

STUDENT NAME _____

Biology
End-of-Course
Examination

Administered Spring 2002

BIOLOGY

DIRECTIONS

Read each question and choose the best answer. Then fill in the correct answer on your answer document.

SAMPLE A

Biology is the study of —

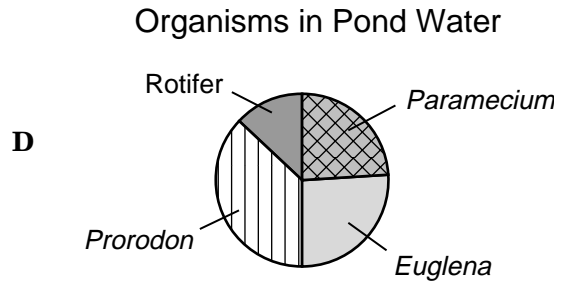
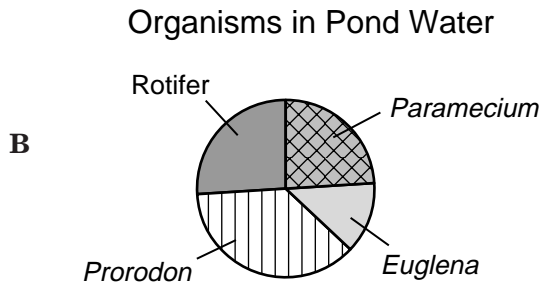
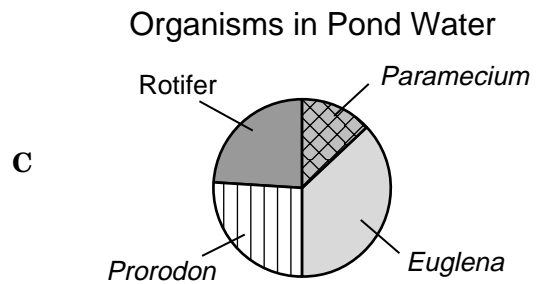
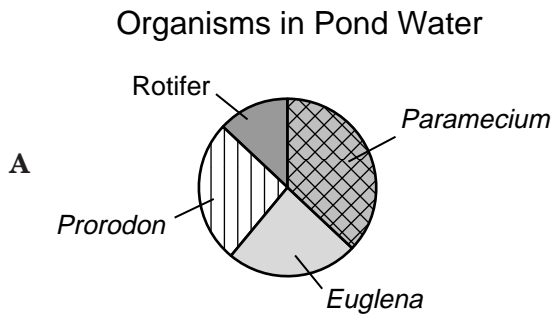
- A atoms
- B energy
- C life
- D stars



Organisms in Pond Water

Microorganism	Individuals per 100 mL
<i>Paramecium</i>	24
<i>Euglena</i>	26
<i>Prorodon</i>	37
Rotifer	13

- 1 The chart shows the types of organisms found in 100 mL of pond water. Which graph is the best representation of these data?



2 Which two systems work with the skeletal system to cause a finger to move?

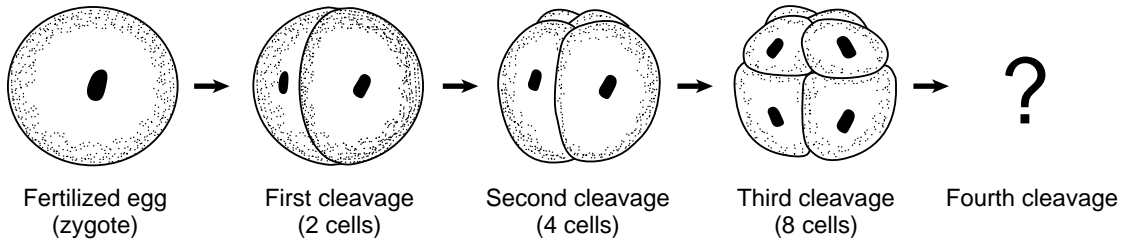
F Immune and excretory

G Digestive and respiratory

H Nervous and muscular

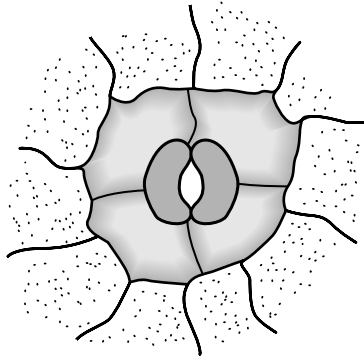
J Circulatory and integumentary

Early Development of a Vertebrate Embryo

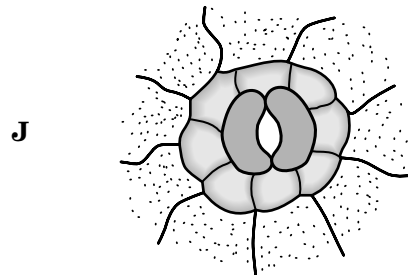
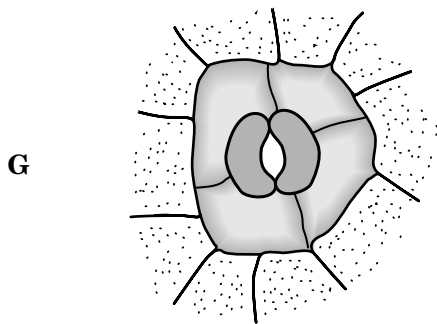
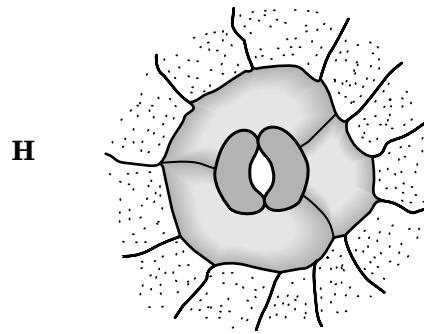
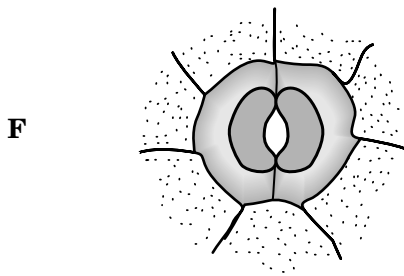


3 The diagram shows the early development of a vertebrate embryo. According to this information, how many cells will be present after the fourth cleavage?

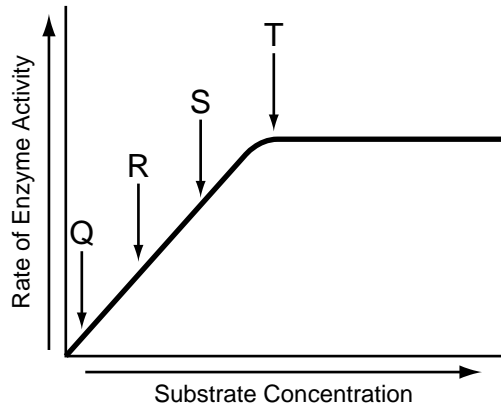
- A 4
- B 16
- C 32
- D 64



4 There are many different ways that plant epidermal cells can be arranged around the stomata on plant leaves. Which of these has a development pattern most similar to the pattern pictured above?



Results of Adding Substrate to an Enzyme Solution



5 The graph shows the results of adding substrate to a solution that contains 10 grams of enzyme. At which point are all of the enzyme molecules working at their maximum rate?

- A Q
- B R
- C S
- D T

- 6 When organisms die, what prevents the environment from being overwhelmed by the bodies of these organisms?
- F Rainwater washes them away.
 - G Other organisms use them as food.
 - H Sunlight releases energy from their tissues.
 - J Natural and controlled fires burn them.

7 Which of these actions helps protect people from bacteria that cause food poisoning?

- A Thawing meat in the kitchen sink
- B Freezing meat in plastic bags
- C Cooking meat until well-done
- D Slicing meat on a picnic table

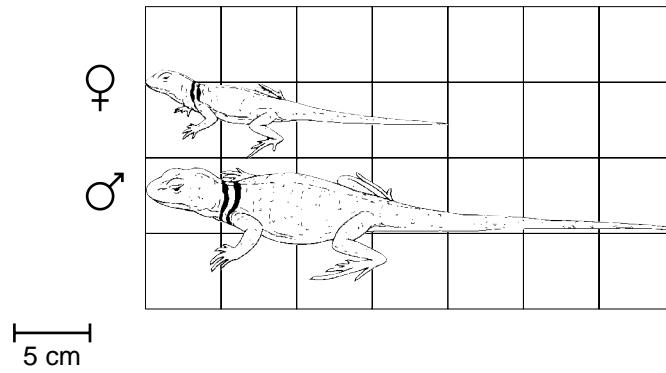
8 An experiment was designed to determine the effects of cool temperatures on the germination of piñon pine seeds. Which of these variables was **LEAST** important to control in this experiment?

- F The brand name of the refrigerator used to produce the cool temperatures
- G The number of seeds used in each group
- H The amount of time that the seeds were exposed to cool temperatures
- J The temperature range used to define cool temperatures

9 All of these should be considered when storing acids **EXCEPT** the —

- A correct labeling of chemicals
- B safety of people in the building
- C shape of the storage containers
- D separation of incompatible chemicals

Collared Lizard
(*Crotaphytus collaris*)



- 10 Male collared lizards are larger than females. According to the pictures above, the difference in length between the male and the female collared lizard when measured from the tip of the nose to the tip of the tail is approximately —
- F 3 cm
 - G 8 cm
 - H 12 cm
 - J 15 cm

- 11 If a single plant species is removed from a food web, then most likely —
- A an animal species will fill the unoccupied niche
 - B other plants will produce enough food for herbivores
 - C dependent herbivores will have to find new food sources
 - D carnivores will be unaffected by the loss

- 12 Dr. Ariel Lugo is an ecologist studying tropical rain-forest ecosystems in Puerto Rico for the U.S. Department of Agriculture. Which of these topics would Dr. Lugo probably be **LEAST** likely to investigate?
- F The content of soils exposed to different land-use practices
 - G The structure and function of forested wetlands
 - H The chemical cycling within tree plantations
 - J The anatomy and physiology of the red fire ant

- 13 Which process occurs in the chloroplasts of plant cells?
- A Cellular respiration
 - B Photosynthesis
 - C Reproduction
 - D Protein synthesis

- 14 According to the theory of natural selection, a species that lacks the variations necessary to adapt to a changing environment will most likely —
- F become dormant
 - G mutate
 - H become extinct
 - J fossilize

- 15 Which occupation would be **LEAST** concerned with the biomass production in a given county?
- A Optometry
 - B Agricultural science
 - C Ecology
 - D Soil science

- 16 Most fertilizer bags are labeled with three numbers that represent the nitrogen, phosphorus, and potassium (NPK) rating. Which of these sets of numbers indicates a fertilizer containing the greatest amount of nitrogen?
- F 5-10-5
 - G 7-7-7
 - H 8-10-12
 - J 10-15-8

- 17 Which of these questions would an ornithologist (a person who studies birds) ask an ethologist (a person who studies animal behavior) for help in answering?
- A Why do some birds avoid viceroy butterflies?
 - B How do birds metabolize sugars?
 - C Which adaptations enable a bird to fly?
 - D Which birds are best suited for cold environments?

- 18 Which of these symbols represents the normal karyotype of a human female?
- F XXY
 - G XX
 - H XO
 - J XXX

19 During the 1920s and 1930s, Lucy Braun (1889–1971) compared the flora growing in Ohio with flora that had grown in the same area 100 years earlier. Her research most likely added knowledge to the scientific field of —

- A virology
- B ecology
- C genetics
- D physiology

Nutrition Facts

Serving Size 3 slices (63g)

Servings per container 8

Amount Per Serving

Calories 460 Calories from Fat 20

% Daily Value*

Total Fat 2.5g 4%

Saturated Fat 1g 4%

Cholesterol 30mg 10%

Sodium 750mg 31%

Total Carbohydrates 100g 33%

Protein 10g

Not a source of dietary fiber, Vitamin A, Vitamin C, and Calcium.

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

	Calories	2,000
Total Fat	Less than	65g
Sat Fat	Less than	20g
Cholesterol	Less than	300mg
Sodium	Less than	2,400mg
Total Carbohydrates		300g
Fiber		25g

Calories per gram:

Fat 9 ● Carbohydrates 4 ● Protein 4

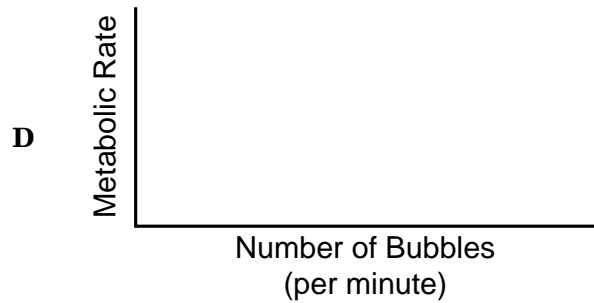
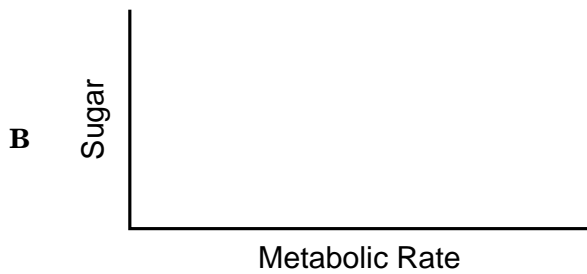
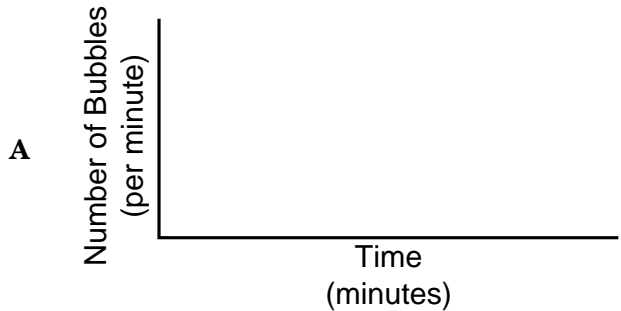
20 According to this label, one serving of this product would provide about 1/3 of the average daily value of —

- F fat
- G cholesterol
- H carbohydrates
- J protein

Yeast Metabolism of Sugar

Time (minutes)	Estimated Metabolic Rate (number of bubbles produced per minute)			
	Sucrose	Maltose	Fructose	Galactose
1	0	0	0	0
2	5	3	8	0
3	8	8	8	3
4	10	11	11	5
5	14	12	16	7

21 Which of these axes would be best to use to analyze these data?



- 22** In order for a species to survive, it must be able to —
- F** consume a wide variety of food
 - G** reproduce successfully
 - H** maintain a constant body temperature
 - J** destroy competing species

- 23** To which of these organisms is the gray wolf (*Canis lupus*) most closely related?
- A** *Calidris alba*
 - B** *Anarhichas lupus*
 - C** *Quercus rubra*
 - D** *Canis familiaris*

- 24** Campers can become infected by *Giardia*, a parasitic protozoan that causes intestinal dysfunction. *Giardia* is contracted through contaminated water. To avoid getting this parasite, campers should —
- F** disinfect water used for cooking and drinking
 - G** trap the parasite with a gauze filter
 - H** drink only water that is clear and free of suspended solids
 - J** avoid camping in wet areas

A Few Characteristics of Selected Species

Characteristic	Species			
	Mouse	Armadillo	Barn swallow	Chicken
Average Number of Offspring	10	4	4	12
Average Adult Mass (kg)	0.08	3.00	0.30	1.00
Body Covering	Hair	Plates and hair	Feathers	Feathers
Average Number of Predatory Species	15	3	3	20
Body Shading	Dark	Dark	Dark	Light

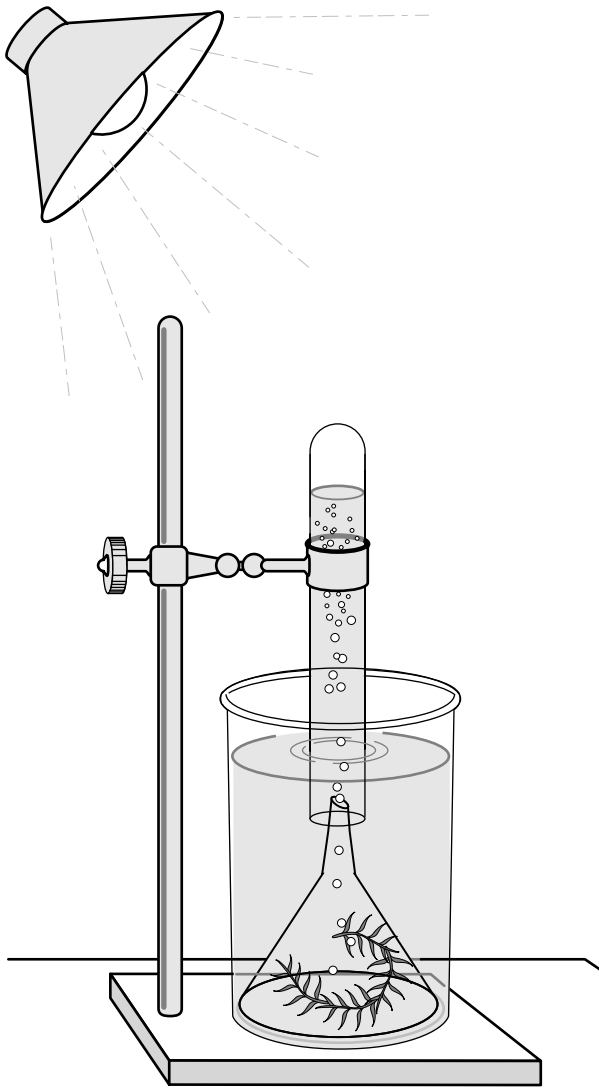
- 25 According to this chart, there seems to be a relationship between the average number of offspring per species and the species's —
- A average adult mass
 - B body covering
 - C average number of predatory species
 - D body shading

26 *Bufo woodhousei* and *Bufo cognatus* are two closely related species of toads. In areas where their ranges overlap, the toads will remain separate species if they —

- F** breed in different seasons
- G** have different color patterns
- H** eat different types of insects
- J** feed at different times of the day

27 The ozone layer protects Earth by absorbing —

- A** cosmic dust
- B** solar heat
- C** ultraviolet radiation
- D** white-light frequencies

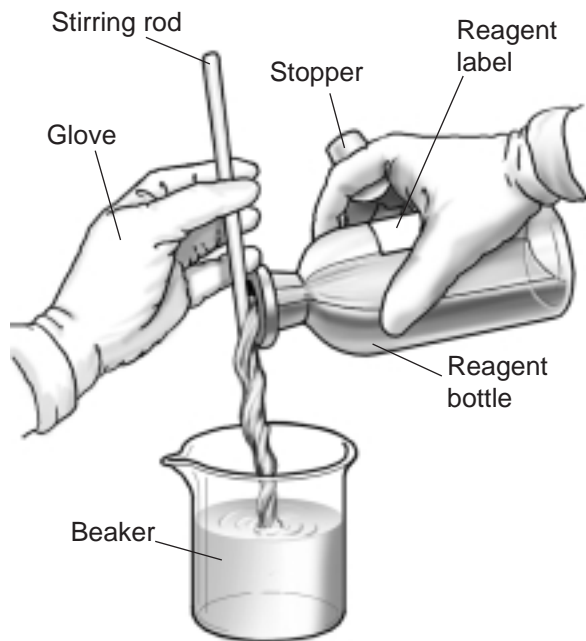


28 The apparatus above was used to collect the oxygen that was produced by *Elodea*. Which factor was most responsible for the production of oxygen by *Elodea*?

- F Sugar was present in the liquid.
- G The liquid contained enough oxygen for the plant to absorb.
- H The presence of light stimulated photosynthesis.
- J The plant contained a large number of mitochondria.

29 Which of these is highest in calories and lowest in vitamins and minerals?

- A 2 ounces of apple juice
- B 2 ounces of powdered sugar
- C 2 ounces of mashed potatoes
- D 2 ounces of mustard



30 The diagram shows a standard technique for dispensing liquid in a laboratory. What is the main reason that liquid should be dispensed from a reagent bottle in this manner?

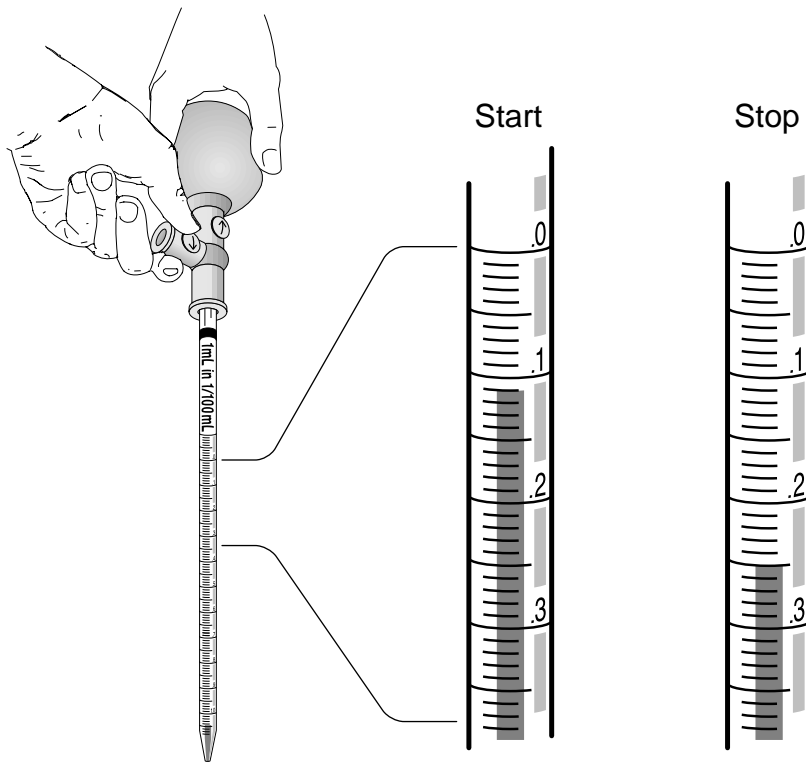
- F** The liquid is slowly heated by friction.
- G** The liquid's increased surface area absorbs more oxygen.
- H** The stirring rod keeps the liquid from splashing.
- J** The beaker causes liquids of different densities to form layers.

31 Anton van Leeuwenhoek is credited with developing the first microscope. Which theory of biology was a direct result of Leeuwenhoek's work?

- A** The theory of natural selection
- B** The Gaia theory
- C** The theory of independent assortment
- D** The cell theory

32 Which of these is a normal response to bright light?

- F** Enlargement of the cornea
- G** Increased blood flow to the retina
- H** Thickening of the lens
- J** Contraction of the pupil



- 33 The picture shows how a solution can be dispensed by a pipette. How much solution was released by this pipette?
- A 0.01 mL
 - B 0.12 mL
 - C 0.14 mL
 - D 0.23 mL

Punnett Square for Corn Height

		pollen grain	
		T	t
ovule ♀	T	TT ^①	Tt ^②
	t	Tt ^③	tt ^④

- 34 Square 4 of this Punnett square represents the genotype of the offspring if —
- F ovule T is fertilized by pollen grain T
 - G ovule t is fertilized by pollen grain T
 - H ovule T is fertilized by pollen grain t
 - J ovule t is fertilized by pollen grain t

- 35 The vector that transmits the malaria pathogen (*Plasmodium*) from one host to another is —
- A mosquitoes
 - B ticks
 - C lice
 - D houseflies

Storage Compatibility Chart

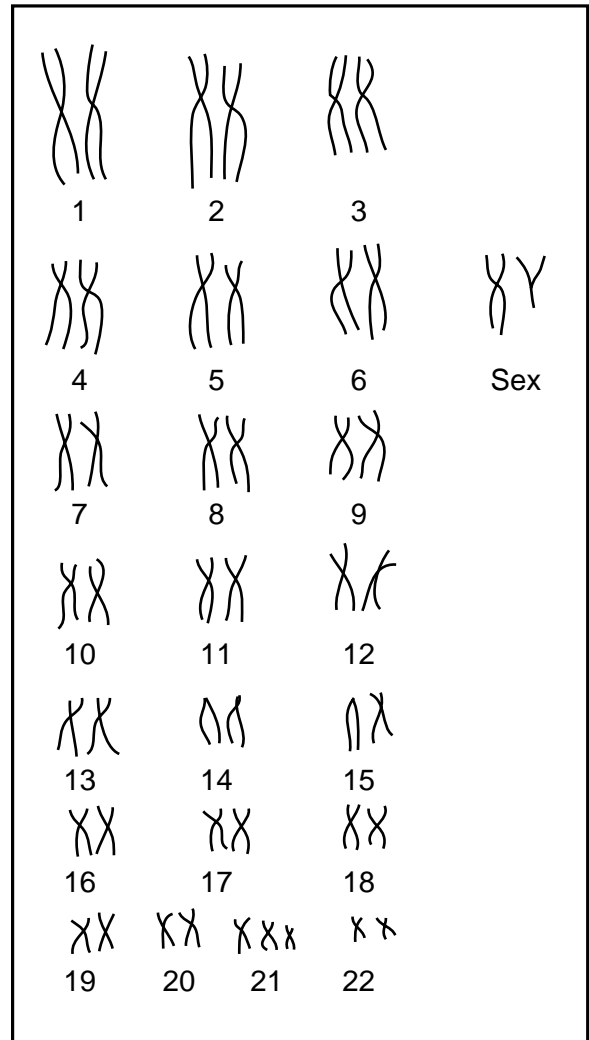
"X" indicates groups are incompatible and should NOT be stored together.

Group A	Group B			
	Amines	Ammonia	Caustics	Ketones
Vinyl acetate	X	X		
Nitric acid	X	X	X	X
Sulfuric acid	X	X	X	X
Organic acid	X	X	X	

- 36** The chart shows the storage compatibility of a few chemicals. According to this chart, which pair of chemicals can be safely stored together?

- F** Vinyl acetate and amines
- G** Nitric acid and caustics
- H** Sulfuric acid and ammonia
- J** Organic acid and ketones

Unusual Human Karyotype



- 37** This human karyotype is unusual because chromosome set —
- A** 5 has chromosomes of different shapes
 - B** 10 is missing genetic material
 - C** 14 has enlarged centromeres
 - D** 21 has extra genetic material

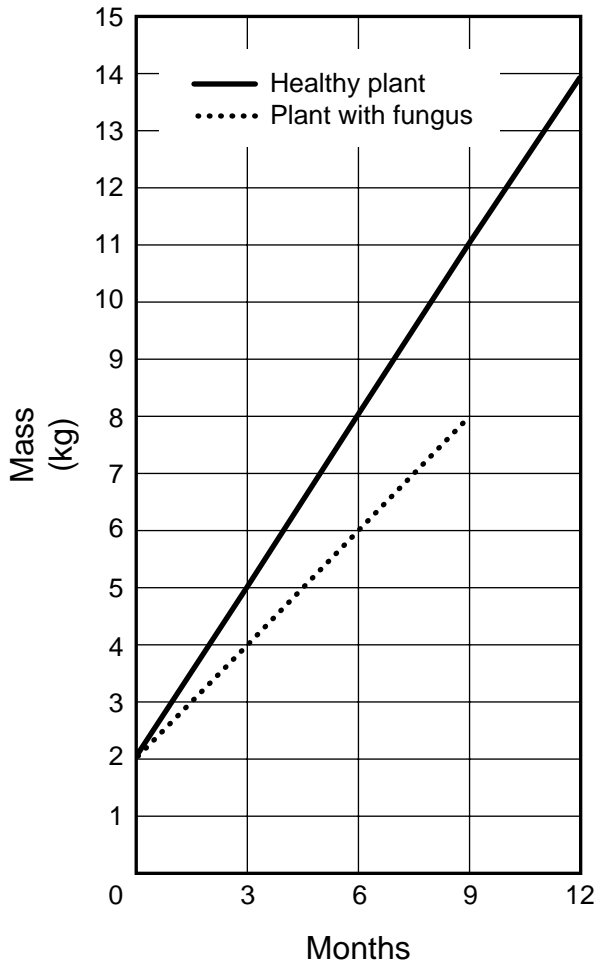
38 Plants that can tolerate great extremes in environmental temperatures are most often found living in —

- F** deserts
- G** coastal pine forests
- H** prairies
- J** island hardwood forests

39 Which molecule resembles the shape of a twisted ladder?

- A** DNA
- B** Sugar
- C** ATP
- D** Lipid

How a Fungus Affects Plant Growth



40 The graph shows the growth curves of a healthy plant and a plant infected with a fungus. If this trend continues, what will be the mass of the plant infected with the fungus at 12 months?

- F 10 kg
- G 11 kg
- H 12 kg
- J 13 kg



41 According to this label, people should **NOT** take this pain reliever if they —

- A suffer from cold-related headaches
- B are allergic to aspirin
- C have high blood pressure
- D experience mild heartburn

Change in Mass of Estivating Frogs

Week	Average Mass After Estivation (g)
0	450
3	442
6	434
9	426
12	???

42 The chart shows the average change in mass of some frogs during a period of estivation. If this trend continues, what will be the average mass of the frogs by the twelfth week of estivation?

- F** 424 g
- G** 422 g
- H** 420 g
- J** 418 g

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS
ON THE ANSWER DOCUMENT.



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