West Nile Virus (WNV) disease is caused by a virus that is transmitted by mosquitoes. The mosquitoes that carry WNV need stagnant or standing water to complete their life cycle. In nature the disease is past from infected birds to other birds by the mosquitoes. Once in awhile these same mosquitoes bite humans. For most people, WNV infection is usually no worse than the flu, but in some cases it can be fatal. The young, sick, and the elderly are most affected by West Nile Virus. There is no known cure for WNV.

1. After reading the information, determine which question is of most importance to a researcher studying WNV.
   A. Do all mosquitoes carry West Nile Virus?
   B. Do seasonal temperature changes affect the activity level of mosquitoes?
   C. Can humans get WNV from pets?
   D. Do mosquitoes feed on plants?

2. Which of these methods would be a practical way to reduce the West Nile Virus with the least amount of damage to the environment?
   A. use a pesticide spray and kill all the insects in an area
   B. eliminate all birds from an area
   C. keep people away from birds
   D. eliminate stagnant water around homes

3. Researchers have found that certain bird species seem to be more affected by the WNV than other species. Cornell University has had a program called the “Feeder Watch Program” for many years. People all over the country collect data from bird feeders and enter the data onto a Cornell website. In order for this data to be usable by scientists studying WNV, what must be true?
   A. All the people must follow the same steps to collect the data.
   B. All the people must be over 25 years old to collect reliable data.
   C. All the birds must be less than 12 inches in length to be counted.
   D. All the birds must be tranquilized before counting them.

4. A student noticed that a lot of birds were found around the outside eating area after lunch. However, when the student visited the same area after school, there were no birds to be found. Which of these questions is most closely based on these observations?
   A. Why are birds only found in the area at certain times?
   B. How many different birds are found on campus?
   C. What affect do students have on bird behavior?
   D. What affect do bird repellants have on birds?
5. A scientist was testing the effects of a toxic compound on the growth of bacteria. When the experiment was done, the scientist still had some of the compound left. What should the scientist do with the leftover compound?

A. Wash the compound down the drain using lots of water.
B. Throw the compound into the regular trash.
C. Take the compound home and store it for use in another experiment.
D. Check with the State for information on how to dispose of it.

6. Research shows that the greater the number of affected birds in an area, the greater the number of human cases of West Nile Virus reported. Which graph best represents the trend?
7. A scientist is doing research on how insulin works in the human body. Which of the following resources would be the most reliable?

A. An atlas  
B. A dictionary  
C. A scientific journal  
D. A diabetic’s personal web page

8. What type of experiment evaluates the effect of a single variable?

A. Variable experiment  
B. Poor experiment  
C. Invalid experiment  
D. Controlled experiment

9. A student recorded the number and type of birds visiting his bird feeder every morning at 6:00 am for 15 minutes. What is the best way to record this data?

A. Notes  
B. Sketches  
C. Data Table  
D. Journal

10. A student was on a hike where she observed a large number of different cactus species. She wanted to identify the different species but lacked any field guides or other information that could help her. Which of these methods would be the best way for her to record her observations?

A. Graph  
B. Sketches  
C. Data Table  
D. Diary

11. The main goal of science is to:

A. arrange a series of observations.  
B. help humans to control nature.  
C. follow the scientific method.  
D. understand the world around us.
The breathing rate of a goldfish can be measured by the number of times the goldfish opens its mouth. In an experiment, students placed a goldfish in a container of water at 25°C and counted the number of times the fish opened its mouth. The students gradually lowered the temperature and counted the times the fish opened its mouth at 20°C, 15°C, 10°C and 5°C. This test was repeated three more times over the next three days. The results are shown in the table below.

<table>
<thead>
<tr>
<th>Trial</th>
<th>The Effect of Temperature on the Breathing Rate of a Goldfish in openings per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25°C</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>102</td>
</tr>
<tr>
<td>3</td>
<td>99</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Average</td>
<td>100.25</td>
</tr>
</tbody>
</table>

12. Which graph best represents this data?

A  
B  
C  
D  

13. To determine the effect of caffeine on the activity of mice, some scientists took a group of 20 mice and gave them water with caffeine added. They then measured their activity level over the next 5 hours. They repeated the experiment 6 times. What error did the scientists make in conducting this experiment?

A. The number of trials should be increased.
B. The sample size was too small.
C. The control group is missing.
D. The experiment did not test the hypothesis.
14. As part of an arthropod study at ASU, the following data was collected. What would be the best way to represent the breakdown of this data?

<table>
<thead>
<tr>
<th>Araneae</th>
<th>3 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formicidae</td>
<td>7 %</td>
</tr>
<tr>
<td>Acari</td>
<td>30 %</td>
</tr>
<tr>
<td>Collembola</td>
<td>15 %</td>
</tr>
<tr>
<td>Acari</td>
<td>43 %</td>
</tr>
<tr>
<td>Coleoptera</td>
<td>2 %</td>
</tr>
</tbody>
</table>

A. Stem and leaf graph  
B. Scatterplot  
C. Circle/Pie graph  
D. Line graph

15. What kind of cell has a nucleus and membrane-bound organelles?

A. Eukaryotic  
B. Prokaryotic  
C. Unicellular  
D. Monocellular
16. Scientists have been monitoring CO₂ levels in the atmosphere for years and are noticing changes in the climate. What type of relationship is being shown in the graph?

A. positive relationship  
B. negative relationship  
C. no relationship  
D. equal relationship

17. What would be the best explanation for the increase of CO₂?

A. burning of fossil fuels  
B. El Niño climate phenomena  
C. recycling plastic bottles  
D. saving the forests

18. What would be the best way to present these results to other scientists?

A. presenting a research poster  
B. posting a blog  
C. using graphs  
D. newspaper article

A scientist found that when frog tadpoles were placed in pools that contain fish those
tadpoles swim less than tadpoles that are placed in pools with no fish. It was also found that when tadpoles were placed in pools that once contained fish the tadpoles swim less.

19. Choose the best hypothesis for the tadpole problem.

A. Tadpoles can sense fish have been in the water.
B. Tadpoles swim deeper in water with fish.
C. Tadpoles can see fish in the water.
D. Tadpoles swim faster in water with fish.

20. Which of the following would the investigator use for information on the tadpole problem?

A. a scientific journal
B. an atlas
C. a thesaurus
D. a dictionary

21. What would be the "best" question to investigate?

A. Why do tadpoles swim less in pools that are cold?
B. Why do tadpoles swim less in pools that are warm?
C. Why do tadpoles sense the presence of a fish?
D. Why do tadpoles swim quickly, then stop?

22. What other investigation should the scientist do to find more about the tadpole behavior?

A. test the water temperature
B. test the fish for diseases
C. test the tadpoles for diseases
D. test the water for chemicals
Observations:
You are outdoors during the day overturning rocks and logs. You repeatedly find pill bugs under the rocks and logs.

23. Based on these observations which of the following would be a relevant scientific question?

A. Pill bugs prefer light to dark.
B. Pill bugs prefer dark to light.
C. Do pill bugs prefer dark to light?
D. Are pill bugs happy under rocks and logs?

24. Based on the above observations, what would you predict the results of the following experiment to be?

Experiment:

<table>
<thead>
<tr>
<th>Clear Transparency</th>
<th>Pan containing pill bugs</th>
<th>Darkened Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>![Image of pill bugs]</td>
<td></td>
</tr>
</tbody>
</table>

A. All the pill bugs will go under the clear transparency.
B. All the pill bugs will stay in the middle.
C. All the pill bugs will go under the darkened transparency.
D. Half the pill bugs will go under the clear transparency and half under the darkened transparency.

25. What has caused a loss of biodiversity and desert habitat?

A. urban sprawl
B. stocking fish
C. burning fossil fuels
D. sport fishing
26. A student lives about 100 miles away from a volcano. After a recent volcanic eruption, he noticed the skies were very cloudy. What compound is most likely to be the main component of the clouds?

A. smog  
B. volcanic dust  
C. pollution  
D. cloud cover

27. Which of the following graphs is most likely to occur if a predator is introduced to the ecosystem?

A.  
B.  
C.  
D.
28. Which organism would **NOT** be considered a predator?

A. rabbit  
B. mouse  
C. fox  
D. gila monster

29. In an ecosystem, which of the following is an abiotic factor?

A. plants  
B. soil  
C. birds  
D. lizards

30. What trophic level is represented by plants?

A. primary producer  
B. primary consumer  
C. secondary consumer  
D. tertiary consumer
31. Which direction does energy flow in an ecosystem?

A. prey to producer to consumer  
B. predator to prey  
C. prey to predator  
D. consumer to producer

32. Which organism is both a primary and secondary consumer?

A. cricket  
B. mouse  
C. butterfly  
D. hawk

33. Which answer best shows an animal’s adaptation to the desert?

A. long ears of the jackrabbit  
B. the long trunk on an elephant  
C. the long beak on a hummingbird  
D. birds migrating in winter

34. The Peppered Moth population was once white in color with dark spots. Over the industrial boom, the color of the population has changed to a dark moth with darker spots. This is an example of:

A. genotype  
B. natural selection  
C. adaptation  
D. allopatric speciation
35. According to the cladogram, which species of horse is the most closely related to *equus*.

A. *eohippus*
B. *mesohippus*
C. *pliohippus*
D. *merychippus*

36. An increase in rainfall increases the amount of producers in an ecosystem. What effect will this have on the rabbits and bobcat populations?

A. The rabbit population will increase and will be followed by an increase in bobcat population.
B. The bobcat population will increase and will be followed by an increase in rabbit population.
C. The rabbit population will increase and the bobcat population will decrease.
D. The rabbit population will decrease and the bobcat population will increase.
37. What human activity can directly increase the cloudiness and temperature in nearby streams?

A. increasing factory CO₂ emissions
B. clear-cutting forests
C. driving cars that emit air pollutants
D. increasing the consumption of meat

38. When scientists discover a new species, what system do they use to name it?

A. binominal nomenclature
B. Linnaeus system
C. 5 kingdom system
D. species nomenclature

39. Taxonomy, by which we mean classifying living things into groups based on their similarities and differences, is credited to which scientist?

A. Carolus Linneaus
B. Leonardo Da Vinci
C. Watson and Crick
D. Bill Nye

40. We want to determine how much water is best for a barrel cactus. We use three cacti. Cactus one gets 5mL of water per week. Cactus two gets 10 mL of water per week and cactus three gets 15 mL of water per week. How many trials did we run?

A. 1
B. 15
C. 2
D. 3

41. What can we say about our sample size?

A. It was too big.
B. It does not matter.
C. It was too small.
D. It was just right.

42. Which cactus is the control?

A. 1
B. 2
C. 3
D. 4

43. Fifty years ago doctors would tell people who had breathing (asthma, respiratory) issues to move to Arizona. Since that time the population of Arizona has increased
tremendously, and more people in the state of Arizona have developed asthma. What would be the cause of this respiratory issue?

A. dust  
B. air pollution  
C. rain  
D. volcanic dust  

44. A student noticed that the sky was extremely cloudy after a recent volcano eruption. The clouds in the sky were:

A. smog.  
B. volcanic dust.  
C. pollution.  
D. cloud cover.  

45. These birds are blown to an island in a storm. On the island they reproduce for many generations. New birds are blown on to the island occasionally, but can't mate with the original population. What has occurred?

A. geographic isolation  
B. genetic drift  
C. gene flow  
D. gene variance