

Name:

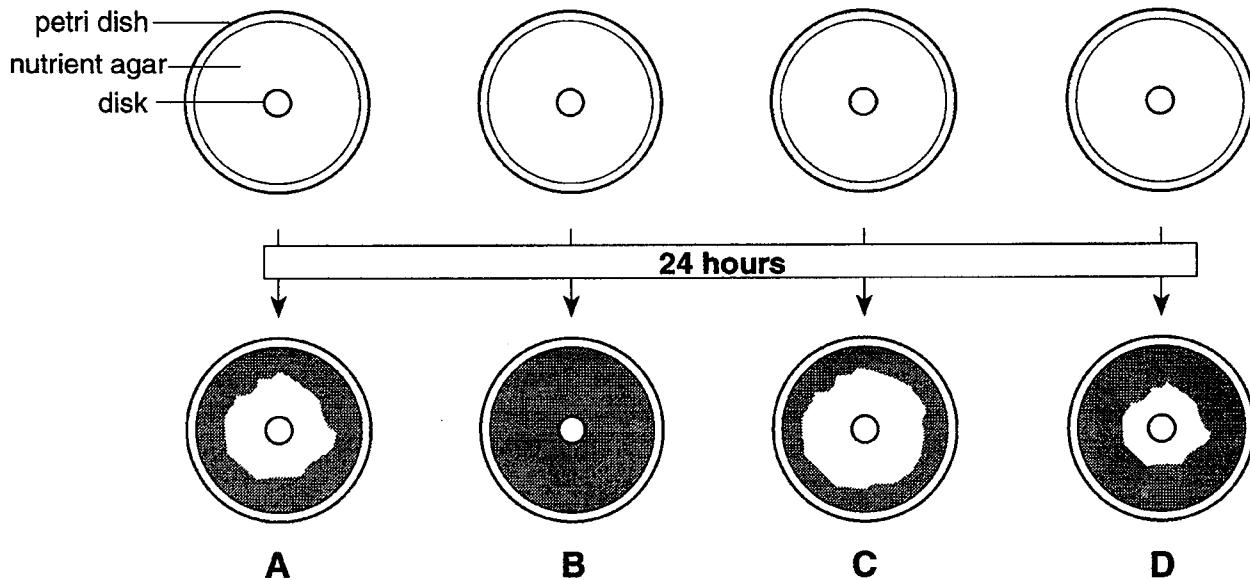
# L.E. 1/4 Final Review

---

1. The directions for a laboratory activity call for 50 milliliters (ml) of solution *A*. A student accidentally takes 55 ml from the stock bottle. What should the student do with the extra 5 ml of solution *A*?
    - 1) Return the extra 5 ml to the stock bottle and replace the cap.
    - 2) Pour the extra 5 ml down the drain and rinse the sink with cold water.
    - 3) Dilute the extra 5 ml with 100 ml of water and pour it down the drain.
    - 4) Set the extra 5 ml aside in a labeled beaker and ask the teacher for advice.
  2. Chlorophyll can be removed from leaves by boiling them in alcohol, a flammable solvent. In addition to wearing safety goggles, which is the safest procedure to follow?
    - 1) A stoppered test tube of leaves and alcohol should be held over a Bunsen burner.
    - 2) A stoppered test tube of leaves and alcohol should be placed into a beaker of alcohol on a tripod over a Bunsen burner.
    - 3) A beaker of leaves and alcohol should be placed on a tripod over a Bunsen burner.
    - 4) A beaker of leaves and alcohol should be placed into a larger beaker of water and heated on a hot plate.
  3. Which safety precaution is recommended when a liquid is being heated in a test tube?
    - 1) When holding the test tube, keep fingers closest to the open end of the tube.
    - 2) Direct the flame of the burner into the open end of the test tube.
    - 3) Stopper the test tube with a rubber stopper.
    - 4) Wear goggles and a laboratory apron.
  4. Researchers performing a well-designed experiment should base their conclusions on
    - 1) the hypothesis of the experiment
    - 2) data from repeated trials of the experiment
    - 3) a small sample size to insure a reliable outcome of the experiment
    - 4) results predicted before performing the experiment
  5. A biologist plans to spend a year investigating the mating behavior of a certain species of frog. To make meaningful observations, the biologist should observe
    - 1) a small number of frogs in their natural habitat
    - 2) a large number of frogs in their natural habitat
    - 3) several groups of frogs maintained in different temperatures in the laboratory
    - 4) several groups of frogs maintained on different diets in the laboratory
  6. 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?
    - 1) doing research in a library
    - 2) having discussions with other scientists
    - 3) completing a data table of expected results
    - 4) using what is already known about the enzyme
  7. The analysis of data gathered during a particular experiment is necessary in order to
    - 1) formulate a hypothesis for that experiment
    - 2) develop a research plan for that experiment
    - 3) design a control for that experiment
    - 4) draw a valid conclusion for that experiment
-

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

A student investigated the effectiveness of four different mouthwashes in destroying bacteria. He inoculated the nutrient agar in four petri dishes with bacteria. Each of four paper disks, 1 centimeter in diameter, was soaked in a different mouthwash sample and placed on a different agar surface. Sterile procedures were used throughout the experiment. Each petri dish was placed in an incubator at a temperature of 37°C for a 24-hour period. The diagram below represents the sequence of events in this investigation. The shaded areas in the petri dishes represent regions of bacterial growth.



Which petri dish contains the most effective mouthwash?

- 1) *A*                      2) *B*                      3) *C*                      4) *D*

9. Which statement best expresses a basic scientific assumption?

- 1) Interpretation of experimental results has provided explanations for all natural phenomena.
- 2) If a conclusion is valid, similar investigations by other scientists should result in the same conclusion.
- 3) For any conclusion to be valid, the design of the experiment requires that only two groups be compared.
- 4) After a scientist formulates a conclusion based on an experiment, no further investigation is necessary.

10. A scientist tested a hypothesis that white-tailed deer would prefer apples over corn as a primary food source. The findings of the test, in which the scientist claimed that the deer preferred apples, were published. Which research technique, if used by the scientist, might result in this claim being questioned?

- 1) The scientist observed four deer in different locations at various times of the day.
- 2) The scientist observed a total of 500 deer in 20 different locations at various times of the day.
- 3) The scientist observed 200 deer in various natural settings, but none in captivity.
- 4) The scientist observed 300 deer in various locations in captivity, but none in natural settings.

11. Transport in mammals generally involves absorption and

- 1) circulation              2) absorption              3) transpiration              4) assimilation



---

16. In an investigation designed to determine the effect of the amount of water on plant growth, two groups of equal-sized bean plants of the same species were grown under identical conditions, except for the amount of water they were given. One group was watered with 200 milliliters of water once a day, while the other group was watered with 400 milliliters of water once a day. After several days, the heights of the plants were measured. It was determined that the plants watered with 400 milliliters of water once a day showed more growth.

The variable in this investigation is the

- 1) type of bean plants used in the experiment
- 2) amount of water given the plants each day
- 3) type of soil the bean plants were growing in
- 4) group of bean plants watered with 200 ml of water

17. A new drug for the treatment of asthma is tested on 100 people. The people are evenly divided into two groups. One group is given the drug, and the other group is given a glucose pill. The group that is given the glucose pill serves as the

- 1) experimental group
- 2) limiting factor
- 3) control
- 4) indicator

18. Which statement about the use of independent variables in controlled experiments is correct?

- 1) A different independent variable must be used each time an experiment is repeated.
- 2) The independent variables must involve time.
- 3) Only one independent variable is used for each experiment.
- 4) The independent variables state the problem being tested.

19. A student conducted an experiment to determine if listening to different types of music would affect pulse rate. She thought that pulse rate would change with different types of music. Each person participating in her experiment listened to seven different selections of music for 30 seconds each. The pulse rates were taken after each 30-second interval of music. Based on her experiment, the student concluded that a person's pulse rate changed when listening to different types of music.

The component missing from this experiment is a

- 1) prediction
- 2) hypothesis
- 3) control group
- 4) research plan

20. When a test tube of water containing elodea (an aquatic plant) is placed near a bright light, the plant gives off gas bubbles. When the light is placed at different distances from the plant, the rate of bubbling is affected. The experimental variable in this demonstration is the

- 1) concentration of gas in the water
- 2) type of aquatic plant in the test tube
- 3) amount of water in the test tube
- 4) distance of the plant from the light

Base your answers to questions 21 and 22 on the information below and on your knowledge of biology.

An experiment was carried out to answer the question "Does the pH of water affect the growth of radish plants?" Two groups of ten radish plants were set up. One group was watered with water having a pH of 3.0, and the other group was watered with water having a pH of 7.0. Both groups of plants received the same amount and intensity of light, the same amount of water, and they were grown in the same type of soil. The heights of the radish plants were measured every 2 days for a period of 2 weeks.

21. What was the dependent variable in this experiment?

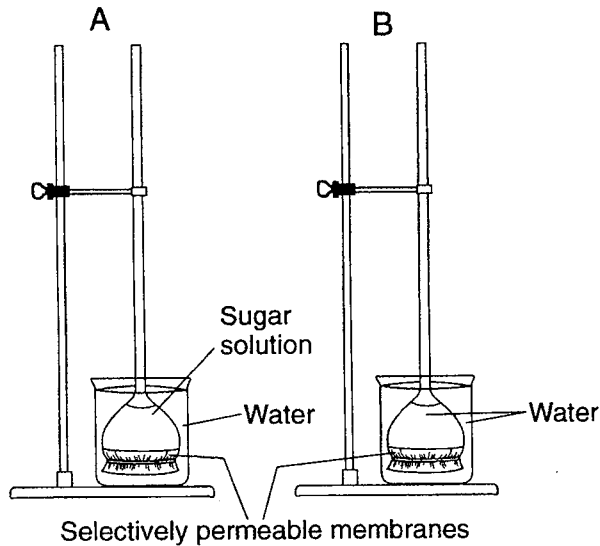
- 1) heights of the plants
  - 2) pH of the water
  - 3) temperature of the water
  - 4) type of soil
-

---

22. Which sentence is a possible hypothesis that was tested in this experiment?

- 1) Does the pH of water affect the growth of radish plants?
  - 2) Will the amount of water alter the heights of the radish plants?
  - 3) The temperature of the water will affect the heights of the radish plants.
  - 4) The pH of the water will affect the heights of the radish plants.
- 

23. Which apparatus shown below is serving as the control for the experiment?



- 1) A
- 2) B
- 3) Both A and B
- 4) Neither A or B

---

24. In an experiment, DNA from dead pathogenic bacteria was transferred into living bacteria that do not cause disease. These altered bacteria were then injected into healthy mice. These mice died of the same disease caused by the original pathogens. Based on this information, which statement would be a valid conclusion?

- 1) DNA is present only in living organisms.
- 2) DNA functions only in the original organism of which it was a part.
- 3) DNA changes the organism receiving the injection into the original organism.
- 4) DNA from a dead organism can become active in another organism.

---

25. Which sentence represents a hypothesis?

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

---

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

Dissolved oxygen (DO) can be found in an aquatic ecosystem and is often one factor that affects the size of populations of aquatic organisms. Water temperature is very important in determining the amount of DO in a water supply. The colder the temperature of the water, the more DO the water can hold.

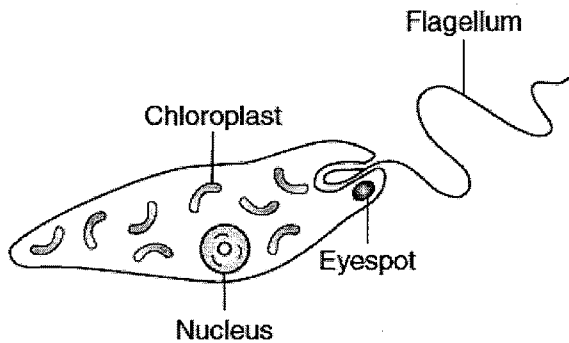
State *one* possible reason why the biodiversity of an aquatic ecosystem could *decrease* if the water temperature were to increase. Support your answer.

---

---

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

Euglena are single-celled organisms that live in ponds. All euglena have chloroplasts and can make their own food. They can also take in food from the environment. The diagram below represents a euglena.



An experiment was set up to determine the effect of nitrates, a pollutant, on the number of chloroplasts present in euglena. Five tanks were set up, each with euglena and a different concentration of nitrate solution: 0%, 0.5%, 1.0%, 1.5%, and 2.0%.

The tanks were placed in a sunny location where each tank received the same amount of light.

Which statement is a possible hypothesis for this experiment that could be supported by the results of this experiment?

- 1) If the average number of chloroplasts in euglena decreases, will less nitrate be needed in each tank?
- 2) If the nitrate concentration is increased, then the euglena will have a lower average number of chloroplasts.
- 3) If the number of euglena in a tank increases, will more nitrates be produced?
- 4) If the nitrate concentration is decreased, then more light will reduce the average number of chloroplasts in euglena.

Base your answers to questions 28 and 29 on the information below and on your knowledge of biology.

A scientist conducted an experiment to test the hypothesis that maple seeds exposed to acid rain will take longer to germinate than seeds exposed to normal rain, which has a pH of 5.6. The scientist set up four groups, each containing 200 maple seeds. The water used for each group had a different pH value: 5.6, 4.0, 3.0, and 2.0. All other conditions were kept the same. After ten days, the number of seeds that had germinated in each group was counted.

28. Identify the control group in this experiment.

29. State *one* example of experimental results that would indicate that acid rain, which has a pH between 4.5 and 4.0, could be responsible for a *decrease* in the number of young maple trees in some forest regions.

---

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

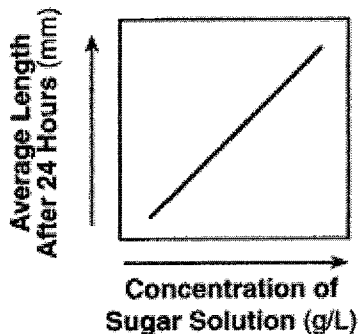
Students cut 20 rod-shaped pieces of potato of the same diameter and length. Five pieces of potato were placed into each of four beakers containing different concentrations of sugar solutions. Each potato piece was measured again after 24 hours. The table below shows the results of their experiment.

**Change in Length**

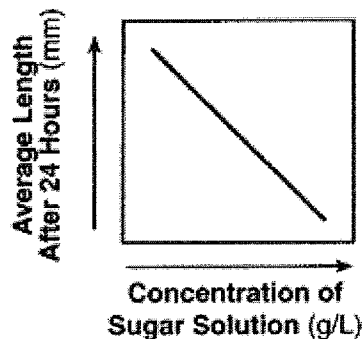
Concentration of Sugar Solution (grams per liter)	Original Length of Potato Pieces (mm)	Average Length After 24 Hours (mm)
0	50.0	52.0
5	50.0	44.0
8	50.0	43.5
10	50.0	42.5

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

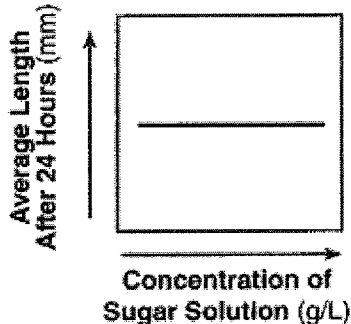
1)



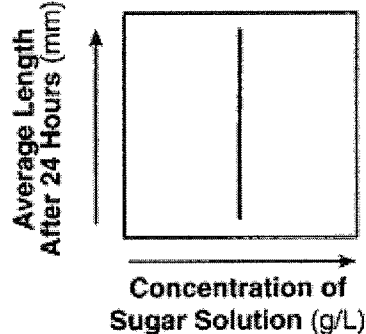
2)



3)



4)



( 4 )

31. During an investigation, a student measures out 15 grams of salt. Then, he measures 15 milliliters of water and adds the salt to it. Next, he measures a 1 centimeter wide by 4 centimeters long section of plant leaf. Which list of tools is arranged in the order that the student used them?

1) graduated cylinder, ruler, balance

2) balance, ruler, graduated cylinder

3) graduated cylinder, balance, ruler

4) balance, graduated cylinder, ruler

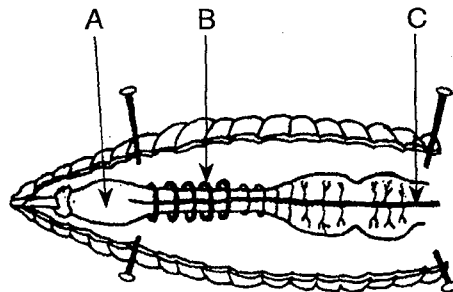
32. A student could best demonstrate knowledge of how energy flows throughout an ecosystem by

- 1) drawing a food web using specific organisms living in a pond
- 2) conducting an experiment that demonstrates the process of photosynthesis
- 3) labeling a diagram that illustrates ecological succession
- 4) making a chart to show the role of bacteria in the environment

33. A piece of refrigerated, cooked meat will remain safe to eat for a longer period of time than a refrigerated piece of raw meat of similar size. Which statement is a valid inference based on this information?

- 1) Cooking meat kills many bacteria and fungi.
- 2) Cool temperatures stimulate the growth of microbes on raw meat.
- 3) Raw meat cannot be preserved.
- 4) Cooked meat contains antibodies that destroy decomposers.

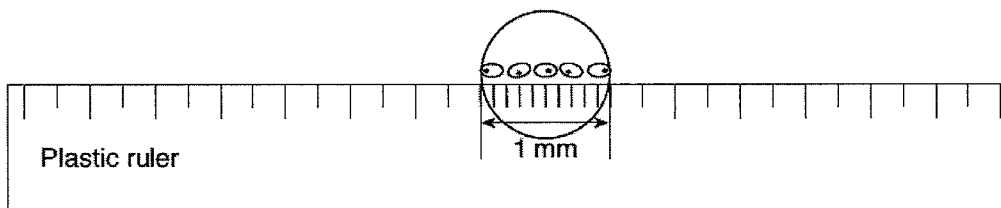
34. Base your answer to the following question on the diagram below of some internal structures of an earthworm and on your knowledge of biology.



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

- 1) 2.5 mm
- 2) 2.0 mm
- 3) 1.5 mm
- 4) 0.5 mm

35. A clear plastic ruler is placed across the middle of the field of view of a compound light microscope. A row of cells can be seen under low-power magnification (100 $\times$ ).



What is the average length of a single cell in micrometers ( $\mu\text{m}$ )?

- 1) 10 $\mu\text{m}$
- 2) 100 $\mu\text{m}$
- 3) 200 $\mu\text{m}$
- 4) 2000 $\mu\text{m}$

36. Which piece of equipment would most likely be used to separate materials by density?

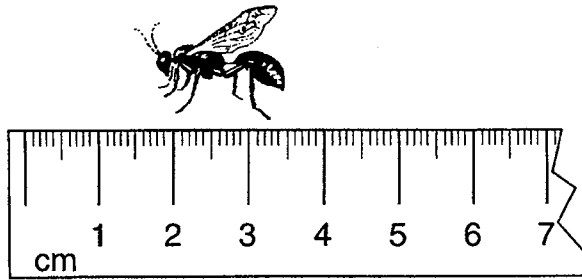
- 1) centrifuge
- 2) compound light microscope
- 3) dissecting microscope
- 4) scalpel

37. Which part of a compound light microscope should a student adjust to allow more light to pass through a specimen?

- 1) fine adjustment
- 2) ocular
- 3) diaphragm
- 4) stage



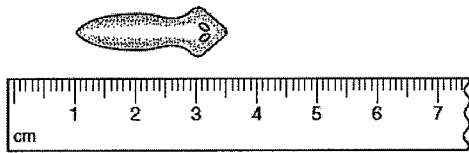
38. The diagram below shows a wasp positioned next to a centimeter ruler.



What is the approximate length of a wing of this wasp?

- 1) 1.0 mm      2) 1.4 cm      3) 3.5 cm      4) 35 mm

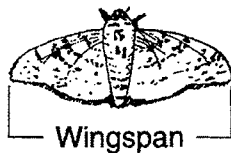
39. The diagram below represents the measurement of a biological specimen.



What is the approximate length of the specimen in millimeters?

- 1) 25 mm      2) 30 mm      3) 35 mm      4) 40 mm

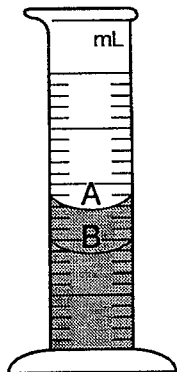
40. A diagram of the actual size of a peppered moth wingspan is shown below.



An estimated length of the wingspan could be

- 1) 3 centimeters      2) 3 grams      3) 3 milliliters      4) 3 kilometers

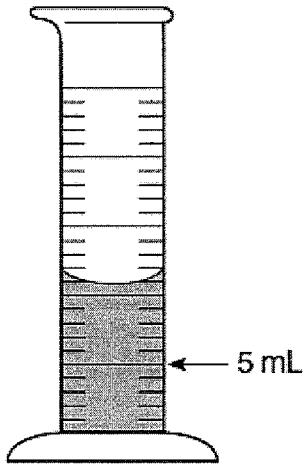
41. In the diagram below, letter *A* represents the starting volume of liquid in a graduated cylinder. Letter *B* represents the volume after 8 milliliters of this liquid was removed.



This information indicates that the scale on this graduated cylinder is in milliliter increments of

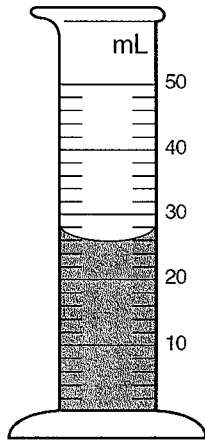
- 1) 1      2) 2      3) 4      4) 8

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



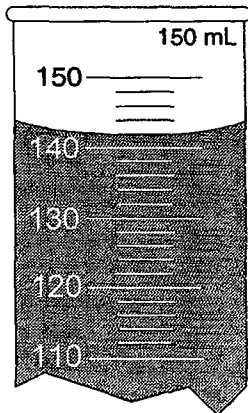
- 1) 6 mL      2) 7 mL      3) 11 mL      4) 12 mL

43. What is the volume of the liquid in the graduated cylinder shown below?



- 1) 23 mL      2) 26 mL      3) 27 mL      4) 28 mL

44. A chicken bone was placed in a graduated cylinder containing 100 milliliters of water. The diagram below illustrates the new level of water.



What is the volume of the chicken bone?

- 1) 41 mL      2) 42 mL      3) 141 mL      4) 142 mL

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

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

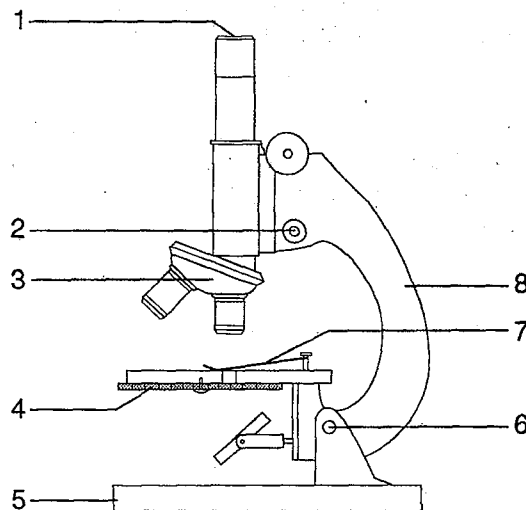
46. While viewing a specimen under high power of a compound light microscope, a student noticed that the specimen was out of focus. Which part of the microscope should the student turn to obtain a clearer image under high power?

- 1) eyepiece
- 2) coarse adjustment
- 3) fine adjustment
- 4) nosepiece

47. When an *Elodea* leaf is placed in a concentrated salt solution, its cells lose water. When this process is observed with a compound light microscope, which organelle is more noticeable after the cells lose water?

- 1) cell membrane
- 2) mitochondrion
- 3) endoplasmic reticulum
- 4) ribosome

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



After part 3 is turned, which part must often be adjusted?

- 1) 1
- 2) 5
- 3) 6
- 4) 4

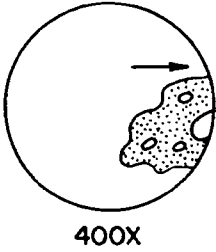
49. Which part of a microscope should be used with the low-power objective, but *not* with the high-power objective?

- 1) coarse adjustment
- 2) fine adjustment
- 3) diaphragm
- 4) ocular

50. Which part of a light microscope would most likely be damaged if the coarse adjustment is improperly used while a specimen is being observed under high power?

- 1) objective lens
- 2) light source
- 3) iris diaphragm
- 4) eyepiece lens

51. The diagram below shows an ameba moving out of the high-power field of view of a compound microscope in the direction indicated by the arrow.



What should be done to center the ameba in the field of view and focus it sharply?

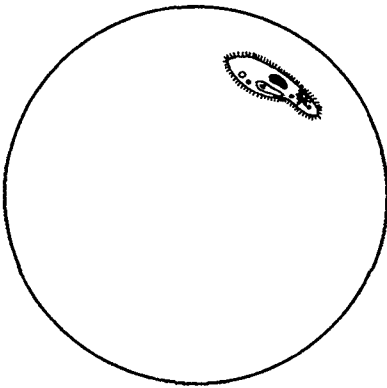
- 1) Move the slide to the right, and refocus with the fine adjustment.
- 2) Move the slide to the right, and refocus with the coarse adjustment.
- 3) Move the slide to the left, and refocus with the fine adjustment.
- 4) Move the slide to the left, and refocus with the coarse adjustment.

52. Which sequence contains the correct order of steps for a student to follow to observe the nucleus of protozoa in a stained wet mount, using a compound light microscope?

	Begin by using the	Focus using the	Focus using the	Switch to the
(1)	low-power objective →	coarse adjustment →	fine adjustment →	high-power objective
(2)	low-power objective →	fine adjustment →	coarse adjustment →	high-power objective
(3)	high-power objective →	coarse adjustment →	fine adjustment →	low-power objective
(4)	high-power objective →	fine adjustment →	coarse adjustment →	low-power objective

- 1) 1                      2) 2                      3) 3                      4) 4

53. A cell in the field of view of a compound light microscope is shown in the diagram below.



In which direction should the slide be moved to center this cell in the microscopic field?

- 1) to the right and up                      2) to the right and down
- 3) to the left and up                      4) to the left and down

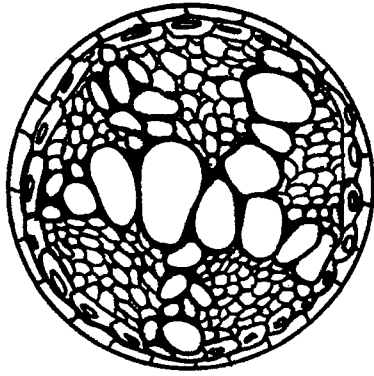
54. Which substance is used as a stain to make it easier to observe a wet mount of cheek cells with a compound light microscope?

- 1) Benedict's solution                      2) methylene blue
- 3) bromthymol blue                      4) salt solution

55. An activity carried on by every living plant and animal is

- 1) photosynthesis    2) respiration    3) reproduction    4) transpiration

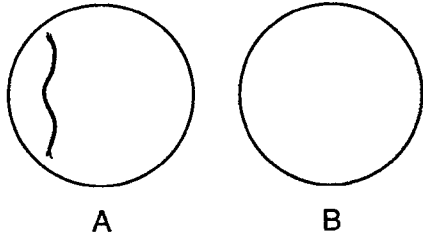
56. The diagram below shows a microscopic field containing a portion of the cross section of a root tip.



How should a student adjust the microscope in order to view a greater portion of the root tip?

- 1) stay at the same power and adjust the focus
- 2) stay at the same power but increase the size of the opening of the diaphragm
- 3) switch to a lower power and decrease the size of the opening of the diaphragm
- 4) switch to a higher power and adjust the focus

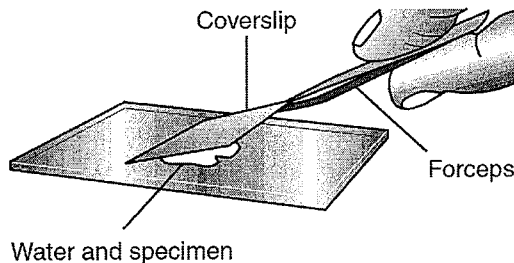
57. A wet-mount slide preparation of a thread viewed in the low-power field ( $100\times$ ) of a compound light microscope is shown in diagram *A* below. Diagram *B* shows the field of view as it appeared when the objective was switched to high power.



Which statement best explains why the thread is not visible in diagram *B*?

- 1) No stain was added to the slide preparation.
- 2) The specimen was not centered in the low-power field.
- 3) The diaphragm was not adjusted for more light.
- 4) The thread is too large to be viewed with high power.

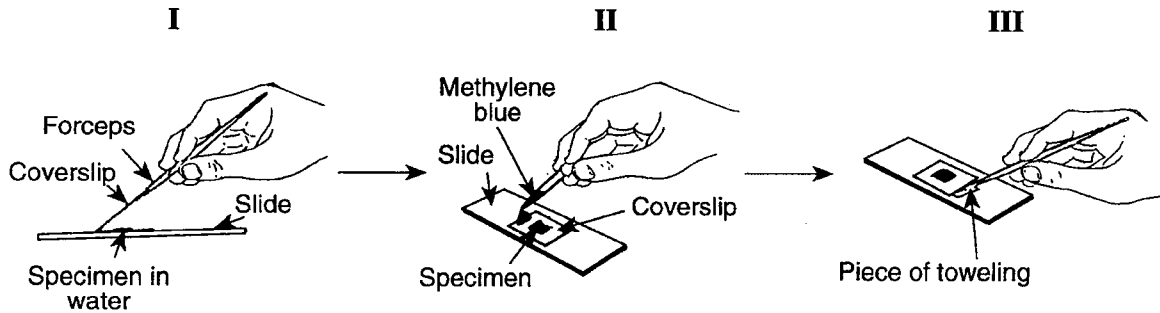
58. A laboratory technique is illustrated in the diagram below.



The technique of lowering the coverslip at an angle is used to

- 1) make organelles more visible
- 2) reduce the formation of air bubbles
- 3) make the specimen transparent
- 4) reduce the size of the specimen

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



Which laboratory technique is illustrated in the diagram?

- 1) testing a specimen for amino acids
- 2) determining the pH of a specimen
- 3) measuring the photosynthetic rate in a specimen
- 4) preparing a wet mount of a specimen

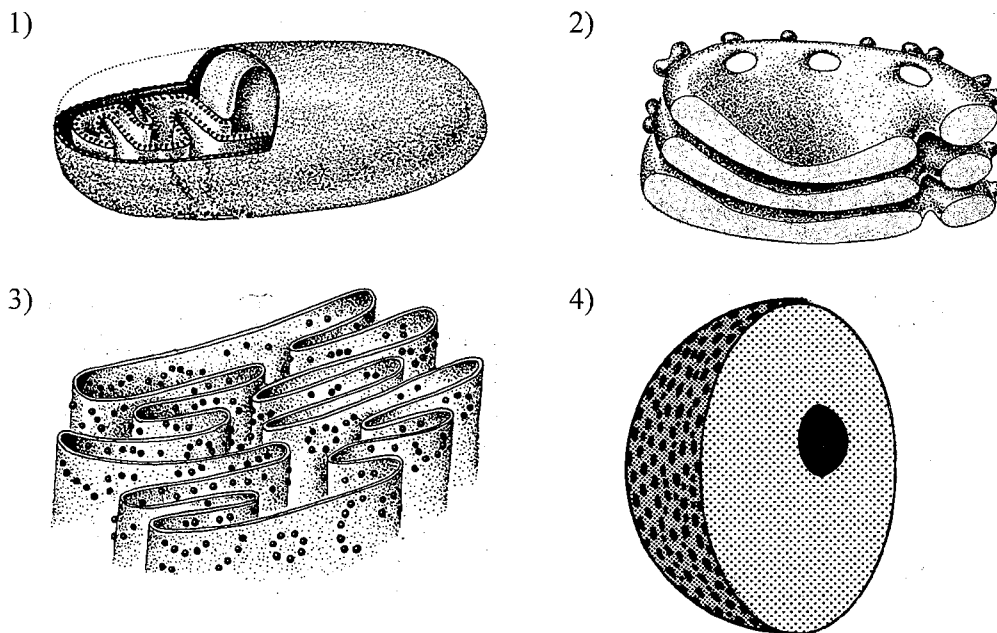
60. When an onion cell is stained with iodine, which organelle becomes more visible under the compound light microscope?

- 1) mitochondrion
- 2) lysosome
- 3) ribosome
- 4) nucleus

61. During the preparation of a wet mount of an *Elodea* leaf, a student dropped a plastic cover slip directly on top of the drop of water containing the specimen on the slide. This slide preparation technique most probably

- 1) caused the cover slip to shatter
- 2) crushed the specimen
- 3) trapped air bubbles under the cover slip
- 4) scratched the surface of the slide

62. Which diagram represents a cell organelle that can absorb iodine stain and then be seen with the low power of a compound light microscope?



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

- 1) chloroplasts of onion cells
- 2) iron in hemoglobin
- 3) photosynthesis in elodea
- 4) nuclei in animal cells

64. When using a compound light microscope, the most common reason for staining a specimen being observed is to

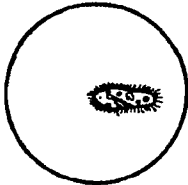
- 1) keep the organism from moving around
- 2) make the view more colorful
- 3) determine the effects of chemicals on the organism
- 4) reveal details that are otherwise not easily seen

65. A student adds several drops of iodine solution to a sample of onion tissue. Which cell component would become more visible under low power of a compound light microscope as a result of this procedure?

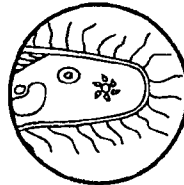
- 1) centriole
- 2) Golgi complex
- 3) deoxyribonucleic acid
- 4) nucleus

66. The diameter of a microscope field under low power ( $100\times$ ) is 2,000 micrometers. Which diagram best shows how a paramecium 500 micrometers long would appear under high power ( $400\times$ )?

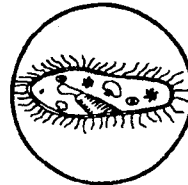
1)



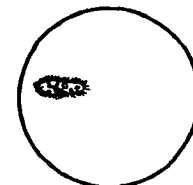
2)



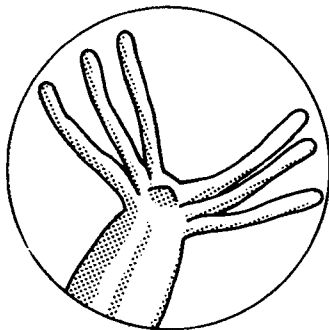
3)



4)



67. The diagram below illustrates a part of a hydra as seen with the low-power objective of a compound microscope. The diameter of the low-power field of view is 1.4 millimeters.



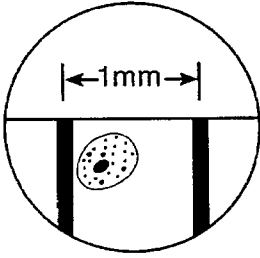
The length of one of the tentacles is closest to

- 1)  $300\ \mu\text{m}$
- 2)  $700\ \mu\text{m}$
- 3)  $1,100\ \mu\text{m}$
- 4)  $1,400\ \mu\text{m}$

68. What is the highest magnification that can be obtained with a microscope that has a  $10\times$  eyepiece with  $10\times$  and  $43\times$  objectives?

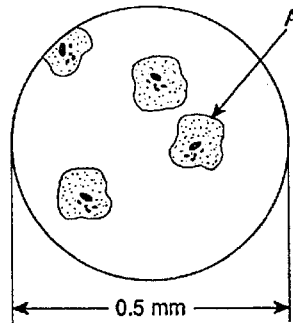
- 1)  $43\times$
- 2)  $100\times$
- 3)  $430\times$
- 4)  $4300\times$

69. What is the approximate diameter of the cell shown in the low-power field of a compound light microscope represented below?



- 1) 100  $\mu\text{m}$       2) 500  $\mu\text{m}$       3) 800  $\mu\text{m}$       4) 1,000  $\mu\text{m}$

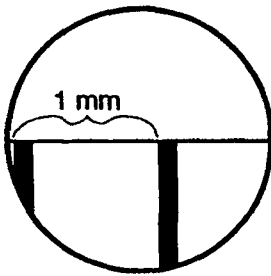
70. Base your answer to the following question on the diagram below and on your knowledge of biology. The diagram shows cells as seen in the high-power (400 $\times$ ) field of view of a compound light microscope.



What is the approximate diameter of cell A in micrometers?

- 1) 1      2) 100      3) 150      4) 250

71. The diagram below represents a portion of a metric ruler as seen with a compound microscope.



The diameter of the field of view illustrated is approximately

- 1) 1,600 mm      2) 0.0016 mm      3) 1,600  $\mu\text{m}$       4) 2,000  $\mu\text{m}$

72. The diagrams below show four different one-celled organisms (shaded) in the field of view of the same microscope using different magnifications. Which illustration shows the largest one-celled organism?

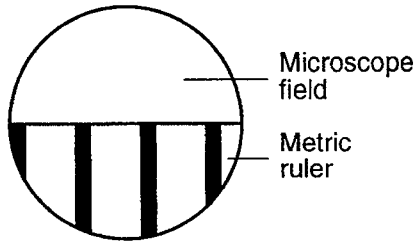
- 1) 100x      2) 400x      3) 100x      4) 400x

73. Which term is defined as all the chemical reactions that are required to sustain life?

- 1) metabolism      2) nutrition      3) regulation      4) synthesis



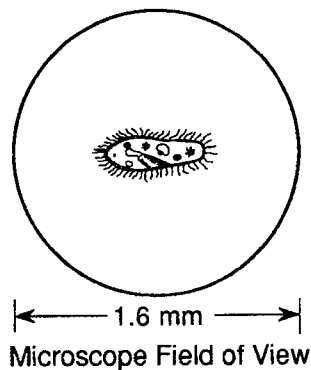
74. Each division of the metric ruler shown in the diagram below equals 1 millimeter.



The diameter of the field of vision is approximately

- 1) 2,800  $\mu\text{m}$       2) 3,700  $\mu\text{m}$       3) 4,400  $\mu\text{m}$       4) 4,700  $\mu\text{m}$

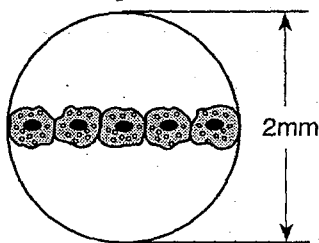
75. Base your answer to the following question on the diagram below, which represents a paramecium observed by a student using the low power objective (100 $\times$ ) of a compound light microscope.



The approximate length of the paramecium is

- 1) 40  $\mu\text{m}$       2) 160  $\mu\text{m}$       3) 300  $\mu\text{m}$       4) 700  $\mu\text{m}$

76. 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

- 1) 200  $\mu\text{m}$       2) 400  $\mu\text{m}$       3) 500  $\mu\text{m}$       4) 2,000  $\mu\text{m}$

77. The size of the image of a cell being examined with a microscope is determined by the

- 1) light source and fine adjustment      2) stage and stage clips  
3) objectives and ocular      4) diaphragm and coarse adjustment

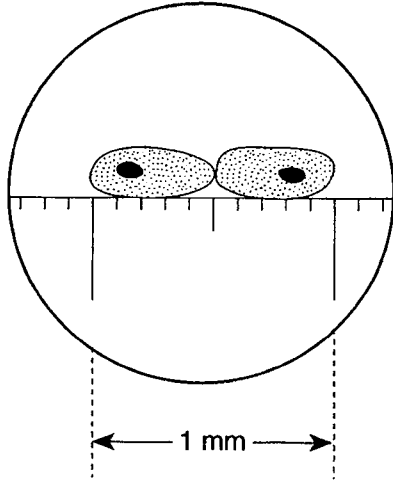
78. The endocrine system releases hormones that travel to their target organs through

- 1) The circulatory system      2) The respiratory system  
3) The excretory system      4) The digestive system

79. In the earthworm, digested proteins are converted to new proteins by the process of

- 1) ingestion      2) digestion      3) transport      4) synthesis

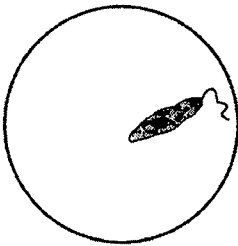
80. The diagram below represents two cells next to a metric measuring device under the low-power objective of a compound light microscope.



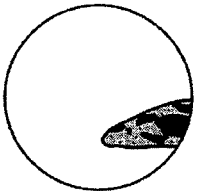
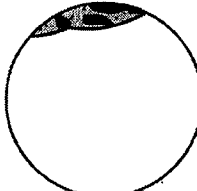
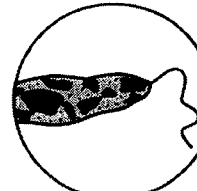

What is the approximate length of a nucleus of one of these cells?

- 1) 100  $\mu\text{m}$       2) 500  $\mu\text{m}$       3) 1000  $\mu\text{m}$       4) 1500  $\mu\text{m}$

81. The diagram below represents a specimen in the low-power field of view of a compound light microscope.



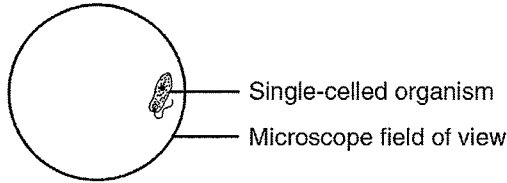
If the slide is not moved, which view best represents the way the specimen will look when the high-power objective lens is switched into place?

- 1)       2) 
- 3)       4) 

82. In an Ameba, materials are taken from its environment and then moved throughout its cytoplasm. These processes are known as

- 1) absorption and circulation      2) food processing and energy release  
3) energy release and synthesis      4) coordination and regulation

83. A student used the low-power objective of a compound light microscope and observed a single-celled organism as shown in the diagram below.



When he switched to high power, the organism was no longer visible. This most likely happened because switching to high power made the

- 1) field too bright to see the organism
- 2) image too small to be seen
- 3) area of the slide being viewed smaller
- 4) fine-adjustment knob no longer functional

84. Figure *A* represents a cell as viewed by a student using the 10× ocular and the 10× objective of a compound light microscope. Figure *B* represents the same cell as seen with a different objective.

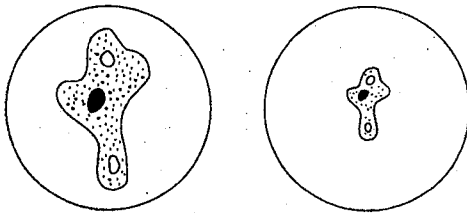


Figure A

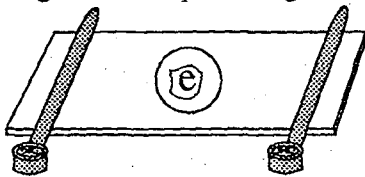
Figure B

The magnification of the objective used to observe the cell shown in figure *B* is most likely

- 1) 4×
- 2) 40×
- 3) 60×
- 4) 100×

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

A student prepared a wet mount of the letter "e" from a newspaper. He then placed the slide on the stage of a compound light microscope and adjusted the stage clips as shown below.



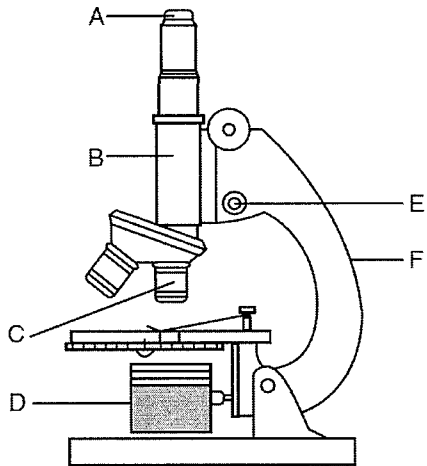
After the student switched to high power, he indicated on his laboratory drawing that the total magnification of the "e" was 440×. What is the magnifying power of the objective lens if the ocular (eyepiece) has a magnifying power of 10× ?

- 1) 44×
- 2) 340×
- 3) 430×
- 4) 4,400×

86. A hydra ingests a *Daphnia*, digests it, and later egests some materials. All of these events are most closely associated with the life process known as

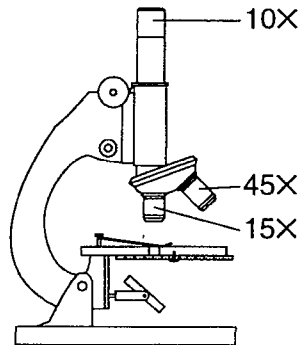
- 1) transport
- 2) synthesis
- 3) growth
- 4) nutrition

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



Information about which *two* lettered parts is needed in order to determine the total magnification of an object viewed with the microscope in the position shown?

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



The diameter of the low-power field of this compound light microscope measures 1,200 micrometers. What is the diameter of the high power field in micrometers?

- 1) 0.4                      2) 3.6                      3) 40                      4) 400

89. An iodine test of a tomato plant leaf revealed that starch was present at 5:00 p.m. on a sunny afternoon in July. When a similar leaf from the same tomato plant was tested with iodine at 6:00 a.m. the next morning, the test indicated that less starch was present. This reduction in starch content most likely occurred because starch was

- 1) changed directly into proteins
- 2) transported out of the leaves through the guard cells
- 3) transported downward toward the roots through tubes
- 4) changed into simple sugars

90. Which life process is classified as autotrophic in some organisms and heterotrophic in other organisms?

- 1) hormonal regulation
- 2) nutrition
- 3) anaerobic respiration
- 4) transport

---

91. Respiration is best described as a process by which

- 1) necessary nutrients are circulated
- 2) hydrogen is used to synthesize glucose
- 3) metabolic wastes are absorbed
- 4) chemical energy is converted into a usable form

92. For survival, a hummingbird uses a considerable amount of energy. This energy most directly results from the life activity of

- 1) transport
- 2) excretion
- 3) regulation
- 4) respiration

93. The delivery of oxygenated blood to all tissues around the body involves what two life functions?

- 1) Digestive and circulatory
- 2) Digestive and respiratory
- 3) Respiratory and circulatory
- 4) Excretory and circulatory

94. By which process is the potential energy of organic molecules transferred to a form of energy that is usable by the cells?

- 1) digestion
- 2) hydrolysis
- 3) photosynthesis
- 4) respiration

95. Which observation could lead to the conclusion that an object is nonliving?

- 1) It passes on hereditary information only through asexual reproduction.
- 2) It carries out synthesis.
- 3) It cannot perform metabolic processes.
- 4) It is composed of a cell, but does not have tissues.

96. Which of the following is the primary nutrient used in metabolism?

- 1) Sugar
- 2) Lipids
- 3) Proteins
- 4) genetic material

97. Living organisms can best be distinguished from nonliving things by determining the presence or absence of

- 1) carbon atoms
- 2) oxygen atoms
- 3) metabolic activities
- 4) chemical reactions

98. Every single-celled organism is able to survive because it carries out

- 1) metabolic activities
- 2) autotrophic nutrition
- 3) heterotrophic nutrition
- 4) sexual reproduction

99. Which group contains only molecules that are each assembled from smaller organic compounds?

- 1) proteins, water, DNA, fats
- 2) proteins, starch, carbon dioxide, water
- 3) proteins, DNA, fats, starch
- 4) proteins, carbon dioxide, DNA, starch

100. As a direct result of which life process does a plant make a variety of chemical substances such as poisons, drugs, and flavorings

- 1) digestion
- 2) excretion
- 3) respiration
- 4) synthesis

101. Enzyme molecules are produced by the life function known as

- 1) egestion
- 2) respiration
- 3) growth
- 4) synthesis

102. What is maintenance of the pH of human blood within a certain range known as?

- 1) digestion
  - 2) synthesis
  - 3) respiration
  - 4) homeostasis
-

---

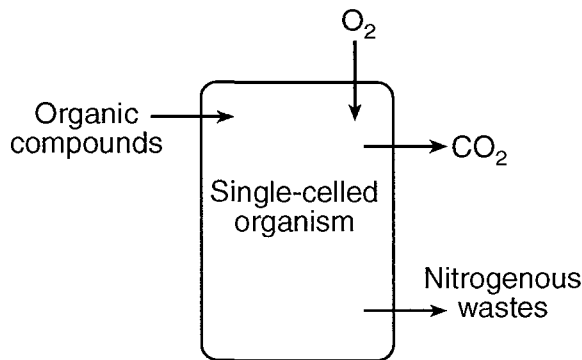
103. Which statement concerning simple sugars and amino acids is correct?

- 1) They are both wastes resulting from protein synthesis.
- 2) They are both building blocks of starch.
- 3) They are both needed for the synthesis of larger molecules.
- 4) They are both stored as fat molecules in the liver.

104. On hot, dry days, guard cells often close microscopic openings in plant leaves, conserving water. This is an example of

- 1) environmental factors causing gene mutation in plants
- 2) finite resources acting as selecting agents for evolution
- 3) a feedback mechanism for maintaining homeostasis
- 4) differentiation in plants as a result of stimuli

105. The arrows in the diagram below indicate the movement of materials into and out of a single-celled organism.



The movements indicated by all the arrows are directly involved in

- 1) the maintenance of homeostasis
- 2) photosynthesis, only
- 3) excretion, only
- 4) the digestion of minerals

106. The disease known as malaria may result in a fever, a decrease in red blood cells, and an enlarged liver and spleen. These symptoms are evidence of

- 1) a disruption of homeostasis
- 2) a decrease in allergic reactions
- 3) an increased number of cell organelles
- 4) hormone destruction

107. Feedback interactions in the human body are important because they

- 1) determine the diversity necessary for evolution to occur
- 2) direct the synthesis of altered genes that are passed on to every cell in the body
- 3) regulate the shape of molecules involved in cellular communication
- 4) keep the internal body environment within its normal range

108. Which process illustrates a feedback mechanism in plants?

- 1) Chloroplasts take in more nitrogen, which increases the rate of photosynthesis.
- 2) Chloroplasts release more oxygen in response to a decreased rate of photosynthesis.
- 3) Guard cells change the size of leaf openings, regulating the exchange of gases.
- 4) Guard cells release oxygen from the leaf at night.

109. The process that removes metabolic waste products from an organism is known as

- 1) egestion
  - 2) secretion
  - 3) excretion
  - 4) oxidation
-

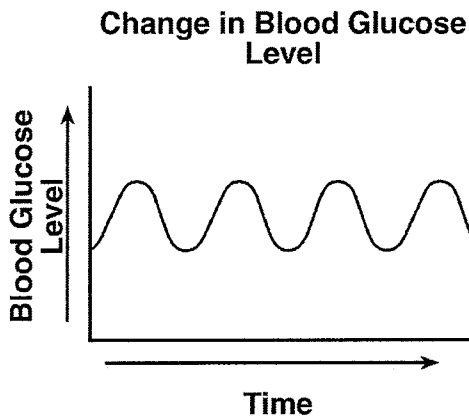
110. Which statement does *not* describe an example of a feedback mechanism that maintains homeostasis?

- 1) The guard cells close the openings in leaves, preventing excess water loss from a plant.
- 2) White blood cells increase the production of antigens during an allergic reaction.
- 3) Increased physical activity increases heart rate in humans.
- 4) The pancreas releases insulin, helping humans to keep blood sugar levels stable.

111. Which statement best describes why pathogens are harmful?

- 1) All of the cells of an organism infected by pathogens become pathogens.
- 2) Pathogens cannot be controlled once they enter the cells of an organism.
- 3) Pathogens produce antibodies that will kill the host organism.
- 4) Pathogens can interfere with normal life functions.

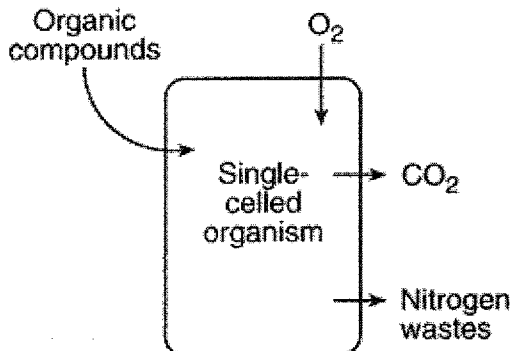
112. The graph below shows changes in the level of glucose in the blood of a person over a period of time.



The graph represents the

- 1) maintenance of dynamic equilibrium
- 2) failure of homeostasis
- 3) reaction of white blood cells to a pathogen
- 4) oxygen carrying capacity of the blood

113. The arrows in the diagram below indicate the movement of materials into and out of a single-celled organism.



The movements indicated by all the arrows are directly involved in what process?

- 1) the maintenance of homeostasis
- 2) respiration, only
- 3) excretion, only
- 4) the digestion of proteins

114. As a result of their metabolic activities, many organisms produce harmful substances. These substances are eliminated by the process of

- 1) ingestion      2) secretion      3) pinocytosis      4) excretion

115. The list below includes three organ systems that are directly used when a human runs.

circulatory system

muscular system

skeletal system

Which system should also be included in the list?

- 1) immune system                      2) reproductive system  
3) digestive system                      4) nervous system

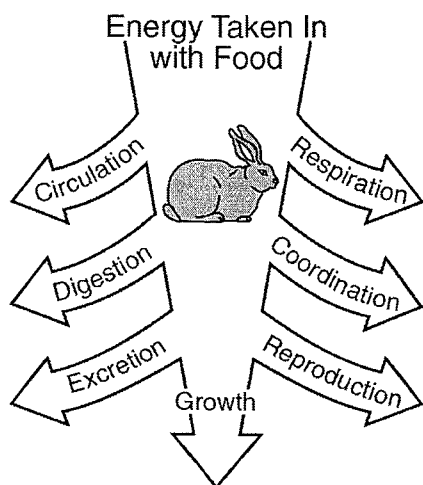
116. Plants that live in hot, dry climates have evolved mechanisms to help conserve limited water supplies. One example is the closing of leaf openings by guard cells during the day to decrease water loss from their leaves. This detection of and response to an environmental stimulus is an example of

- 1) a feedback mechanism                      2) a genetic mutation  
3) an organ malfunction                      4) an allergic reaction

117. Three human hormones most directly involved in sexual reproduction are

- 1) estrogen, insulin, and progesterone      2) testosterone, estrogen, and insulin  
3) progesterone, ATP, and testosterone      4) estrogen, progesterone, and testosterone

118. Rabbits have evolved strategies that get them through periods of time when there is little food. The diagram below represents essential life functions that rabbits need to perform.



Which life function in the diagram could be eliminated without affecting an individual rabbit's ability to survive when food is scarce?

- 1) digestion      2) excretion      3) circulation      4) reproduction

119. Which life activity is *not* required for the survival of an individual organism

- 1) nutrition      2) respiration      3) reproduction      4) synthesis



---

120. Prions are proteins that act as an infectious agent. They cause a variety of diseases, including “Mad Cow” disease. Prions cannot produce more prions on their own, but cause the host organism to replicate more prions. Most scientists do not consider prions to be alive. A valid reason for accepting that prions are nonliving things is that

- 1) no living thing can cause a disease
- 2) proteins are inorganic molecules
- 3) prions contain all of the material needed to reproduce
- 4) prions cannot carry out reproduction independently

121. What is a similarity between all bacteria and plants?

- 1) They both have a nucleus
- 2) They are both composed of cells
- 3) They both have chloroplasts
- 4) They both lack a cell wall

122. What is common to all cells?

- 1) All cells have a cell wall
- 2) All cells are photosynthetic
- 3) All cells divide to form new cells
- 4) All cells have a nucleus

123. A deletion of a DNA segment alters a gene in a single skin cell of an individual. Which statement best describes a result of this mutation?

- 1) Any cell produced from this skin cell will have the same mutation.
- 2) All offspring of the individual will have a skin cell mutation.
- 3) The mutation will spread into other types of cells.
- 4) The gametes of this individual will have the same mutation.

124. All of the following are true regarding cells except?

- 1) All cells have genetic material
- 2) All cells have cell walls
- 3) All cells have plasma membranes
- 4) All cells can divide to form new cells

125. Which sequence of terms is in the correct order from simplest to most complex?

- 1) cells → tissues → organs → organ systems
- 2) tissues → organisms → cells → organ systems
- 3) cells → tissues → organ systems → organs
- 4) organs → organisms → organ systems → cells

126. Which instrument was used in the 18th and 19th centuries and helped scientists develop the cell theory?

- 1) electron microscope
- 2) light microscope
- 3) microdissecting apparatus
- 4) ultracentrifuge

127. It was once thought that decaying meat turned into maggots (fly larvae). Careful experimentation by scientists demonstrated that maggots actually come from fly eggs and not meat. These experiments illustrate that new individuals result only from

- 1) genetic engineering
- 2) reproduction and development
- 3) nutrition and replication
- 4) metabolic homeostasis

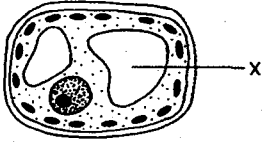
128. An ameba, a one-celled organism, can move, ingest, and transport material within the cell, because it has

- 1) organs
  - 2) organelles
  - 3) tissues
  - 4) systems
-

129. The invention of the compound light microscope enabled scientists to observe cells, helping them to

- 1) determine the number of atoms in a molecule
- 2) discover a basic similarity among organisms
- 3) study the behavior of chordates
- 4) develop techniques for growing plants in a laboratory

130. In the diagram of a cell below, the structure labeled X enables the cell to



- 1) release energy
- 2) store waste products
- 3) control nuclear division
- 4) manufacture proteins

131. The chloroplast is to a plant as

- 1) a window is to a building
- 2) a solar cell is to a building
- 3) a room is to a building
- 4) the roof is to a building

132. If the ribosomes of a cell were destroyed, what effect would this most likely have on the cell?

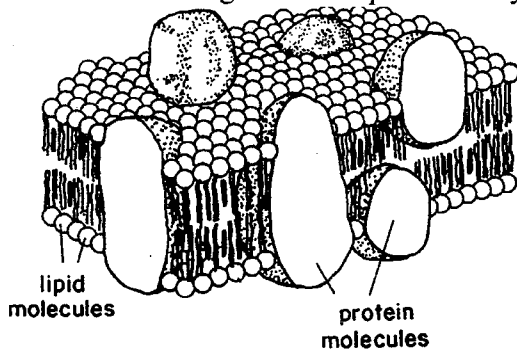
- 1) It would stimulate mitotic cell division.
- 2) The cell would be unable to synthesize proteins.
- 3) Development of abnormal hereditary features would occur in the cell.
- 4) Increased protein absorption would occur through the cell membrane.

133. Which diagram represents the relative sizes of the structures listed below?

Structures	
A	gene
B	cell
C	chromosome
D	nucleus

- 1)
- 2)
- 3)
- 4)

134. Which cellular organelle is represented by the diagram below?



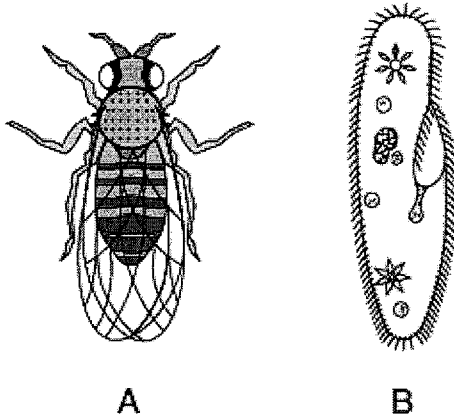
- 1) cell wall
- 2) molecules
- 3) plasma membrane
- 4) protein

135. As a human red blood cell matures, it loses its nucleus. As a result of this loss, a mature red blood cell lacks the ability to

- 1) take in material from the blood
- 2) release hormones to the blood
- 3) pass through artery walls
- 4) carry out cell division

---

136. A land-dwelling organism, *A*, and an aquatic single-celled organism, *B*, are represented below.

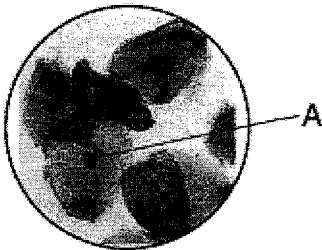


Which statement best explains how *A* and *B* are able to survive in their environments?

- 1) The organelles in *B* perform similar functions to the organ systems in *A*.
- 2) The transport system in *B* is more complex than the transport system in *A*.
- 3) Both *A* and *B* take in oxygen from the water.
- 4) Only *A* can pass on traits to offspring.

---

137. A photograph of human cells as seen with a compound light microscope is shown below. A cell structure is labeled *A*.



Structure *A* is most likely a

- 1) mitochondrion that synthesizes food for the cell
- 2) nucleus that is the site of food storage
- 3) mitochondrion that absorbs energy from the Sun
- 4) nucleus that is responsible for the storage of information

---

138. Within a cell, where is the DNA chiefly found?

- |              |                    |
|--------------|--------------------|
| 1) cell wall | 2) plasma membrane |
| 3) ribosomes | 4) nucleus         |

---

139. Microscopic examination of an animal cell reveals the presence of a plasma membrane but no cell wall. Which additional structures would normally be present within this cell?

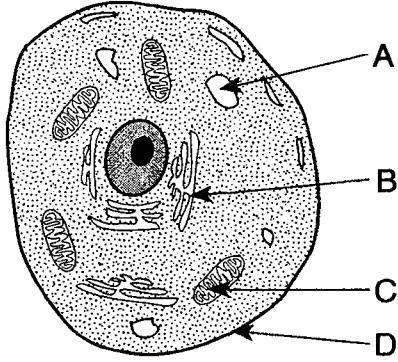
- |                  |               |                 |                   |
|------------------|---------------|-----------------|-------------------|
| 1) starch grains | 2) centrioles | 3) chloroplasts | 4) large vacuoles |
|------------------|---------------|-----------------|-------------------|

---

140. What has to be properly functioning in a unicellular organism for homeostasis to be maintained?

- |               |            |                |               |
|---------------|------------|----------------|---------------|
| 1) organelles | 2) insulin | 3) guard cells | 4) antibodies |
|---------------|------------|----------------|---------------|
-

141. Which organelle in the diagram below represents an exception to the cell theory because it contains genetic material and can reproduce within the cell?

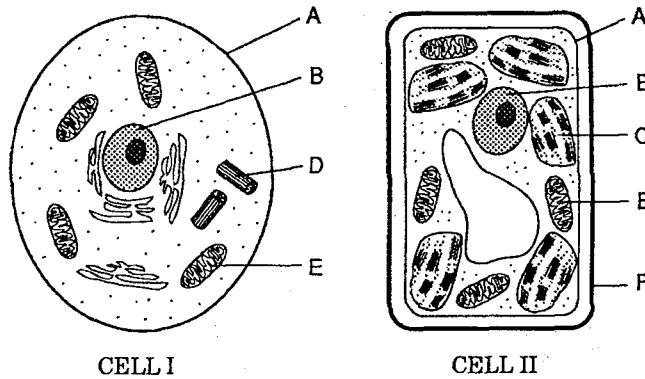


- 1) A                      2) B                      3) C                      4) D

142. Which unstained cellular organelles can be seen with a compound light microscope that has a total magnification of 400×?

- 1) cell membrane, ribosomes, vacuole                      2) cell wall, vacuole, chloroplast  
 3) nucleolus, chloroplast, ribosomes                      4) mitochondria, nucleus, centrioles

143. Base your answer to the following question on the diagrams below which represent two different cells.



Cell II most likely represents a plant cell due to the presence of

- 1) A                      2) B                      3) E                      4) F

144. Which structures could *most likely* be observed in cells in the low-power field of a compound light microscope?

- 1) cell walls and chloroplasts                      2) ribosomes and endoplasmic reticula  
 3) lysosomes and genes                      4) nucleotides and mitochondria

145. Which cell structure is correctly paired with its primary function?

- 1) ribosome—protein synthesis                      2) mitochondrion—movement  
 3) vacuole—cell division                      4) nucleus—storage of nutrients

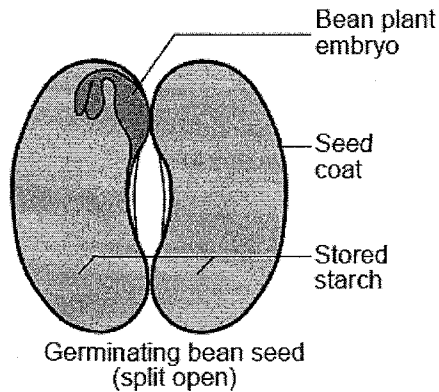
146. Centrioles are cell structures involved primarily in

- 1) cell division                      2) storage of fats  
 3) enzyme production                      4) cellular respiration

147. After a cell was treated with a certain chemical, the ribosomes stopped functioning. Which cell activity was immediately affected by this change in ribosome function?

- 1) intracellular transport
- 2) protein synthesis
- 3) aerobic respiration
- 4) excretion of metabolic wastes

148. Base your answer to the following question on the diagram and information below and on your knowledge of biology. The diagram represents a germinating bean seed that has been split open.



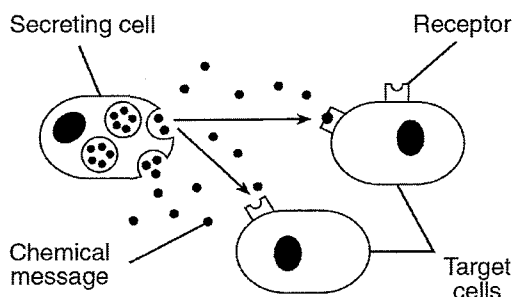
Plants are able to continue to grow and develop once the starch supply in the seed is gone, because they

- 1) develop roots to absorb starch from the environment
- 2) grow leaves, which use light energy for cell respiration
- 3) have chloroplasts and use light energy to make more food
- 4) produce more seeds, which contain additional food reserves

149. Which statement best explains why some cells in the reproductive system only respond to certain hormones?

- 1) These cells have different DNA than the cells in other body systems.
- 2) These cells have specific types of receptors on their membranes.
- 3) Reproductive system cells could be harmed if they made contact with hormones from other body systems.
- 4) Cells associated with the female reproductive system only respond to the hormone testosterone.

150. The diagram below shows how a chemical message produced by one cell is received by other cells.



If these chemical messages are destroyed, the target cells will

- 1) produce their own chemical messages
- 2) not respond with appropriate actions
- 3) develop different receptors
- 4) no longer be produced in the organism



158. Which model best represents the relationship between a cell, a nucleus, a gene, and a chromosome?

