

Name: _____
Class: _____

Date: _____

1. Which statement best describes the term *theory* as used in the gene-chromosome theory?

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| 1. A theory is never revised as new scientific evidence is presented. | 3. A theory refers to a scientific explanation that is strongly supported by a variety of experimental data. |
| 2. A theory is an assumption made by scientists and implies a lack of certainty. | 4. A theory is a hypothesis that has been supported by one experiment performed by two or more scientists. |

2. Researchers performing a well-designed experiment should base their conclusions on

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| 1. the hypothesis of the experiment | 3. a small sample size to insure a reliable outcome of the experiment |
| 2. data from repeated trials of the experiment | 4. results predicted before performing the experiment |

3. A student was comparing preserved specimens of three species, *X*, *Y*, and *Z*, in a classroom. Which statement is an example of an observation the student could have made and *not* an inference?

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| 1. The leaves produced by plant <i>X</i> are 4 cm across and 8 cm in length. | 3. Plant <i>X</i> produces many seeds that are highly attractive to finches. |
| 2. Plant <i>Y</i> has large purple flowers that open at night. | 4. The flowers of plant <i>Z</i> are poisonous to household pets. |

4. A science researcher is reviewing another scientist's experiment and conclusion. The reviewer would most likely consider the experiment *invalid* if

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| 1. the sample size produced a great deal of data | 3. it contains conclusions not explained by the evidence given |
| 2. other individuals are able to duplicate the results | 4. the hypothesis was not supported by the data obtained |

5. Which statement best describes a controlled experiment?

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| 1. It eliminates the need for dependent variables. | 3. It avoids the use of variables. |
| 2. It shows the effect of a dependent | 4. It tests the effect of a single independent |

variable on an independent variable.

variable.

6. Students were asked to determine if they could squeeze a clothespin more times in a minute after resting than after exercising. An experiment that accurately tests this question should include all of the following *except*

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| 1. a hypothesis on which to base the design of the experiment | 3. two sets of clothespins, one that is easy to open and one that is more difficult to open |
| 2. a large number of students | 4. a control group and an experimental group with equal numbers of students of approximately the same age |

7. Base your answer on the information below and on your knowledge of biology.

Evolutionary changes have been observed in beak size in a population of medium ground finches in the Galapagos Islands. Given a choice of small and large seeds, the medium ground finch eats mostly small seeds, which are easier to crush. However, during dry years, all seeds are in short supply. Small seeds are quickly consumed, so the birds are left with a diet of large seeds. Studies have shown that this change in diet may be related to an increase in the average size of the beak of the medium ground finch.

The most likely explanation for the increase in average beak size of the medium ground finch is that the

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| 1. trait is inherited and birds with larger beaks have greater reproductive success | 3. birds interbred with a larger-beaked species and passed on the trait |
| 2. birds acquired larger beaks due to the added exercise of feeding on large seeds | 4. lack of small seeds caused a mutation which resulted in a larger beak |

8. In the United States, there has been relatively little experimentation involving the insertion of genes from other species into human DNA. One reason for the lack of these experiments is that

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| 1. the subunits of human DNA are different from the DNA subunits of other species | 3. inserting foreign DNA into human DNA would require using techniques completely different from those used to insert foreign DNA into the DNA of other mammals |
| 2. there are many ethical questions to be answered before inserting foreign genes into human DNA | 4. human DNA always promotes human survival, so there is no need to alter it |

9. The development of an experimental research plan should *not* include a

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| 1. list of safety precautions for the experiment | 3. procedure for the use of technologies needed for the experiment |
| 2. list of equipment needed for conducting the experiment | 4. conclusion based on data expected to be collected in the experiment |

10. A student performed an experiment to demonstrate that a plant needs chlorophyll for photosynthesis. He used plants that had green leaves with white areas. After exposing the plants to sunlight, he removed a leaf from each plant and processed the leaves to remove the chlorophyll. He then tested each leaf for the presence of starch. Starch was found in the area of the leaf that was green, and no starch was found in the area of the leaf that was white. He concluded that chlorophyll is necessary for photosynthesis.

Which statement represents an assumption the student had to make in order to draw this conclusion?

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| 1. Starch is synthesized from the glucose produced in the green areas of the leaf. | 3. The white areas of the leaf do not have cells. |
| 2. Starch is converted to chlorophyll in the green areas of the leaf. | 4. The green areas of the leaf are heterotrophic. |

11. A scientist is planning to carry out an experiment on the effect of heat on the function of a certain enzyme. Which would *not* be an appropriate first step?

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| 1. doing research in a library | 3. completing a data table of expected results |
| 2. having discussions with other scientists | 4. using what is already known about the enzyme |

12. Which statement best describes a scientific theory?

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| 1. It is a collection of data designed to provide support for a prediction. | 3. It is a scientific fact that no longer requires any evidence to support it. |
| 2. It is an educated guess that can be tested by experimentation. | 4. It is a general statement that is supported by many scientific observations. |

13. Which source would provide the most reliable information for use in a research project investigating the effects of antibiotics on disease-causing bacteria?

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| 1. the local news section of a newspaper from 1993 | 3. a current professional science journal article on the control of pathogens |
| 2. a news program on national television about antigens produced by various plants | 4. an article in a weekly news magazine about reproduction in pathogens |

14. A student prepared a slide of pollen grains from a flower. First the pollen was viewed through the low-power objective lens and then, without moving the slide, viewed through the high-power objective lens of a compound light microscope.

Which statement best describes the relative number and appearance of the pollen grains observed using these two objectives?

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| 1. low power: 25 small pollen grains
high power: 100 large pollen grains | 3. low power: 25 large pollen grains
high power: 100 small pollen grains |
| 2. low power: 100 small pollen grains
high power: 25 large pollen grains | 4. low power: 100 large pollen grains
high power: 25 small pollen grains |

15. In 1910, Thomas Morgan discovered a certain pattern of inheritance in fruit flies known as sex linkage. This discovery extended the ideas of inheritance that Gregor Mendel had discovered while working with garden peas in 1865. Which principle of scientific inquiry does this illustrate?

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| 1. A control group must be part of a valid experiment. | 3. The same experiment must be repeated many times to validate the results. |
| 2. Scientific explanations can be modified as new evidence is found. | 4. Values can be used to make ethical decisions about scientific discovery. |