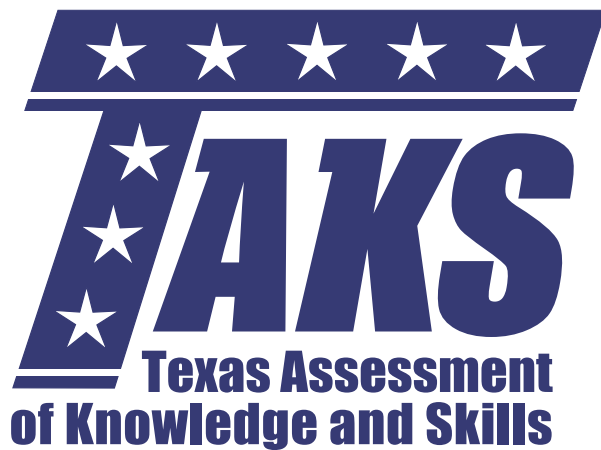


STUDENT NAME _____



**GRADE 8
SCIENCE**

Administered April 2009

SCIENCE

FORMULA CHART

Work = force \times distance

$$W = Fd$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$s = \frac{d}{t}$$

Force = mass \times acceleration

$$F = ma$$

Weight = mass \times acceleration due to gravity

$$\text{Weight} = mg$$

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{m}{v}$$

Constants/Conversions

$$g = \text{acceleration due to gravity} = 9.8 \frac{\text{m}}{\text{s}^2}$$

$$\text{speed of light} = 3 \times 10^8 \frac{\text{m}}{\text{s}}$$

$$\text{speed of sound} = 343 \frac{\text{m}}{\text{s}} \text{ at sea level and } 20^\circ\text{C}$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

Metric ruler can be found on the separate formula chart.

Periodic Table of the Elements

Atomic number — 14

Symbol — **Si**

Atomic mass — 28.086

Silicon — Name

Group		Atomic mass																Silicon		Name		18	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16								

DIRECTIONS

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

SAMPLE A

Which of the following would be best to use to measure the mass of a mineral sample?

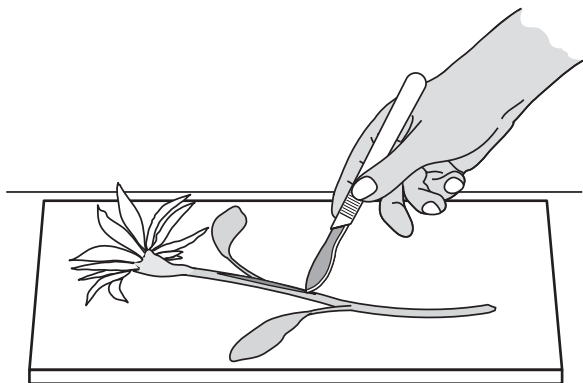
- A** Meterstick
- B** Graduated cylinder
- C** Balance
- D** Hand lens

Water Temperature

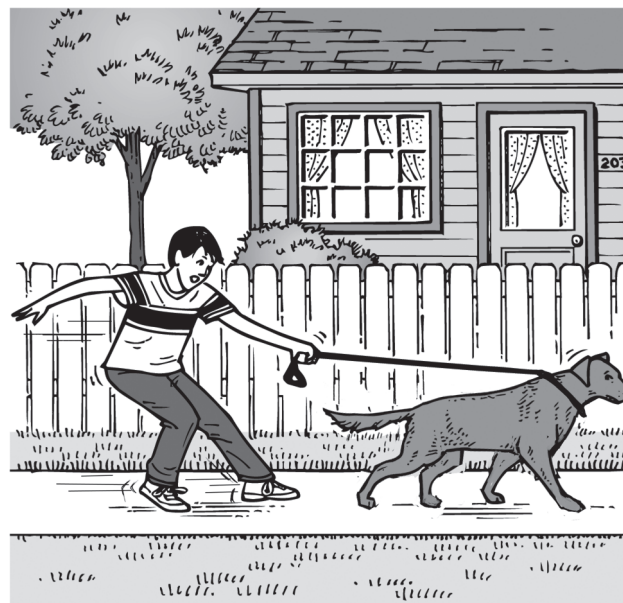
Time (min)	Temperature (°C)
1	10
2	15
3	20
4	25
5	30


A student heats a water sample and records its temperature at the end of every minute, as shown above. If this trend continues, what temperature in degrees Celsius will the student observe at the end of the eighth minute? Record and bubble in your answer as a whole number in degrees Celsius on the answer document.



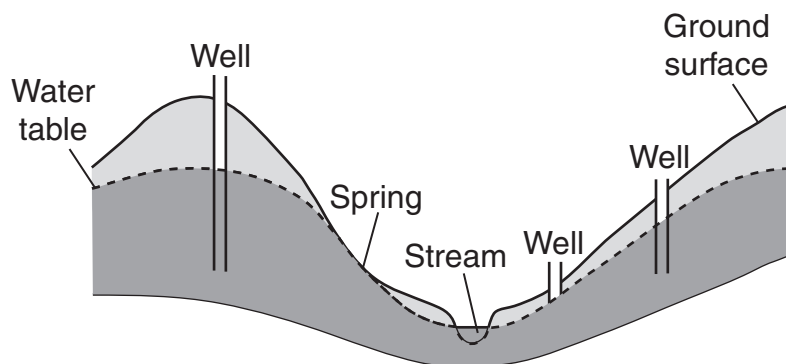


- 1 During a dissection activity, a student accidentally knocks a scalpel off the lab table. Which of these actions should the student take?
- A Use both hands to protect the eyes from the scalpel
 - B Try to catch the scalpel before it reaches the floor
 - C Pick up the scalpel, avoiding the sharp edge
 - D Get a new scalpel, leaving the dropped one
- 2 A drain cleaner consists of sodium hydroxide and aluminum. When the drain cleaner is added to water, bubbles of hydrogen are produced, and the solution becomes very hot. Which of these best describes what happens to form the bubbles when the cleaner is added to water?
- F A chemical reaction
 - G Condensation
 - H A physical change
 - J Evaporation



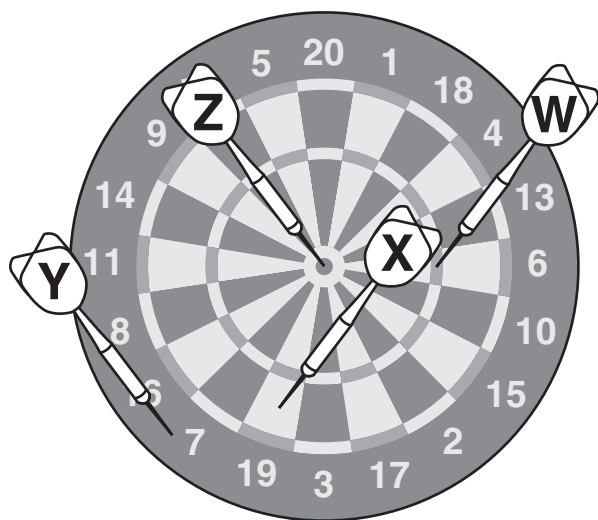

 Direction of movement

- 3 In the picture above, a boy is trying to pull a dog on a leash, but the dog and the boy are moving in the same direction. Which of the following best describes the forces in this situation?
- A The forces are balanced, and the net force is zero.
 - B The forces are unbalanced, and the boy's force is greater.
 - C The forces are unbalanced, and the dog's force is greater.
 - D The forces are balanced, and the dog is stronger than the boy.



- 4 In the diagram shown above, what are two main factors that affect where groundwater becomes surface water?

F The number of wells and the temperature of the water
G The height of the water table and the height of the ground surface
H The force of the water and pressure from the atmosphere
J The direction of the wind and the direction of the stream's flow

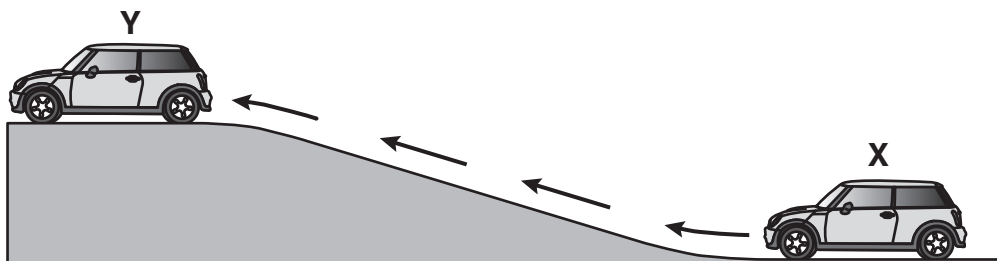


- 5 If the dartboard above is used to model an atom, which dart indicates where the protons and neutrons are located?

A Dart W
B Dart X
C Dart Y
D Dart Z

Spider	Type of Spider	Color	Length (cm)
Cobweb spider	Web spider	Brown	0.9
Wolf spider	Hunting spider	Brown	3.5
Jumping spider	Hunting spider	Black with orange or red spots	1.9
Yellow garden spider	Web spider	Yellow and black	2.5

- 6 A student studying spiders creates the table shown above. What is the best conclusion the student can make based on this information?
- F Web spiders are larger than hunting spiders.
 - G Wolf spiders are the largest of these spiders.
 - H Hunting spiders usually have warning color patterns.
 - J Jumping spiders are faster than yellow garden spiders.



- 7 A gasoline-powered vehicle goes up a hill from point X to point Y. What energy transformation must occur in the car's engine?
- A Chemical energy into mechanical energy
 - B Electrical energy into chemical energy
 - C Heat energy into chemical energy
 - D Mechanical energy into nuclear energy

Birds Living in Plant Layers in a Texas Ecosystem

Location of Layer	Birds Found Within Layer
Above tree level	Vultures, hawks, swallows, swifts
Treetops	Owls, woodpeckers, thrushes, warblers
Middle of trees	Jays, chickadees, vireos
Shrubs, small trees, and plants	Mockingbirds, cardinals, wrens, doves

Source: Texas Parks and Wildlife Department

- 8 The table above shows where some birds in a Texas ecosystem are located within the layers of plants in their environment. These layers begin at the ground and end in the area above the treetops. Which of these would most likely occur if a wildfire destroyed all the plants in the lowest level of this ecosystem?
- F** Vireos would begin to nest on the ground.
 - G** Doves would have to move to a different area to find food.
 - H** Hawks would begin to hunt for animals in the middle level.
 - J** Cardinals would move to above tree level and begin competing with hawks.

- 9 Which of these would most likely improve the air quality in large Texas cities?
- A** Limiting the number of cars on the roads
 - B** Switching to wood stoves for home heating
 - C** Requiring large vehicles to use diesel fuel
 - D** Maintaining filters in large buildings

Temperature (°C)	Grams of Substance That Dissolve in 100 Milliliters of Water			
	Substance W	Substance X	Substance Y	Substance Z
10	5.0	22.0	70.0	37.0
20	8.0	32.0	52.0	37.5
30	10.0	45.0	42.0	38.0
40	15.0	60.0	35.0	38.5
50	20.0	80.0	28.0	39.0
60	26.0	100.0	22.0	39.5
70	33.0	130.0	18.0	40.0

- 10** Some students hypothesize that heating a mixture of any substance and water will always increase the amount of the substance that will dissolve in the water. The table shows results of an investigation testing this hypothesis. The results for which of the substances tested weaken this hypothesis?

- F** Substance W
- G** Substance X
- H** Substance Y
- J** Substance Z

11 When a butterfly emerges from its chrysalis, its wings are crumpled. In order to expand its wings, the butterfly hangs upside down, causing fluid to be pumped into the veins of its wings. This pumping most likely expands the wings by —

- A** increasing the pressure inside the wings
- B** decreasing the density of the wings
- C** increasing the temperature inside the wings
- D** decreasing the mass of the wings

12 Which process below uses carbon dioxide and the sun's radiant energy to produce chemical energy?

- F** Evaporation
- G** Photosynthesis
- H** Respiration
- J** Decomposition

Use the information below and your knowledge of science to answer questions 13–15.

Ancient Trees

The climate in central California's White Mountains is cold and dry. Clouds traveling east tend to lose their moisture over the Sierra Nevada, a large mountain range just west of the White Mountains. For this reason, the White Mountains receive less than 30 cm of precipitation per year. Most of this precipitation falls as snow.

The White Mountains are the home of the oldest living trees on Earth, bristlecone pines that can survive thousands of years. Bristlecone pines have several strategies for surviving in this dry environment. These trees often grow in patches of dolomite soil. Dolomite is a type of limestone that holds more moisture than the surrounding sandstone. The light color of the dolomite soil reflects sunlight, helping keep the trees' roots cool and conserving the limited moisture. Needles on these trees can live 20 to 30 years. They provide a stable source of photosynthesis for many years.

These ancient trees teach scientists about Earth's climate history. Each spring and summer the trees grow a layer of new cells between the living wood and the bark. The trees grow more in a wet year than in a dry year. Because these trees live a long time, they can be used as a record of climate change over thousands of years.

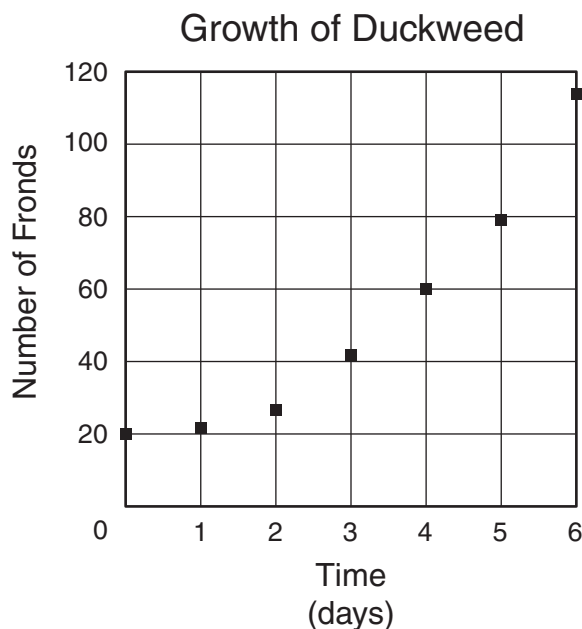


© Ken Bablone/Stockphoto # 773258

- 13** A bristlecone pine in the White Mountains usually adds a new ring when which of the following occurs?
- A** Earth's daily rotation is complete.
 - B** The full moon causes a monthly high tide.
 - C** The new moon is visible from Earth's surface.
 - D** Earth's Northern Hemisphere is tilted toward the sun.

- 14** How could tree rings from bristlecone pines support the theory that some areas have had periods of drought and flooding for hundreds of years?
- F** By providing direct evidence of the most recent flood
 - G** By showing how humans have affected Earth's climate patterns
 - H** By providing evidence of relative precipitation levels
 - J** By showing how precipitation levels and temperature changes are related

- 15** The dolomite soil keeps the roots of the bristlecone pines cool by —
- A** absorbing chemical energy from the roots
 - B** transforming heat energy into chemical energy
 - C** transferring thermal energy from the soil to the roots
 - D** reflecting the heat energy from the soil around the roots



Source: John W. Cross

- 16** Duckweed is a plant that grows on the surface of ponds. Duckweed has leaf-like structures called fronds. A student conducts a lab investigation on duckweed growth and creates the graph shown above. Which of these is a valid conclusion based on the data from this investigation?

F The number of fronds more than doubled between Days 2 and 4.

G The number of fronds increased quickly because the plant has a short life span.

H The number of fronds is related to the number of hours of sunlight each day.

J The number of fronds increased at a constant rate between Days 1 and 5.

- 17** A cook touches a hot stove and quickly moves his hand away. What are the two primary body systems that work together to produce this response?

A Integumentary and endocrine systems

B Muscular and respiratory systems

C Nervous and muscular systems

D Skeletal and nervous systems

- 18** A recent study concluded that about 90% of all large predatory fish such as tuna have disappeared from the world's oceans in the past 50 years. Which of these is most likely the direct cause of this loss?

F Urban development near the coast

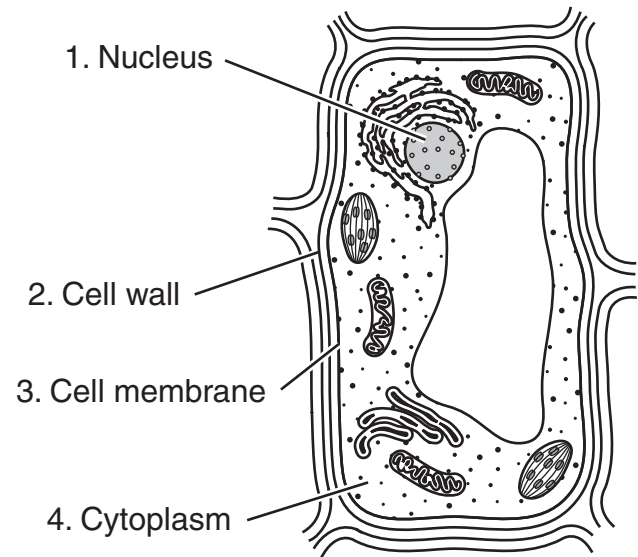
G Commercial harvesting from the ocean

H Climate change on Earth

J Acid precipitation over the oceans

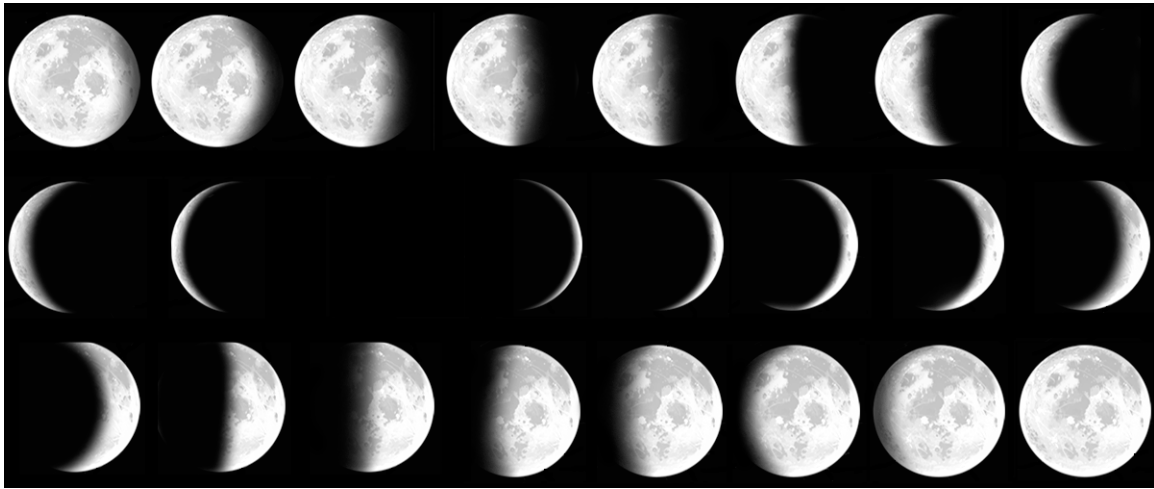
19 In a healthy forest, dead trees and limbs fall to the ground and decompose. Which of these statements best describes why decomposition is important to a forest ecosystem?

- A** Nutrients are released when wood is broken down.
- B** Worms produce oxygen used by other organisms.
- C** Dead trees provide nest sites for many different species of birds.
- D** Water is stored in dead trees and limbs.

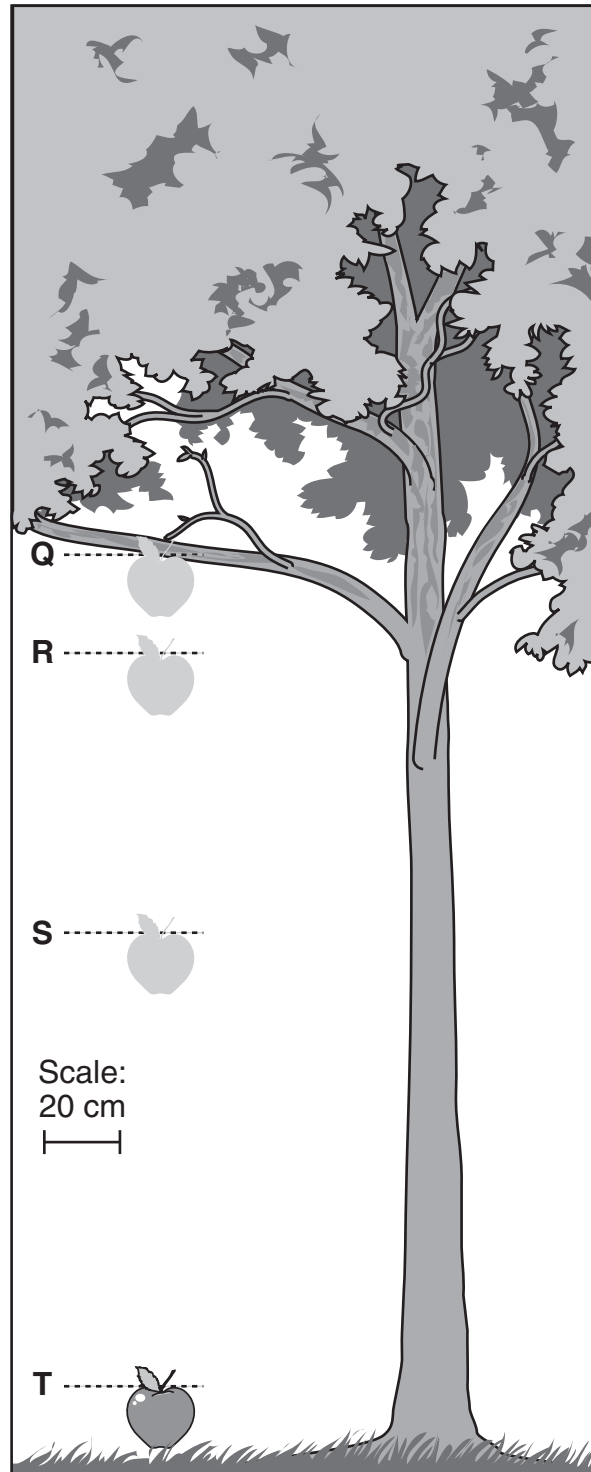


20 Which numbered part of the plant cell shown above primarily provides support for the plant's structure?

- F** 1
- G** 2
- H** 3
- J** 4



- 21 The series of pictures shows a view of the moon from the same position on Earth on different days of one month. The pictures show that on certain nights the moon —
- A moves away from Earth
 - B receives less light from Earth
 - C is unlit as viewed from Earth
 - D makes half a turn around Earth



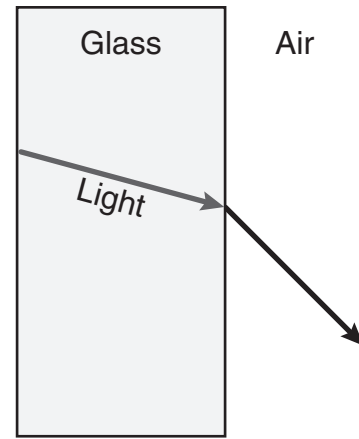
- 22** In the picture, 1 centimeter equals an actual distance of 20 centimeters. According to this information, how far in centimeters did the apple actually fall from Position S to Position T? Record and bubble in your answer in centimeters on the answer document.

23 Two students make hot chocolate. One student pours the hot chocolate into a foam cup. The other student pours the hot chocolate into a metal cup. The metal cup becomes too hot to touch, but the foam cup can be held comfortably. The best explanation for this difference in temperature is that the foam cup —

- A** heats up much faster than the metal cup
- B** has a higher specific heat than the metal cup
- C** is a better conductor of heat than the metal cup
- D** has a specific heat that is similar to that of the metal cup

24 As a river enters a larger body of water, sediments are deposited over a wide area. Which of these landforms is likely to be formed at the site of deposition?

- F** Cave
- G** Mountain
- H** Delta
- J** Valley



25 Which of these best describes what happens to the light ray in the diagram?

- A** Reflection
- B** Absorption
- C** Attraction
- D** Refraction

26 The growth of which of the following usually occurs first in primary succession on a bare rock?

- F** Lichens
- G** Grasses
- H** Trees
- J** Shrubs

27 Which of these best explains why the oceans have a great impact on the weather over the continents?

- A** Ocean waves move more easily than continental rock.
- B** The oceans contain a wider variety of organisms than the continents.
- C** The oceans store and transfer more heat than the continents.
- D** Ocean water contains more salt than most continental lake water.

New Herbs

Made from natural herbs, this product is absolutely the best cold remedy on the market.

We have tested this product on more than 5000 patients with colds and have had a 90% success rate. Patients' family doctors noted that symptoms of the common cold disappeared in three weeks.

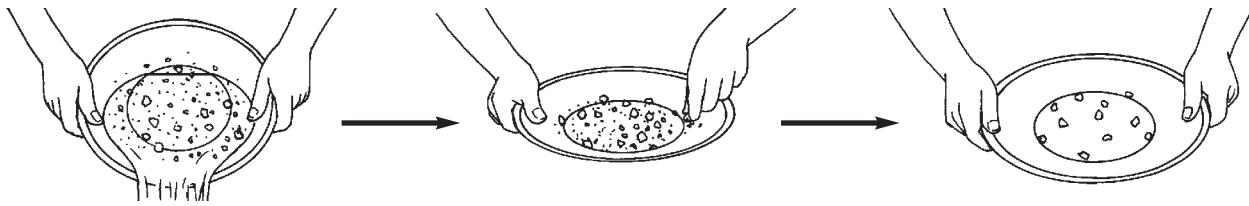
The herbal substances are easily absorbed into the bloodstream with no known side effects.

28 The advertisement above is for an herbal cold remedy. Which of these claims should immediately alert a buyer that New Herbs might not be as effective as claimed?

- F** The tests involved more than 5000 cold patients.
- G** Family doctors were consulted during the tests.
- H** Cold symptoms disappeared in three weeks.
- J** The medicine is made from natural herbs.

29 Some students measure the mass of a small pile of leaves before and after the leaves decompose. Each time the students measure the mass, they place a container with the decomposing leaves on a balance. Before recording the mass of the leaves, the students must do which of the following?

- A** Subtract the mass of the container
- B** Add leaves from other plants to the container
- C** Allow the leaves to settle in the container for a few days
- D** Use a metric ruler to measure the volume of the container



30 People pan for gold by scooping material from a streambed and shaking it in a pan as shown above. The gold nuggets in the pan can easily be separated from the sand and gravel because of their greater density. The material scooped from the streambed is an example of —

- F** a solution
- G** a mixture
- H** an acid
- J** an element

31 A group of students found metamorphic rocks near a campsite. The presence of metamorphic rocks is most likely evidence of —

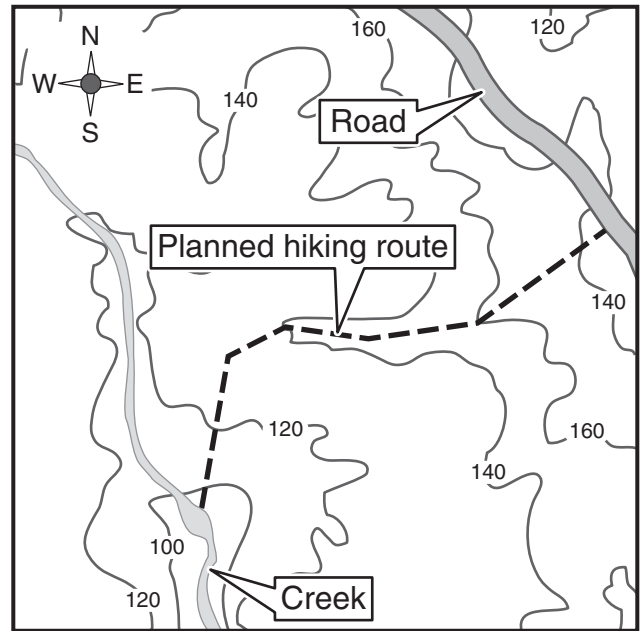
- A** dinosaur activity
- B** sediment deposition
- C** high pressure
- D** wind-borne sand

32 Which of the following traits is most influenced by the environment?

- F** Body weight
- G** Eye color
- H** Blood type
- J** Color blindness

33 Rhea is a moon of Saturn. Which of these facts about Rhea best indicates that it does not have a water cycle in which water changes state?

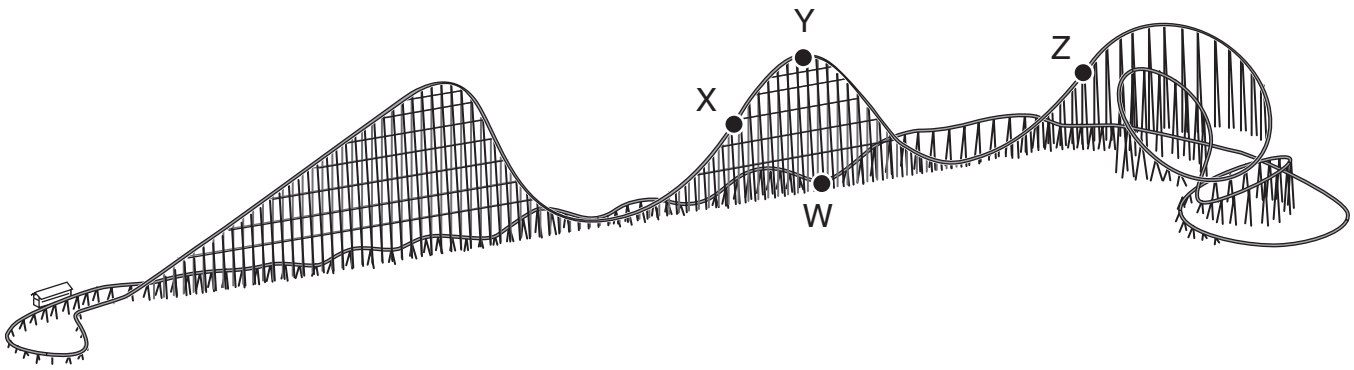
- A** Its radius is 765 km.
- B** Its density is about 1.3 kg/m^3 .
- C** Its period of rotation is about 4.5 Earth days.
- D** Its temperature is between -174°C and -220°C .



34 Some students use this map to plan a hike from a road to a creek in an unfamiliar area. Which of these additional pieces of information would most help the students plan their hike?

- F** The scale used on the map
- G** The type of bedrock in the area
- H** The length of the creek on the map
- J** The location of the nearest large city

Steel Dragon 2000

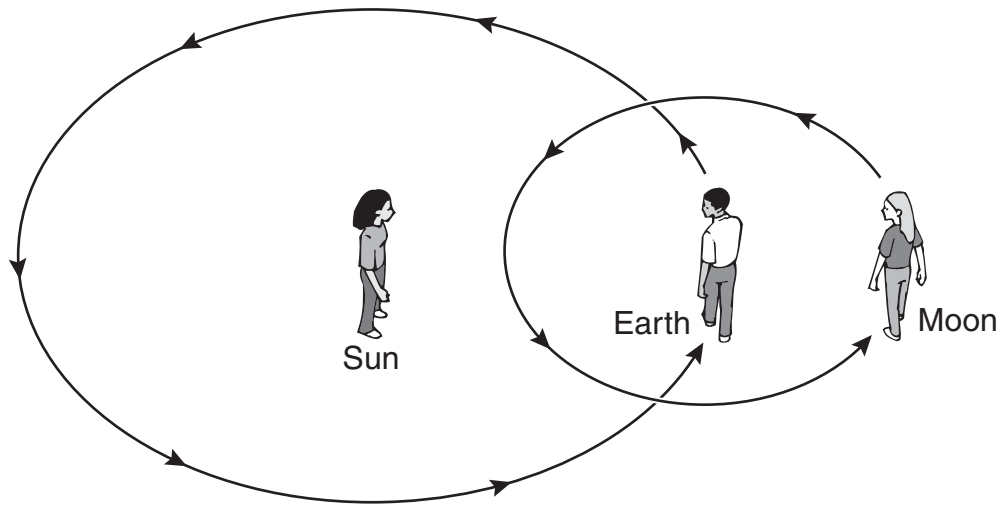


35 The drawing above shows a diagram of the Steel Dragon 2000, a roller coaster in Japan. It is one of the longest roller coasters in the world. At which point on the roller coaster would a rider have the greatest gravitational potential energy?

- A** W
- B** X
- C** Y
- D** Z

36 How many elements are in the compound $\text{Mg}(\text{OH})_2$?

- F** 2
- G** 3
- H** 4
- J** 5



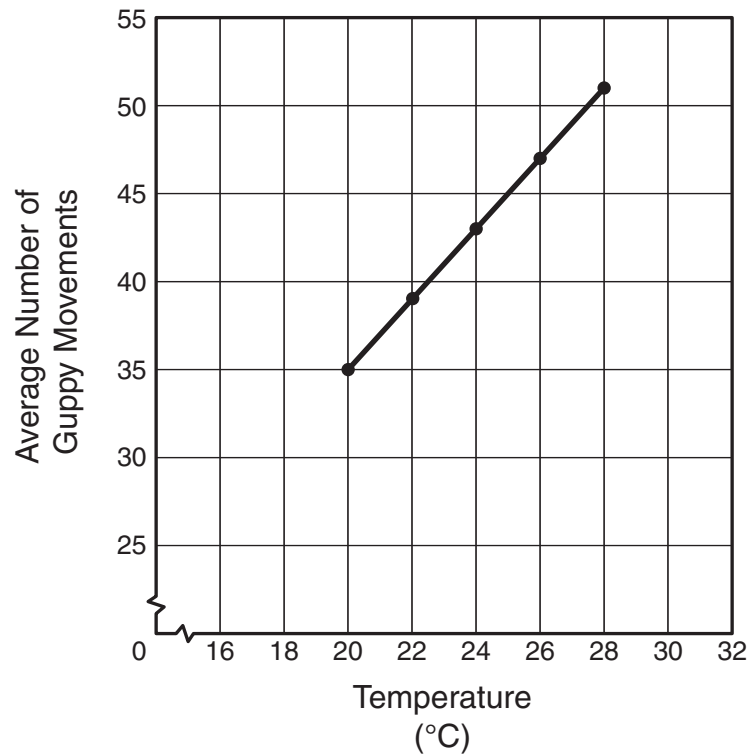
- 37** Three students use their bodies to show how the sun, the moon, and Earth are aligned during the phases of the moon. What is one limitation of this model?
- A** It cannot show the relative motion of the three objects.
 - B** It cannot be safely used to show gaseous objects such as the sun.
 - C** It cannot show how the sun's light affects the moon's appearance.
 - D** It cannot be used to show the direction of Earth's revolution.

- 38** At certain times of the year, meteor showers can be observed from Earth. Why are these objects from space usually harmless?
- F** They are always microscopic.
 - G** They are closer to the sun than to Earth.
 - H** They are made of soft, spongy materials.
 - J** They burn up high in Earth's atmosphere.

- 39** Squirrels in cold climates gather and store food for winter. The squirrels sometimes bury nuts and then do not return for them. These nuts can grow to become trees. This chain of events is an example of —
- A** predation
 - B** seed distribution
 - C** competition
 - D** seed fossilization

- 40** Which of these resources will most likely be depleted first?
- F** Wind
 - G** Solar energy
 - H** Fossil fuels
 - J** Water

Effect of Temperature on Guppy Movements



- 41 A student is studying guppies, a type of fish. The student learns that common guppies normally live in water with temperatures from 22°C to 30°C. The student counts the number of movements in 1 minute at several different temperatures. According to the student's graph, about how many movements on average would the guppies most likely make at 30°C?

- A 51
- B 55
- C 58
- D 60

- 42** The presence of hair on the middle section of the fingers (H) is a dominant trait in humans. Two parents with this dominant trait have children. Some of the children have this trait, and some children do not. Which of the following Punnett squares shows the genotypes of the parents and children in this family?

F

	H	h
H	HH	Hh
h	Hh	hh

H

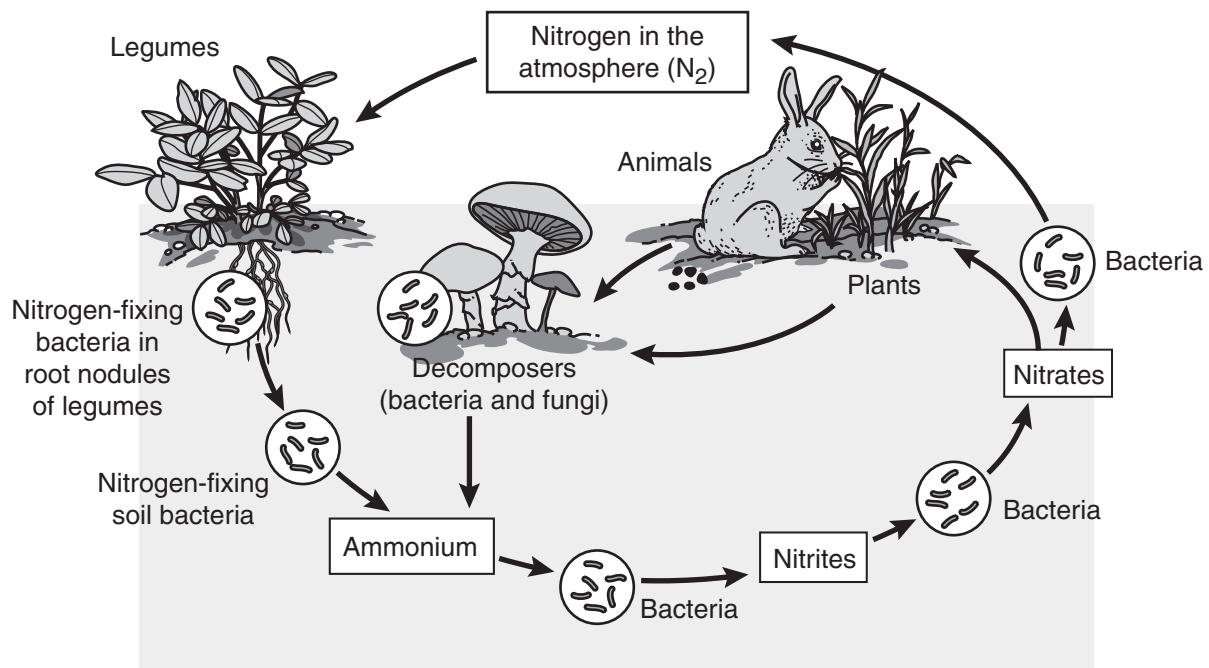
	H	H
H	HH	HH
H	HH	HH

G

	h	h
h	hh	hh
h	hh	hh

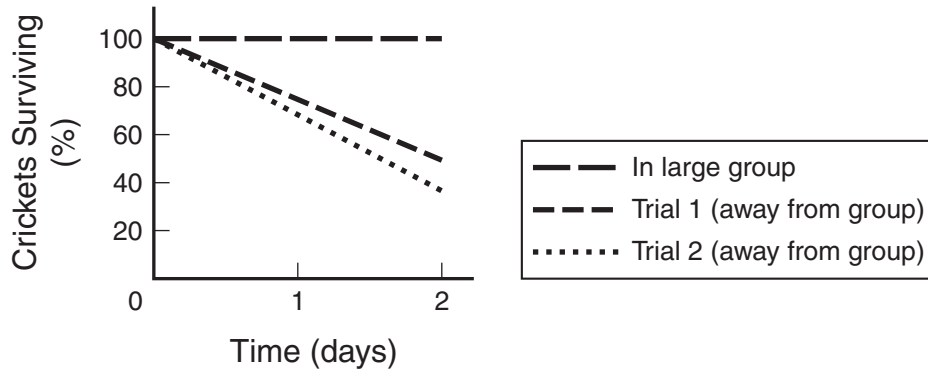
J

	H	H
H	HH	HH
h	Hh	Hh



- 43 Planting additional legumes in the area shown above would most likely lead to which of the following?
- A A decrease in the activity of bacteria
 - B A decrease in the number of animals in the area
 - C An increase in the activity of nitrogen-fixing bacteria
 - D An increase in the number of species that can fix nitrogen

Mormon Cricket Survival



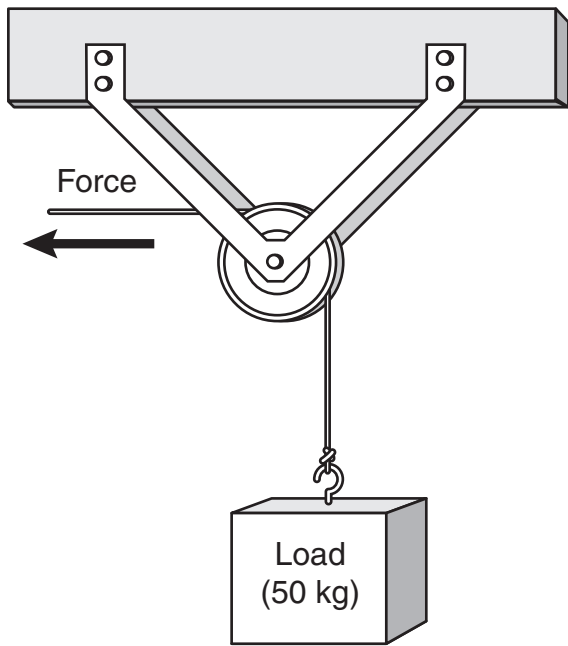
Source: Macmillan Publishers Ltd: *Nature*, Vol. 433

- 44 Flightless Mormon crickets often move in large groups. The graph shows the survival rate of crickets moving in large groups and of some crickets that were moved away from the groups. Which of these inferences about Mormon crickets is most likely accurate?

F Mormon crickets within a group survive only two days.
G Mormon crickets away from a group successfully reproduce.
H Mormon crickets away from a group return to it for protection.
J Mormon crickets within a group are less likely to be eaten by predators.

- 45 When people exercise, they often feel thirsty and begin to sweat. It is important for people to feel thirsty when exercising because it makes them realize that they should —

A take a break
B consume liquids
C slow their breathing
D stop to eat something

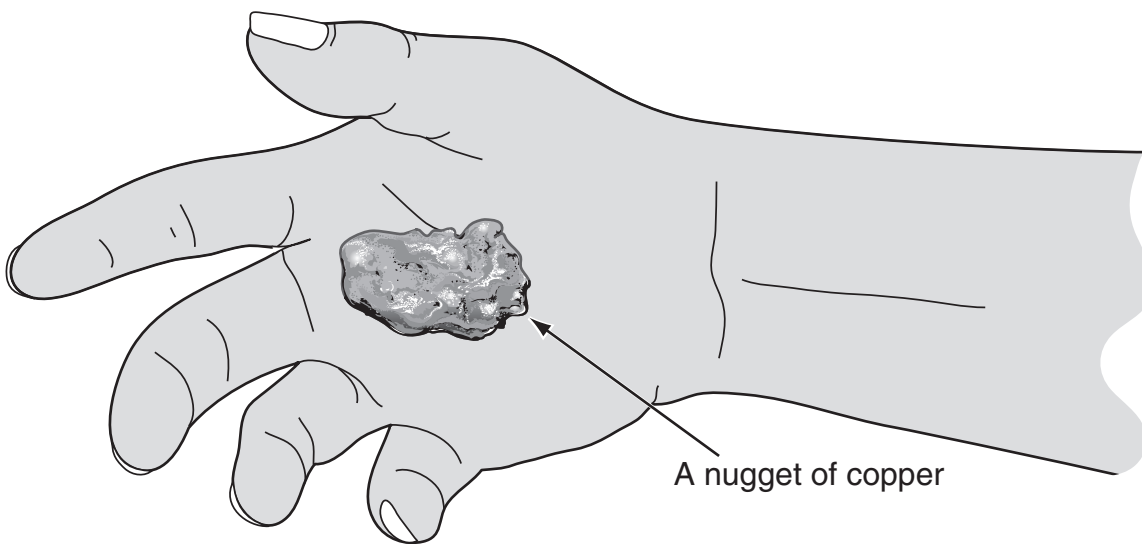


- 46 The picture above shows a pulley being used to move a load. In which direction will the load move if the force applied to the rope is greater than the force of gravity on the load?

F Right
G Left
H Up
J Down

- 47 According to the periodic table, all of the following are metals except —

A sodium
B zinc
C fluorine
D calcium



Nugget Sample	Nugget 1	Nugget 2
Mass of Nugget (g)	27.95	18.56
Volume of Nugget (cm ³)	3.13	2.09
Density of Nugget (g/cm ³)	8.93	8.88
Average Density of Copper (g/cm ³)	8.91	

- 48 A field geologist collected data for two nuggets of copper and determined their density. Which two pieces of equipment did the geologist most likely use to determine the density of the copper nuggets?

F Balance and graduated cylinder
G Metric ruler and beaker
H Thermometer and Erlenmeyer flask
J Specimen bottle and tweezers

- 49** The petals of flowers often are brightly colored. These petals provide a benefit for the plant because they —
- A** prevent insects from taking pollen to other flowers
 - B** hide the plant from predators that would eat its flowers
 - C** protect the leaves from injury by birds and insects
 - D** attract insects that can carry the pollen needed for plant reproduction

- 50** A shoe company claims in an advertisement that its athletic shoes are “for winners only.” The shoe company hopes that people who read the ad will infer which of the following about the shoes?
- F** They are designed for people who play only one sport.
 - G** They are more expensive than other brands of shoes.
 - H** They are likely to improve the athletic ability of people who wear them.
 - J** They come in colors that are different from those of other athletic shoes.

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



