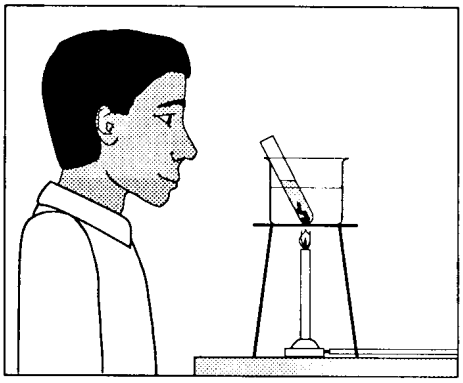
1. Base your answer to the following question on Base your answer on the diagram below and on your knowledge of biology.



Which statement describes *two* unsafe laboratory practices represented in the diagram?

A) The flame is too high and the test tube is unstoppered.
B) The opening of the test tube is pointed toward the student and the student is not wearing goggles.
C) The test tube is unstoppered and the student is not wearing goggles.
D) The beaker has water in it and the flame is under the tripod.

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

A) list of safety precautions for the experiment
B) list of equipment needed for conducting the experiment
C) procedure for the use of technologies needed for the experiment
D) conclusion based on data expected to be collected in the experiment

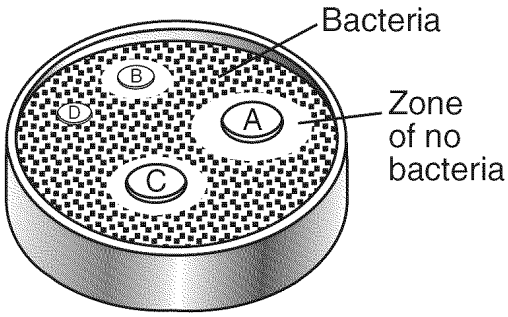
3. In 1910, Thomas Morgan discovered a certain pattern of inheritance in fruit flies known as sex linkage. This discovery extended the ideas of inheritance that Gregor Mendel had discovered while working with garden peas in 1865. Which principle of scientific inquiry does this illustrate?

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

4. Which statement most accurately describes scientific inquiry?

A) It ignores information from other sources.
B) It does not allow scientists to judge the reliability of their sources.
C) It should never involve ethical decisions about the application of scientific knowledge.
D) It may lead to explanations that combine data with what people already know about their surroundings.

5. Base your answer to the following question on A mouthwash experiment tested mouthwash against bacteria commonly found in the mouth. Four paper discs each with a different brand of mouthwash were placed onto the surface of a plate that contained food, moisture, and bacteria commonly found in the mouth. The diagram below shows the growth of bacteria on the plate after 24 hours.



Which change in procedure would have improved the experiment?

A) using a smaller plate with less food and moisture
B) using bacteria from many habitats other than the mouth
C) using the same size paper discs for each mouthwash
D) using the same type of mouthwash on each disc

6. Which statement best describes a scientific theory?

A) It is a collection of data designed to provide support for a prediction.
B) It is an educated guess that can be tested by experimentation.
C) It is a scientific fact that no longer requires any evidence to support it.
D) It is a general statement that is supported by many scientific observations.

7. 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?

   A) doing research in a library
   B) having discussions with other scientists
   C) completing a data table of expected results
   D) using what is already known about the enzyme

8. Why do scientists consider any hypothesis valuable?

   A) A hypothesis requires no further investigation.
   B) A hypothesis may lead to further investigation even if it is disproved by the experiment.
   C) A hypothesis requires no further investigation if it is proved by the experiment.
   D) A hypothesis can be used to explain a conclusion even if it is disproved by the experiment.

9. A student observes that an organism is green. A valid conclusion that can be drawn from this observation is that

   A) the organism must be a plant
   B) the organism cannot be single celled
   C) the organism must be an animal
   D) not enough information is given to determine whether the organism is a plant or an animal

10. Base your answer to the following question on A student hypothesized that lettuce seeds would not germinate (begin to grow) unless they were covered with soil. The student planted 10 lettuce seeds under a layer of soil and scattered 10 lettuce seeds on top of the soil. The data collected are shown in the table below.

Data Table

Seed Treatment	Number of Seeds Germinated
Planted under soil	9
Scattered on top of soil	8

To improve the reliability of these results, the student should

   A) conclude that darkness is necessary for lettuce seed germination
   B) conclude that light is necessary for lettuce seed germination
   C) revise the hypothesis
   D) repeat the experiment using a larger sample size

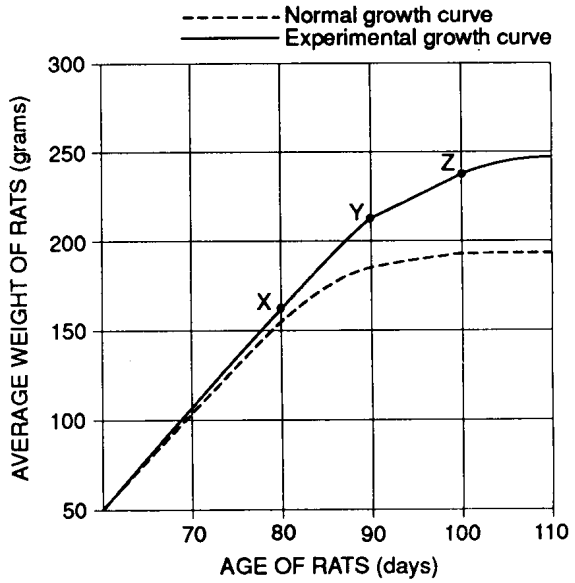
11. The diagram below shows two setups that were used to study bacterial growth. Each setup initially contained an equal number of the bacterium *E. coli* in different carbohydrate solutions. After one hour, a 1-milliliter sample was drawn from each tube and analyzed. The number of bacteria found in the sample from test tube 1 was higher than the number in test tube 2.

Which conclusion regarding this investigation is *not* valid?

A) All bacteria grow best in a solution of glucose.
B) *E. coli* grows better in a 10% solution of glucose than in a 10% solution of sucrose.
C) The type of sugar solution will make a difference in the rate of growth of *E. coli.*
D) The rate of growth of *E. coli* depends on the type of carbohydrate present.

12. Base your answer to the following question on the graph below and on your knowledge of biology.

The graph below illustrates the results of an investigation using newborn rats. The dashed line curve shows the normal growth rate of rats, based on previous investigations. The solid-line curve shows the growth rate of 50 rats that were fed a normal diet containing nutrients *A* and *B* until they reached an age of 80 days (point *X*). At point *X*, the amounts of nutrients *A* and *B* were increased. At point *Y*, nutrient *A* was returned to the normal amount. At point *Z*, nutrient *B* was returned to the normal amount.



According to the graph, at what age do rats normally reach a stable weight?

A) 70 days
B) 80 days
C) 90 days
D) 100 days

13. Base your answer to the following question on the information below and on your knowledge of biology.

An experiment was designed to determine if chlorophyll is responsible for the growth of corn seedlings toward light. In the experiment, equal numbers of albino corn seedlings and green corn seedlings were grown at a temperature of 24ºC. All other environmental conditions were the same for both groups of seedlings. The results of the experiment showed that both the albino seedlings and the green seedlings bent toward light.

Which sequence of steps was most likely taken in this experiment?

A) develop a hypothesis→select suitable laboratory materials→test the hypothesis→ formulate a conclusion
B) select suitable laboratory materials→formulate a conclusion→develop a hypothesis→test the hypothesis
C) develop a hypothesis→test the hypothesis→select suitable laboratory materials→formulate a conclusion
D) formulate a conclusion→select suitable laboratory materials → develop a hypothesis →test the hypothesis

14. Base your answer to the following question on the investigation described below and on your knowledge of biology.

Twelve bean plants were used to study the effect of nutrients on the rate of plant growth. All the plants used in this investigation were initially the same height. Starting on day 1, six of the bean plants (Group *A*) were given 30 milliliters of distilled water every day for seven consecutive days. Starting on the same day, the other six bean plants (Group *B*) were given 30 milliliters of distilled water containing 0.1 gram of fertilizer every day for seven consecutive days. The average daily change in height of the plants in each group is shown in the data table below.

DATA TABLE

	Average Daily Increase in Plant Height (mm)	
Day	*Group A*	*Group B*
1	0	0
2	2	4
3	1	3
4	3	5
5	2	5
6	2	4
7	1	4

Based on the data in the table, if all the bean plants were 70 millimeters tall on day 1, the average height of the bean plants in group *B* on day 7 would be

A) 75 mm
B) 81 mm
C) 95 mm
D) 100 mm

15. Which procedure would most likely provide valid results in a test to determine if drug *A* would be effective in treating cancer in white mice?

A) injecting 1 mL of drug *A* into 100 white mice with cancer
B) injecting 1 mL of drug *A* into 100 white mice with cancer and 0.5 mL of drug *X* into 100 white mice without cancer
C) injecting 1 mL of drug *A* into 100 white mice with cancer and 0.5 mL of drug *X* into another group of 100 white mice with cancer
D) injecting 1 mL of drug *A* into 100 white mice with cancer and 1 mL of distilled water into another group of 100 white mice with cancer

16. How does the CONTROL GROUP setup in an experiment differ from the other setups in the same experiment?

A) It tests a different hypothesis.
B) It has more variables.
C) It does not receive the experimental treatment (Independent Variable).
D) It utilizes a different method of data collection.

17. A student is investigating the effect of different environmental factors on the growth of a certain species of bean plant over a period of 30 days. Which factor would *not* function as a variable in this investigation?

A) species of bean plant
B) soil moisture content
C) amount of light
D) atmospheric temperature

18. Which sentence represents a hypothesis?

A) Environmental conditions affect the pollination of plants.
B) Boil 100 milliliters of water, let it cool, and then add 10 seeds to the water.
C) Is water depth in a lake related to available light in the water?
D) A lamp, two beakers, and elodea plants are selected for the investigation.

19. As part of an investigation, 10 bean seedlings in one setup were grown in the dark, while 10 seedlings in another setup were grown in sunlight. All other growth conditions were kept the same in both setups. The seedlings grown in the dark were white with long, slender stems. These seedlings eventually died. The seedlings grown in the sunlight were green and healthy. Which hypothesis was most likely being tested in this investigation?

A) Plants grown in the dark cannot perform the process or respiration.
B) Sunlight is necessary for the normal growth of bean plants.
C) Light is necessary for the germination of bean seeds.
D) Light is necessary for proper mineral absorption by plants.

20. A biologist used the Internet to contact scientists around the world to obtain information about declining amphibian populations. He was able to gather data on 936 populations of amphibians, consisting of 157 species from 37 countries. Results showed that the overall numbers of amphibians dropped 15% a year from 1960 to 1966 and continued to decline about 2% a year through 1997.

What is the importance of collecting an extensive amount of data such as this?

A) Researchers will now be certain that the decline in the amphibian populations is due to pesticides.
B) The data collected will prove that all animal populations around the world are threatened.
C) Results from all parts of the world will be found to be identical.
D) The quantity of data will lead to a better understanding of the extent of the problem.

21. Base your answer to the following question on Base your answer to the following question on the information below and on your knowledge of biology.

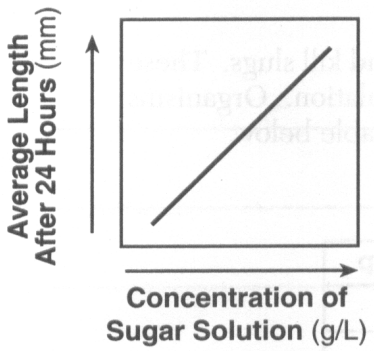
Students cut 20 rod-shaped pieces of potato of the same diameter and length. Five pieces of potato were placed into each of four beakers containing different concentrations of sugar solutions. Each potato piece was measured again after 24 hours. The table below shows the results of their experiment.

Change in Length

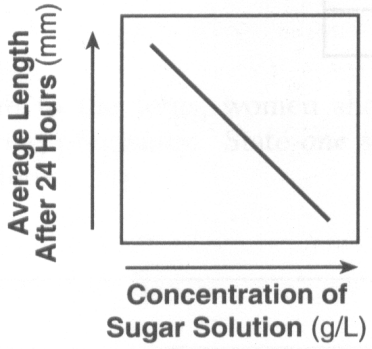
Concentration of Sugar Solution (grams per liter)	**Original Length of Potato Pieces** (mm)	**Average Length After 24 Hours** (mm)
0	50.0	52.0
5	50.0	44.0
8	50.0	43.5
10	50.0	42.5

Which graph best represents the information in the data table above?

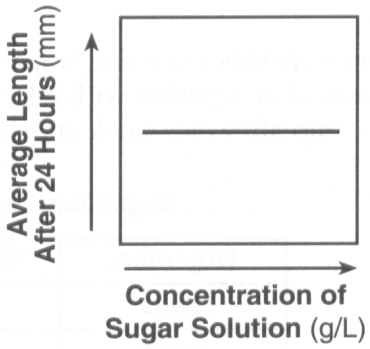
A)



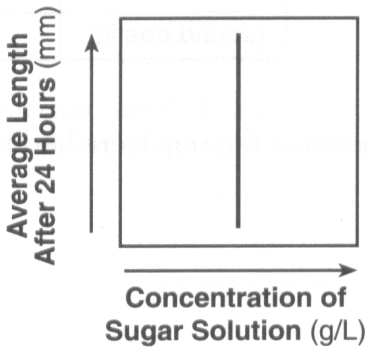
B)



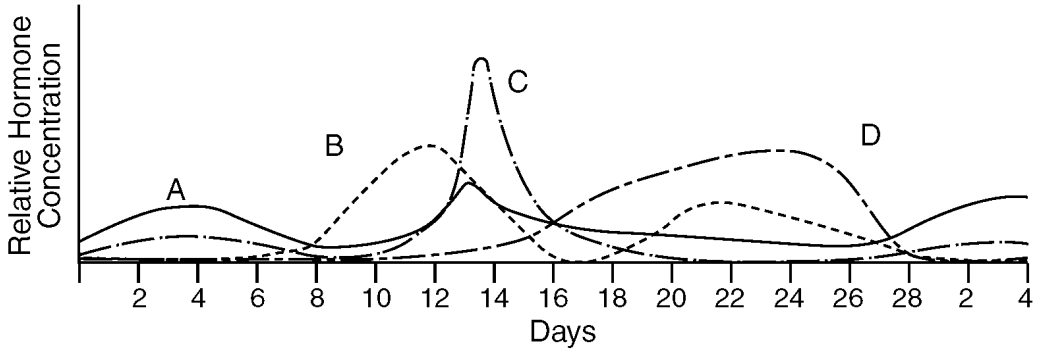
C)



D)



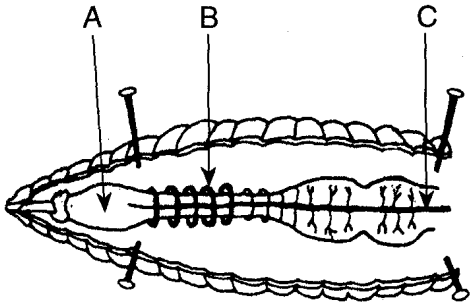
22. Base your answer to the following question on The graph below shows the different concentrations of female reproductive hormones *A, B, C,* and *D* over a 28-day cycle.



Although the data used to make this graph was originally entered in a data table, most scientists prefer to see the information in the form of a graph because

A) the information in a graph is more accurate than the information in a data table
B) it is easier to see relationships between variables in a graph than in a data table
C) it is possible to put more information in a graph than in a data table
D) only graphs can be used to predict future trends

23. Base your answer to the following question on the diagram below of some internal structures of an earthworm and on your knowledge of biology.



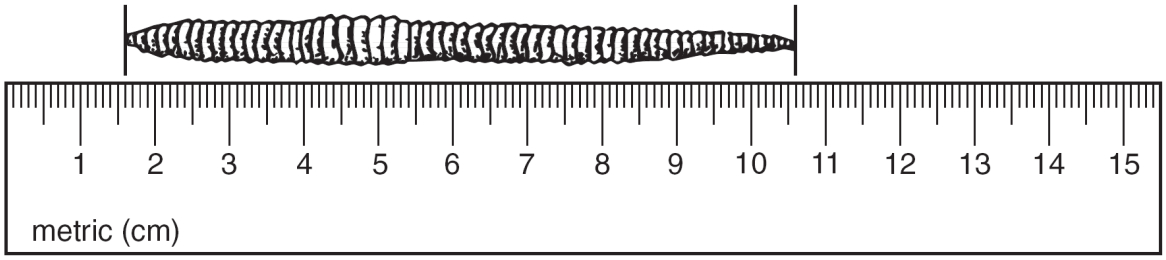
Structure *A* has a diameter of 3 millimeters. What is the approximate diameter of the blood vessel indicated by arrow *C*?

A) 2.5 mm
B) 2.0 mm
C) 1.5 mm
D) 0.5 mm

24. Which group of measurement units is correctly arranged in order of increasing size?

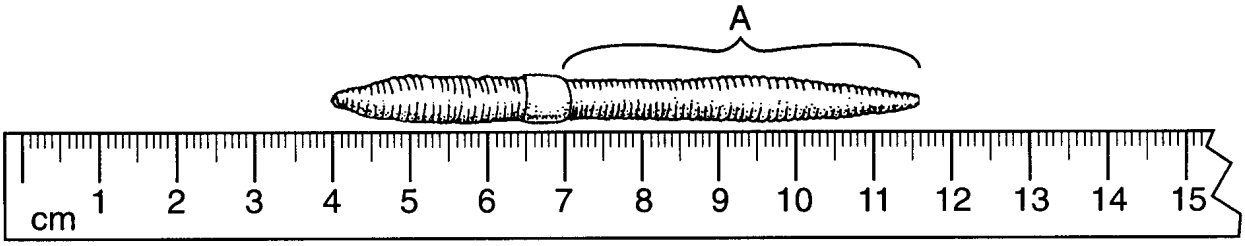
A) micrometer, millimeter, centimeter, meter
B) millimeter, micrometer, centimeter, meter
C) meter, micrometer, centimeter, millimeter
D) micrometer, centimeter, millimeter, meter

25. Base your answer to the following question on What is the approximate length of the earthworm shown in the diagram below?



A) 9 mm **B) 90 mm** C) 10.6 cm D) 106 cm

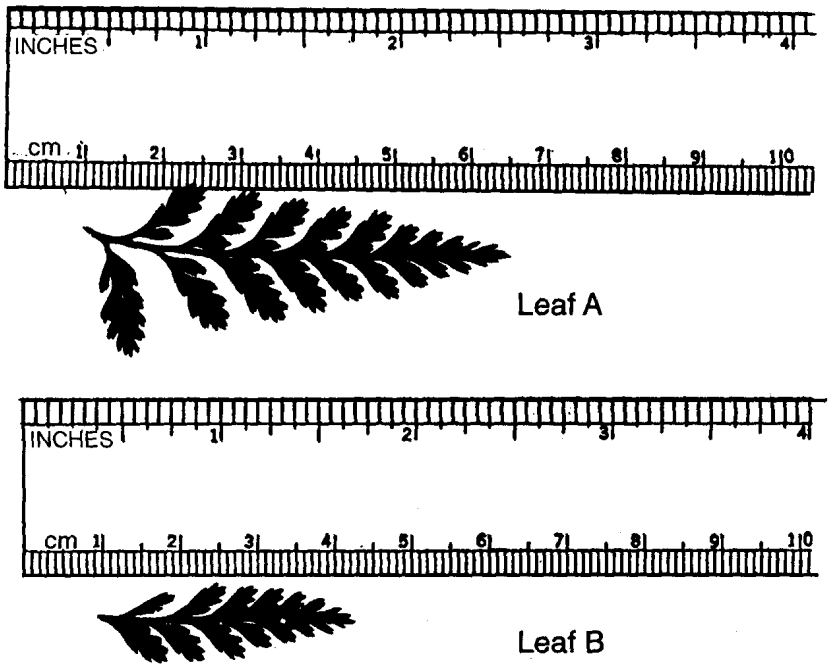
26. Base your answer to the following question on A student measured an earthworm using a metric ruler, as shown in the diagram below.



What is the length of section *A*?

A) 7.6 cm B) 11.6 cm **C) 46 mm** D) 23 mm

27. Base your answer to the following question on The diagram below represents the measurements of two leaves.



The difference in length between leaves *A* and *B* is closest to

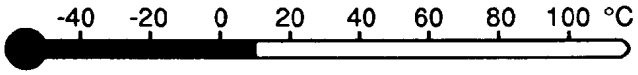
A) 20 mm B) 20 cm C) 0.65 m D) 1.6 μm

28. According to the chart below, which neuron is the longest?

Neuron	Length of Neuron
A	1.5 microns
B	50.0 microns
C	0.5 millimeter
D	0.005 millimeter

A) *A* B) *B* **C) *C*** D) *D*

29. Base your answer to the following question on The diagram below represents a Celsius thermometer.



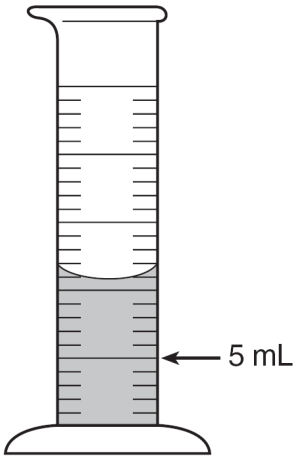
The reading on the thermometer might indicate the temperature of a

A) healthy human
B) human with a fever
C) very cool day
D) beaker of boiling water

30. Which environmental factor could have a temperature of 39ºC?

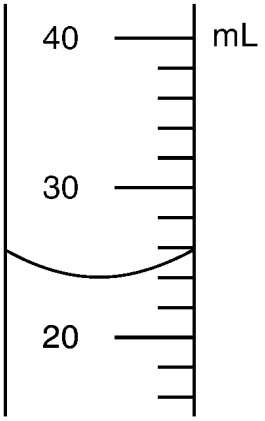
A) water temperature at the North Pole in March
B) water temperature in a lake in New York State in January
C) air temperature in a desert in the southwestern United States during a day in July
D) air temperature in the Adirondack Mountains of New York State in December

31. How much water should be removed from the graduated cylinder shown below to leave 5 milliliters of water in the cylinder?



A) 6 mL B) 7 mL
C) 11 mL D) 12 mL

32. The diagram below shows a portion of a graduated cylinder.



What is the volume of the liquid in this cylinder?

A) 22 mL **B) 24 mL**
C) 25 mL D) 26 mL

33. Which procedure is the most acceptable method for obtaining the accurate weight of a specimen in a laboratory experiment?

A) Make sure the balance weighs accurately before starting the measurement, and then record the weight for three trials and average the results.
B) Readjust the balance after weighing the specimen, and then weigh the specimen again.
C) Have two classmates use different balances to determine the weight of the specimen, and average the values they obtain.
D) Determine the weight of the specimen using one balance, and then measure the weight again using a different balance.

34. An important function of the ultracentrifuge is to

A) increase the magnification of different parts of cells
B) slice specimens embedded in wax into thin sections
C) transplant nuclei from one cell to another
D) separate different cell organelles by their density

35. While viewing a specimen under high power of a compound light microscope, a student noticed that the specimen was out of focus. Which part of the microscope should the student turn to obtain a clearer image under high power?

A) eyepiece
B) coarse adjustment
C) fine adjustment
D) nosepiece

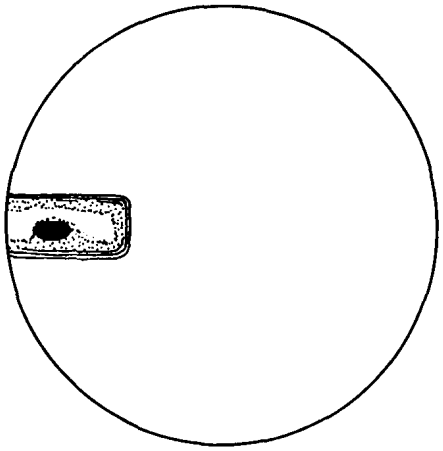
36. A student prepared a slide of pollen grains from a flower. First the pollen was viewed through the low-power objective lens and then, without moving the slide, viewed through the high- power objective lens of a compound light microscope.

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

A) low power: 25 small pollen grains; high power: 100 large pollen grains
B) low power: 100 small pollen grains; high power: 25 large pollen grains
C) low power: 25 large pollen grains; high power: 100 small pollen grains
D) low power: 100 large pollen grains; high power: 25 small pollen grains

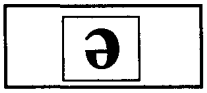
37. Base your answer to the following question on the information and diagram below and on your knowledge of biology.

The diagram below represents a specimen on a slide as seen with the low-power objective of a compound light microscope.



Using one or more complete sentences, explain how the slide should be moved to observe the entire specimen.

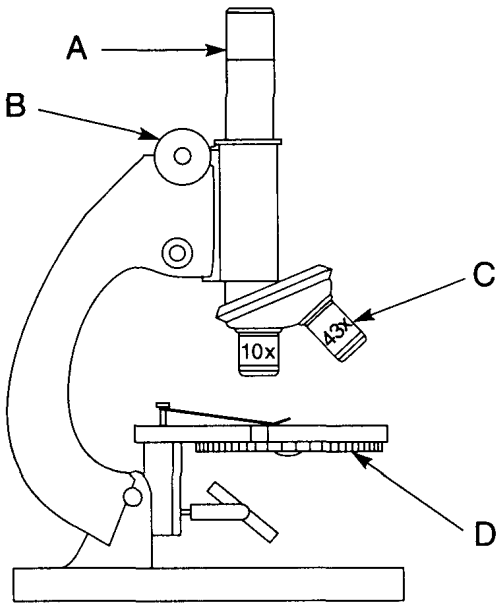
38. Base your answer to the following question on The table below shows the position of slides of the letter "e" on the stages of four microscopes. The image of the "e" as seen using each microscope is also shown.

	Microscope A	Microscope B	Microscope C	Microscope D
Position of slide on the stage				
Image of specimen as seen using the microscope				

Which letters correctly identify the microscopes most likely used to provide the information in the table?

A) *A* and *D* — compound light microscopes; *B* and *C* — dissecting microscopes
B) *B* and *C* — compound light microscopes; *A* and *D* — dissecting microscopes
C) *C* and *D* — compound light microscopes; *A* and *B* — dissecting microscopes
D) *B* and *D* — compound light microscopes; *A* and *C* — dissecting microscopes

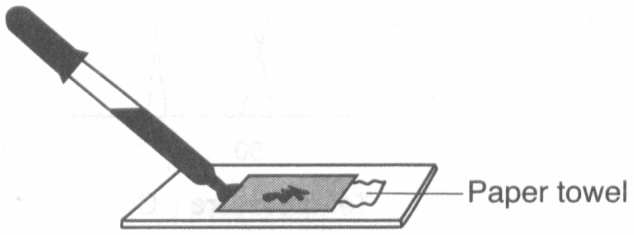
39. Base your answer to the following question on A compound light microscope is represented in the diagram below.



Which microscope part is correctly paired with its function?

A) ***A* – magnifies the image of the specimen**
B) *B* – used for focusing only when the high-power objective is used
C) *C* – provides the field of view with the largest diameter
D) *D* – holds the specimen on the stage

40. Base your answer to the following question on Which laboratory procedure is represented in the diagram below?

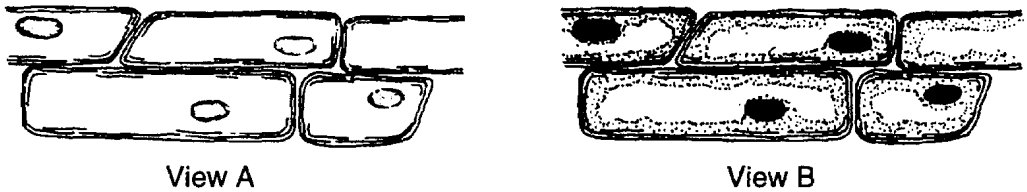


A) placing a coverslip over a specimen
B) removing a coverslip from a slide
C) adding stain to a slide without removing the coverslip
D) reducing the size of air bubbles under a cover- slip

41. Which statement best describes the procedure for removing excess methylene blue from a wet mount slide preparation?

A) Remove the coverslip and drop water onto the specimen.
B) Place a piece of paper towel at one edge of the coverslip to absorb the methylene blue, and then add water at the opposite edge of the coverslip.
C) Insert a pipette under the coverslip and withdraw some methylene blue.
D) Remove the coverslip, allow the methylene blue to dry, and then replace the coverslip.

42. Two views of the same onion epidermal cells, as seen with a compound light microscope, are shown in the diagram below.



What was most likely done to change the view from A to B?

A) Lugol's iodine solution was added to the cells.
B) The 40× objective was switched to the 10× objective.
C) The 10× objective was switched to the 40× objective.
D) Salt water was added to the cells.

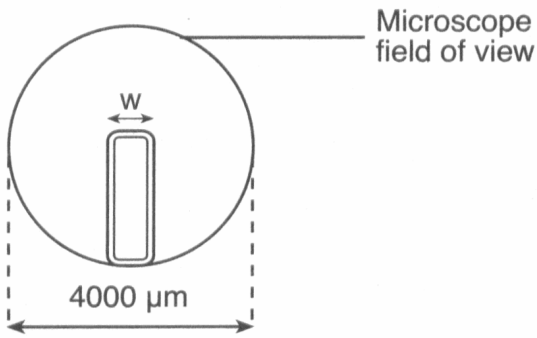
43. The results of one experiment carried out by a research team would be considered valid if

A) the experiment had no control setup
B) all the members of the research team came to the same conclusion
C) the experiment had more than one variable
D) the experiment was repeated and the same results were obtained each time

44. Methylene blue is used in microscope studies to help in the observation of

A) chloroplasts of onion cells
B) iron in hemoglobin
C) photosynthesis in elodea
D) nuclei in animal cells

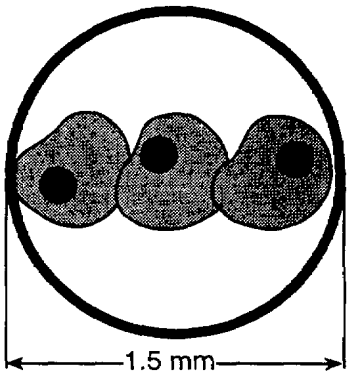
45. A plant cell in a microscopic field of view is represented below.



The width (w) of this plant cell is closest to

A) 200 µm
B) 800 µm
C) 1200 µm
D) 1600 µm

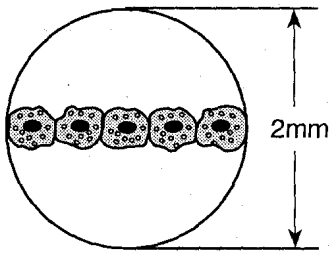
46. Base your answer to the following question on The diagram below shows three cells in the field of view of a microscope. The diameter of the field of view is 1.5 millimeters.



What is the approximate diameter of each cell?

A) 50 µm
B) 250 µm
C) 500 µm
D) 4500 µm

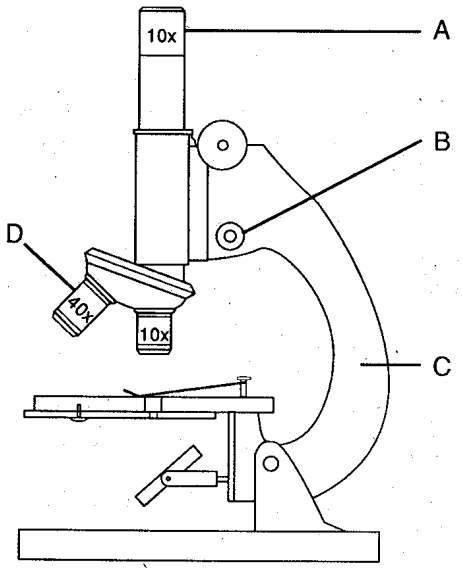
47. Base your answer to the following question on The diagram below represents cells seen in the low-power field of view of a compound light microscope.



The length of one of these cells is approximately

A) 200 µm
B) 400 µm
C) 500 µm
D) 2,000 µm

48. Base your answer to the following question on the diagram below of a microscope and on your knowledge of biology.



The highest possible magnification that can be obtained when using this microscope is

A) 40×
B) 100×
C) 400×
D) 4,000×

Answer Key
Do Now Unit 1 Biology is a Science

1. **B**
2. **D**
3. **B**
4. **D**
5. **C**
6. **D**
7. **C**
8. **B**
9. **D**
10. **D**
11. **A**
12. **D**
13. **A**
14. **C**
15. **D**
16. **C**
17. **A**
18. **A**
19. **B**
20. **D**
21. **B**
22. **B**
23. **D**
24. **A**
25. **B**
26. **C**
27. **A**
28. **C**
29. **C**
30. **C**
31. **A**
32. **B**
33. **A**
34. **D**
35. **C**
36. **B**
37. The slide should be moved to the left.
38. **A**
39. **A**
40. **C**
41. **B**
42. **A**
43. **D**
44. **D**
45. **B**
46. **C**
47. **B**
48. **C**