

Spotted Lanternfly 3 Act Task (Grade 4)

Kate Nastus and Jocelyn Muzychko

CURR 672- Math Connections in the STEM Classroom

Lisa Waldman

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Mandatory 4: Math Modeling

2 day lesson (50 minutes): 3 Act Task is day one and Wanted/Unwanted Poster is day 2

<p>Modeling Activity</p>	<p>Act 1</p> <ul style="list-style-type: none">• The teacher shares a compelling multimedia depiction of a situation through the following photograph:  <p>(<i>Stop the Spotted Lanternfly: Identify and Destroy Their Eggs</i> Philadelphia Parks & Recreation, n.d.)</p> <ul style="list-style-type: none">• Students discuss what they notice and wonder about the picture, including mathematical features of the situations.• The teacher provides students with a recording sheet to jot down their noticing and wonderings.• Students collectively decide on a mathematical question to answer about the situation. (How many spotted lantern fly eggs are there on the tree? How many SLFs will hatch out of that many egg masses?) <p>Act 2</p> <ul style="list-style-type: none">• The teacher provides information or resources that students think they need to work on the focal question.• Students work to answer the question. <p>Act 3</p> <ul style="list-style-type: none">• Students present their strategies and solutions.• The teacher will facilitate the discourse of comparing and connecting students' ideas• Students consider why their modeling may be different from the actual number of SFL eggs. <p>Summative Assessment: Students will create a “wanted” or “unwanted” poster for the SLF egg masses or SLF adults including their data and reasoning for wanting them gone. Rubric is provided.</p>
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	Survey: Students complete a brief survey to collect evidence about the task.
Engaging Context	New Jersey is currently in its 5 th year of invasion from spotted lanternfly (SLF). The SLF is an invasive pest that has the potential to greatly impact agricultural crops and hardwood trees. For this reason the Department of Agriculture wants New Jersey residents to destroy SLF eggs before they hatch in the warmer weather and destroy the Garden State's crops and trees. The context is engaging because students in NJ are familiar with the SLF and NJ's campaign to "Stomp it Out" has inspired many students to spend recess fulfilling their civic duty by killing as many SLF as possible. The activity provides students with a real world opportunity to practice using the four operations to determine how massive the SLF problem is and why it's so important to destroy the eggs before they hatch.
Measurable Objective	<ul style="list-style-type: none"> -Students will hypothesize about the amount of SLFs that could hatch out of that many eggs by using estimation strategies including rounding. -Students will analyze the SLF's lifecycle as well as attributes of the egg mass in order to develop a cause for its successful spreading throughout New Jersey. -Students will demonstrate multi-digit multiplication based on properties of operation and place value as they formulate the possible amount of SLFs that could hatch. -Students will use the standard algorithm for addition and subtraction in order to help them figure out how many SLFs could hatch. -Students will create a function table in order to show the relational patterns to number the egg masses to the output of SLFs. -Students will create a "wanted poster" or "unwanted poster" to inform others about the impact of egg masses on the spread of SLFs including their data that was learned during the 3 Act task.
Standards	<p>DCI LS1.A: Structure and Function-Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</p> <p>CCSS.MATH.CONTENT.4.OA.A.3</p> <p>Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</p> <p>CCSS.MATH.CONTENT.4.OA.C.5</p> <p>Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate</p>

	<p>between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. CCSS.MATH.CONTENT.4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm. CCSS.MATH.CONTENT.4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. NJSLs.ELA.W.4.1. Write opinion pieces on topics or texts, supporting a point of view with reasons and information. NJSLs.ELA..RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. NJSLs SOCIAL STUDIES In an interconnected world, increased collaboration is needed by individuals, groups, and nations to solve global issues. (6.1.4.A.15)</p>
Evidence	<p>There are multiple pieces of evidence being used to evaluate student understanding of the various objectives noted above. The pieces of evidence include: the recording sheet, math discussions participation, peer discourse, evaluating peer strategies and developing a “wanted/unwanted” poster to build awareness. The final piece of evidence will be a brief survey about student learning.</p> <p>The recording sheet provided to students will be used to evaluate students mathematical thinking and strategy use. The recording sheet specifically names the type of math that could be used. One of the bigger strands in 4th grade is that students are able to multiply multi-digit numbers using place value strategies, models and properties of operation. This lesson was designed as a 3-Act Task as it has a low floor, high ceiling approach.</p>

Students are first asked to develop an estimate for the amount of SLFs that could hatch by making an estimate of the amount of egg masses. Reviewing the different strategies for estimation could even lead to incorporating fractional understanding. An example of this is if $\frac{1}{3}$ of the tree has 6 egg masses than $\frac{3}{3}$ of it would have 18. Students are then asked to watch a short video and gather the data they need to solve the problem as well as learn more about the structure and function of the egg masses and SLFs which has allowed their spread so easily. Once they have the data they will use strategies that work best for them to solve the problem. Students are encouraged to develop a pattern table (function table) to show the relationship between the egg masses and the amount of SLFs.

The last part of the 3 Act Task is to discuss the results. The teacher should actively be gathering evidence of the strategies used and having students share strategies from concrete to abstract. Students will use the standard of mathematical practice of-Construct viable arguments and critique the reasoning of others to review others' strategies, compare strategies and link to their own strategies. The discourse between peers and participation should be noted and leads to a great opportunity to coach in on proper discourse.

Students will also have the opportunity to create a "wanted" or "unwanted" poster as a call to action artifact. Students will use their mathematical data and modeling to show the impact of the SLFs. Some students may choose the egg masses to be wanted/unwanted or the adult SLFs. Students will be

given a rubric for the poster in order to make sure their poster has all the key components and know the expectations.

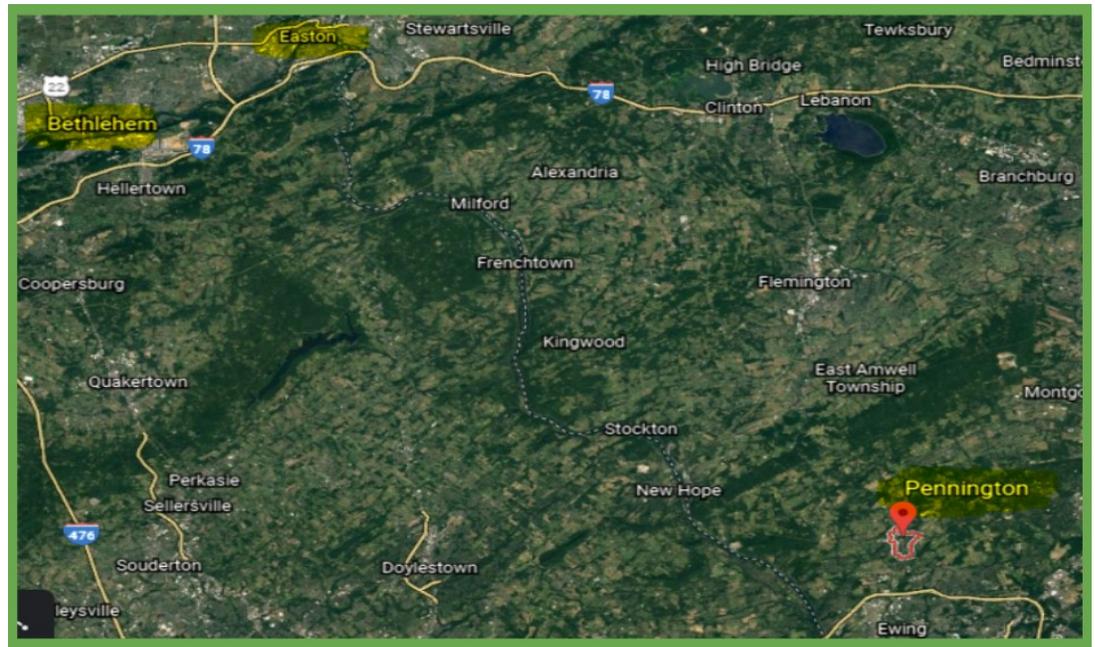
See attachments below.

Data
Extension

Problem Based Learning:

In 2020, the Spotted Lanterfly was not noticeable in Easton, Pa. In 2021 they were pervasive in the area. In a neighboring city about 15 miles away they were prevalent in 2020. So in a year's time, the plant hopper was able to travel roughly 15 miles to make a new home in Easton.

Pennington, New Jersey is about 45 miles away. Based on the information from what happened between Bethlehem and Easton, how long do you think it will take that swarm to spread to Pennington, NJ?



References

3-Act Tasks. (2018, February 9). Questioning My Metacognition.

<https://gfletchy.com/3-act-lessons/>

Destroying Spotted Lanternfly Egg Masses. (n.d.). www.youtube.com. Retrieved June 9, 2022, from <https://youtu.be/aTRr1Oc6weE>

Spotted lanternfly. (n.d.). Retrieved June 8, 2022, from

<https://www.nj.gov/agriculture/divisions/pi/prog/pests-diseases/spotted-lanternfly/>

Stop the spotted lanternfly: identify and destroy their eggs | Philadelphia Parks &

Recreation. (n.d.). City of Philadelphia. <https://www.phila.gov/2020-10-13-stop-the-spotted-lanternfly-identify-and-destroy-their-eggs/>

Name: _____

Spotted Lanternfly 3-Act Task

What did you notice about the image?

What do you wonder?

Write a question(s) that you can answer using mathematical thinking.

Make an estimate using strategies such as rounding:

What information do you need in order to solve your question(s)?

Information learned from the video that can help you solve your problem:

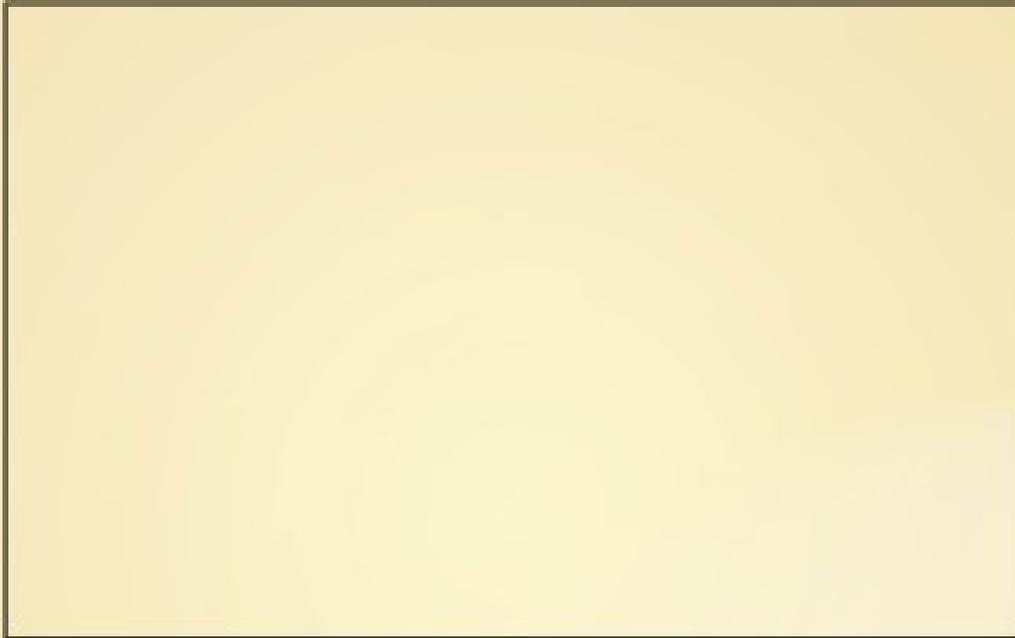
Solve your problem.

(You may use the standard algorithm for addition and subtraction, multi digit multiplication using properties of operation, place value or other modeling strategies.)

Develop a function table to help others see the relationship and patterns between SLF egg masses and the amount of SLFs that could hatch.

Share your findings and take note of your classmates strategies

WANTED



Wanted By:

Wanted For:

Description of Crime (include your data here!)

REWARD: \$100,000

★ UNWANTED! ★



★ SPOTTED LANTERN FLY ★

Directions

Create a “unwanted poster” that informs people about the Spotted Lantern Fly and the problems they are causing in NJ.

- Use the following website for information:
<https://www.nj.gov/agriculture/divisions/pi/prog/pests-diseases/spotted-lanternfly/>
- Include data from the 3-Act Task about the impact of egg masses on the spread of SLFs and include your data from the 3-Act Task as evidence.
- Tell people what they can do to help stop the spread of SLFs.



RUBRIC: UNWANTED POSTER



1

2

3

4



... a start



.. getting there



... that's it



... Wow!

Accuracy	<ul style="list-style-type: none"> work includes major errors in recording or calculations 	<ul style="list-style-type: none"> may include some errors in recording or calculations; generally close 	<ul style="list-style-type: none"> recording and calculations are generally accurate; may include minor errors 	<ul style="list-style-type: none"> recording and calculations are accurate
Concepts and Application	<ul style="list-style-type: none"> unable yet to identify math concepts and procedures does not yet apply relevant math concepts and skills appropriately; major errors or omissions unable yet to describe patterns or relationships 	<ul style="list-style-type: none"> identifies most math concepts and procedures needed applies most relevant math concepts and skills appropriately; some errors or omissions may need help to describe and use patterns and relationships 	<ul style="list-style-type: none"> identifies math concepts and procedures needed applies math concepts and skills appropriately; may be inefficient, make errors or omissions describes and uses basic patterns and relationships 	<ul style="list-style-type: none"> identifies math concepts and procedures needed; may offer alternatives applies math concepts and skills accurately and efficiently; thorough independently describes and uses patterns and relationships
Strategies and Approaches	<ul style="list-style-type: none"> work is unsystematic or inefficient results or solutions are improbable 	<ul style="list-style-type: none"> generally follows instructions without adjusting or checking may need reminding to verify results or solutions; estimates are generally logical 	<ul style="list-style-type: none"> follows logical steps; may be inefficient makes logical, relatively accurate estimates to verify results or solutions 	<ul style="list-style-type: none"> structures the work efficiently; may find a shortcut makes logical estimates to verify results or solutions
Representation and Communication	<ul style="list-style-type: none"> Work is confusing with key information missing explanations are incomplete or unreasonable required charts, diagrams or graphs are missing or contain errors 	<ul style="list-style-type: none"> most work is clear; may omit some needed information creates required charts, diagrams or graphs; some features may be inaccurate or incomplete explanations may be incomplete or imprecise 	<ul style="list-style-type: none"> work is generally clear and easy to follow uses required charts, diagrams or graphs appropriately; may have minor errors or flaws explains procedures and results logically in own words 	<ul style="list-style-type: none"> work is clear, detailed and logically organized uses required charts, diagrams or graphs effectively and accurately explains procedures and results clearly and logically; may include visuals

Name: _____

Date: _____

Spotted Lanternfly 3 Act Task and Poster

1. How did modeling with math help you understand the Spotted Lanternfly problem?
2. What difficulties did you encounter when working on the task?
3. What is one thing you learned from doing the 3 Act Task?
4. What is one thing you learned from creating the poster?
5. If you could change one thing about the lesson what would it be?