 3
   b) 6
   c) 12

14) Schools should leave a clean, dry, mulch-free border _____ wide around the structure.
   a) 3 inches.
   b) At least 1 foot.
   c) At least 3 feet.

15) What is one way to avoid excessive moisture in mulched areas?
   a) With splash blocks and extended downspouts.
   b) By using shredded hardwood mulch.
   c) By covering mulch with leaves at the foundation perimeter.

answers

Chapter 4

PEST PREVENTION

4.1 HOUSEKEEPING AND SANITATION

1) Answer c) is correct.
Pesticides are a component of an IPM program, although preference should be given to control measures that do not use pesticides.

Answer a) is incorrect because monitoring is an important part of an IPM program, but it is not a control measure. Answer b) is incorrect because recordkeeping is not a pest control measure.

2) Answer c) is correct.
This is the true statement because removing spilled food and garbage can eliminate an easy food source for pests.

Answer a) is not true because pests are drawn to areas with clutter that provide harborage or hiding places. Answer b) is not true because cockroaches and ants need small amounts of water on a regular basis and can get it from a drippy faucet or a puddle.

3) Answer b) is correct.
This statement is false because unless school staff understands that pests are attracted to trash, spilled food, and other housekeeping shortcomings, they will rarely correct these conditions satisfactorily.

4) Answer a) is correct.
Sanitation is especially important in food preparation and food service areas because these sites are a ready source of food and water for pests.

Answer b) is incorrect because classrooms are less likely to provide food for pests. Answer c) is incorrect because bathrooms provide water for pests, but food and harborage here is limited.

5) Answer a) is correct.
Food preparation surfaces should be cleaned immediately after each use before spills dry or crumbs fall to the floor to become food for pests.

Answer b) is incorrect because waiting until the end of the school day leaves food residue available for pests for several hours. Answer c) is incorrect because food and water spillage should never be left overnight when foraging pests are most active.

6) Answer b) is correct.
Kitchens should be deep-cleaned two to three times a year.

Answer a) is incorrect because once a year is not often enough to prevent accumulations of grease and food debris. Answer c) is incorrect because cleaning this often is more than is necessary for the typical kitchen.

7) Answer a) is correct.
This statement is true because moving or disassembling equipment allows you to get at hidden food debris, grease, and pest harborage that you would not otherwise be able to access.

8) Answer d) is correct.
Floors in food handling areas should be cleaned daily, preferably in the evening, to eliminate any food or liquid spillage that is attractive to pests.

Answer a) is incorrect because grease in exhaust filters, ovens, and grease traps should be removed regularly, but not daily. Answer b) is incorrect because floor drains should be treated regularly, but not daily, with an enzymatic or biological cleaner. Answer c) is incorrect because the catch trays in insect light traps should be emptied regularly, but not daily, to avoid secondary insect problems.

9) Answer c) is correct.
Emptying garbage cans only once a week is not proper handling of garbage, they should be emptied daily and should never be allowed to remain with garbage overnight.

Answer a) is incorrect because garbage cans should be cleaned regularly to eliminate any spilled or dried food debris that could draw pests. Answer b) is incorrect because garbage cans should have a plastic bag liner. Check under the liner regularly for spills.

10) Answer b) is correct.
Open steel wire shelving allows any food spillage to drop through to the floor where it be easily seen and cleaned up.

Answer a) is incorrect because food spillage tends to become lodged in the grain or seams on wooden shelves. Answer c) is incorrect because food items on the floor are too accessible to pests and are difficult to clean around.

11) Answer b) is correct.
This statement is false because pallets must be at least 18 inches from the wall to create an "inspection aisle" and to allow cleaning between the wall and the pallet.

12) Answer c) is correct.
Foods that have been in storage for a long time, even unopened, are more likely to be infested with stored product pests. Older packages should be used up first.

Answer a) is incorrect because foods purchased some time ago may have been cheaper, but that has no bearing on when they are used. Answer b) is incorrect because older foods should be at the front of the shelf with new purchases behind so that those first in will be used first.

13) Answer c) is correct.
A janitor's closet is not a likely place for storage or preparation of food.

Answers a), b), and d) are incorrect because all of these sites either store, prepare, or serve food or drink and the same sanitation guidelines should apply as in cafeterias or kitchens.

14) Answer b) is correct.
This statement is false because food and pests can occur anywhere in a school. Food debris can also be found in lockers, classrooms, trash cans in any room, and in other sites, so good housekeeping is important throughout the school.

15) Answer b) is correct.
Animal feed should be stored in jars, plastic ware, plastic trash cans or some similar container with a tight-fitting lid.

Answer a) is incorrect because insects can easily penetrate boxes and bags, even those that have not yet been opened. Answer c) is incorrect because, ideally, animals should be fed during the day with food removed at night because that is when most pests are actively foraging.

16) Answer c) is correct.
Mops should be rinsed, wrung out, and hung upside-down to dry after use.

Answer a) is incorrect because a wet mop left in a bucket can retain water and quickly turn "sour," attracting pests such as fruit flies (Drosophila). Answer b) is incorrect because standing scummy water is also an attractant for certain pests. Mop buckets should be emptied after use.

17) Answer a) is correct.
Cardboard boxes are very attractive to many pests, such as cockroaches, because the corrugations provide hiding places and the cardboard absorbs moisture. Cardboard boxes should be disposed of quickly.

Answer b) is incorrect because school supplies would not have any particular attraction for pests other than clutter. Answer c) is incorrect because textbooks might provide some harborage for certain pests but not to the extent of cardboard boxes.

18) Answer c) is correct.
Floor drains and shower drains in rest rooms, locker rooms, and janitorial closets must be routinely cleaned.

Answer a) is incorrect because if school policy permits, student lockers should be inspected on a regular basis for conditions that attract pests like forgotten bag lunches and snacks. Answer b) is incorrect because computers should never be sprayed. Donated equipment and furniture should be inspected for pests which, if found, can then be controlled by methods other than chemical sprays.

19) Answer b) is correct.
This statement is false because power-washing is a good way to clean these items, as well as trash rooms, trash cans, dumpsters, compactors, and loading docks.

20) Answer a) is correct.
This statement is not true because power washing equipment comes as hot water units or cold water units.

Answer b) is incorrect because it is true that sometimes power-washing may be provided as a separate service by the IPM technician. It is usually done by school custodial staff, though. Answer c) is incorrect because it is true that trash rooms can be power-washed.

21) Answer a) is correct.
This statement is true because small foamers filled with degreasing chemicals and foaming agents are effective in dissolving grease and food debris in drains, food carts, and other sites.

22) Answer b) is correct.
Plastic trash bags should be taken outside on a regular basis and stored in closed containers while awaiting disposal.

Answer a) is incorrect because trash bags should never be stored outside of a container because rodents and other animals and insects can easily get into plastic bags. Answer c) is incorrect because trash should not be held inside any longer than necessary because pests will be drawn into the school by the odors.

23) Answer b) is correct.
This statement is false because even after containers are emptied, sugary residues from sodas and food debris from other recycled containers remains in the bottom of the container and requires regular cleaning.

24) Answer c) is correct.
Poor dumpster management is the main cause for rats on school grounds. Dumpsters provide a ready supply of spilled food, and rats like to burrow underneath them.

Answer a) is incorrect because dense shrubbery hides rodent burrows and collects trash, but it is not as important a factor. Answer b) is incorrect because rats are attracted to rotting fruit, but dumpsters provide a wider range of available foods at all times of the year. Answer d) is incorrect because rats require some water, but their need for food is more important.

25) Answer c) is correct.
Dumpsters should be located at least 50 feet from outside doors.

Answers a) and b) are incorrect because dumpsters that are located less than 50 feet from the school will attract pests that may find their way into the building, plus odor is a factor.

26) Answer a) is correct.
This statement is not true because dumpsters should be placed on concrete pads so rodents cannot burrow under the dumpster and so that cleanup of spilled debris is easier.

Answer b) is incorrect because it is true that whenever possible dumpsters should slope to a sanitary sewer drain to handle runoff from cleaning. Answer c) is incorrect because it is true that dumpster drain openings should be sealed, except during cleaning, or screened to keep rodents out.

27) Answer b) is correct.
If a dumpster cannot be placed on concrete, use of a small dumpster on wheels allows you to see burrows underneath and to move it for cleaning.

Answer a) is incorrect because dense plantings should never be placed around a dumpster because they hide burrows and collect trash. Answer c) is incorrect because gravel would collect food and trash and make cleaning the area around the dumpster difficult.

28) Answer b) is correct.
This statement is false because shrubs of any kind around a dumpster make it difficult to see rodent burrows. Thorny shrubs, especially, collect trash and are difficult to inspect.

29) Answer a) is correct.
If there regularly is so much trash in the dumpster that the lid cannot be kept closed, the school either needs a bigger dumpster or must schedule more frequent pickups.

Answer b) is incorrect because a bigger dumpster is going to do little to correct the problem of burrowing rats. Answer c) is incorrect because trash should never be left in any size dumpster for more than a few days. In warm weather, flies can lay eggs on garbage in a dumpster and complete their development in less than a week.

30) Answer d) is correct.
School staff should check dumpster areas at least twice a day. On trash pickup days one of those times should be right after the dumpster has been emptied so any spilled or missed trash can be picked up. Dumpsters should also be checked at the end of the day because spilled trash should never be allowed to remain on the ground overnight.

Answers a), b) and c) are incorrect because each is only part of the complete answer.

31) Answer b) is correct.
Yellowjackets are strongly attracted to fermenting fruits on the school grounds. Any fruits or vegetables lying on the ground should be removed daily.

Answer a) is incorrect because Indian meal moths develop in stored food products in kitchens and in other sites inside buildings. Answer c) is incorrect because termites are found in the soil or in the wood that they feed upon. Answer d) is incorrect because a) and c) are incorrect.

4.2 PEST-PROOFING

1) Answer c) is correct.
Killing pests is not a reason to do pest-proofing. Rather than killing pests, pest-proofing limits their movements.

Answer a) is incorrect because keeping pests from entering a building is a primary reason for pest-proofing. Answer b) is incorrect because limiting the movement of pests from room to room inside a building is also a reason to do pest-proofing.

2) Answer a) is correct.
Caulking cracks and repairing screens are examples of very simple pest-proofing techniques. Pest-proofing, however, can be as complex as major building repairs.

Answer b) is incorrect because applying gel bait is a chemical control measure that kills pests and is not an example of pest-proofing. Answer c) is incorrect because steam cleaning is an example of a sanitation measure but is not an example of pest-proofing. Answer d) is incorrect because b) and c) are incorrect.

3) Answer d) is correct.
All of the benefits listed are positive aspects to caulking openings as part of pest-proofing.

Answer a) is incorrect because savings on heating and cooling costs when openings are sealed is just one of the correct answers. Answer b) is incorrect because pest-proofing measures are largely permanent solutions and are just one of the correct answers. Answer c) is incorrect because the exclusion of pests by pest-proofing is just one of the correct answers.

4) Answer b) is correct.
This statement is false because minor pest-proofing jobs such as screening or caulking are often done by the IPM technician, depending on the terms of the IPM contract.

5) Answer c) is correct.
Harborage elimination is one of the three goals of pest proofing, along with pest exclusion and pest isolation. Caulking openings can seal off areas that pests use for hiding.

Answer a) is incorrect because sanitation is an important part of an IPM program, but it is not considered part of pest-proofing. Answer b) is incorrect because education is not part of pest-proofing.

6) Answer b) is correct.
This statement is false because it is much easier to exclude large pests from areas than it is to exclude small pests. There are so many small openings that can be used by small pests that finding and closing them all can be prohibitive.

7) Answer b) is correct.
In general, a mouse needs an opening of only 1/4-inch. If it can get its head through, it can enter the space.

Answer a) is incorrect because this size opening is too small for a mouse to enter. Answers c) and d) are incorrect because a mouse can enter through openings of these sizes, but they are bigger than the minimum size required.

8) Answer a) is correct.
Door sweeps, thresholds, and weather seals can all be added to outside doors to establish a tight seal and help prevent the movement of pests into a building.

Answer b) is incorrect because a lock will do little to stop pest movement because pests usually enter around the edges of a door when there is not a tight seal. Answer c) is incorrect because an outside light will draw pests to the door where they might find a way to get in.

9) Answer d) is correct.
Air entering around the door frame is not an advantage to adding a weather seal. The purpose of a weather seal is to close openings around the door to prevent air, and pests, from entering.

Answer a) is incorrect because less outside noise and light coming through the door is an advantage to adding a weather seal. Answer b) is incorrect because adding a weather seal to a door will improve air conditioning and heating efficiency. Answer c) is incorrect because a weather seal on an outside door is an advantage because it helps to prevent migration of pests into the building.

10) Answer b) is correct.
An air curtain or air door can be installed over loading docks or other doorways that are regularly opened. The downward force of air keeps flying insects from entering.

Answer a) is incorrect because a pheromone trap may attract and capture certain flying insects but does not prevent them from entering the space in the first place. Answer c) is incorrect because bird spikes are installed as a pest-proofing measure to keep pest birds from roosting but has no effect on flying insects.

11) Answer b) is correct.
To pest-proof an outside vent, fit it with a screen of a small enough mesh size to keep out insect pests. You should not screen dryer vents, however, because that may trap lint inside the vent creating a fire hazard.

Answer a) is incorrect because using foam sealant inside the vent will block the necessary air flow. Answer c) is incorrect because covering the vent opening with plastic will block the necessary air flow.

12) Answer c) is correct.
The best way to keep both insects and rodents from entering around pipes and conduits is to stuff the space with wire mesh, which rodents cannot chew through, then seal it with appropriate filler.

Answer a) is incorrect because screening around pipes or conduits may keep rodents out, but some insects will be able to pass through the screen and moisture and air movement will be a problem. Answer b) is incorrect because rodents can chew through foam sealant and it often degrades due to exposure to weather.

13) Answer a) is correct.
Bird deterrent spikes, pin and wire, or similar commercial products can be permanently installed on ledges or other building surfaces to keep birds from landing.

Answer b) is incorrect because baiting is not a pest-proofing measure and toxic bait should not be placed on building ledges. Answer c) is incorrect because air curtains are designed to fit over exterior doorways to prevent flying insects from entering and would not be appropriate to repel birds from ledges.

14) Answer b) is correct.
Sealing around conduits, and installing caulk, mesh, and other sealants around pipes, utility lines, and other entries into voids between rooms can isolates pests within one area.

Answer a) is incorrect because installing door on outside thresholds is designed to keep pests out of a building but does not isolate them once inside. Answer c) is incorrect because repairing screens will help keep pests out of a building but will not isolate them to one area once inside.

15) Answer c) is correct.
Installation of traps is not a pest-proofing recommendation because rodent traps are a lethal control method.

Answer a) is incorrect because screening of floor drains is a pest-proofing recommendation that can keep out phorid flies, rodents, and other pests. Answer b) is incorrect because repair of grout around wall and floor tiles in restrooms, locker rooms and other sites is a pest proofing recommendation a pest management professional could make.

16) Answer a) is correct.
This statement is true because, although many buildings simply have too many cracks and crevices to effectively seal, in others where harborage sites are limited, a pest management professional can seal enough openings to make a difference.

4.3 LIGHT MANAGEMENT

1) Answer a) is correct.
Bats are attracted to lights by the activity of the swarms of flying insects around them.

Answer b) is incorrect because bats are not attracted to the light itself, they are attracted to the insects that are drawn to the lights. Moths are programmed to orient and navigate based on the moon or another light source. Thus, artificial light confounds their navigation; and they fly endlessly around the light. Answer c) is incorrect because bats do not appear to be attracted by heat of lights but by the movement of their prey. Answer d) is incorrect because answers b) and c) are incorrect.

2) Answer c) is correct.
If school lights are causing pest problems an IPM technician should first discuss with the school how to change the lighting to prevent pest problems, while still retaining security and visibility. Treating with pesticides is almost never the first step in an IPM approach. However, if the school does not take action, the pest management professional may need to use pesticides to control the pests so they do not move inside the school.

Answer a) is incorrect because any insecticide treatment will only be of limited duration and success, and will require a large amount of insecticide. Answer b) is incorrect because light traps will be outcompeted by the bright security lights. Answer d) is incorrect because answers a) and b) are incorrect.

3) Answer b) is correct.
Many insects are attracted to high UV (ultraviolet) light, such as in fluorescent bulbs.

Answer a) is incorrect because fluorescent bulbs actually have a high UV output. Answer c) is incorrect because it is, in fact, the male insect that is most often attracted to light.

4) Answer a) is correct.
This statement is true because an insect may be attracted to a particular wavelength of light but may only be attracted at a certain time of the night or at a certain time of the year or at a certain temperature. Insects and lights are a complex issue.

5) Answer b) is correct
Bright lights will typically out compete lesser lights when it comes to attracting insects, and a security light will overwhelm the attractiveness of an ILT.

Answer a) is incorrect because insects are actually attracted to high-energy security lights, not repelled. Answer c) is incorrect because a security light will overwhelm the attractiveness of an ILT.

6) Answer b) is correct.
The statement that midges mostly fly to lights near midnight is not true; they mostly fly to lights in early evening.

Answer a) is incorrect because it is true that midges mostly fly to lights in early evening; their peak activity period is one to two hours after sunset. Answer c) is incorrect because it is true that midge problems can be reduced simply by waiting until one to two hours after sunset before turning on lights during a midge outbreak because this coincides with their peak activity period.

7) Answer c) is correct.
This statement is true because many insects are attracted to UV light. Sodium vapor lamps or others with low UV output are less attractive to insects than are mercury vapor lamps and fluorescent lamps.

Answer a) is incorrect because it is not true that high wattage bulbs attract more insects, because they produce more light. Answer b) is incorrect because it is not true that insects are more attracted to light in the yellow and red portions of the spectrum.

8) Answer c) is correct.
A bright light shining onto a white wall may be the most attractive presentation of light from an insect's point of view.

Answer a) is incorrect because indirect landscape lighting tends to be low intensity and mostly shielded. Answer b) is incorrect because sodium vapor lights are less attractive to insects than most types of lights.

9) Answer a) is correct.
Bright decoy lights every 100 feet at a distance of 250 feet from the building will produce a wall of light attracting insects from the school yard and away from the school itself.

Answer b) is incorrect because the decoy lights are too close to the building and there are not enough to outcompete security lighting. Answer c) is incorrect because decoy lights on the roof would actually draw insects to the building.

10) Answer d) is correct.
Lighting strategies that reduce insect problems almost always come with trade-offs, two of which are that lights that are less attractive to insects may also be dimmer and less attractive to people, and low-pressure sodium lamps wash out most colors, for example, making them appear yellow or gray, and should be used only where color rendition is not important.

Answer a) is incorrect because, while true, it is only part of the answer. Answer b) is incorrect because, while true, it is only part of the answer. Answer b) is incorrect because, while true, it is only part of the answer.

11) Answer a) is correct.
It is true that lighting alternatives can often reduce the insect risk without seriously affecting security because there are less attractive light sources that still provide adequate light for security purposes. Light shields can also help reduce a light's attractiveness without significantly reducing its security effect.

4.4 LANDSCAPING

1) Answer b) is correct.
Wineglass-shaped shrubs do not favor rodents and other pests because the area under them is open and unprotected, a poor burrow site for rodents, and easy to inspect.

Answer a) is incorrect because thick low-growing ground covers such as juniper hide burrows and provide ideal rodent hiding places and runways, the ground underneath is impossible to inspect, and the plants capture food debris and other trash. Answer c) is incorrect because mound-shaped shrubs provide good hiding areas for rodents and other pests and they are difficult to inspect underneath. Answer d) is incorrect because answers a) and c) are incorrect.

2) Answer d) is correct.
Thick low-growing ground covers such as juniper and ivy hide burrows and provide ideal rodent hiding places and runways, the ground underneath is impossible to inspect, and the plants capture food debris and other trash.

Answer a) is incorrect because this answer is only a part of the reason that thick, low-growing ground covers are a contributing factor for rodents. Answer b) is incorrect because this answer is only a part of the reason that thick, low-growing ground covers are a contributing factor for rodents. Answer c) is incorrect because this answer is only a part of the reason that thick, low-growing ground covers are a contributing factor for rodents.

3) Answer a) is correct.
Wineglass-shaped shrubs are open at the base so the area under them is open and unprotected, a poor burrow site for rodents, and easy to inspect.

Answer b) is incorrect because the fact that they supply shade does nothing to make the plants less attractive to rodents. Answer c) is incorrect because some wineglass plants may, in fact, produce fruit and should never be placed close to a building. Answer d) is incorrect because answers b) and c) are incorrect.

4) Answer b) is correct.
When rodents are living in large numbers under a large area of thick, dense ground-hugging plants, pest management professionals are unable to inspect the area properly, nor can they get to many of the burrows for treatment. The best way, and sometimes the only way, to deal with the rodent problem in such a site is to remove the plants and make the area accessible for treatment and unattractive for rodents.

Answer a) is incorrect because a mass trapping program would be difficult or impossible in an area of thick, dense ground-hugging plants, and this area would likely also have birds and other non-targets that could be killed by the traps. Answer c) is incorrect because tracking powders can only be used outdoors in burrows at a building perimeter.

5) Answer a) is correct.
The thorns on thorny shrubs act as hooks that grab onto any windblown trash.

Answer b) is incorrect because trees are not very effective at capturing wind-borne trash except for a few shrubby, thorny trees such as acacia and locust. Answer c) is incorrect because wineglass-shaped shrubs are rarely a problem in capturing wind-blown trash.

6) Answer a) is correct
When tree branches touch a building it allows ants, squirrels, and rats (roof rats especially) to follow branches and enter a building.

Answer b) is incorrect because tree shade may make the area more attractive to certain pests, but it is not a major issue. Answer c) is incorrect because raking leaves can help reduce the attractiveness of the area to certain pests, but it is not as important as the issue of the entry to a building provided when tree branches touch the building.

7) Answer b) is correct.
A distance of 300 feet from a school is a good rule of thumb for fruit and nut trees because it is the upper limit of the foraging distance for Norway rats. It is also far enough away to limit squirrel activity near the building.

Answer a) is incorrect because 25 feet is well within the foraging distance for rats and mice, and well within the common flying distance for stinging insects around a food source. Answer c) is incorrect because 1,000 feet is excessive.

8) Answer c) is correct.
Low-growing dense shrubs are especially a problem around dumpsters because dumpsters are the number one site for rodent activity, and these shrubs make the site even more attractive to rats, as well as more difficult to inspect and treat for technicians.

Answer a) is incorrect because such shrubs at a building's foundation make it more likely that rats will nest there, but the most serious problem is associated with the dumpsters. Answer b) is incorrect because play areas are usually not a prime site for rat activity.

9) Answer a) is correct.
Bees and wasps attracted to flowers near points of student activity greatly increase the risk that students will be stung.

Answer b) is incorrect because flowering plants offer little to attract rodents. Answer c) is incorrect because flowering plants do not compete with insect baits.

10) Answer b) is correct.
Weeds are attractive nest areas for rodents. String trimmers can be used to mechanically manage weeds along fence lines or around abandoned equipment or debris, which are particularly attractive to rodents.

Answer a) is incorrect because rodents are unaffected by the noise of string trimmers. Answer c) is incorrect because string trimmers are not designed to level ground, although it might be true in the very limited sense of clearing a patch of ground of vegetation to make station placement easier.

11) Answer c) is correct.
Organic mulches are made of plant material that gradually decomposes, and they attract millipedes, sowbugs or pillbugs, cockroaches, slugs, earwigs, and crickets and other pests that feed on decaying material.

Answer a) is incorrect because some eggs may be present in delivered mulch, but high populations are caused by the fact that these pests feed on the decaying mulch. Answer b) is incorrect because none of the pests mentioned are predators, so they have no "prey," and instead feed on decaying vegetation.

12) Answer a) is correct.
This statement is true because termites can travel through the protective mulch above ground and any termiticide barrier in the soil and enter the building through foundation cracks, conduits, or weep holes in brick.

13) Answer a) is correct.
A layer of mulch no deeper than three inches will usually dry out enough at times to kill or repel any moisture-loving pests, or at least keep their population low.

Answer b) is incorrect because a layer of mulch that is deeper than three inches stays damp for too long and becomes very favorable for large populations of moisture-loving pests. Answer c) is incorrect because a layer of mulch that is deeper than three inches stays damp for too long and becomes very favorable for large populations of moisture-loving pests. A 12 inch layer of mulch would greatly favor large populations of moisture-loving pests; unfortunately, mulch this deep is not uncommon around schools.

14) Answer b) is correct.
A mulch-free border 12-inches wide provides a barrier to many moisture-dependent pests and is easy to inspect. It is best if this area is covered by gravel.

Answer a) is incorrect because a three inch barrier is not enough to reduce pest movement towards the building, and is not wide enough to remain intact. Answer c) is incorrect because while it would be excellent from a pest prevention standpoint, it would never be acceptable to landscapers or school grounds departments.

15) Answer a) is correct.
Splash blocks and extended downspouts can be used to drain rainwater away from the school building and beyond the mulched area, helping to keep the mulch dry and less attractive to moisture-loving pests.

Answer b) is incorrect because shredded hardwood mulch is the most likely to hold excessive moisture and stay wet. Answer c) is incorrect because covering mulch with leaves will increase moisture retention by the mulch.

study guide

Chapter 5

CONTROL TOOLS

5.1 INSECT TRAPS

As discussed in Chapter 2 Monitoring Tools, traps are commonly used in IPM programs for monitoring, but they are also used for pest control. There are some advantages of traps such as the capability of monitoring an area 24/7 and thus, provide data regarding pest activity when the technician is not present; capturing and holding pests for further identification; tracking and recording trends over time; being a low risk tool, as a control alternative. However, here are also some disadvantages to traps in a school setting such as school children investigating and interfering with traps that are visible and accessible. For this reason, it is important to place traps in areas inaccessible to children; occasionally being moved, stolen, or discarded by custodians and food service workers; being cited by a health inspector in kitchen operations when they find insect pests in traps.

STICKY TRAPS

The traps commonly used to capture insects are sticky traps, pitfall traps, jar traps, and light traps. While primarily used for monitoring insects rather than controlling them, both sticky traps with or without pheromone can be considered a viable control tool when placed strategically and in enough quantity. As part of a monitoring program, sticky traps can identify areas where pests are located, the relative size of the population, and the status of the control efforts. Cockroach traps will sometimes adequately suppress a small, isolated cockroach population in a location such as a pantry, or around a sink, if enough traps are used. When trapping for cockroaches, place traps in areas where cockroaches will likely travel based on the behavior of the cockroach you are controlling. For example, German cockroaches are most likely to be found in cracks and crevices near warmth and a source of moisture.

Pheromone mating disruption devices can flood the area with mating pheromones to interfere with successful mating. Certain stored product pests in a food storage room will be suppressed when enough mating disruption devices (pheromone traps designed for that pest) are placed in a tight grid throughout the room. These devices are placed in a grid pattern to evenly disperse the pheromone in the treatment site.

Fly traps come in a wide range of styles and can suppress populations when placed in large enough numbers but are best used as supplemental control to capture occasional fly invaders. There are sticky traps designed for both interior and exterior uses (e.g., flypaper in sheets and rolls as well as other type of sticky traps that contain an attractant). Care must be taken in placing these traps in areas to ensure people will not contact them. Also, some of them smell quite bad. Window mounted traps, which are small and relatively inconspicuous, can be used to trap flies attracted to the natural sunlight of the window.

INSECT LIGHT TRAPS (ILTs)

Insect light traps (ILTs), which use UV light to attract flies, may be used in areas inaccessible to children. ILTs traps use either glue to hold the insect or the insect is killed via an electrical charge. ILTs kill flies and other flying pests that have entered the school from outside or that have emerged from infested materials. There are many types of ILT traps including ceiling-hung, two-sided models, wall-mounts, corner-mounts and decorative wall sconce ILTs for use in cafeterias and other public areas. ILTs must be installed and maintained properly to be effective.

ILTs should be placed so that they do not face open doors or windows which may attract more insects into the building. Never place ILTs in such a manner that compromises food safety by attracting flies towards open and exposed food. Install ILTs at key points along the paths to stored or processed

food; that is where the flies will be heading. This way flies can be intercepted along their pathway from the exterior to the sensitive food preparation areas. In kitchens and other food prep areas, ILTS should be placed to draw the insects away from the food, but it is imperative to follow all applicable food codes regarding ILT placement.

You can greatly increase the effectiveness of the traps by placing the right trap in the right location, so look for high insect traffic areas. A good first line of defense is a large ceiling-hung trap mounted 15-25 feet inside of the school loading dock (if there is one) or in food delivery doors. The ILT should be mounted perpendicular to the door so that the light will not be seen from outside and will not attract insects into the facility. However, the majority of ILTs should not be ceiling-hung, but instead placed low because ILTs installed within five feet of the floor will capture many more flies, which are your main concern in schools. Also, bear in mind that most flying insects, such as moths, will not respond to lights more than 100 feet away and flies rarely respond if the light is beyond 25 feet.

ILTS should have their bulbs replaced per manufacturing recommendations, which in most cases, is at least once per year. Bulbs need to be shatter resistant in food areas and per local food codes. You cannot tell by looking at a glowing UV bulb whether it is working at full strength. It looks the same to humans, no matter the phosphor degradation. Bulbs will lose effectiveness over a period of time. Check with the manufacturer for data on phosphor degradation percentages over time. For example, some bulbs lose 50% of effectiveness after a year of continuous use. Common bulbs may only have an effective life of 7,000 hours, or about nine months, but some bulbs may remain effective longer. Regardless, bulbs in continuous use should be changed every nine months, or per manufacturer recommendations, in order to coincide with the effective life of the bulb, even if they appear to be burning strongly. It is a good idea to keep records on when new bulb installments are made in order to schedule replacements.

Instruct schools to avoid placing items in front of the ILT, which might render it ineffective. Collection trays for ILTs should be emptied often and glue boards replaced when they have insect captures or have reduced tackiness. As a general rule, boards should be replaced at least once per month. Dead insects in an ILT can attract dermestid beetles and other scavengers and if traps are not serviced often enough, scavenger pests may lay their eggs right in the trap, making the trap the cause of an infestation rather than the cure. Keep records of trap inspection dates and captures. In order to maintain good records, put the date and initials on the glue boards when they are replaced.

JAR TRAPS AND BAG TRAPS

Jar traps and bag traps are typically used outside for filth flies and inside for small flies such as Drosophila (small fruit flies or vinegar flies). Commercial lures for filth flies can be objectionable to humans and are not typically placed in public areas. Different lures are used depending on the target pest. Some lures are designed specifically for Drosophila flies. These traps typically contain a liquid attractant like vinegar or fruit extracts. For filth flies on the exterior of structures around dumpsters and other areas, these traps may contain a variety of lures designed to attract filth flies, including house fly pheromones.

Jar traps can also be used for capturing yellowjackets on the exterior of structures, which is useful because yellowjackets can present sting hazards around schools. Remember that yellowjackets present hazard to children. This is especially true in the fall and around food, drink and garbage. For a serious fall yellowjacket problem around a large school and its grounds you might need to trap ten or twenty thousand yellowjackets. For this reason, consider starting your trapping efforts in the spring when wasp numbers are small. Aim to reduce populations before they achieve high population numbers. Always use an adequate number of traps and be sure to place them in areas where children cannot access them. Whenever possible, locate nests and destroy them in conjunction with trapping. Sunny locations tend to be better trap sites, but the sunniest locations may change through the day. Secure jar traps to prevent movement from selected placement sites.

5.2 RODENT TRAPS

Most technicians are familiar with traps for rodent control, and there is nothing special about their use in IPM except that they are typically used more often. The most common traps used to catch mice and rats are glue boards, snap traps, and multiple-catch mouse traps (repeating mouse traps). There are also other kinds of traps that are used less commonly such as, small "live traps" that will capture single mice alive to be disposed of or relocated and electronic shock traps that use batteries and an electrocuting plate to kill mice or rats that enter the trap.

There are several advantages to using traps and they are typically preferred over rodenticide application in a school, and especially inside, if the traps can be used effectively to solve a particular problem. Some advantages include:

- reduced risk of environmental contamination from chemicals.
- reduced use of pesticides inside sensitive sites such as schools where pesticide use must be kept to a minimum.
- effectiveness against both large and small populations of rodents.
- immediately being able to tell whether the control has been successful, which is unlike the results of poison baits.
- the holding of the rodent carcass for disposal, which avoids odor and insect problems that occur when rodents die in hidden locations.
- absence of toxic bait for rodents to carry away or to translocate and potentially contaminate other sites.
- immediate capture of a rodent instead of potentially taking many days to kill, which is the case of poison baits and during the wait time for the rodent to die, it will continue to feed and contaminate food.

However, there are some disadvantages to using rodent traps in a school setting including:

- interference with traps that are visible and accessible to school children who may investigate them.
- traps being moved, or discarded by custodians and food service workers.
- considerable expense to purchase, service and set up traps in sites with large rodent populations requiring many traps.
- visibility of dead rodents to school children and staff unless traps are placed inside bait stations or under other cover.
- frequent returns to the school to remove dead rodents, and rebait/ reset traps.
- potential injury to children who may come into contact with traps. Rodent snap traps can cause injury and rodent glue boards can stick to hands, feet, and other body parts of children. Further, rodents captured on glue traps may not be killed immediately and pose a risk to children or staff if they attempt to handle the board. For this reason, traps should not be used where there are children or where animals can get at them unless they are placed inside a tamper-resistant bait station.
- citations by health inspectors when they find rodents in traps in kitchen operation areas.
- inhumane extermination of a rodent. Rodents that are caught by the leg or tail, or that suffocate, do not die humanely or quietly. This may disturb school children.

RODENT SNAP TRAPS

Rodent snap traps have been around for a very long time. The original professional mouse trap is the wooden base, spring-operated snap trap people are familiar with. The main improvement of snap traps since they were first developed is the expanded trigger design which improves trapping success. Snap traps may now also be made of plastic or metal, but plastic snap traps are preferred in wet environments and on the exterior of buildings.

The killing bar on a snap trap is powered by a spring and is released when a rodent steps on the bait pan. When it works properly, the rodent is killed quickly when its neck, skull, or back is broken. When it does not work properly, the rodent may escape or may be trapped, but remain alive. Mouse snap traps will not kill rats; larger, more powerful traps are required for rats. Snap traps can be baited with food or nest material, or left unbaited. Most schools will not want peanut butter used as a bait, or any other big eight allergens used due to food allergies. Consult with the school policies before using a food lure.

In addition to the traditional snap trap, for mice there are also "clam shell" snap traps which can be set with one hand and are easily cleaned. However, some clam shell traps suffocate the mouse, instead of killing it quickly.

RODENT GLUE TRAPS

Glue traps for rodents are similar to sticky traps used for insects but are often larger in size. They consist of a cardboard or plastic tray base covered with a sticky material. Some models are "pre-scented" with a food smell and some models are covered or can be folded into a tent shape; others are perforated so they can be torn down to fit specific areas. However, in general, it is best to use glue boards flat and not tented or covered. Also, avoid using oily food baits on glue traps because they will reduce the effectiveness of the glue. Glue traps are less effective in extreme temperatures, if they become wet, or if they become dusty or covered with debris. In dusty or damp areas, place glue traps inside rodent bait stations. Make sure the glue trap is inside so that the rodent commits to entering before it detects the glue surface. Glue traps are often used inside multiple-catch traps to hold captured mice. An advantage of adding the glue trap is it contains the rodent and dropping for easy removal. It can also serve as a monitor for insect pests.

Students and school staff may consider glue traps to be an inhumane method of rodent control because glue traps kill primarily by suffocation when the rodent's face becomes trapped in the glue. In situations where visibility of a caught or trapped rodent might be objectionable, place glue traps inside rodent stations or use an alternative trapping method. Glue traps are most often used for mice; larger glue traps with a stickier surface can be used for rats. It is important to secure traps for safety reasons and inspect traps frequently. Rats generally do not die quietly or easily on a glue trap and may carry the trap away if it is not securely anchored. Similar to snap traps, glue traps should be placed inside tamper-resistant bait stations if children, pets, or other non-targets may access the traps. If a glue trap becomes attached to a non-target, regular cold cooking oil can be poured on the trap and it will dissolve the glue to release a child's hand, a snake or any other animal accidentally trapped.

RODENT MULTIPLE-CATCH TRAPS

Multiple-catch or automatic repeating mouse traps are larger, metal or plastic traps that are capable of catching many mice without having to be reset. Multiple catch traps are for mice not for rats, although, occasionally a multi-catch mouse trap may capture a juvenile rat. There are "wind-up" traps that "kick" the mouse into the trap. Other traps use a double treadle door to channel the mouse into the trap. Mice are usually captured alive but can also be caught on a glue board placed inside the trap.

Multiple-catch traps work because mice are curious and will investigate new things in their territories. Mice will usually enter the small entrance hole without hesitation and with or without a food attractant. Traps which have previously captured mice will have urine and other odors which tend to attract additional mice into the trap. Bait or scents can be added to multiple-catch traps but may not significantly increase trap catches.

RODENT TRAP PLACEMENT

If you are not sure about sites of activity, set traps along possible runways. Glue traps should be placed in the same locations that you would place snap traps, with the following exceptions:

- placement must be lengthwise against the wall or other object that lines a runway.
- placement should not be in direct sunlight.
- placement should not be in extremely cold conditions (below 20 degrees F.), or near open flames or on hot pipes.

Traps can also be set overhead along pipes, beams, rafters, etc. Set snap traps along pipes or beams, especially where you see rub marks. Fasten the traps to pipes or beams with nails, wire, heavy rubber bands, bungee cords, Velcro straps, or hose clamps. Glue traps can also be fastened to pipes, but not hot pipes, and beams that are overhead runways. Secure glue boards in place using wire, zip-ties or other methods. Do not place traps above food areas.

Traps for roof rats should be placed in somewhat different locations. Set traps along branches, beams, ledges, and sills. Traps can be attached to chain link fence poles or tree branches using cup hooks and rubber bands or bungee cords. Be sure to consider safety to children in selecting locations for these traps. Outdoor traps should be set only from dusk to dawn to avoid trapping non-target animals like birds and squirrels. Indoors traps should be set in dark corners inside suspended ceilings, attics, or overhangs and soffits.

MULTIPLE-CATCH TRAP PLACEMENT TIPS:

Concentrate your traps where you see or suspect rodent activity, rather than evenly spacing them around the perimeter of a room or building.

Place more traps in areas of high activity and fewer traps in other areas.

Place traps along the route between the rodent's nest and its food source.

Place traps where you see large numbers of droppings because that is where the rodents are spending most of their time.

Place traps along baseboards or edges of walls or other objects where you see obvious signs of rodent activity.

Other good trapping sites are behind objects, and in dark corners, particularly where runways narrow funneling rodents into a small space.

Glue traps, however, should not be placed in corners because mice slow down to explore corners and their whiskers may touch the glue warning them away.

To increase effectiveness, set two or three snap or glue traps side by side, about an inch apart, so that a rodent leaping over one will be caught in the second or third.

Rats and mice react differently to traps. Rats are wary of anything new in their territory and will initially avoid it, while mice are usually very curious and will usually explore new things. At the beginning of a trapping program for rats, place baited traps unset for a few days, or a week, so the rats will get used to them. Because mice are curious, you can improve your trapping results by moving boxes, pallets, shelves, or other objects in their territories to create new runways that lead to your traps. Mice will investigate the changed territory thoroughly. While getting rats used to traps can take some time, a mouse trapping program can be very successful very early. Perhaps the biggest mistake in trapping rodents is not using enough traps. A large number of snap traps or glue traps set for a short time will be more effective than a small number of traps set for a long time.

RODENT TRAP BAIT

If rodent food or nest material is in short supply, attractive bait can increase trap effectiveness. For mice, dental floss, bacon, cereal, and chocolate are traditional baits. To prevent thievery of the bait, use a sticky bait like cheese whiz or one of the commercially available non-allergen based baits that cannot be carried away. Or, tie the bait onto the trigger with dental floss. Baits for Norway rats include hot dog slices, raw bacon, oil-packed sardines, beef jerky, chicken nuggets or burger bits. Roof rats prefer more vegetarian foods such as raisins or prunes, grapes, or pieces of bananas, oranges, or apples. Another favorite food of roof rats is snails, which can be tied to the trigger using string or dental floss. Food baits must be fresh to work well, so check bait frequently and replace moldy or rancid bait. You can also bait traps with nesting material such as cotton balls, soft string, dental floss, and strips of cloth. Nesting material is especially effective as bait in areas where food is already abundant but nest material is in short supply. You can also add a couple of drops of a food oil or vanilla extract to a cotton ball. Tie the nest material to the trap. Avoid nut-based baits including peanut butter due to potential for allergic reactions.

PLACEMENT DIFFERENCES FOR MICE AND RATS

Mice	**Rats**
Trap placement should be five to ten feet apart, and even closer if the population is large. Be aware of traps being so close that they set off a chain reaction.	Trap placement should be 10 to 20 feet apart, and even closer if the population is large.
Perpendicular to the wall or object with the trigger next to the wall.	Perpendicular to the wall or object with the trigger four to six inches away from the wall.

2 TACTICS TO HELP IMPROVE LONG-TERM TRAPPING SUCCESS AGAINST MICE:

After a week of trapping success, unset your traps for a week.

When you restart the trapping, move the traps several feet to new locations to take advantage of the mouse's natural instinct to investigate new things.

Service frequency for traps can range from daily, to twice a week, to monthly depending on where the trap is located and the chance for odor problems from dead rodents. In warm, summer weather, check traps more often because decaying carcasses can quickly attract flies and other pests. Wear disposable gloves when handling dead rodents. Dispose of the rodents in a sealed plastic bag.

5.3 OTHER PHYSICAL CONTROL METHODS

VACUUMING

Vacuuming can be used to control many pests. IPM technicians are increasingly using industrial-type vacuums to suck up cockroaches, flies, ants, spiders, and other pests. For many pest problems, a vacuum may be all that is needed. A group of cockroaches living under a rabbit cage in a school science classroom can best be removed simply by lifting the cage and vacuuming them up. For other pest problems, a vacuum may be the only control method that is acceptable. Examples include ants or cockroaches living inside an oven. Vacuuming is the quickest way to quickly knock-down populations of aggregating pests such as boxelder bugs, cluster flies, spiders, clover mites, even yellowjackets. Using a crevice tool on the vacuum can eliminate large pockets of cockroaches in heavy infestations. As an added benefit, vacuuming also removes roach droppings, body parts, egg-capsules, and other cockroach allergens, as well as food particles and debris. Special vacuum attachments allow vacuuming under appliances and around sensitive equipment like computers. A protective bee suit should be worn when vacuuming yellowjackets.

After vacuuming, the vacuum bag should be dropped into a sealable plastic bag and discarded. To ensure all insects are dead, vacuum up talc or corn starch at the end of every service to kill any pests that might have remained alive inside the vacuum bag. This abrades and desiccates any pests that might have remained alive. Vacuums should be equipped with high efficiency filters (100-series HEPA filters) to capture cockroach, mouse, or other allergens that otherwise could become airborne.

EXTREME TEMPERATURE TREATMENTS

Some materials that are infested with pests can be disinfested with heat or cold. Freezing infested materials in a large commercial freezer that can reach temperatures of zero degrees Fahrenheit or lower. Lyctid beetles will be killed by holding the specimens at zero degrees for at least 48 hours, although four days is preferable. Most other pests can be destroyed by the same regime. Books can be disinfested by wrapping them tightly in plastic and freezing them for one to two weeks. Note that freezing poses a significant risk of damage to certain woods, bone, lacquers, some painted surfaces, and leather. Low, but above-freezing temperatures, usually 40-42 degrees Fahrenheit can be used to protect items in storage.

Heat will also kill insects. Successful heating may be complicated by insulating properties of the item within which the insect resides. The following temperatures are a guide but longer temperatures may be required if the pest is inside food, wood or other item which helps insulate the pest from the heat. Holding a specimen at a temperature of 130 degrees Fahrenheit for three hours will kill any insect. This level of heat may damage veneers or the finish of specimens, warp lumber, or melt glues. Small items can be heated in an oven to kill infesting pests and larger items may require a commercial kiln. Items can also be placed under tarps and portable forced-air heaters used to raise the temperature to the desired level.

OTHER TREATMENTS

Infested items can also be treated in a chamber using a low-oxygen atmosphere. The item is encased in plastic under a vacuum. Nitrogen or carbon dioxide replaces the oxygen, suffocating the pests. Moisture reduction can prevent and sometimes even suppress or eliminate certain pest populations. Examples include millipedes, springtails, powder post beetles, house centipedes and psocids. These pests require relatively high levels of moisture to survive. In some cases simply reducing moisture levels through structural changes, ventilation, or using dehumidifiers will eventually desiccate and kill the pests. Even when reduced moisture does not kill the pests directly, it may make it impossible for them to reproduce.

5.4 PESTICIDES

Pesticides are acceptable tools in school IPM programs, but they must be used judiciously. Pesticides should not be applied automatically or on a schedule. Established action thresholds should be used to trigger applications. Pesticides can be used when justified against identified pests and when non-chemical control measures are unavailable, impractical, ineffective, or likely to fail to reduce pests below action thresholds. Whenever pesticides are used, they are always used in ways that minimize risk to people, particularly school children, and the environment. Never apply pesticides when school children are occupying a room or area. Limit pesticide applications in classrooms, hallways, cafeterias, and other common areas during school hours or when children are present. In general, pesticides should not be applied in public areas during school hours. Government regulations or school policy may dictate their limited use. Pest emergencies, such as stinging insects, may also dictate the use of pesticides in public areas after the students have been removed.

Do not apply insecticide sprays or dusts in infirmaries, nursing stations, and other medical areas except in severe infestations. If such treatment is necessary for a severe infestation in these areas, get clearance from medical personnel in advance. Choose pesticide products that pose the least risk to people, particularly to children. When using indoors, choose a product with low volatility to minimize the level of airborne pesticide residues present after treatment. Additionally, choose an insecticide application from those listed below rather than space treatments (fogging) or general treatment of floors, walls, or furniture.

- insecticide bait stations
- insecticide paste, gel, or granule baits applied in cracks and crevices
- insect growth regulators
- application of insecticides into cracks, crevices and voids

When using outdoors, avoid pesticide drift into non-target areas. Place rodenticides in tamper resistant bait stations. When possible, hide bait stations from view and follow all notification and posting guidelines.

For insects and other arthropod pests indoors in schools, baits are normally the first choice if an insecticide is considered necessary. Baits are specific to certain pests and are very effective against those pests. Compared to many other insecticide formulations, baits have relatively low toxicity to people. Baits are low in volatility; the less insecticide vapors in the air, the lower the hazard from airborne residues. Many types of bait are designed to be placed in voids, cracks and crevices, further reducing hazard. Baits are generally more accepted by people who are against other forms of pesticides. Bait treatments do not leave behind any noticeable odor. Insecticide baits are available for cockroaches, ants, termites, and crickets. For other pests, success is variable using insecticide baits.

Pastes, gels, and other injectable baits are designed for use inside cracks and crevices, and in small "spots." Insecticide bait may be packaged inside tubes or syringes that you squeeze to apply, or designed to be applied by various types of bait "guns" or with a small spatula or putty knife. The main benefits of injectable baits over other baits are that the placements are hidden, and that the baits are more easily placed inside cracks, crevices, and voids. Injectable baits come in a cartridge, syringe, or special applicator gun and are applied as either a bead or a spot, depending on the site you're treating. Be careful using these applicator guns in schools. They may be confused with the real thing.

ADVANTAGES TO INSECT BAIT STATIONS:

- The insecticide is enclosed and protected inside a plastic station.
- The bait remains effective for long periods.
- The stations are very easy to apply. Bait stations are also easily removed at the end of the treatment period.

Insecticide bait stations are available to control both cockroaches and ants. Baits can be placed in stations, or stations may come prefilled; stations provide their own voids, cracks and crevices. Stations should be labeled with their content. Never use peanut butter based stations, especially in classrooms. Cockroach baits are used most often against German cockroaches, but can be effective against other species as well including the American cockroach. Based on the biological and behavioral characteristics of the German cockroach, there are certain techniques that technicians should follow when using baits. Sufficient quantities of bait must be placed based on the size and range of the population. Oftentimes, the more bait placements, the more effective the control. Put a small amount of bait at each placement site. Follow all label directions when making placements. Place baits in cracks and crevices, voids or into secured bait stations wherever possible. Place bait stations in corners or flush against edges, horizontally whenever possible. Areas

with cockroach spotting are prime baiting sites. Replace bait as needed, following the manufacturer's directions. In heavy infestations, replace bait more often. Do not allow an excessive build-up of gel and paste baits; once a year, scrape up old bait with a spatula. Avoid using other insecticides near bait (except for IGRs-insect growth regulators), and avoid contaminating baits with any chemicals. Be aware of possible chemical residues on your hands. Carry baits separately from other insecticides. Enforce sanitation near baiting sites. Baits work much better when cockroaches are hungry. Carefully inspect at each service visit and change baiting sites to reflect recent cockroach activity. Remove old bait stations when replacing new ones or cockroaches may live inside them after the bait is gone. To avoid resistance, you should periodically change the type of bait used.

Ant baits come in prepackaged plastic bait stations, gel tubes, squeeze bottle, liquids, or as a concentrate to be mixed with a food bait. Bait effectiveness varies greatly in ant control. One type of bait may work very well against a few species, fair with some, and not at all against others. Particular ant bait effectiveness may change from season to season. No matter which ant bait product formulation is chosen, placement is critical in determining success. Bait ant trails wherever ants have been seen. When possible, try to place bait between the nest site and where the ants are foraging for food. Place bait near water sources, such as around sinks, tubs, toilets, water fountains, air conditioners, dishwashers, potted plants, aquariums; near food sources, such as near pet food, kitchen counters, stoves, shelves, microwaves, vending areas, break areas, and on windowsills where ants feed on dead insects; and around heat sources, such as near light fixtures, electrical boxes, heat ducts, hot water heaters, radiators, and near appliances such as refrigerators.

Baits should be checked and replaced often. Baits that have no activity should be moved. Surveying and prebaiting with a non-toxic bait may save time and the unnecessary use of bait. Honey, jam or dead mealworms are an example of possible pre-bait food lures. Once the technician is satisfied that there are a number of active baiting sites, the non-toxic food baits are replaced by the toxic bait formulation. Rodenticides are sometimes necessary to suppress rodent populations around schools, but great care needs to be taken in their use because of their toxicity to people, especially children.

DISADVANTAGES TO INSECT BAIT STATIONS:

- The stations may be visible to the public.
- School children may access the stations if they are not secured or is they are placed improperly.

There are three common formulations of rodenticide used against rodents: food baits, water baits, and tracking powders. Use rodenticides of any sort only as a last resort. In schools, especially, nonchemical methods are preferred over the use of rodenticides. Non-chemical methods include snap-traps, tin cats and catchalls. Avoid the use of rodenticides in any student area except under emergency conditions. Or, use rodenticides during periods when school is not in session and children are not going to be present in the building. Baits are preferable to tracking powder in most scenarios because tracking powder has both higher toxicity and increased risk of exposure from dust in the air. All baits should be removed at the end of the baiting program. Bait should not continue to be used as part of a preventative strategy. All spoiled bait and any unused bait shall be disposed of as specified on the product label. Never dispose of pesticides at the school.

Children, pets, or other non-target animals should never be exposed to rodenticides. Follow all use directions and precautions on the label of each specific rodenticide product used. Be sure you select a product which is labeled for use in or around schools. Also, some rodenticide products may not be labeled for use in burrows. Place all rodenticides around a school according to label instructions which may reference placing bait inside heavy-duty tamper-resistant bait stations. Unless there is a very good reason, and the baiting is performed under close supervision, it is not appropriate to use rodenticides inside rodent burrows at schools. Bait stations must be anchored securely to the ground or other surfaces to prevent them from being moved or their contents displaced in areas accessible to children or pets. Stations should be secured and lids should be locked or otherwise secured as well. Each bait station should be labeled with a number and have a unique identifying number keyed to a location on a map or drawing of the area. Some states may require the labeling of the station with the name of the rodenticide product used. Follow state requirements in addition to rodenticide label requirements.

study questions

Chapter 5

CONTROL TOOLS

5.1 INSECT TRAPS

1) Traps are nontoxic, easy to use, and have what additional advantage?
   a) Contain pests for identification and disposal.
   b) Can be checked by health inspectors.
   c) Can be moved by food service workers.

2) What is a disadvantage to using traps in a school setting?
   a) Traps are difficult to use.
   b) Custodians may move or discard traps.
   c) Traps are non-toxic.
   d) All of the above.

3) While primarily used for monitoring, insect traps can sometimes control insects when placed in large enough numbers.
   a) TRUE
   b) FALSE

4) A glue trap may provide information about:
   a) The relative size of a pest population.
   b) The effectiveness of current pest management procedures.
   c) The location of pests.
   d) All of the above.

5) In what pattern should you place pheromone mating disruption devices in a room if your goal is to suppress a particular stored product pest?
   a) In a tight grid throughout the room.
   b) Staggered at different heights.
   c) Every five feet around the perimeter.
   d) At all doors and windows.

6) Which of the traps below is designed to trap flies?
   a) Insect light trap.
   b) Window-mounted trap.
   c) Jar trap.
   d) All of the above.

7) What types of lures are best suited for yellowjacket jar traps in the fall?
   a) Protein based lures.
   b) Sweet based lures.
   c) Oil based pheromone lures.
   d) All of the above.

8) Filth fly jar traps with commercial lures are often used indoors.
   a) TRUE
   b) FALSE

9) Insect light traps will not attract moths beyond what distance?
   a) 10 feet.
   b) 25 feet.
   c) 100 feet.

10) Insect light traps will not attract flies beyond what maximum distance?
    a) 10 feet.
    b) 25 feet.
    c) 100 feet.

11) What position is the best to install a ceiling-hung insect light trap at a loading dock door?
    a) Directly under the top door frame with the trap facing outside.
    b) 20 feet back from the door with the trap facing the door.
    c) 20 feet back from the door with the trap perpendicular to the door.

12) If your main goal is to trap filth flies, where should place an insect light trap?
    a) Within five feet of the floor.
    b) Within five feet of the ceiling.
    c) Hung on the ceiling.

13) Which of the following locations below would be a good site for an insect light trap?
    a) Over a food preparation area.
    b) In a narrow hallway.
    c) In front of a window.

14) Which of the following statements about insect light traps is true?
    a) UV bulbs dim noticeably as they lose power.
    b) The effective life of the average UV bulb is nine months of continuous use.
    c) The effective life of the average UV bulb is 16 months of continuous use.

15) An insect light trap can become the cause of an insect infestation in a school.
    a) TRUE
    b) FALSE

5.2 RODENT TRAPS

1) There is nothing different about the use of rodent traps in IPM as compared to traditional pest control except that they are typically used more often.
    a) TRUE
    b) FALSE

2) Which of the following is NOT an advantage to rodent traps?
    a) School children are often curious about traps.
    b) No risk of environmental contamination.
    c) Effective against both large and small populations of rodents.
    d) Tell immediately whether control was successful.

3) Which of the following is an advantage to using traps inside a school?
    a) Health inspectors can see if rodents are present.
    b) To be effective, many traps need to be set.
    c) Traps hold the rodent carcass for disposal.
    d) All of the above.

4) One disadvantage to using traps in a school is the risk of them being moved.
    a) TRUE
    b) FALSE

5) How can you prevent children from seeing trapped mice or from interfering with the traps?
    a) Place traps inside tamper-resistant bait stations.
    b) Place traps out of reach.
    c) Use traps in unoccupied areas.
    d) All of the above.

6) What has been the main improvement in the snap trap since its development over 100 years ago?
    a) Plastic construction.
    b) Expanded trigger.
    c) Increased power.

7) Snap traps are designed to kill rodents by what method?
    a) Suffocation
    b) Shock
    c) Breaking the neck, skull, or back

8) Mouse snap traps are not designed to kill rats.
    a) TRUE
    b) FALSE

9) Snap traps can be baited with food bait or nest material, or left unbaited.
    a) TRUE
    b) FALSE

10) Glue traps are effective against which rodents?
    a) Mice.
    b) Rats.
    c) Both mice and rats.

11) Glue traps kill primarily by suffocation when the rodent's face becomes trapped in the glue.
    a) TRUE
    b) FALSE

12) What is a disadvantage of using glue traps against rats?
    a) They will avoid the glue traps.
    b) They generally do not die quietly or easily, and may drag the trap.
    c) You must use larger glue traps than for mice.
    d) All of the above.

13) What is the best way to release a non-target animal or a child's hand from a glue trap?
    a) By pouring on oil such as vegetable or baby oil.
    b) By heating the glue.
    c) By freezing the glue.

14) Multiple-catch traps are designed for capturing mice and not rats.
    a) TRUE
    b) FALSE

15) How do multiple-catch traps capture mice?
    a) They "sweep" the mouse into the holding area.
    b) They "channel" the mouse into the trap with a double-treadle door.
    c) There are multiple-catch traps that use both methods, a) and b).
    d) None of the above.

16) Which statement is true about multiple-catch traps?
    a) Mice will usually enter the small entrance hole without hesitation.
    b) Mouse odors in traps generally improve trap catch.
    c) Mice will usually enter the trap with or without a food attractant.
    d) All of the above.

17) When might it be a good idea to add food attractant to a multiple-catch trap?
    a) In large mouse infestations.
    b) When food is scarce.
    c) When there is a breeding population.

18) The most effective placement strategy for any type of rodent traps is to space them evenly around the perimeter of a room or building.
    a) TRUE
    b) FALSE

19) Which is NOT typically a good site for rodent traps?
    a) Between the rodent's nest and its food source.
    b) Where you find a lot of droppings.
    c) On open surfaces back from edges.
    d) Along baseboards and other wall edges.

20) As a general rule, how far apart should you place mouse traps along runways in a light mouse infestation?
    a) 5-10 feet.
    b) 10-20 feet.
    c) 20-30 feet.

21) As a general rule, how far apart should you place rat traps along runways in a light rat infestation?
    a) 5-10 feet.
    b) 10-20 feet.
    c) 20-30 feet.

22) How should you place a snap trap against a wall to trap mice?
    a) Parallel to the wall.
    b) Perpendicular to the wall with the trigger away from the wall.
    c) Perpendicular to the wall with the trigger next to the wall.

23) How should you place a glue trap in relation to a wall?
    a) Parallel to (lengthwise) and against the wall.
    b) Perpendicular and against the wall.
    c) Perpendicular and three inches away from the wall.

24) Mice seem to be avoiding your traps, although they are active around them. What is the best way to improve your capture rate?
    a) Place traps every 5-10 feet around the room.
    b) Change your bait on snap traps or add bait to glue boards.
    c) Make trap sets with two or three snap or glue traps side by side, about an inch apart.

25) Both snap traps and glue traps can be set on pipes and rafters if rodents are active there.
    a) TRUE
    b) FALSE

26) Which of the following is a good location for trapping roof rats?
    a) Along tree branches.
    b) On chain link fences.
    c) In suspended ceilings.
    d) All of the above.

27) Outdoor traps for roof rats should be set only from dawn to dusk to avoid trapping non-target animals like birds and squirrels.
    a) TRUE
    b) FALSE

28) Which of the statements below is true?
    a) Place baited rat traps unset for a few days or a week so that the rats will get used to them.
    b) You can improve rat trapping results by periodically moving boxes, pallets, shelves, or other objects to create new runways that lead to your traps.
    c) Getting mice used to traps can take days or weeks.

29) What is the number one mistake made by technicians when trapping rodents?
    a) Not using enough traps.
    b) Not using the correct bait.
    c) Not placing traps at the perimeter of each room.

30) Which tactic can improve your long-term trapping success against mice?
    a) Never leave your traps unset for more than a day.
    b) Periodically move the traps several feet to new locations.
    c) Keep the type of bait consistent in all areas.

31) Good baits for Norway rats include hot dog slices, and sardines. Which of the following is the best bait for roof rats?
    a) Prunes.
    b) Bacon.
    c) Liverwurst.

32) What is the primary reason to check traps more often in warm weather?
    a) Carcasses decay faster at higher temperatures.
    b) There is more rodent activity in summer.
    c) Baits need replacement more often in warm weather.

5.3 OTHER PHYSICAL CONTROL METHODS

1) Which pest problem is best controlled with a vacuum?
    a) Cockroaches in an oven.
    b) Drain flies around a sink.
    c) Cicada killers by a walkway.

2) What type of pest is most likely to be successfully controlled with a vacuum?
    a) Solitary.
    b) Aggregating.
    c) Those with complete metamorphosis.
    d) All of the above.

3) Why would you vacuum up talc or corn starch after vacuuming pests?
    a) To clean the vacuum.
    b) To eliminate any airborne pathogens.
    c) To kill any insects living inside the vacuum bag.

4) What filters can be used on a vacuum to minimize the risk that cockroach and other allergens could be released into the air during vacuuming?
    a) 100-series filters.
    b) 95-series filters.
    c) Dust filters.

5) How long should items be kept at zero degrees Fahrenheit to kill most insects?
    a) 8 hours.
    b) 24 hours.
    c) 48 hours.

6) What is a practical and effective temperature and time frame to heat-disinfest an item?
    a) 130 degrees Fahrenheit for three hours.
    b) 160 degrees Fahrenheit for one day.
    c) 200 degrees Fahrenheit for three hours.

7) What equipment is necessary to heat-treat infested materials?
    a) Standard oven.
    b) Commercial kiln.
    c) Tarps and portable heater.
    d) Any of the above.

8) Which pest is most difficult to kill by moisture reduction alone?
    a) Cockroach.
    b) Psocid.
    c) Springtail.

9) Even when reduced moisture does not kill the pests directly, it may make it impossible for them to reproduce.
    a) TRUE
    b) FALSE

5.4 PESTICIDES

1) Pesticides are part of the IPM tool box as long as they are applied after action thresholds have been reached.
   a) TRUE
   b) FALSE

2) In IPM, if non-chemical control methods are unavailable, impractical, ineffective, or likely to fail to reduce pests below action thresholds, then:
   a) Pesticides can be used.
   b) The IPM program should be discontinued.
   c) Action thresholds must be raised.
   d) All of the above.

3) What pesticide strategy should you follow if school children are occupying a room or area?
   a) Do not apply any pesticide.
   b) Apply only bait.
   c) Apply either bait or a crack and crevice treatment.

4) What pesticide strategy should you follow whenever possible in classrooms, hallways, cafeterias, and other common areas during school hours?
   a) Apply any pesticide labeled for the site.
   b) Apply insecticide baits only when children are not present in these areas.
   c) Apply spot treatments near critical areas.

5) In a school nurse's office, you should seek approval from school medical personnel before apply a pesticide.
   a) TRUE
   b) FALSE

6) Which product or application method generally produces the lowest airborne pesticide residue?
   a) Insecticide gel.
   b) Low-pressure crack and crevice treatment.
   c) Insect growth regulator.
   d) Pyrethrin space spray.

7) For insects and other arthropod pests indoors in schools, baits are normally the first choice if an insecticide is considered necessary. Why?
   a) Baits are broad spectrum, affecting a wide range of pests.
   b) Compared to many other insecticide formulations, insect baits have relatively low hazard to people.
   b) Baits easily vaporize, attracting pests from near and far.

8) What is the main advantage of gel or injectable baits over granular or prepackaged bait stations?
   a) They are inexpensive.
   b) Bait can be placed in inaccessible cracks and crevices.
   c) They can double as caulks to seal cracks and crevices.
   d) All of the above.

9) What is an advantage of insect bait stations over other baits?
   a) The insecticide is enclosed and protected.
   b) The stations are very visible.
   c) They are not an attractant to school children.
   d) All of the above.

10) When used in student areas, bait stations should be placed in areas inaccessible to children (e.g., hidden inside cabinets and equipment among other cryptic places).
   a) TRUE
   b) FALSE

11) Which statement is not true regarding baiting for German cockroaches?
   a) Put a small amount of bait at each placement site.
   b) Do not place bait in areas where cockroach fecal material is found.
   c) Place bait stations flush against edges.
   d) All of the above.

12) Why should you remove old bait stations once the bait has been consumed?
   a) The site is no longer active.
   b) Because cockroaches may live inside old stations.
   c) There is no need to remove old stations.

13) Which statement is true about ant baits?
   a) Bait effectiveness may change from season to season.
   b) Ant baits work equally well against most household ants.
   c) Place ant baits in the same locations as for German cockroaches.
   d) Do not place baits near a heat source.

14) Surveying and prebaiting ants with a nontoxic bait may save time and the unnecessary use of insecticide bait.
   a) TRUE
   b) FALSE

15) Ant baits that show no activity should be moved.
   a) TRUE
   b) FALSE

16) When can rodent baits be used in student areas in most school IPM programs?
    a) When placed inside tamper-resistant bait stations.
    b) Only anticoagulants can be used and they must be in tamper-resistant bait stations.
    c) Only in emergencies.

17) Which statement regarding rodenticide use around schools is FALSE?
    a) Only pellet baits should be used inside tamper-resistant bait stations.
    b) Bait station lids must be locked or otherwise secured.
    c) Each bait station should be labeled and mapped.
    d) All spoiled bait and any unused bait shall be disposed of as specified on the product label.

18) Placing rodenticide baits inside rodent burrows is an acceptable method for all rodenticide bait formulations used around schools
    a) TRUE
    b) FALSE

19) Rodenticide baits should be used:
    a) only in high schools.
    b) as a way to monitor rodent activity around schools.
    c) preferably when school is not in session or when rodents pose an immediate health threat and other methods are considered less effective.
    d) all of the above.

answers Chapter 5

CONTROL TOOLS

5.1 INSECT TRAPS

1) Answer a) is correct.
Traps contain the pest after death so the pests can be disposed of easily, and identified to species, stage, and sometimes the direction of entry, which helps determine pest population size and main infestation areas.

Answer b) is incorrect because the fact that traps can be checked by health inspectors is actually a disadvantage because inspectors may cite kitchen operations for vermin when they find insect pests in the traps. Answer c) is incorrect because kitchen workers can and do often move insect traps, but this movement usually makes the traps less effective because kitchen workers do not understand proper trap placement.

2) Answer b) is correct.
Custodians (and food service staff) will often move or discard traps for reasons of their own. Good communications can help prevent this.

Answer a) is incorrect because insect traps are easy to use, not difficult to use. Answer c) is incorrect because lack of toxicity would not be a disadvantage in a school setting. Answer d) is incorrect because answers a) and c) are incorrect.

3) Answer a) is correct.
This statement is true because both sticky traps and pheromone traps can be considered a viable control tool when placed in large enough numbers. For example, cockroach traps will sometimes adequately suppress a small, focused, and isolated cockroach population, say in a pantry or around a sink if enough traps are used, and certain stored product pests in a food storage room can be suppressed when enough pheromone traps are placed in a tight grid throughout the room.

4) Answer d) is correct.
All answers are correct. A glue trap can tell you size of population. Help determine locations of the infestation and whether or not the control strategies being used are effective. Tracking trap counts over time are useful in determining control success.

5) Answer a) is correct.
Research has shown that flooding an area with a sex pheromone can be effective in controlling certain stored product moths. The pheromone dispersal is accomplished through the placement of the mating disruption control devices in a grid pattern.

Answer b) is incorrect because dispersing pheromone only based on different heights may not insure thorough distribution in a given area. Answer C is incorrect because placing the pheromone only at the perimeter may not provide sufficient coverage of the entire area to suppress mating.

6) Answer d) is correct.
Fly traps come in a wide range of styles, including insect light traps, window-mounted traps, and jar traps.

Answer a) is incorrect because window-mounted traps and jar traps also trap flies. Answer b) is incorrect because insect light traps and jar traps also capture flies. Answer c) is incorrect because insect light traps and window-mounted traps also capture flies.

7) Answer b) is correct.
Yellowjackets are especially attracted to sweet based foods in the fall when other natural sources of sweet foods like nectar are scarce. Worker numbers are also at their highest and these food foragers need sweet foods for energy.

Answer a) is not correct because protein sources are in more demand in the spring when the colony is just starting. Answer c) is not correct because there is not a pheromone lure available for yellowjackets and they do not forage actively on oil. Answer d) is incorrect because answers A and C are not correct.

8) Answer b) is correct.
Filth fly jar traps tend to be used more commonly outdoors because the lures may be offensive to the public.

9) Answer c) is correct.
Research has demonstrated that most flying insects, such as moths, will not respond to UV lights more than 100 feet away.

Answer a) is incorrect because moths will be attracted to UV light from far beyond 10 feet. Answer b) is incorrect because moths will be attracted to UV light from far beyond 25 feet.

10) Answer b) is correct.
Research has demonstrated that flies rarely respond if the UV light is beyond 25 feet.

Answer a) is incorrect because flies will respond to UV light at a distance beyond 10 feet, and up to 25 feet. Answer c) is incorrect because flies rarely respond if the UV light is beyond 25 feet.

11) Answer c) is correct.
A good first line of defense is a large ceiling-hung insect light trap mounted 15-25 feet inside of the school's loading dock (if there is one) or food delivery doors. The trap should be mounted perpendicular to the door. Then the light will not be seen from outside and will not attract insects into the facility.

Answer a) is incorrect because an insect light trap mounted in the door would attract insects in from outdoors. Answer b) is incorrect because a trap facing the door would attract insects in from outside.

12) Answer a) is correct.
In general, flies travel closer to the floor than to the ceiling. Research has shown that traps within five feet of the floor will consistently capture more flies than those near the ceiling.

Answer b) is incorrect because traps near the ceiling capture fewer flies than those within five feet of the floor. Answer c) is incorrect because research has shown that traps within five feet of the floor will consistently capture more flies than those near the ceiling.

13) Answer b) is incorrect.
A narrow hallway is one of the most effective sites for an insect light trap because the flying insects are funneled close to the trap.

Answer a) is incorrect because an insect light trap over a food preparation area increases the risk that flying insects or insect parts might contaminate the food below. Answer c) is incorrect because an insect light trap in front of a window would attract outdoor insects to the window, and they might then find their way inside.

14) Answer b) is correct.
This statement is true because the effective life of the average bulb is 7,000 hours, only about nine months. The phosphor inside loses 50% of its effectiveness after a year of continuous use.

Answer a) is incorrect because you cannot tell by looking at a glowing UV bulb whether it is working at full strength. Answer c) is incorrect because by 16 months a UV light would be nearly completely ineffective. The effective life of the average bulb is 7,000 hours, only about nine months.

15) Answer a) is correct.
This statement is true because dead insects in an ILT can attract dermestid beetles and other scavengers. If traps are not serviced often enough, scavenger pests may lay their eggs right in the trap, making the trap the source of an infestation rather than the cure.

5.2 RODENT TRAPS

1) Answer a) is correct.
This statement is true because rodent traps are installed the same way in IPM as in traditional pest control, but because non-chemical methods are preferred in IPM programs, rodent traps tend to be used much more in IPM.

2) Answer a) is correct.
It is a disadvantage to using rodent traps that children are often curious about them because they may investigate them and interfere with traps that are visible and accessible.

Answer b) is incorrect because the fact that rodent traps have no risk of environmental contamination is an advantage. Answer c) is incorrect because it is true that rodent traps are effective against both large and small populations of rodents and that is an advantage to their use. Answer d) is incorrect because traps allow you to tell immediately if control was successful because the carcass is visible in the trap, and that too is an advantage to using traps.

3) Answer c) is correct.
Because traps hold the carcass, you can tell immediately if control has been successful, and you can quickly and easily dispose of the carcass and so avoid odor and insect problems from dead rodents.

Answer a) is incorrect because the fact that health inspectors can see the dead rodent is actually a disadvantage because inspectors may cite kitchen operations for vermin when they find rodents in the traps. Answer b) is incorrect because successful trapping programs usually require many traps that must be set and checked often, a labor-intensive process, and this is a disadvantage to their use. Answer d) is incorrect because a) and b) are not advantages to using traps.

4) Answer b) is correct.
This statement is false because translocation is when rodents move rodenticide out of the target application site and into other areas. It has nothing to do with traps.

5) Answer d) is correct.
There are many ways to prevent children from seeing trapped mice or from interfering with traps including installing them inside stations, placing the traps out of reach (such as up in drop ceilings or on top of cabinets), and using them in areas that children do not go.

Answer a) is incorrect because b) and c) are also effective ways to keep children from the traps. Answer b) is incorrect because a) and c) are also effective ways to keep children from the traps. Answer c) is incorrect because a) and b) are also effective ways to keep children from the traps.

6) Answer b) is correct.
The original professional mouse trap is the wooden base, spring-operated snap trap everyone is familiar with. The main improvement since snap traps were first developed is the expanded trigger design which improves trapping success.

Answer a) is incorrect because snap traps also may be made of plastic or metal, but this is not a major change and provides no major advantage to the user. Answer c) is incorrect because the power of the traps has not increased since their original development.

7) Answer c) is correct.
When a snap trap works properly, the rodent is killed quickly when its neck, skull, or back is broken.

Answer a) is incorrect because in rare cases, a rodent in a trap might die from suffocation, but when a snap trap works properly, the rodent is killed quickly when its neck, skull, or back is broken. Answer b) is incorrect because in rare cases, a rodent in a trap might die from shock, but when a snap trap works properly, the rodent is killed quickly when its neck, skull, or back is broken.

8) Answer a) is correct.
This statement is true because mouse snap traps are simply not powerful enough to kill a rat except in rare instances with young rats.

9) Answer a) is correct.
This statement is true because snap traps can be baited with food bait or nest material, or left unbaited. Unbaited traps work when curious rodents investigate or, more commonly, when rodents simply step on them during their regular foraging trips.

10) Answer c) is correct.
While glue traps are most often used for mice, the larger rat glue traps with a stickier surface can be used for rats. However, technicians working in schools should be aware that rats generally do not die quietly or easily on a glue trap and may carry the trap away if it is not securely anchored.

Answer a) is incorrect because glue traps can be used against both rats and mice, although they are more effective against mice. Answer b) is incorrect because glue traps can be used against both rats and mice, although they are more effective against mice.

11) Answer a) is correct.
This statement is true because a rodent trapped on a glue trap will typically struggle until its snout gets caught in the glue, resulting in the rodent's eventual suffocation.

12) Answer d) is correct.
There are disadvantages to using glue traps against rats, including that rats are neophobic (avoid unfamiliar objects) and so often avoid glue traps placed in their territory. Once trapped on a glue trap, rats do not die easily, and they are strong enough to drag off a trap unless it is secured, or to pull themselves free from the trap unless it is a large trap with strong glue.

Answer a) is incorrect because b) and c) are also disadvantages to using glue traps against rats. Answer b) is incorrect because a) and c) are also disadvantages to using glue traps against rats. Answer c) is incorrect because a) and b) are also disadvantages to using glue traps against rats.

13) Answer a) is correct.
Cooking oil acts as a solvent for the glue and will release anything captured in it, including children, pets, snakes, and other non-targets.

Answer b) is incorrect because heating the glue will make it runnier, but cooking oil is much more effective. Answer c) is incorrect because freezing the glue will make it less "sticky," but anything already trapped in the glue will remain so when frozen, and it would not be very comfortable for the child.

14) Answer a) is correct.
This statement is true because multiple-catch traps are only designed to capture mice. The entry holes are too small and the mechanisms too weak to deal with rats.

15) Answer c) is correct.
There are two primary designs for multiple-catch traps. There are "wind-up" traps that "sweep" the mouse into the trap. Other traps use a double treadle door to channel the mouse into the trap.

Answer a) is incorrect because there are two primary designs for multiple-catch traps, represented by answers a) and b). Answer b) is incorrect because there are two primary designs for multiple-catch traps, represented by answers a) and b). Answer d) is incorrect because there are two primary designs for multiple-catch traps, represented by answers a) and b).

16) Answer d) is correct.
Multiple-catch traps work because mice are curious and will investigate new things in their territories. It is true that mice will usually enter the small entrance hole without hesitation, and if they smell mice they are even more inclined to do so. Also, mice will usually enter the trap with or without a food attractant, simply from curiosity.

Answer a) is incorrect because statements b) and c) are also true. Answer b) is incorrect because statements a) and c) are also true. Answer c) is incorrect because statements a) and b) are also true.

17) Answer b) is correct.
Mice will usually enter the small entrance hole of a multiple-catch trap without hesitation, but when food is scarce, bait will make the trap even more attractive.

Answer a) is incorrect because the size of the population has no impact on whether or not bait makes a multiple-catch trap more effective. Answer c) is incorrect because a population of mice is always a breeding population.

18) Answer b) is correct.
The statement is false because placement of traps evenly around a room is probably the least effective placement strategy. You should concentrate traps wherever you find or suspect rodent activity.

19) Answer c) is correct.
Rodents are least likely to be found out in the open away from walls, boxes, etc., so open surfaces away from edges are poor placement sites for traps.

Answer a) is incorrect because traps placed along runways between a rodent's nest and food will get high activity, and so this is a good trapping site. Answer b) is incorrect because wherever you find lots of droppings will be a site of rodent activity, and so it is a good trapping site. Answer d) is incorrect because rodents typically travel along baseboards and other wall edges and so this is a good trapping site.

20) Answer a) is correct.
Mice have small territories, often ranging only 10 feet from their nests. You should place snap traps or glue boards five to 10 feet apart, and even closer if the population is large.

Answer b) is incorrect because traps placed 10-20 feet apart can allow mice to forage between them without ever coming near the traps. Answer c) is incorrect because traps placed 20-30 feet apart can allow mice to forage between them without ever coming near the traps.

21) Answer b) is correct.
Rats have much larger territories than mice. Experience shows that traps placed 10-20 feet are usually effective in a light infestation, although they may need to be closer together if the population is large.

Answer a) is incorrect because in a light infestation the traps do not need to be that close together to be effective. Answer c) is incorrect because traps placed 20-30 feet apart can allow rats to forage between them without ever coming near the traps.

22) Answer c) is correct.
Mouse trap catches are highest when the trap is placed perpendicular to the wall with the trigger against the wall.

Answer a) is incorrect because for some reason mice are more likely to avoid traps or escape from them if they are installed parallel to the wall rather than perpendicular to the wall. Answer b) is incorrect because tests show that mice are more likely to escape from a trap when its trigger is away from the wall than when the trigger is against the wall.

23) Answer a) is correct.
When traps are placed lengthwise against the wall rodents are less likely to successfully jump over them.

Answer b) is wrong because when perpendicular to the wall it is easier for a rodent to jump over the sticky trap. Answer c) is wrong because the rodents will simply bypass the sticky trap if it is away from the wall.

24) Answer c) is correct.
Double and triple trap sets capture mice that are jumping over traps.

Answer a) is incorrect because the question stated that the mice were active around your traps so the mice are at your traps, just not being trapped. Answer b) is incorrect because while changing the bait might improve the catch somewhat, making double and triple trap sets will prove far more effective.

25) Answer a) is correct.
The statement is true because snap traps can be fastened to pipes or beams with nails, wire, heavy rubber bands, bungee cords, Velcro straps, or hose clamps, and glue traps can be fastened to pipes (but not hot pipes) and beams with tape, wire, or nail or thumbtacks (for wood beams).

26) Answer d) is correct.
Tree branches, chain link fences, and the inside of suspended ceilings are common runways for roof rats and so they all are good trap sites.

Answer a) is incorrect because tree branches, chain link fences, and the inside of suspended ceilings are all good trap sites for roof rats. Answer b) is incorrect because tree branches, chain link fences, and the inside of suspended ceilings are all good trap sites for roof rats. Answer c) is incorrect because tree branches, chain link fences, and the inside of suspended ceilings are all good trap sites for roof rats.

27) Answer b) is correct.
This statement is false because dawn to dusk is a bad time to trap for roof rats because daylight hours are when birds, squirrels, and many other non-target animals are active, and because roof rats are most active at night. Dusk to dawn is the best time to trap roof rats.

28) Answer a) is correct.
Rats are wary of anything new in their territory and will initially avoid it. At the beginning of a trapping program for rats, place baited traps unset for a few days or a week so that the rats will get used to them.

Answer b) is incorrect because rats are wary of anything new in their territory, including anything that changes position. If you move boxes, pallets, etc. it will reduce trap effectiveness against rats. Answer c) is incorrect because mice are very curious and will inspect traps as soon as they appear. Trap success against mice tends to be the best when the traps are first placed.

29) Answer a) is correct.
Technicians typically use far too few traps to be effective. A large number of snap traps or glue traps set for a short time will be more effective than a small number of traps set for a long time. Thirty traps in an infested 12' x 15' room would not be too many.

Answer b) is incorrect because although the type of bait can make a difference in trapping success with snap traps, the improvement in trap catch from a bait change tends to be much smaller than from increasing the number of traps to an adequate level. Answer c) is incorrect because most technicians seem to place too many traps on the perimeter, not too few, and ignore other sites of rodent activity.

30) Answer b) is correct.
Moving the traps several feet to new locations takes advantage of the mouse's natural instinct to investigate new things.

Answer a) is incorrect because it is actually good trapping strategy after a week of trapping success to unset your traps for a week to break the connection between traps and dead rodents in the minds of the remaining rodents. Answer c) is incorrect because you should actually do the opposite in many cases, that is, use different types of baits.

31) Answer a) is correct.
Roof rats prefer more vegetarian foods such as raisins or prunes, grapes, nuts, or pieces of bananas, oranges, or apples. Do not use nuts as bait in a school environment.

Answer b) is incorrect because bacon is good bait for Norway rats, but it is not so good for roof rats. Answer c) is incorrect because liverwurst is good bait for Norway rats, but it is not so good for roof rats.

32) Answer a) is correct.
The main reason for checking traps more often in warm weather is because the carcasses decay faster and so produce odor faster and attract scavenger insects sooner, and those insects can go through their life cycles faster to generate insect problems in the school.

Answer b) is incorrect because there might be more rodent activity outdoors in warm weather, but indoor activity is typically highest in the fall and winter. Answer c) is incorrect because bait replacement is a function of activity, independent of season.

5.3 OTHER PHYSICAL CONTROL METHODS

1) Answer a) is correct.
Cockroaches in an oven are perfectly suited for control with a vacuum. They are clustered together and traditional control methods would be unacceptable (insecticides) or ineffective (traps).

Answer b) is incorrect because it is difficult to vacuum flying pests and because drain fly control is dependent on eliminating the breeding site, not harvesting the adult flies. Answer c) is incorrect because cicada killers would be extremely difficult to vacuum.

2) Answer b) is correct.
Aggregating pests are found in large, dense groups that make vacuuming very easy and effective.

Answer a) is incorrect because solitary insects do not group together, and so it is very labor intensive to track them all down with a vacuum. Answer c) is incorrect because an insect's type of metamorphosis has nothing to do with suitability for vacuuming. Answer d) is incorrect because a) and c) are incorrect.

3) Answer c) is correct.
Larger insects may not be killed by the physical action of the vacuum. Talc or corn starch acts as a desiccant and abrasive to kill all insects in the vacuum bag.

Answer a) is incorrect because vacuuming talc or corn starch makes the vacuum dirtier not cleaner. Answer b) is incorrect because there is no evidence that talc or corn starch have any impact on airborne pathogens.

4) Answer a) is correct.
Series 100 filters are designed to filter nearly 100% of particles 0.3 microns or larger, the standard to filter allergens.

Answer b) is incorrect because series 95 filters allow 5% of particles 0.3 microns or larger to get through, an unacceptable level for removing allergens. Answer c) is incorrect because simple dust filters do not filter out many common allergens.

5) Answer c) is correct.
To be sure of a complete kill of all stages of most insects, an item would have to be held at 0 degrees Fahrenheit for 48 hours.

Answer a) is incorrect because eight hours is not long enough to be sure of a complete kill of all stages of most insects. Answer b) is incorrect because 24 hours is not long enough to be sure of a complete kill of all stages of many insects.

6) Answer a) is correct.
Holding a specimen at a temperature of 130 degrees Fahrenheit for three hours will kill any insect.

Answer b) is incorrect because it is excessive and likely to damage many items being treated. Answer c) is incorrect because it is excessive and likely to damage many items being treated.

7) Answer d) is correct.
Any method that can hold a temperature of 130 degrees Fahrenheit for three hours is acceptable. Small items can be heated in an oven to kill infesting pests. Larger items may require a commercial kiln. Items can also be placed under tarps and portable forced-air heaters used to raise the temperature to the desired level.

Answer a) is incorrect because all the equipment listed, a), b), and c) can be used to heat-treat infested materials. Answer b) is incorrect because all the equipment listed, a), b), and c) can be used to heat-treat infested materials. Answer c) is incorrect because all the equipment listed, a), b), and c) can be used to heat-treat infested materials.

8) Answer a) is correct.
While many species of cockroach prefer moisture, they are also resistant to desiccation (drying out) because of their thick, oily cuticle, so cockroaches are not likely to be controlled by moisture reduction alone.

Answer b) is incorrect because psocids are susceptible to desiccation, and can often be controlled by moisture reduction alone. Answer c) is incorrect because springtails are susceptible to desiccation, and can often be controlled by moisture reduction alone.

9) Answer a) is correct.
This statement is true because many pests can survive low moisture levels but are unable to reproduce; sometimes they can reproduce but their offspring cannot survive at the low moisture levels, and so the population eventually crashes.

5.4 PESTICIDES

1) Answer a) is correct.
This statement is true because pesticides can be used when justified by reaching the action threshold and when non-chemical controls are not a good choice. However, pesticides should not be applied automatically or as a standalone tool. Even when applying pesticides, non-chemical control methods should continue, where appropriate.

2) Answer a) is correct.
Pesticides can be part of a school IPM program if non-chemical measures would not provide adequate control.

Answer b) is incorrect because the program should continue to use non-chemical measures along with the careful use of pesticides as part of a total IPM program. Answer c) is incorrect because action thresholds should not be raised when control methods are failing. Instead, more effective controls must be implemented. Answer d) is incorrect because answers b) and c) are incorrect.

3) Answer a) is correct.
Pesticides of any type should not be applied by any application method to a room if there are children present. Pesticides, when used in a school, must always be used in a way that minimizes risk to children.

Answer b) is incorrect because bait is a good pesticide choice for schools, but it should not be applied when children are present. Answer c) is incorrect because crack and crevice is a good choice of application method, but it should not be done while children are present.

4) Answer b) is correct.
Only insecticide baits should be used in classrooms, hallways, cafeterias and other common areas during school hours. Even these products should not be applied when children are present.

Answer a) is incorrect because even pesticides labeled for the site should not be used during school hours unless they are baits, and then they should not be applied if children are present. Answer c) is incorrect because no airborne pesticides should be applied in common areas during school hours.

5) Answer a) is correct.
Check with school medical personnel before any pesticide application is made in this area. Before using pesticide in any manner or in any area that is not covered under the standard IPM protocol, discuss the need for the use with your supervisor. In this case, you should obtain clearance from the school's medical staff before treating the area, and you must make sure to follow all posting and notification required by the school.

6) Answer a) is correct.
Insecticide gel baits are low in volatility and so produce virtually no airborne vapors, compared to other application methods.

Answer b) is incorrect because crack and crevice treatment does place insecticide in out-of-the-way places, but there is the potential for airborne particles. Answer c) is incorrect because, although insect growth regulators are relatively nontoxic to people, they do produce airborne residues during application. Some insect growth regulators are volatile and will move off from the site of application. This can be an advantage from a control standpoint in certain environments. Answer d) is incorrect because a space spray produces a large amount of airborne insecticide residues and should be avoided in schools.

7) Answer b) is correct.
Insect baits have a low toxicity to people and are low in volatility, thus they are a preferred formulation in sensitive environments.

Answer a) is incorrect because baits tend to be specific for certain pests and do not affect all pests. Different baits must be used for cockroaches and ants. Answer c) is incorrect because baits do not easily vaporize which is an advantage when used around people.

8) Answer b) is correct.
Injectable insect baits can be applied in small amounts that can be hidden inside cracks, crevices, and voids away from children and animals.

Answer a) is incorrect because injectable baits tend to be more expensive than some other bait formulations. Answer c) is incorrect because gel baits are not designed to be applied as caulks. Answer d) is incorrect because answers a) and b) are incorrect.

9) Answer a) is correct.
Bait stations protect the bait inside from moisture and dust and keep it from drying out. Because the insecticide is enclosed in a plastic station, it keeps it away from children and non-target animals.

Answer b) is incorrect because although the stations are very visible, this is not an advantage when they are used in schools, because children may find the stations and remove or play with them. Answer c) is incorrect because children can find the bait stations attractive and may remove or play with them. Answer d) is not correct because answer b) and c) are not correct.

10) Answer a) is correct.
This statement is true because bait stations can be highly visible and attractive to children and so they should be placed out-of-sight and inaccessible to children as much as possible. Place them under shelves, under or inside equipment, inside cabinets, and in other inaccessible areas.

11) Answer b) is correct.
Areas with cockroach spotting are prime spots for applying bait because it indicates regular cockroach activity and pheromones draw other cockroaches to these sites.

Answer a) is incorrect because you should place a small amount of bait at many treatment sites rather than placing large amounts of bait in only a few sites. Answer c) is incorrect because you should place bait stations against edges because cockroaches travel along edges rather than out in the open. Answer d) is incorrect because it is good practice to remove old gel bait periodically before reapplying new bait.

12) Answer b) is correct.
Once cockroaches have consumed all of the bait inside a bait station, the container can actually provide a protected hiding place for cockroaches.

Answer a) is incorrect because if cockroaches have eaten all of the bait, you should assume that the location is still an active feeding site and should install a new bait station. Answer c) is incorrect because old bait stations should be removed and replaced with new stations to provide a fresh supply of bait.

13) Answer a) is correct.
This statement is true because the feeding preferences of ants often vary from season to season as their diet switches from protein foods to carbohydrates. Bait that works at one time of year may not work at another time.

Answer b) is not true because different species of pest ants often prefer different types of food bait. Answer c) is not true because ant baits should be placed primarily along ant travel ways so that ants intercept the bait as they move from the nest to a food or water source. Answer d) is not true because ants like sources of heat so these are good locations for bait placement.

14) Answer a) is correct.
This statement is true because pre-baiting with food bait can help locate active feeding sites for the ants. Rather than baiting all sites, pre-baiting can mean fewer bait placements when you substitute toxic bait.

15) Answer a) is correct.
This statement is true because if ants are not feeding at a particular bait placement, you should remove the bait from that site and relocate it to a new spot.

16) Answer c) is correct.
Rodent baits should not be used in student areas of schools unless there is a health emergency requiring rodent populations to be quickly reduced and when other methods will not provide adequate control.

Answer a) is incorrect because, while it is true that rodent baits, when used in student areas, must be in tamper-resistant bait stations, this is not the main restriction against their use. Answer b) is incorrect because the use of anticoagulants and tamper-resistant bait stations is not the main restriction against the use of rodent baits in schools.

17) Answer a) is correct.
This statement is false because loose pellet baits can be shaken out of a poorly anchored station, and rodents can carry the bait to new locations. Block baits anchored on a rod inside the station are recommended.

Answer b) is true because lids must be locked or secured so that children and animals cannot get to the bait. Answer c) is true because each bait station should have a unique identifying number keyed to a location on a map or drawing of the area. Answer d) is true because spoiled or uneaten bait must be disposed of safely according to the label's directions.

18) Answer b) is correct.
Not all rodenticide baits are labeled for burrow applications therefore they should not be used in burrows

19) Answer c) is correct.
Rodenticides should only be used for emergencies or during times when students are not present. Answer A is not correct because the use of rodenticides is not restricted to high schools. Answer B is incorrect because they should not be used as monitoring tools or for preventative rodent control in a school. Answer D is not correct because answers A and B are not correct.

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