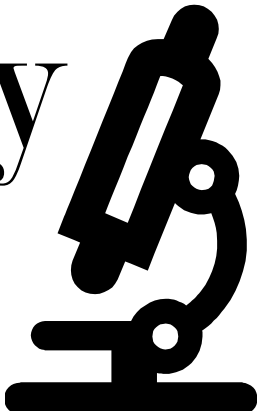
Biology



Advanced/Gifted

Summer Packet

2016

Name:_____

7th Grade Teacher:_____

Name _____ Date _____ Class _____

Diagnostic Test 1

Directions: *Use the diagram below to answer Question 1.*

1. Which of the following statements is a valid conclusion according to the qualitative data shown in the diagram?

A The different species of finches evolved according to adaptations for feeding.
B Finches acquired beaks suitable for eating cactus plants over the course of their lifetimes.
C Tree species that eat insects are more likely to survive than species that do not eat insects.
D The different species of finches evolved from ancestors with different feeding adaptations.

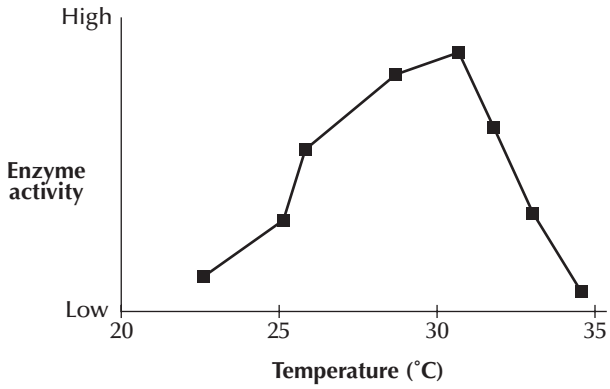
2. Suppose that a student wants to communicate the temperatures at which different enzymes are the most active. The *best* way to communicate this data is with a

A circle graph.
B bar graph.
C written description.
D line graph.

3. Which of the following questions could be answered by a scientific investigation?

A Are frogs shy animals?
B What factors limit the growth of yeast?
C Did Watson enjoy discovering the structure of DNA?
D Should humans be able to choose their children's genetic makeup?

Directions: *Use the graph below to answer Question 4.*



4. The graph shows the activity of a digestive enzyme from the human small intestine at different temperatures. What is the explanation for the loss of activity at temperatures above about 32 degrees C?

A The high temperatures disrupt the shape of the enzyme, inactivating it.
B Rapid molecular motion at high temperatures makes substrate collisions less frequent.
C The optimal temperature of this enzyme is 25 degrees C.
D Enzyme synthesis does not take place at high temperatures.

Name _____ Date _____ Class _____

Diagnostic Test 1 (continued)

5. The units liter, milliliter, and cubic centimeter are all used to measure

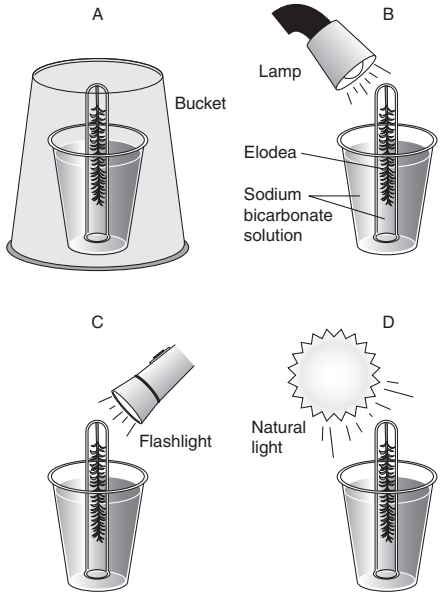
A volume.
B mass.
C length.
D weight.

6. Which of the following tools would be *best* to use to label the location of heterozygous alleles on a pair of homologous chromosomes?

A a DNA fingerprint
B a karyotype
C an autoradiograph
D a genetic marker

Directions: *Use the information and diagram below to answer Question 7.*

Jeremy reads that plants require light, water, and carbon dioxide to produce sugars and oxygen in the process of photosynthesis. Jeremy decides to test the hypothesis that light is needed for photosynthesis. He sets up his experiment as shown, making sure that each test tube is filled with sodium bicarbonate solution and contains no air. He allows the setup to remain undisturbed for three days.



7. Which setup in the experiment serves as the control?

A setup A
B setup B
C setup C
D setup D

GO ON

Diagnostic Test 1 (continued)

Directions: *Use the table below to answer Question 8.*

Number of Chromosomes in Body Cells of Various Animals	
Organism	Chromosome Number
Roundworm	2
Fruit Fly	8
Cricket	22
Mouse	40
Human	46
Pigeon	80

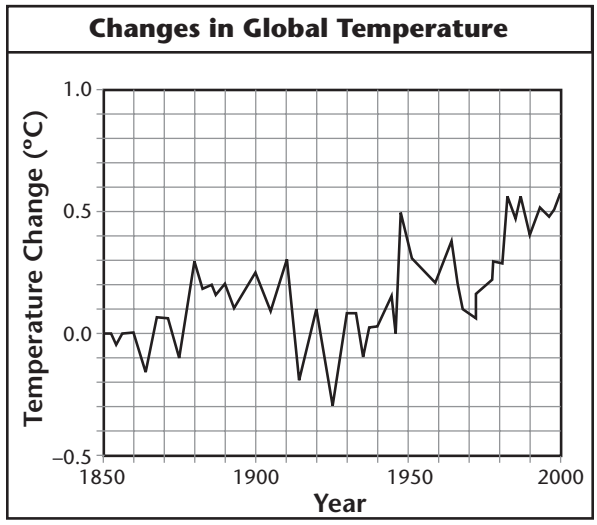
8. Which technology was *most* helpful in obtaining the data shown in the table above?

A microscope
B DNA fingerprinting
C calorie counter
D laboratory balance

9. Which technology contributes *most* to the effort to understand inherited disorders?

A DNA analysis
B body imaging techniques
C transmission electron microscopes
D cell fractionation

Directions: *Use the information and graph below to answer Question 10.*



The graph shows how global temperature changed between 1850 and 2000. The value 0.0 on the *y*-axis represents the temperature in 1850. The rest of the values on the *y*-axis represent how much the temperature increased or decreased from the 1850 temperature.

10. What is the main trend shown in the graph?

A Although the temperature has risen and fallen since 1850, the average temperature has remained about the same.
B Although the direction of temperature change has not been consistent since 1850, the overall trend has been an increase in global temperature.
C Although the direction of temperature changes has not been consistent since 1850, the overall trend has been a decrease in global temperature.
D Since 1850, Earth's temperature has consistently been increasing.

GO ON

Diagnostic Test 1 (continued)

Directions: *Use the information below to answer Question 11.*

To study how many food particles an amoeba consumes during an hour, a student counted the number of particles 10 amoebas consumed in 5 minutes. From this data he calculated the average number of particles an amoeba consumes in 5 minutes. He then multiplied the average by 12 to obtain the number of particles an amoeba would consume in an hour.

11. Li has asserted that extrapolating the results from 5 minutes to an hour is a source of error in the procedure. What would be the *best* way to respond to this criticism?

- **A** Ask Li to repeat the experiment using the same procedure.
- **B** Redo the experiments and increase the observation time to 60 minutes.
- **C** Ignore the assertion as being irrelevant to the strength of the results.
- **D** Increase the observation time to 30 minutes in future experiments on amoebas.

12. An engineer wants to design a new type of microscope. Which of the following would the engineer *most likely* do first?

- **A** Test a model of the new microscope.
- **B** Modify the model of the new microscope.
- **C** Retest the model of the new microscope.
- **D** Build a model of the new microscope.

Directions: *Use the information below to answer Question 13.*

Grace is the head of a company that wants to develop a watershed area. Protesters are asserting that the loss of the watershed would mean reduced rainfall. However, Grace is not convinced that deforesting watershed areas would have any effect on the amount of rainfall received in the area.

13. What could she do to learn more about the subject quickly?

- **A** She could deforest an area and see if the amount of rainfall in the area changed.
- **B** She could visit an area in which the watershed was destroyed and ask some of the older residents if they had noticed a change in the rainfall.
- **C** She could research scientific journals about the topic.
- **D** She could measure the rainfall in areas that have watersheds and in areas that don't have watersheds.

GO ON

Diagnostic Test 1 (continued)

Directions: *Use the information in the table below to answer Question 14.*

Tamika has heard that the chirping of crickets varies with the air temperature. She performs an investigation in which she counts the number of times crickets chirp in 30 seconds at different temperatures. Her data are shown in the table below.

Temperature (°C)	12	15	18	21
Number of Chirps	28	40	48	59

14. Should Tamika use a line graph to show this data?

A Yes, because a line graph will show how the number of chirps varies in response to the temperature

B No, because the chirps are parts of a whole that should be shown in a circle graph

C No, because the chirps should be considered separate but related items that require a bar graph

D No, because the temperatures should be considered separate but related items that require a bar graph

15. Two groups of scientists study the same data on the stability of hare and lynx populations. Which of the following provides the *best* explanation for why the two groups might reach different conclusions?

A Scientists change data to fit their hypotheses.

B Scientists have different backgrounds and so will interpret data differently.

C Some scientists like hares more than lynx, and some like lynx more than hares.

D One group spent more time analyzing the data than the other.

16. Martin and Elisa tested a growth hormone used on tomato plants. The tomatoes produced by the plants ripened more quickly. Their research is funded by the company that would produce and sell tomatoes grown using the hormone. Martin and Elisa agree that the hormone speeds the ripening process. What should they do to make sure that their research is thorough and unbiased before the company decides whether to use the hormone?

A Report only the experimental results that favor the tomato-producing company.

B Keep their results private so that other scientists do not repeat their experiments.

C Test the hormone for safety in humans and then report the results to other scientists.

D Write an advertisement for the company that explains how the hormone works in tomatoes.

GO ON

Diagnostic Test 1 (continued)

17. Genetic technology poses many ethical questions. What is one technological question that involves human values?

A Should foods be genetically modified?
B Can DNA technology be used to identify people?
C How can *lac* operons be controlled?
D Can bacteria be modified to produce vaccines?

18. Zia and Frank are conducting an experiment to test how tall a plant grows when it has enough sunlight. They place five plants in the dark and five plants on a window sill. They water each plant regularly and equally. Each day, they measure the height of the plants. How should they represent their data?

A in a circle graph
B in a bar graph
C in a line graph
D in a table

Directions: *Use the information below to answer question 19.*

A student wants to measure how the amount of waste gas exhaled by a person changes before and after exercise.

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19. Which item would be *most* useful for the student to measure?

A inhalations per minute
B milliliters of carbon dioxide exhaled
C grams of oxygen exhaled
D liters of oxygen exhaled

20. Suppose that a student wants to present information on several different properties of enzymes. The *best* way to communicate this data is with a

A circle graph.
B table.
C written description.
D drawing.

21. Robert Hooke invented a microscope in the mid-1600s. Why was this technology essential to the scientific study of life?

A The microscope enabled scientists to see and learn about cells.
B The microscope made observations about living things more valid.
C His invention led the way to even more powerful microscopes.
D His invention led to the invention of telescopes and space travel.

22. Which of the following theories is the consensus of the current scientific community?

A the theory of spontaneous generation
B the theory of geocentricity
C the Red Queen theory
D the theory of evolution

23. Jenna built a microscope at home so that she can study microscopic organisms in more detail than she could using a hand lens. How would she know that she has built a successful model?

A if she can see more detail in a subject than with the microscopes at school
B if she can see more detail in a subject than when using only a hand lens
C if the image that she sees is only slightly distorted
D if the homemade microscope does not fall apart

GO ON

Diagnostic Test 1 (continued)

24. Under what conditions are scientists *most likely* to come up with very different conclusions from the same data?

A When the experiment had a control and only one variable was manipulated.
B When more than one variable was manipulated.
C When the sample size is very large.
D When the experiment has been done many times and the data remain the same.

25. A theory differs from a hypothesis because a theory

A is only speculation about cause and effect.
B explains something without giving evidence.
C is not testable by experiment or observation.
D explains a large body of evidence and has been tested many times.

26. If drugs that are approved for sale in the United States have been tested rigorously using large sample sizes, why are some drugs recalled after many years on the market?

A because the drug company will be able to charge higher prices by driving up demand for the drug
B because the drug company wants to prevent other companies from stealing the formula for the drugs
C because long-term use may cause unexpected side effects
D because drug companies cannot sell a drug while they are renewing their patent

27. In science, sample size is an important consideration in experimental design. However, there are times in which the apparatus may be used by only one individual or test at a time. What should be done to reduce errors caused by a small sample size?

A publish a note with the results alerting readers to the fact that the sample size was 1
B try to modify the apparatus so that it can accomodate the appropriate sample size
C avoid using apparatus that are so restrictive because the results would no be useful
D run multiple trials so that the results are calculated from a large enough sample size

28. Juan is studying a population of birds in the tropics. After he tags each individual, he measures the beak length, beak width, wing span, and weight of each of the birds that he traps. What would be the *best* format to record this data?

A in a line graph
B in paragraph form
C in a table
D in a circle graph

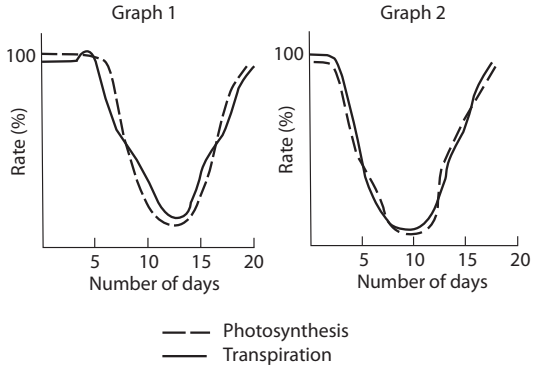
GO ON

Name _____ Date _____ Class _____

Diagnostic Test 1 (continued)

Directions: *Use the information and graphs below to answer Question 29.*

The effect of a lack of water on the photosynthetic and transpiration rates in plants was examined. Corn and geranium plants were deprived of water for 11 days. On the twelfth day, water was added to the soil. The photosynthetic and transpiration rates were determined each day for the length of the experiment. The results for corn plants are represented in Graph 1, and those for the geraniums in Graph 2.



29. The *best* conclusion to draw from the data given in these graphs is that

- **A** geranium and corn plants can live no longer than 11 days without water.
- **B** all plants carry on photosynthesis only as long as transpiration occurs.
- **C** geraniums are more drought-resistant than corn plants.
- **D** a relationship seems to exist between transpiration rate and photosynthetic rate in geranium and corn plants.

Directions: *Use the information below to answer Question 30.*

Marcus is studying plant growth. He uses four identical trays of potting soil. He plants 2 marigolds in the first tray, 5 in the second tray, 8 in the third tray, and 15 in the last tray. Marcus places each of the trays on the same table near a window. Each day he adds an equal amount of water to the soil in each tray. Once a week for the next month, Marcus measures the heights of the plants in each tray.

30. Which hypothesis is Marcus *most likely* to be testing in his investigation?

- **A** Different types of plants have adaptations for different kinds of environments.
- **B** Larger populations of organisms have a better chance of survival than smaller populations.
- **C** Photosynthesis requires sunlight and a regular supply of water and carbon dioxide.
- **D** Similar kinds of organisms compete for the same resources.

31. When using a light microscope, how do you keep the objective lens from being damaged while focusing your field of view?

- **A** Never lower the body tube using the fine adjustment.
- **B** Never raise the body tube using the coarse adjustment.
- **C** Never lower the body tube using the coarse adjustment.
- **D** Never raise the body tube using the fine adjustment.

GO ON

Diagnostic Test 1 (continued)

32. A population of lizards lives in a desert and feeds mainly on mice. Some lizards in the population also eat insects and spiders. Which of the following changes in the environment would probably have the *least* effect on the population of lizards over time?

A The population of mice suddenly decreases.
B The population of insects suddenly increases.
C The mice's food supply decreases dramatically.
D The spiders' food supply decreases dramatically.

33. Which of the following distinguishes a theory from a hypothesis?

A A theory is much more speculative than a hypothesis.
B A hypothesis can be tested by experiment, but a theory cannot.
C A hypothesis can be shown to be wrong, but a theory cannot.
D A theory explains far more phenomena than a hypothesis.

Directions: *Use the information below to answer Question 34.*

You are conducting a laboratory investigation with acids and bases. When you finish the investigation, you have several milliliters of the acid and the base you were working with left over.

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34. What should you do with this leftover material?

A Return each substance to its original container.
B Pour both substances down the sink.
C Pour the substances into an unused beaker.
D Ask the teacher for instructions about how to dispose of the materials.

35. For many years, stomach ulcers were attributed to certain habits in a person's lifestyle. However, the discovery of *H. pylori*, a bacteria that burrows into the stomach lining and causes inflamation, changed the older idea. Of what characteristic of science is this an example?

A that science is often incorrect and should not be relied upon
B that science is based only on facts
C that science can be used to answer any question
D that science is constantly changing based on the latest evidence

GO ON

Diagnostic Test 1 (continued)

36. What safety equipment should you wear during a laboratory experiment that involves the use of corrosive chemicals?

A heat-resistant gloves
B gloves and goggles
C apron, goggles, and heat-resistant gloves
D apron, gloves, and goggles

37. When studying factors such as selection pressures, what is an important advantage to using the short-lived fruitfly instead of a longer-lived, larger animal?

A Because the effects of selection pressure need to be studied over generations, more data can be gathered from a short-lived organism in a given time period.
B Because fruitflies are easier to train for the tasks required in the experiment, more accurate data can be gathered.
C Because the scientific community has always studied the fruitfly, it is easier to follow this convention.
D Because it costs less to feed a large population of fruitflies than an equivalent population of larger animals, scientists prefer fruitflies.

38. An observer noted an increase in the population of mallard ducks in a local river and a decrease in pollution levels. He concluded that the increase in the mallard population was a direct result of decreasing levels of toxic chemicals in the river. What is a more scientific explanation for this increase?

A The amount of available food in the area increased.
B The number of mallard predators in the area increased.
C The number of parasites that live on mallards increased.
D Emigration of mallards from the area increased.

39. The following phrase is used commonly in commercials: "proven in clinical testing." What is meant by this phrase?

A The company conducted experimental trials, which provided results supporting their claim.
B The company developed the product in a clinical setting.
C The company has a lab facility that can test how well their products work.
D The company has paid to use the phrase to sound more scientific.