Name: _____ Class: _____ Date: _____ ID: A

Bio-Process Lab 2010

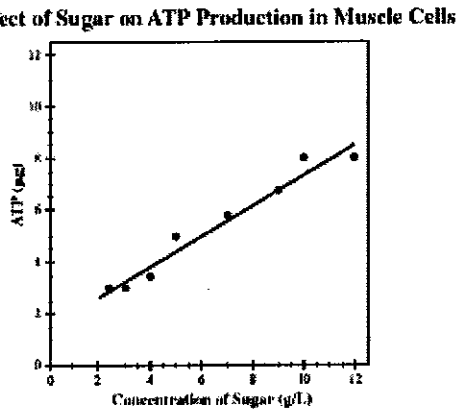
Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Legumes, such as clover and alfalfa, have nodules on their roots that contain nitrogen-fixing bacteria. Which of the following best accounts for the presence of nitrogen-fixing bacteri in legume root nodules?
a. Nitrates are a food source for earthworms.
b. Plants can use nitrates, but not nitrogen gas.
c. Nitrates are one of those reactants in photosynthesis.
d. Nitrogen gas is toxic to most plants, but nitrates are nontoxic.

____ 2. Which of the following is an example of codominance in genetic traits?
a. A tall pea plant and a short pea plant produce tall pea plants.
b. An orange cat and a black cat produce and orange-and-black cat.
c. A blue-eyed man and a brown-eyed woman produce a blue-eyed child.
d. A color-bling woman and a man with normal vision produce a color-blind son.

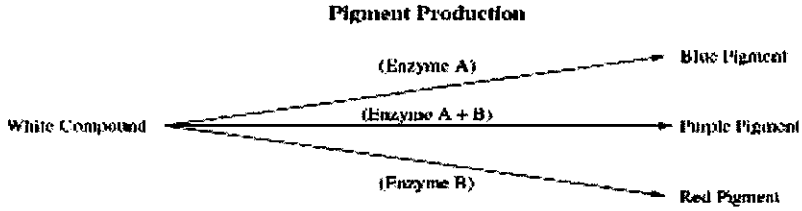
____ 3. A cell has a defect that results in the loss of its ability to regulate the passage of water, food, and wastes into and out of the cell. In which of the structures is this defect most likely to be located?
a. ribosome
b. chloroplasts
c. cell membrane
d. endoplasmic reticulum

____ 4. The graph below represents data gathered during an experiment on cellular respiration. Which of the following conclusions is **best** supported by data from this graph?



a. ATP production is independent of sugar availability.
b. The amount of cellular respiration is constant in muscle cells.
c. ATP is only produced when sugar concentrations are above 4 g/L.
d. The amount of cellular respiration increases as sugar concentration increases.

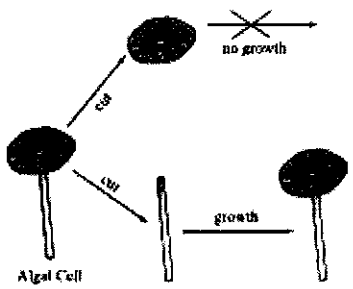
____ 5. The diagram below shows a biochemical pathway.



In one species of plant, the flower petals are normally purple if both enzyme A and B are produced. If a mutation occured that stopped production of enzyme A, but not enzyme B, what color flower petals would be produced?

a. red
b. blue
c. white
d. purple

____ 6. The algal cell pictured below is a single-celled organism.



When the algal cell is cut in two as shown, the bottom part can grow into a complete cell, but the top part cannot. What conclusion does this support?

a. The ribosomes are found in the top of the cell.
b. The nucleus is found in the bottom of the cell.
c. The top of the cell contains most of its chromosomes.
d. The bottom of the cell contains most of its cytoplasm. Algal Cell growth cut cut no growth

____ 7. An amoeba, oak tree, squirrel, and mildew are all classified in the same

a. domain
b. kingdom
c. genus
d. species

____ 8. Many aquatic birds secrete waxy organic substances that repel water. The birds use these substances to coat their feathers. An analysis of these substances would reveal that they are composed mostly of

a. lipids
b. proteins
c. carbohydrates
d. nucleic acids

____ 9. Carbon atoms in organic molecules **most commonly** bond to atoms of hydrogen, oxygen, and

a. calcium
b. magnesium
c. nitrgogen
d. sodium

____ 10. A student using a compound microscope measured the diameter of several red blood cells and found that the average cell length was 0.008 millimeter. What is the average length of a single red blood cell in micrometers?

a. 8
b. 800
c. 80
d. .8

____ 11. The structure of a cell nucleus would be seen in the *greatest* detail by use of

a. a compound light microscope
b. an electron microscope
c. an ultracentrifuge
d. a dissecting microscope

____ 12. An investigation was conducted to observe the effects of glucose ingestion on glucose concentration in the blood. An animal was fed 10 milliliters of a glucose solution. At five different times following ingestion of the solution, the blood glucose concentration was determined and the results were recorded in the data table below.

DATA TABLE

Time After Glucose Ingestion (minutes)	Glucose Concentration in Blood (mg/100 mL)
0	75
30	125
60	110
90	90
120	80
100	70

A variable in this investigation is the

a. amount of ingested
b. time the blood sample was taken
c. size of the animal
d. size of blood samples taken

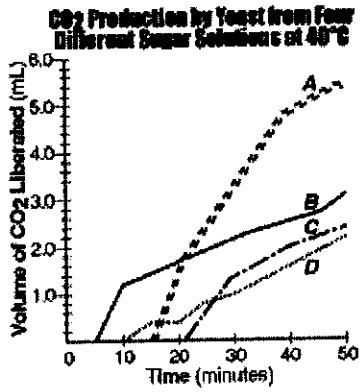
____ 13. An investigation was performed to estimate the amount of absorption of different wavelengths (nanometers) of light by a photosynthetic organism. The following data were collected:
550 nanometers, 40% absorption;
450 nanometers, 85% absorption;
650 nanometers, 70% absorption;
500 nanometers, 60% absorption;
600 nanometers, 50% absorption
Which inference is *best* supported by the data collected?

a. Increasing the wavelength of light will always increase the rate of photosynthesis.
b. The rate of photosynthesis is greatest when the photosynthetic organism is exposed to a light wavelength of 550 nanometers.
c. The 450-nanometer wavelength corresponds to green light used in photosynthesis.
d. The 550-nanometer wavelength is probably not very effective for photosynthesis.

____ 14. An organism was kept at a temperature of 40DC for a period of 2 weeks. At the end of that time, the investigator determined that the organism was sterile. To support the hypothesis that high temperatures cause sterility, the investigator should be able to show that the

a. high temperature did not alter the blood pressure of the organism
b. organism was homozygous for temperature sensitivity
c. organism was not sterile before the experimental period began
d. pituitary gland of the organism had not degenerated

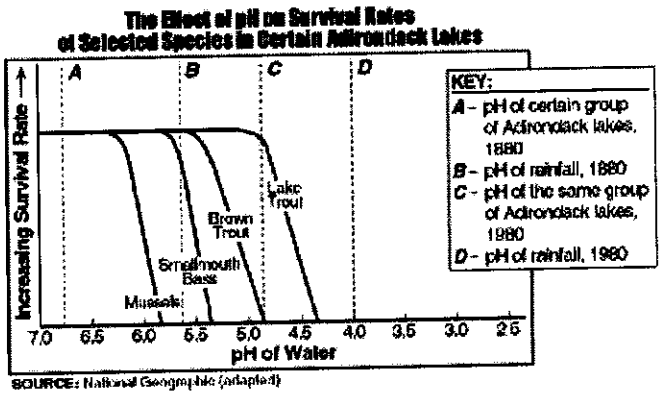
____ 15. Equal amounts of a mixture of yeast and water were placed in each of four different test tubes. One of four different sugars, *A*, *B*, *C*, or *D*, was added to each test tube in equal concentration. The volume of CO_2 liberated from each solution was measured every few minutes and the data were plotted on the graph as shown below.



After how many minutes was the volume of CO_2 liberated from sugar *A* solution equal to the volume of CO_2 liberated from
sugar *B* solution?

a. 20
b. 10
c. 5
d. 25

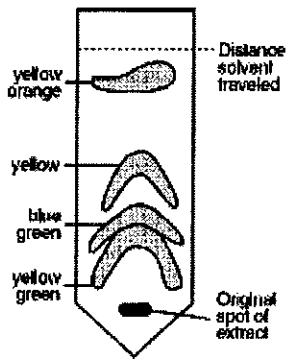
____ 16. The graph below illustrates a comparison between pH conditions and species survival rates in certain Adirondack lakes.



In the years between 1880 and 1980, which species would most likely have been eliminated first due to the gradual acidification of Adirondack lakes?

a. lake trout
b. mussels
c. brown trout
d. smallmouth bass

____ 17. Several drops of concentrated pigment extract obtained from spinach leaves were placed at the bottom of a strip of highly absorbent paper. When the extract dried, the paper was suspended in a test tube containing solvent so that only the tip of the paper was in the solvent. As the solvent was absorbed and moved up the paper, the various pigments contained within the extract became visible as shown in the diagram below.



A valid conclusion that can be drawn from this information is that spinach leaves

a. use only chlorophyll during photosynthesis
b. contain more orange pigment than yellow pigment
c. contain pigments in addition to chlorophyll
d. are yellow orange rather than green

____ 18. When a true-breeding plant self-pollinates,

a. it will always produce offspring with the same traits the parent plant has.
b. it will never produce offspring with the same traits the parent plant has.
c. it will only occasionally produce offspring with the same traits the parent plant has.

____ 19.

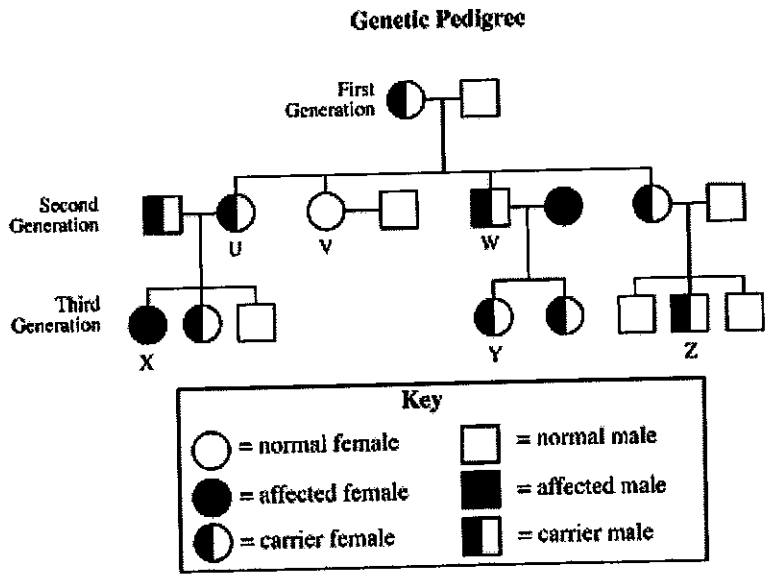
Sickle cell Disease

Sickle cell disease is a group of inherited disorders in which deoxygenated red blood cells become distorted and take on a shape like a sickle. There are two common alleles for this gene. One causes normally shaped red blood cells and the other allele causes the red blood cells to have a sickle shape. The sickled cells can lodge in the smallest blood vessels and reduce the circulation of blood to tissues.

The sickle cell allele is most common in areas where the disease malaria is a significant problem, and among people whose ancestors are from those areas. Evidence shows that having just one sickle cell allele makes a person resistant to malaria.

This genetic condition is a recessive trait. When an individual has only one allele for the sickle cell trait, the person is a carrier.

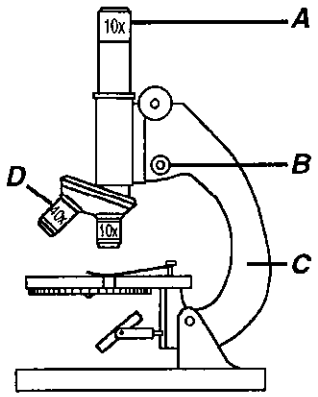
The pedigree below represents a family in which some members have the sickle cell allele.



Question: Which person on the pedigree could not pass the allele for sickle cell disease to his/her offspring?

a. V
b. X
c. Y
d. Z

Questions 20 and 21 refer to the following:



20) While viewing a specimen under high power, a student noticed that the specimen was out of focus. Which part of the microscope should the student use to obtain a clearer image?

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

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

1) 40× 2) 400× 3) 4,000× 4) 100×

22) A microscope objective is changed from high power (40×) to low power (10×) and a tissue sample is brought into focus. Compared to the number of cells observed under high power, the number of cell observed under low power would be

1) greater 2) less 3) the same

23) A student viewing a specimen under low power of a compound light microscope switched to high power and noticed that the field of view darkened considerably. Which microscope part should the student adjust to brighten the field of view?

1) fine adjustment 2) eyepiece 3) coarse adjustment 4) diaphragm

24) 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) light source 2) eyepiece lens 3) objective lens 4) iris diaphragm

25) Which objective of a compound microscope would show the *largest* field of view?

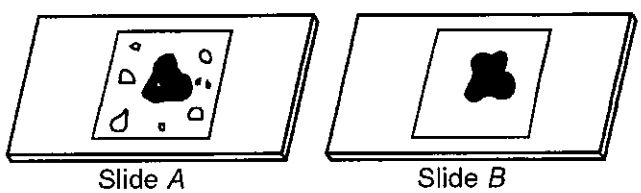
1) 10× 2) 5× 3) 44× 4) 20×

26) To locate a specimen on a prepared slide with a compound microscope, a student should begin with the low-power objective rather than the high-power objective because the

1) field of vision is larger under low power than under high power
2) specimen does not need to be stained for observation under low power but must be stained for observation under high power
3) amount of the specimen that can be observed under low power is less than the amount that can be observed under high power
4) field of vision is smaller under low power than under high power

Questions 27 and 28 refer to the following:

The diagrams below represent wet mount microscope slides of fresh potato tissue.



27) The formation of air bubbles on slide *A* could have been prevented by

1) using a longer piece of potato and a cover slip with holes in it
2) using a thicker piece of potato and less water
3) holding the cover slip parallel to the slide and dropping it directly onto the potato
4) bringing one edge of the cover slip into contact with the water and lowering the opposite edge slowly

28) A drop of stain is put in contact with the left edge of the cover slip on slide *B*, and a piece of absorbent paper is placed in contact with the right edge of the cover slip. What is the purpose of this procedure?

1) It helps increase the osmotic pressure of the solution.
2) It prevents the water on the slide from penetrating the potato tissue.
3) It allows the stain to penetrate the potato tissue without the removal of the cover slip.
4) It prevents the stain from getting on the ocular of the microscope.

29) 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 the height of the plants in each group is shown in the data table below.

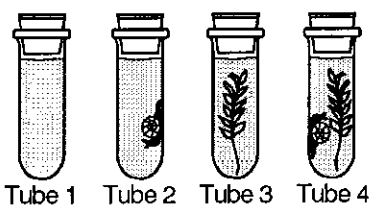
DATA TABLE

	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

A variable in this investigation was the

1) amount of nutrient fed to each group of bean plants
2) number of bean plants in each group
3) amount of water given daily to each plant
4) initial height of each bean plant

30) In an investigation of the cycling of environmental gases, a student placed water and bromthymol blue in each of four test tubes as shown in the diagrams below. No additional items were placed in tube 1, a snail was placed in tube 2, an aquatic plant (elodea) was placed in tube 3, and both a snail and an elodea were placed in tube 4. The tubes were then stoppered and placed in bright light for 24 hours.



The function of tube 1 in this investigation is to

1) determine the amount of gases in the water
2) demonstrate the transparency of the solution
3) serve as a control
4) detect the presence of glucose

Name: _____ Class: _____ Date: _____ ID: A

Bio Process Lab

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 31. What percentage can be expected in the offspring of a cross between a female carrier for color blindness and a male with normal color vision?
a. 25% normal males, 25% colorblind males, 25% carrier females, 25% colorblind females
b. 50% colorblind males, 50% colorblind females
c. 25% normal males, 25% colorblind males, 25% normal females, 25% carrier females
d. 75% normal males, 25% carrier females

____ 32. Probability is
a. always expressed as a ratio.
b. a 50% chance that an event will occur.
c. the mathematical chance that an event will occur.
d. a 3:1 chance that an event will occur.

____ 33. A fruit fly has 8 chromosomes in each body cell. How many chromosomes would you find in one of its gamete cells?
a. 2
b. 4
c. 8
d. 16

____ 34. A human **diploid** cell contains how many chromosomes?
a. 46
b. 23
c. 48
d. 24

____ 35. How many amino acids does the DNA sequence ACCTAGTTGACC code for?
a. 1
b. 4
c. 6
d. 12

____ 36. Which of the following would be a good source of fiber?
a. cheese sandwich
b. macaroni and cheese
c. salad
d. taco

____ 37. Involving the following information:
Serving size 85g
Calories/serving 400
Fat 6.0g
Total Carbs 43g
Protein 4g
Calories per gram carb 4
Calories per gram protein 4
Calories per gram fat 9

What percent of calories in this food come from carbohydrates?
a. 10
b. 4.7
c. 50
d. 24

____ 38. Suppose the recommended daily amount of protein is 48g. If the above food (question 36) were the only source of protein in the diet, how much (in grams) of this food would have to be eaten?
a. 5 servings
b. 16 servings
c. 8 servings
d. 12 servings

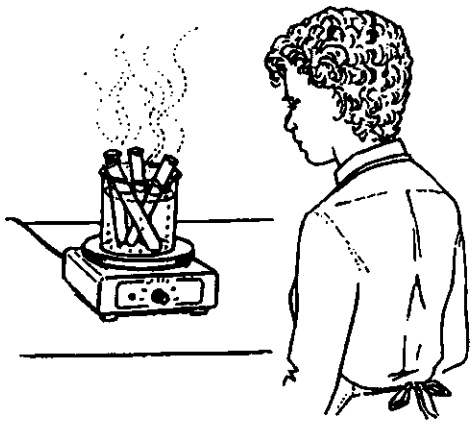
Matching

Match the temperature with the indicated situation. Come choices may be used more than once, others, not at all.

a. -150 degrees Celsius to zero degrees Celsius
b. Zero degress Celsius to 20 degrees Celsius
c. 35 Degrees Celsius to 45 Degrees Celsius
d. Over 100 Degrees Celsius

____ 39. Bath Water
____ 40. Ice Cubes taken from a freezer
____ 41. Normal human body temperature
____ 42. Oven for baking bread
____ 43. Mountain stream in January
____ 44. Typical temperature in OH in January

45)



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

1) The flame is too high and the test tube is unstoppered.
2) The beaker has water in it and the flame is under the tripod.
3) The test tube is unstoppered and the student is not wearing goggles.
4) The opening of the test tube is pointed toward the student and the student is not wearing goggles.

Questions 46 and 47 refer to the following:

The following four sets listed below are of laboratory materials.

SET *A*

- Light source
- Colored filter
- Test tubes
- Beaker
- Test tube stand

SET *B*

- Droppers
- Benedict's solution
- Iodine
- Test tube holder
- Test tube rack
- Test tubes
- Starch solution
- Sugar solution
- Goggles
- Heat source

SET *C*

- Scalpel
- Pan with wax bottom
- Stereomicroscope
- Goggles
- Forceps
- Pins
- Scissors

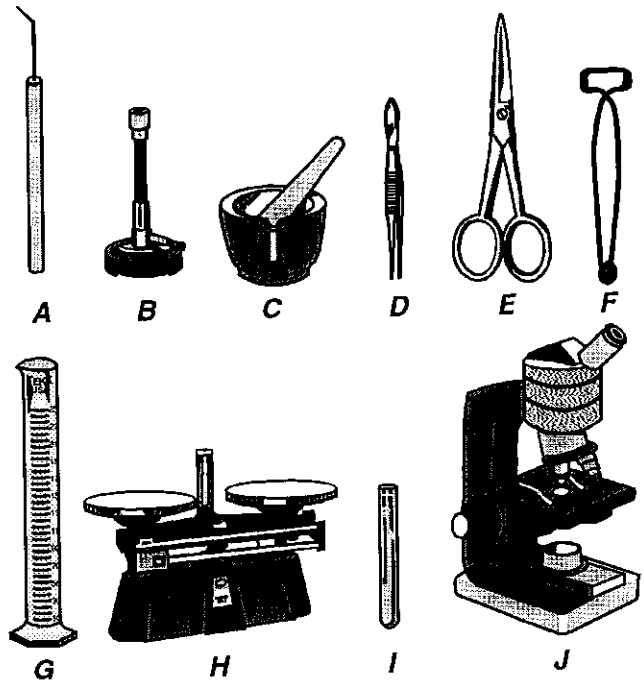
SET *D*

- Glass slides
- Forceps
- Water
- Compound light microscope

46) Which set should a student select to determine the location of the aortic arches in the earthworm?

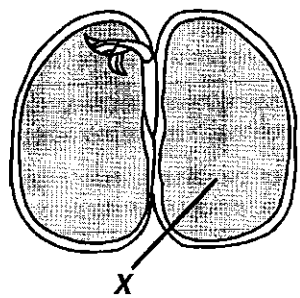
47) Which set should a student use to observe chloroplasts in elodea (a green waterplant)?

48) In addition to an indicator and proper safety equipment, which pieces of equipment shown below should be used to test for the presence of glucose in apple juice?

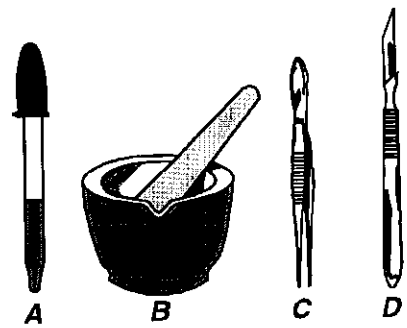


1) *C*, *G*, and *H*
2) *A*, *D*, and *E*
3) *B*, *F*, and *I*
4) *A*, *B*, and *J*

49) The diagram below represents an unstained bean seed.

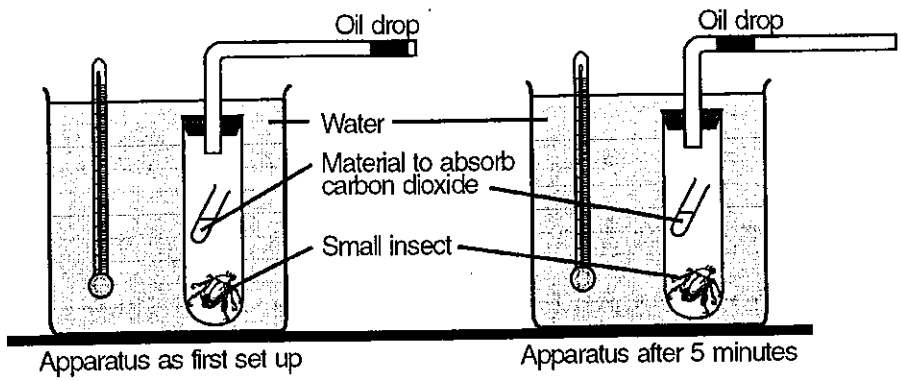


Which instruments were most likely used to prepare the bean seed as shown?



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

50) The apparatus below was designed with the understanding that animals take in oxygen and release carbon dioxide, and that ordinary air contains very little carbon dioxide.



The apparatus can be used to measure the

1) rate of respiration of the animal
2) effect of carbon dioxide on the animal
3) amount of carbon dioxide absorbed by the animal
4) amount of heat prduced by the animal