MODULE 1 (PART 1) Class Notes src
INTRODUCTION: THEMES IN THE STUDY OF LIFE
Student Name: _____

Take notes from PPT slides

1. **Why Study of Biology Is Important?** To be an informed citizen__. An understanding of biology is important to address a number of social issues today. ____DNA__ testing, ___BIRTH____control , _____Global___ ____warming____, and _____AIDS_____.

2. **What is Biology?** Biology is the ___science___ that deals __with__ ____life___.

3. **What is science?** A process used to_solve problems____and understand natural events. It involves the__scientific_____ _____method_____.

4. **The Scientific Method:** A way of _gaining__ _information__ about the world that involves *forming _possible____ _solutions__ to questions; *rigorous __testing____ to determine if the __solutions__ are___supported____; *continual checking and rechecking to make sure that previous conclusions are still supported; * _modifications__of unsupported conclusions.

5. **Components of the Scientific Method:** 1. __observations____; 2. __questioning____ and __exploration___; 3. Constructing __hypotheses_; 4. Testing of ___hypothesis___ (Experimentation); 5. Conclusion and __communication____

6. **Observation, Questioning, and Exploration:** An __observations___is a thoughtful and careful recognition of an ___event___or a ___fact_____. The information gained by direct observation of an event is called the _empirical__ _____evidence____. The careful observation of a phenomenon leads to a question. How does this happen? What causes it to occur? The question must ___testable____**.** Scientists then _explore_____scientific publications to find any information that has been gathered about the _question_.

7. **Constructing Hypotheses:** Once the question is asked, scientists___propose__ ___answers___. These answers are __hypothesis____. **Hypotheses must:** be____logical___. Account for all _current____ information. Be__testable__. Make the _least_ possible ___assumptionns____. **Testing Hypotheses:** Hypotheses need to be tested to see if they are __supported___ or __disproven__ Disproved hypotheses are_rejected__. Hypotheses can be _supported_but not___proven___.One way to test a hypothesis: is _experimentation__.

8. **Experimentation:** An experiment is a __re-creation__of an occurrence. It tests whether or not the hypothesis can be _supported___or____rejected_____. Scientific Experiments are called _____controlled____ _experiments__.They include _two__ groups. There is only __one__difference (variable) between the two groups. Experimental group: ___one variable is altered___ .Control group: __no variable is altered___. Controls are necessary in scientific experiments because they serve as a _basis for comparison with the experimental results__.

9. **Experimental Design:** The single variable that is altered is called the _independent _ variable___.The variables that change in response to the independent variable are called _dependent variable_. Changes in the dependent variables are documented as _data_. Data from the experiment is _analyzed__ and hypotheses are rejected and revised or supported.

10. **A Sample Experiment:** ***Hypothesis**: Male __sex hormones__produced by the testes _stimulate___male birds to ___sing__. *___Experimental____ group: Male birds with_testes

removed_ at_birth___. *__control _ group: Male birds subjected to a similar _surgery__that were allowed to develop _normally__ with _testes_. ***Independent variable**: Presence or absence of__tests____.*Dependent variable: Presence of _singing___ behavior. *Data: _Male___songbirds __without__ testes do not exhibit ___singing__ behavior. *Conclusion: _hypothesis___is _supported__

11. **Experimental Data:** Experiments must: use large numbers of subjects or must be __repeated____several times (replication). The results should be_VALID_(meaningful) & _RELIABLE_ (give the same results every time). The _validity__ of experimental results must: be tested_statistically__. The results should be ____(meaningful) & _____(give the same results every time). If the hypothesis is supported by ample experimental data, it leads to a_____.

12. **Theory:** A theory may be defined as _____
    _____
    Theories continue to be _____. Exceptions identified. Modifications made.

13. **A Scientific Law:** A scientific law _____
    _____
    An example: All living things come from _____living things. Scientific laws promote the process of generalization. _____reasoning: Since every bird that has been studied lays eggs, we can generalize that_____. Once a theory becomes established, it can be used to_____ specific _____. _____ reasoning: We can predict that a newly discovered bird species _____ _____ _____.

14. **Scientific Communication:** Data is _____ with the scientific community through _____ articles published in scientific_____. Scientists present preliminary data at _____. Scientists collaborate directly by _____ and _____.

15. **Science vs. Nonscience:** Science is distinguished from non-scientific areas of study by the _____.Scientists continually challenge and test principles to determine _____ relationships. EX. Biology, Physics, Chemistry, Astronomy. Nonscientists cannot _____their hypotheses directly and often cannot _____cause-and-effect relationships. EX. History, Literature, Philosophy, Art, Sociology, etc.

16. **Pseudoscience:** A deceptive practice that uses the language of science to convince people into thinking that a claim has scientific validity**.** Pseudoscience may interpret _____ _____ to _____. Marketing claims of nutritional _____. Marketing claims of _____ foods

17. **The Science of Biology:** _____ is the study of living things. _____ biology: _____ biology, animal behavior, biochemistry. _____ biology: Medicine, crop science, plant breeding, wildlife management.

18. **Characteristics of Living Things:** There are _____ characteristics of life. 1. _____ process. 2. _____ process. 3. _____ process. 4. _____ process. 5. _____ structural _____.

1. **Metabolic processes**: All the___chemical reactions_____that take place within your body are known as_____metabolism_____.A. ____Nutrient uptake__ B. __nutrient__processing____C. __waste__elimination____.
2. **Generative processes: A.** _____growth_____: increase in size. B. __REPRODUCTION_____: increase in number of individuals in a population. Organisms reproduce either_sexually____ or _____assexually_____.
3. **Responsive processes:** Organisms react to changes in their_____environment____. A.____Irritability_____: the ability to recognize that something in its surroundings has changed (a stimulus) and __respond___ to it quickly. B. Individual __adaptation__: a longer term response to an environmental change. C. __population___ adaptation: (_evolution_): the whole population of a species adapts to a change in environment. __changes_ in the human species since the time of first humans in an example of __evolution___.
4. **Control processes:** Enable organisms to carry out __metabolic__processes in the___right order___ __. A. ___coordination_____: Enzymes coordinate metabolic reactions. B. __regulation___: Enzymes are regulated in order to maintain homeostasis.
5. **Unique structural organization:** Organisms are made of_cells___.

19. **Levels of Biological Organization: 1.** _biosphere____the worldwide__ecosystem____
    2. _Ecosystem_____communities that _interact__ with one another in a particular place.
    3. ___communities____of different organisms interacting with each other in a particular place.
    4. _population___a group of individual organisms in a particular place.
    5. __organism_ an independent living unit.
    6. __organ system____: many organs that perform a ___particular__ function.
    7. __organ__:many tissues that perform a particular function.
    8. __tissue_____: many cells that perform a particular function.
    9. _cell___: simplest unit that shows characteristics of life.
    10. ____molecules___: specific arrangements of atoms.
    11. ____atoms_____:the fundamental units of matter
20. Evolution, the Core Theme of Biology: ____evolution_____is the one idea that makes logical sense of everything we know about living organisms. The scientific explanation for both the _unity___ and __diversity__ of organisms is the concept that living __organisms__ are modified __descendants____of common __ancestors____. Many kinds of evidence support the occurrence of evolution.

21. The Significance of Biology in Our Lives: Biology has significantly contributed to our high standard of living. For example: * Advanced __food___ ____production_____; Advances in disease_____control____; *Advances in plant and animal_____breeding___; *Advances in__biotechnology_____; *Progress in__genome__ studies