

2000 PROVINCIAL ACHIEVEMENT TEST

Some questions and solutions are common in both the 1999 and 2000 Provincial Achievement Tests. The common questions and solutions from the 1999 Provincial Achievement Test are not repeated as part of the 2000 Provincial Achievement Test for Grade 6 Science. Consequently, the number of questions and solutions appearing for the 2000 Provincial Achievement Test are fewer than the original exam.

Use the following information to answer question 1.

You have won first place in an Alberta-wide science fair competition. Your prize is a two-week trip to Sandbar Camp, which is located in Northern Alberta. You will fly there in a small plane. There, you hope to have fun while participating in camp activities and learning more about science at the Sandbar Science Centre.



Use the following information to answer question 2.

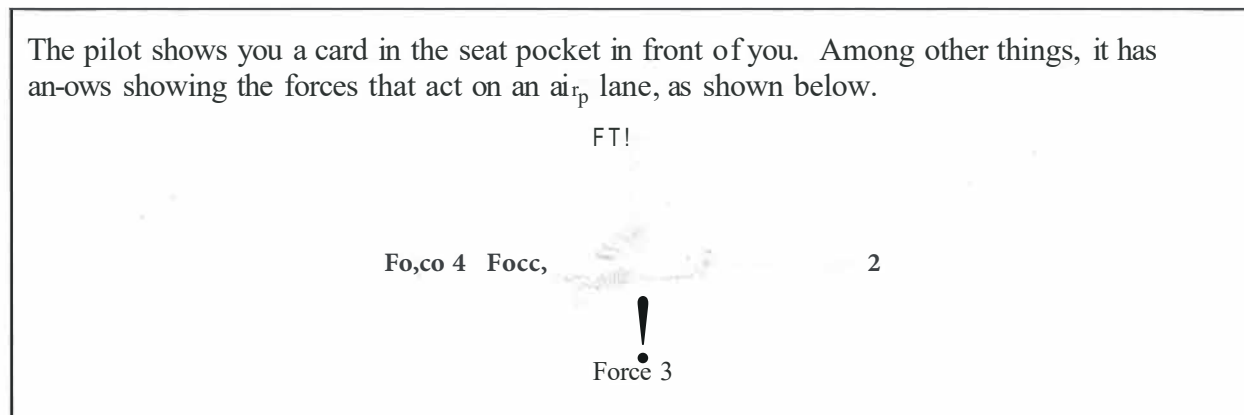
Upon your arrival at the ai_rp_ort, you are introduced to the pilot and board the aircraft for your flight to the camp.



1. As your ai_rp_lane speeds down the runway, you recall that lift occurs when the
 - A. force of drag is equal to the force of thrust
 - B. force of gravity is greater than the force of thrust
 - C. air above the wings is moving faster than the air below the wings
 - D. air above the wings is moving at the same speed as the air below the wings

Use the following information to answer question 3

The pilot shows you a card in the seat pocket in front of you. Among other things, it has an-ows showing the forces that act on an ai_rp lane, as shown below.



2. In which of the following boxes are the forces acting on the ai_rp lane identified?

- A.** Force 1-Thrust
Force 2-Gravity
Force 3-Lift
Force 4-Drag

- B.** Force 1-Lift
Force 2-Thrust
Force 3-Gravity
Force 4-Drag

- C.** Force 1-Drag
Force 2-Lift
Force 3-Thrust
Force 4-Gravity

- D.** Force 1-Lift
Force 2-Drag
Force 3-Gravity
Force 4-Thrust

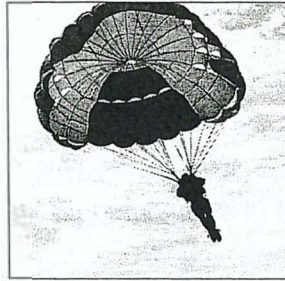
3. The pilot tells you that the principle used to explain how the shape of an airplane's wings creates lift is named after

- A. Orville Wright
B. Albert Einstein
C. Isaac Newton
D. Daniel Bernoulli

4. The pilot points to a parachutist far below the airplane. Which of the following statements is a correct statement about parachutes?
- A. The three forces that act on a parachute are gravity, lift, and drag.
 - B. Parachutes create air resistance so that they fall slowly to Earth.
 - C. Round parachutes are easier to control than are rectangular parachutes.
 - D. The shorter the suspension lines, the slower the parachute will fall.

Use the following information to answer question 6

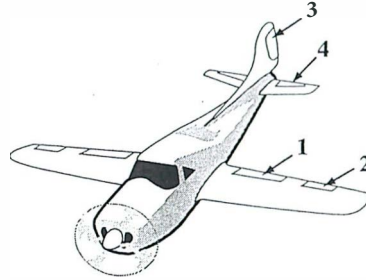
The pilot tells you that the design of a parachute affects how rapidly it descends. She explains that if you did an experiment with two parachutes that were the same size and shape but had different-sized holes, there would be a difference in how fast they fall.



5. In the experiment described by the pilot, the manipulated or independent variable would be
- A. size of the parachute
 - B. height from which the parachute falls
 - C. size of the hole at the top of the parachute
 - D. time it takes the parachute to reach the ground
6. Just before arriving at Sandbar Camp, you notice a ploughed field of dark soil. You know the warmed air over the field will rise because
- A. it is less dense than the surrounding air
 - B. it is more dense than the surrounding air
 - C. the high-altitude cold air is more stable than the lower air
 - D. the high-altitude warm air is less stable than the lower air

Use the following information to answer question 8

As you approach the camp, the airplane begins its descent.

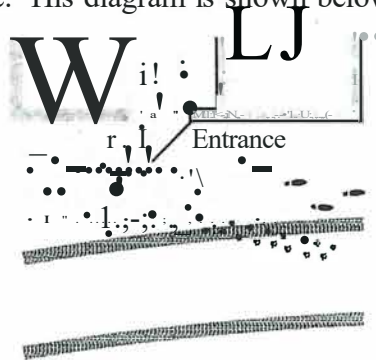


7. The part of the airplane that causes it to descend is labelled
- | | |
|------|------|
| A. 1 | B. 2 |
| C. 3 | D. 4 |

When you arrive at Sandbar Camp, an RCMP officer is inspecting the camp office. He explains that there has been a break-in and that he is conducting an investigation.

Use the following information to answer question 9

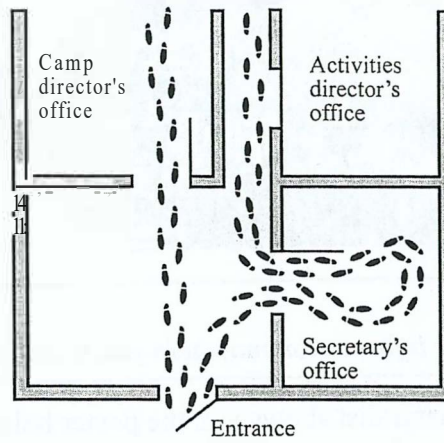
It had rained on the night of the break-in, so the officer made a detailed diagram of all of the tracks left in the mud at the scene. His diagram is shown below.



8. Using the information above, the officer inferred that the thief
- | | |
|---|---------------------------------------|
| A. was let in the building by a partner | B. committed the crime during the day |
| C. was seen by a person walking a dog | D. arrived after it had rained |

Use the following information to answer question 10.

The officer also made a diagram of some of the muddy footprints left inside the building.



9. By looking at the officer's diagram, you infer that the thief
- A. stayed in the building only a few seconds
 - B. triggered an alarm in the secretary's office
 - C. ran out of the building carrying something heavy
 - D. found a second door leading to the camp director's office

Later that evening, the officer informs you that he has identified and arrested the person who he believes broke into the camp office.

The next morning, you and some of the other campers go on a nature walk with the camp naturalist.



The following information may help you to answer question 11.

Before you leave, the camp naturalist shows you the poster below and explains that all living things play an important role in the environment.

The Nutrient Cycle

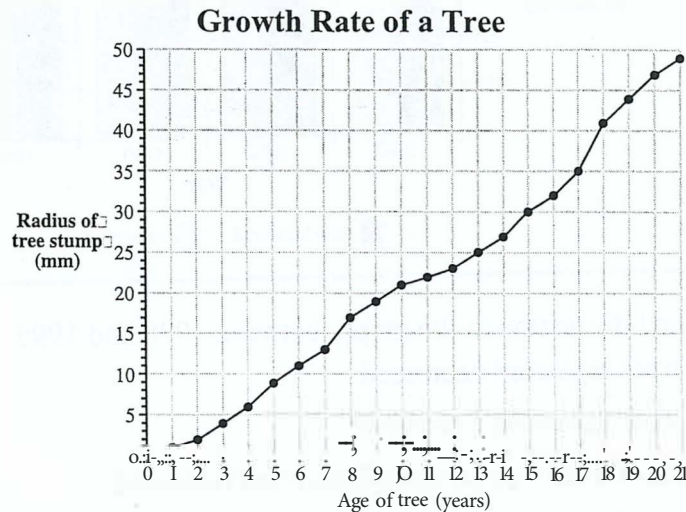


10. The **most important** role of decomposers in the nutrient cycle is to
- | | |
|-------------------------------|--------------------------------|
| A. clean the forest floor | B. break down dead organisms |
| C. produce food for consumers | D. allow air to enter the soil |
11. You spray your bare arms with insect repellent. The fluid in the can sprays out when you press the nozzle because the fluid is
- | | |
|------------------------|----------------------------|
| A. flammable | B. under pressure |
| C. warmer than the air | D. mixed with water vapour |

12. The naturalist explains that for plants to produce their own food through the process of photosynthesis, they require
- A. chlorophyll and release oxygen
 B. chlorophyll and release nitrogen
 C. water vapour and release carbon dioxide
 D. nitrogen and release water vapour

Use the following information to answer question 14.

The naturalist takes out his field guide and shows you a graph. The graph was made by taking measurements from the centre of a tree stump to the outer ring for each year of the tree's growth.

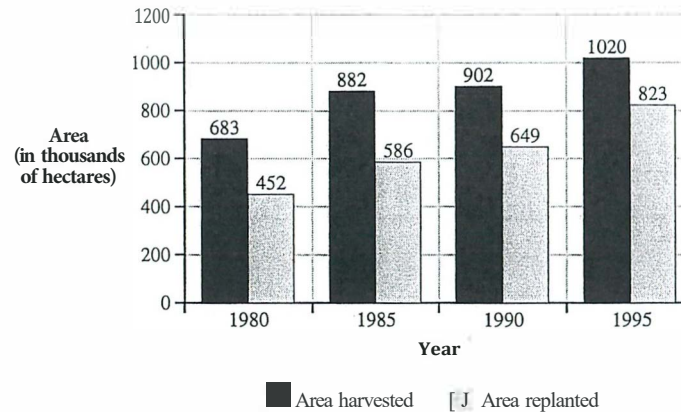


13. Between the 6th year and 10th year, the tree grew approximately
- A. 1.5 mm
 B. 5.5 mm
 C. 10 mm
 D. 21 mm
14. You ask the naturalist what changes to the ecosystem occur when a forest is clear-cut. The naturalist replies that an immediate change to the ecosystem is the
- A. loss of habitat for animals
 B. loss of nutrients in the soil
 C. increased danger of forest fires
 D. increased underbrush growth

Use the following information to answer question 16.

The naturalist shows you a graph of the area of forest harvested and the area of forest replanted during a particular period in a forest near Sandbar Camp.

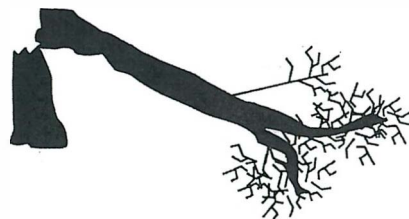
Area of Trees Harvested and Replanted



15. According to the information in the graph, between 1980 and 1995,
- the area of trees replanted decreased
 - the area of trees harvested decreased
 - a greater area of trees was harvested than was replanted
 - a greater area of trees was replanted than was harvested

Use the following information to answer question 17.

While on the walk, you see a tree that looks like the diagram.



16. An observation that can be made about the tree is that it
- has a broken trunk
 - has been hit by lightning
 - was blown over by wind
 - was destroyed in the spring

Use the following information to answer question 18.

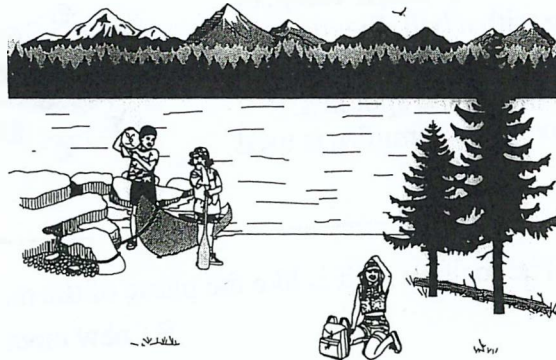
As you walk back to the camp, you notice an animal's footprint in some mud.



17. From this footprint, you infer that the animal

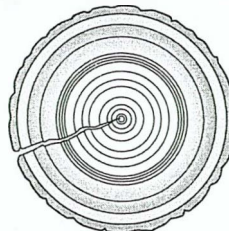
- A. can climb trees
- B. is a plant-eater
- C. can run fast
- D. hibernates in winter

During your stay at Sandbar Camp, you are taken by canoe on an overnight outdoor camping trip to Moss Island.



Use the following information to answer question 20.

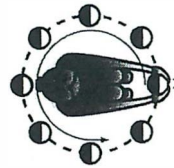
In the afternoon, you collect wood for the evening fire. You notice the end of a large log that looks like the following drawing.



18. Upon examining the log more closely, you observe that some rings are very close together. From this, you infer that for a few years, the tree
- produced seedlings, which slowed its growth rate
 - produced fruit, which increased its growth rate
 - grew quickly as a result of increased rainfall
 - grew slowly as a result of drought conditions
19. While collecting wood, a blue jay glides above you without moving its wings. You know that all birds of flight can do this because their
- tails are long and straight
 - feathers are long and narrow
 - wing structure gives them lift
 - beaks are straight and pointed

Use the following information to answer question 22.

Later that evening, while sitting at the fire, you notice the moon shining brightly. To demonstrate the phases of the moon to some younger campers, you sit in front of the fire with a ball directly in front of you, as shown below. Your position represents Earth. You then turn around on the spot in a counterclockwise direction. The campfire is used to represent the sun.



20. When you hold the ball in position X, it is like the phase of the moon called the
- first quarter
 - new moon
 - full moon
 - last quarter
21. While looking up at the night sky, you remember that an object that emits its own light is called
- amoon
 - a star
 - a planet
 - an asteroid

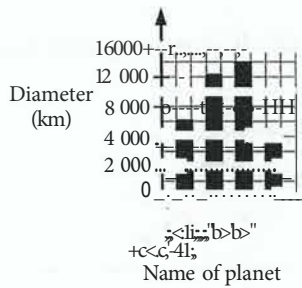
Use the following information to answer question 24.

One of the campers knows a lot about astronomy. He tells you the diameter of four of the planets.

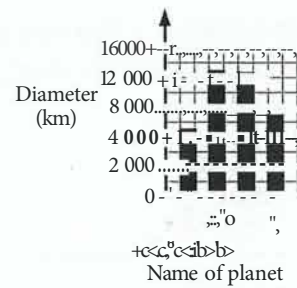
Planet	Diameter (km)
Mercury	4 880
Venus	12 100
Earth	12 756
Mars	6 787

22. Which of the following bar graphs represents the diameter of these four planets?

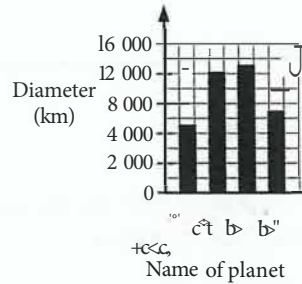
A.



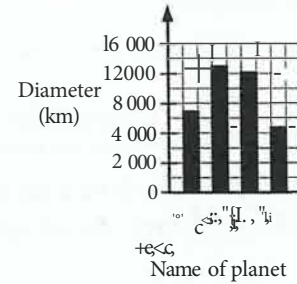
B.



C.



D.



Use the following information to answer question 25.

You and a friend decide to go fishing. You take a chart to help identify the fish you hope to catch.

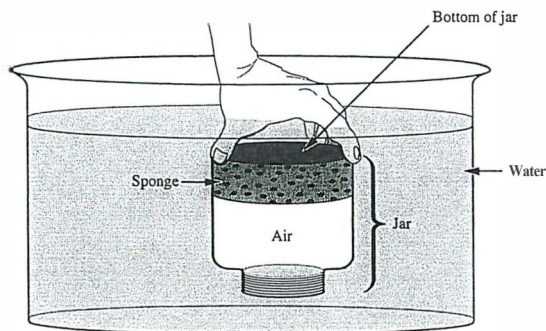
Name	Cisco	Goldeye	Rainbow Trout	Whitefish
Colour	Black	Light blue	Red	Silver
	Silver	Silver	Silver	Green
		Gold	Green	White
Size	25-40 cm	20-35 cm	15-20 cm	30-45 cm
Dorsal Fin	Short	Short	Short	Long
	Soft	Soft	Soft	Soft

23. Your friend catches a fish that is partly silver, is approximately 40 cm long, and has a short, soft dorsal fin. Using the chart, you identify the fish as a
- A. cisco
 - B. goldeye
 - C. rainbow trout
 - D. whitefish

The floatplane turns and lands on the water near your campsite. You and your friends quickly return to the campsite.

Use the following information to answer question 26

Justin's experiment involves a jar and a sponge. Justin wedged a sponge into the bottom of an open jar. Then he turned the jar upside down and held it in a container of water.



24. Which of the following statements explains why the sponge did not get wet?
- A. The air in the jar exerts pressure on the water.
 - B. The sponge is lighter than the air.
 - C. The sponge does not absorb water.
 - D. The air is more dense than the sponge.

Use the following information to answer question 27.

Nicole explained that she studied an ant colony just outside her cabin. Over a five-day period, she observed and recorded the activity level of the ants.

Activity Level of Ants

Day	Temperature (°C)	Rainfall (mm)	Activity Level
1	17	10	high
2	20	0	high
3	27	5	medium
4	30	20	low
5	25	35	low

25. The activity level of the ants appears to decrease when
- A. rainfall is low and the temperature is high
 - B. rainfall is high and the temperature is low
 - C. rainfall is low and the temperature is low
 - D. rainfall is high and the temperature is high

Bubble Answer Sheet

1.00®®	18.00®®	35.00®®
2.000®	19.00®®	36.0®0®
3.000®	20.0®®®	37.0®0®
4.000®	21.00®®	38.0®0®
5.000®	22.00®®	39.000®
6.000®	23.00®0	40.000®
1.0000	24.0000	41.0®0®
5.000®	25.0000	42.0®0®
9.000®	26.0®00	43.0®0®
10.000®	27.0000	44.0®0®
11.000®	28.0®00	45.0®0®
12.0000	29.0®0®	46.0®®®
13.000®	30.0000	47.0®0®
14.000®	31.000®	48.0®®®
15.000®	32.0®0®	49.0®0®
16.000®	33.0000	50.0®®®
11.00®®	34.00®0	

ANSWERS AND SOLUTIONS- 2000 PROVINCIAL ACHIEVEMENT TEST

1. C	6. A	11. B	16. A	21. B
2. D	7. D	12. A	17. A	22. C
3. D	8. D	13. C	18. D	23. A
4. B	9. D	14. A	19. C	24. A
5. C	10. B	15. C	20. B	25. D

1. C

As a plane speeds down a runway, lift will occur when the air moving over the top surface of the wing is moving faster than the air under the wing. Bernoulli's principle states that fast-moving air has low pressure and slow-moving air has high pressure. The stronger air pressure under the wing generates enough force to lift the plane.

A is incorrect because if the force of drag and thrust were equal, the plane would not move.

If the force of gravity were greater than the force of thrust, the plane would not move. Therefore, B is incorrect.

If the air moving on the top and bottom of the wing were moving at the same speed, then lift would not occur. Therefore, D is incorrect.

2. D

Lift is the force that moves objects up. Drag is the force that pulls objects back or slows them down. Gravity is the force that pulls objects down to Earth, and thrust is the force that propels objects forward. D is labelled correctly.

Answers A, B, and C are not correct.

3. D

Daniel Bernoulli was a Swiss scientist of the eighteenth century. His experiments with water proved that when gases or liquids move at different speeds, their pressure changes. Bernoulli's Principle states that as the speed of a moving fluid increases, the pressure within the fluid decreases. Aircraft wings are designed to split airflow in two. The air moving on the top curved surface moves faster than the air on the flat bottom surface. This difference in air speed results in a difference in air pressure, which results in lift.

4. B

A parachute creates air resistance.

A parachute is very lightweight. It uses a large chute to trap air. This creates drag. The more surface area an object has, the more drag it generates.

A is incorrect. Drag and gravity are the only forces that affect a parachutes' descent.

C is incorrect. A rectangular parachute has a larger surface area than a round parachute. The larger parachute would have more drag; therefore, it would fall to the ground more slowly.

D is incorrect. Longer suspension lines generate more drag.

5. C

A manipulated variable is one that is changed altered. The size of the hole is being changed.

6. A

When air is warm, it expands. Air is made up of millions of molecules. When air is warm, the molecules start to move faster and spread farther apart. As a result, the air becomes less dense. In the scenario, the warm air would rise because it is lighter than the cooler air surrounding it.

B is incorrect. Air becomes less dense as it warms.

C and **D** are incorrect because the altitude is not mentioned in the description. Therefore, it is not relevant.

7. D

The elevators are attached to the plane's horizontal stabilizers. When the elevators are raised, the plane's nose goes up. When the elevators are lowered, the plane's nose goes down.

A and **B** are incorrect. The ailerons are used for tilting to the right or left.

C is incorrect. The rudder is used to turn the plane left or right.

8. D

It appears that there is only one set of footprints entering and leaving the building. You would infer that only one person was at the crime scene. **A** is incorrect.

The officer stated that it had rained at night, therefore there were tracks in the mud. Since it rained at night, the crime could not have been committed during the day. **B** is incorrect.

C is incorrect. The lighter set of prints along the side of the building also has a set of dog prints beside them. It would be assumed a person was walking a dog. The set of prints of the person walking the dog are lighter than those left by the thief. The thief's set of prints overlap over the set of prints from the person with the dog. There is nothing to indicate that the thief was seen by the person with the dog.

If the theft had occurred before it rained, there would not have been tracks left in the mud.

D is correct.

9. D

The set of prints indicate that the thief walked through the building. It appears that the thief was walking, not running, which would have taken the thief more than a few seconds. **A** is incorrect.

If the thief had triggered an alarm in the secretary's office, he would not have continued walking into the Activities Director's office. He would have quickly left the building through the front entrance. **B** is incorrect.

If the thief had run from the building carrying something, the footprints would be farther apart. The length of the stride is longer when a person is running. All of the footprints appear to be the same distance apart. **C** is incorrect.

D is correct. Once the thief passed the Activities Director's office, the prints disappeared and then reappeared through another doorway. If there was no other door, the footprints would show the thief walking directly from the Activities Director's office to the front door of the Camp Director's office and then out the entrance.

10. B

The nutrient cycle is made up of three parts: producers, consumers, and decomposers. The producers produce their own food and create food for others. The consumers eat food made by the producers: The decomposers break down dead matter from the consumers and producers. They break down the matter and put nutrients in the ground. Although answers **A**, **C**, and **D** are true **B** is the decomposer's most important role.

10. B

Air is made up of millions of molecules. Air molecules can be compressed (squeezed) into a small space such as the can of insect repellent. This causes the air inside the can to be under a lot of pressure. When the nozzle is pressed, the pressure is released. As the compressed air leaves the can, it acts as a propellant for the liquid inside the can.

12. A

Although plants need chlorophyll for photosynthesis, they do not need nitrogen for photosynthesis. **B** is incorrect.

Plants absorb CO_2 and water to use for photosynthesis. They use the carbon dioxide and water to create sugar and starches. The sugar is used as food, and the oxygen and water vapour that are not needed are released into the environment. **C** is incorrect.

The function of leaves is to make food for the plant. The process by which leaves make food is called photosynthesis. Leaves make food from water and carbon dioxide. Sunlight captured by chlorophyll (a green substance in the leaves that traps light energy) provides the energy needed for plants to absorb carbon dioxide and water. Chlorophyll molecules use the light energy to change carbon dioxide and water into oxygen, sugars, and starches. The leaves release the oxygen they do not need into the air and keep the sugar for food. **A** is correct.

13. C

Start with the age of the tree. Look at the 6th year and then the 10th year. The difference between these years is 10 mm. Answer **C** is closest to the correct response.

14. A

Forests serve as a habitat for a variety of living things. A habitat is an area or environment where an organism or ecological community normally lives. A forest is an area of living and non-living things that create an environment. This is called an ecosystem. An ecosystem is a living community that depends on each member and its surrounding environment. If the forest is clear cut, the immediate consequence is the loss of habitat for animals. **A** is correct.

Loss of nutrients in the soil will occur over time. Once there is no more dead matter for the decomposers to decompose, they will not survive and the soil will lose its nutrients. This is not an immediate response. **B** is incorrect.

With the trees gone, the risk of forest fires decreases. **C** is incorrect.

Underbrush growth would not be increased. **D** is incorrect.

15. C

According to the information on the graph, the area of trees replanted increased between 1980 and 1995. **A** is incorrect.

According to the information on the graph, the area of trees harvested increased between 1980 and 1995. **B** is incorrect.

The graph indicates that between 1980 and 1995, a greater area was harvested than was replanted. **C** is correct.

The graph indicates that a greater area was harvested than replanted. **D** is incorrect.

16. A

An observation is something you can see or prove. The diagram shows a tree with a broken trunk. **A** is correct.

There is no evidence, such as burn marks, that the tree was hit by lightning. **B** is incorrect.

You cannot tell by looking at the diagram how or when the tree broke. **C** and **D** are incorrect.

17. A

Animals that climb trees need claws to climb trees. An inference is a conclusion based on evidence. The evidence here is that the animal has claws. Therefore, you can infer that this animal can use the claws to climb trees.

The footprint does not give any evidence related to what the animal eats, how fast it runs, or if it hibernates; therefore, you cannot make any inferences about these things.

B, **C**, and **D** are incorrect.

18. D

When trees are producing seeds, they are actively growing. **A** is incorrect.

When trees are producing fruit, they are actively growing. **B** is incorrect.

When a tree grows quickly, the rings are evenly spaced and far apart. **C** is incorrect.

Closely spaced growth rings indicate years of very little or poor growth due to water shortage.

19. C

Answers **A**, **B**, and **C** list adaptations birds have that enable them to fly. **D** is an adaptation that helps Blue Jays to meet their needs. Wings are specially designed to create a difference in air speed, which results in a difference in pressure. Without wings, birds would not be able to achieve lift or flight. Therefore, **C** is the most important flight adaptation and the best answer.

20. B

As the moon orbits around Earth, we are able to see different phases of the moon. The cycle begins with a new moon. During this phase, we do not see the moon because the far side of the moon is illuminated by the sun. On Earth, we never see the far side of the moon.

Regardless of which phase the moon is in, the same side of it always faces Earth. If you were living on the moon, you would see Earth go through the same phases. As the moon moves along its orbit, we gradually see more of it lit by the sun. The next phase is a waxing crescent and the first quarter. Next, is the gibbous phase when the moon is starting to become round. In the full moon phase, we are able to see the entire sunlit side of the moon. Throughout the next three phases, we are gradually seeing less and less of the sunlit side. The next phases are gibbous, third-quarter, and waxing crescent.

This cycle occurs month after month as the moon orbits around Earth. When the moon is in its first phase, we do not see it because the moon is actually blocking the light from the sun. **A** is correct.

21. B

Reflected light consists of light that is reflected from another object. Moons, planets, and asteroids do not produce any light of their own. The sun shines on them, and we see the light from the sun reflected from their surfaces. Another light-reflecting object in space is an asteroid. Asteroids are rocky and metallic objects that orbit the sun. Asteroids that are on a collision course with Earth are called meteoroids. Most meteoroids are burned up as they pass through Earth's atmosphere. Only stars emit their own light.

22. C

The graph must show Mercury with the smallest diameter of 4 880 km. Venus must have a diameter of 12 100 km and be smaller than Earth. The graph must show that Earth is the largest of the four planets listed and that it has a diameter of 12 756 km. Mars must have a diameter of 6 787 km and be larger than Mercury but still smaller than Earth and Venus. Graph C correctly represents all the above information.

23. A

The description states that the fish is partly silver. All the fish in the chart are silver. The fish needs to be 40 cm in length. The gold eye and rainbow trout are 20-35 and 15-20 cm in length, therefore answers B and C are incorrect. The fish must have a short, soft dorsal fin. The whitefish has a long, soft dorsal fin. That makes D incorrect. The only fish that meets all of the criteria is the cisco, answer A.

24. A

Air takes up space. The air inside the jar is taking up space and exerting pressure. When the jar is placed in the water, the water cannot enter the jar because there is air inside the jar exerting pressure.

25. D

The information presented in the graph indicates that the activity level of the ants decreases when the temperature is high and the rainfall is high.

