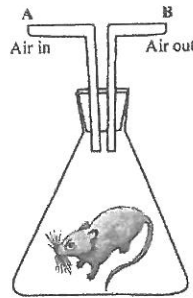


## UNIT TEST—AIR AND AERODYNAMICS

Use the following information to answer the next five questions.

Mr. Woods set up a demonstration to show how animals affect the composition of air. In the experiment, air was moved through the apparatus by a pump.



- The responding variable in this experiment is the
  - change in the air as it passes through the container
  - volume of air that passes through the container
  - health of the animal in the container
  - type of animal in the container
- The manipulated variable in this experiment is the
  - change in air as it passes through the container
  - volume of air that passes through the container
  - size of the container used to place the animal in
  - path and environment the air must travel through
- The students said they should measure for different kinds of gases at A and at B. The animal caused the levels of
  - both oxygen and carbon dioxide to increase
  - both oxygen and carbon dioxide to decrease
  - oxygen to increase and carbon dioxide to decrease
  - carbon dioxide to increase and oxygen to decrease

- It is necessary to measure the gases at both A and B in order to
  - be sure that the animal really did cause a change in the air
  - know how much air was used by the animal
  - make sure there are no poisons in the air
  - check the air for harmful germs
- The class correctly predicted that if the same experiment was carried out using a plant in sunlight rather than an animal in a glass container, that
  - the plant would die
  - the results would be the same
  - no gases would be exchanged by the plant
  - gas exchange by the plant would be the opposite of the gas exchange by the animal

Use the following information to answer the next two questions.



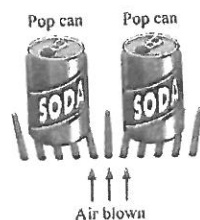
After a fun day at the beach, Mario is laying on his bed for a short rest. The ceiling fan located directly above him is on and sending a welcomed breeze at him. Mario notices that the blades of the fan are turning clockwise.

- If the speed of the fan is increased, the flow of air will
  - increase
  - decrease
  - remain the same
  - change direction

7. Mario wants to see what will happen if he changes the rotation of the fan blades so that they move in a counterclockwise direction. The speed of the fan remained the same but Mario noticed that the air flow
- remained the same
  - changed direction
  - decreased
  - increased

Use the following information to answer the next three questions.

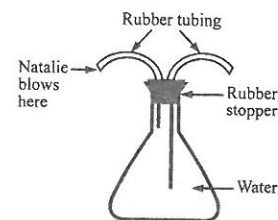
Ms. Frechette set up the following demonstration in her classroom. She blew air between two empty pop cans. The pop cans were resting on drinking straws.



- Why were the drinking straws necessary?
  - They reduce air pressure.
  - They channel the air past the cans.
  - They increase the speed of the air.
  - They allow the cans to move freely.
- According to Bernoulli's Principle, the air pressure is least
  - over the cans
  - under the cans
  - outside the cans
  - between the cans
- The drinking straws serve as rollers. When air is blown between the cans, they will move
  - apart
  - together
  - toward the fan
  - away from the fan

Use the following information to answer the next two questions.

Natalie was enjoying science camp activities during the summer. Natalie set up the experiment as diagrammed below.



- When she blew into the first tube, she observed that
  - the water in the flask began to bubble
  - water dripped out from the tubing
  - the water in the flask rose higher
  - air can be compressed
- Natalie inferred that this happened due to a
  - increase in air pressure outside the flask
  - decrease in air pressure outside the flask
  - increase in air pressure inside the flask
  - decrease in air pressure inside the flask

Use the following information to answer the next question.

In her grade six classroom, Melanie is asked to light a candle and hold it steadily. In a beaker, Rahil mixes together vinegar and baking soda. Rahil then holds the beaker close to the candle's flame, slightly above it. Instantly, the candle is extinguished.

- Both students are able to explain that the candle went out because of the
  - carbon monoxide
  - carbon dioxide
  - nitrogen
  - oxygen

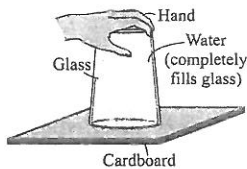
Use the following information to answer the next question

At a birthday party for her younger brother, Christina performed a magic trick. She asked one of the guests to place a crunched up paper towel in the bottom of a large glass jar. Once this was done, Christina took the jar and plunged it, straight down, into a large tub of water. She counted to ten. Next she slowly lifted the jar out of the tub. Christina then asked her younger brother, Jared, to pull the paper from the jar. The paper was completely dry. The kids cheers and Christina smiled cause she knew why the paper towel was not wet.

14. The reason the paper was not wet was because
- A. air exerted pressure and pushed the paper away from the water
  - B. air exerted pressure and would not let Christina push the jar far enough into the tub to allow the water to wet the towel
  - C. air took up space and could not escape from the jar, and there was no room for the water to get in
  - D. air took up space, forcing the paper to move to the very top of the jar, which caused it to remain dry

Use the following information to answer the next question

Christina filled a glass of water to the top. Next, she placed a piece of cardboard over the entirely top of the glass. Holding the glass with one hand and the cardboard with the other, she quickly flipped the glass upside down. Christina gently took her hand off the cardboard. The cardboard stayed stuck to the glass, holding the water inside.

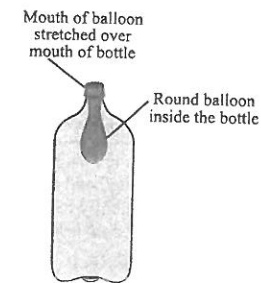


15. The cardboard stayed stuck to the glass because
- A. the air outside presses on the cardboard with greater force than the weight of the water exerts on the inside
  - B. the air outside presses on the cardboard with less force than the weight of the water exerts on the inside
  - C. air takes up space and there was no air in the glass
  - D. air takes up space but does not mix with water

16. At Jared's party, the children enjoyed blowing up balloons. They held races to see who could blow up a balloon the fastest. Christina watched and cheered. She knew that balloons illustrate that
- A. air expands
  - B. air has mass
  - C. air is invisible
  - D. air is odourless

Use the following information to answer the next question.

Christina stretched a deflated balloon across the mouth of a large empty bottle. The deflated balloon hung down inside the bottle. Christina blew some air in to the balloon to try and blow it up. Although the balloon inflated a little, she could not fill the balloon completely with air.



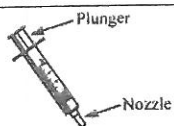
17. Christina knew that balloon would not fully inflate because
- A. the bottle acted as a vacuum creating no space for air
  - B. the air pressure inside the bottle was greater than the air pressure inside the balloon
  - C. the air pressure inside the balloon was greater than the air pressure inside the bottle
  - D. the air pressure inside the bottle became equal to the air pressure applied by Christina blowing
18. When compared to the cooler air around it, the reason why warm air rises is that warmer air
- A. is more dense than cooler air
  - B. is less dense than cooler air
  - C. increases drag
  - D. lessens drag

19. Christina saw some friends playing basketball, a semi-truck entering the nearby grocery store, and a construction crew jack hammering near a local intersection. Christina thought about the many ways air is important in her world. She understood that these were examples of

- A. compressed air
- B. air taking up space
- C. air acting like a fluid
- D. Bernoulli's Principle

Use the following information to answer the next question.

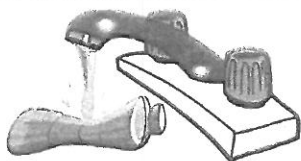
Christina and Jared were playing with the cake decorating syringe. Christina asked Jared to try to pull the plunger nearly all the way out. He did so easily. Then Christina placed her thumb on the nozzle. She asked Jared to pull on it again. Jared pulled the plunger but noticed that it was very hard to move the plunger this time.



20. Christina correctly explained that
- A. air pressure outside the syringe had lowered, making the air pressure inside the syringe greater
  - B. air pressure inside the syringe had lowered, making the outside air pressure greater
  - C. air has mass and is difficult to move
  - D. air can be compressed

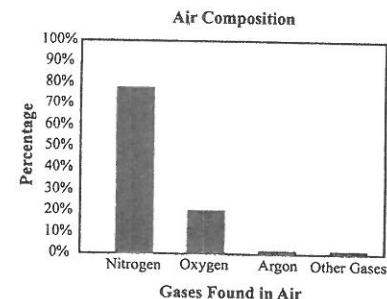
Use the following information to answer the next question.

Mrs. Knot took her grade six class to the science lab. She asked students to set up an experiment. Each group placed an empty plastic bottle underneath very hot running water. When the bottle was heated, the students quickly screwed the cap on tightly. As the bottle cooled, it collapsed inward. Students were asked to think about what they had seen and explain what was happening to the air in the bottle when the hot water was running over it.



21. As the hot water was running over the bottle, the air inside the bottle
- A. expanded and stayed inside the bottle
  - B. contracted and stayed inside the bottle
  - C. contracted and moved out of the bottle
  - D. expanded and moved out of the bottle

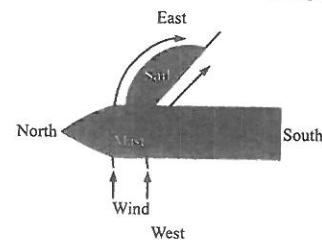
Use the following graph to answer the next question.



22. Air is made up of a mixture of gases. From the information on the bar graph, air is **mostly** composed of
- A. argon
  - B. helium
  - C. oxygen
  - D. nitrogen

Use the following information to answer the next four questions.

Ms. Frechette spends her weekends sailing. She sketched a diagram showing the view looking down onto a sailboat. She drew arrows to show the wind blowing from the west.

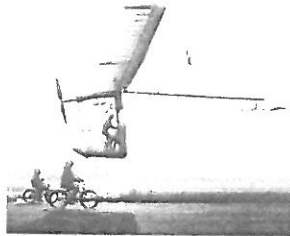


23. Ms. Frechette asked the class what makes a sailboat move. Maren **correctly** answered
- A. gravity
  - B. friction
  - C. air pressure
  - D. water pressure

24. Ms. Frechette said that something the class had been learning was important to the movement of the sailboat. It was
- elevators
  - propellers
  - air compression
  - Bernoulli's Principle
25. The air would be moving fastest
- behind the sail
  - in front of the sail
  - at the top of the sail
  - at the bottom of the sail
26. The air pressure is greatest
- behind the sail
  - in front of the sail
  - at the top of the sail
  - at the bottom of the sail

*Use the following information to answer the next two questions.*

While learning about the principles of flight, some of the students in Mr. Jones' class came across an article about the Gossamer Albatross, a flying machine powered by a human pedaling.



27. For this machine to increase elevation,
- lift must overcome gravity
  - gravity must overcome lift
  - thrust must overcome drag
  - drag must overcome thrust

28. For the Gossamer Albatross to increase speed
- lift must overcome gravity
  - gravity must overcome lift
  - thrust must overcome drag
  - drag must overcome thrust

*Use the following information to answer the next question.*



29. Given this bird's physical characteristics, it can be inferred that this bird **most likely**
- can soar and glide on wind currents
  - has good tail feathers for flight
  - needs a long run to take off
  - cannot fly

*Use the following information to answer the next question.*

Birds have many adaptations that allow them to fly. One adaptation is the air sacs that are attached to the bird's lungs.

30. Which of the following statements best describes how these sacs help a bird during flight?
- They provide the bird with more stability during flight.
  - They help reduce drag, which makes it easier for the bird to fly.
  - They supply the muscles with a large amount of oxygen when the bird is flying.
  - They make a smooth, streamlined shape, which allows the bird to move through the air easily.

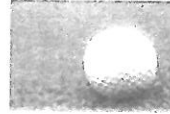
Use the following information to answer the next question.

The word **propel** means to move forward. A jet is propelled by its engines. A paper airplane is propelled by the thrower's arm.

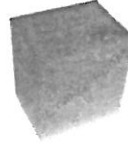
31. What is another name for the aerodynamic force that propels an airplane?
- A. Lift
  - B. Drag
  - C. Thrust
  - D. Gravity
32. Some airplanes have engines in the back that force hot gases out. This means of propulsion is used to
- A. move backward
  - B. move forward
  - C. stay still
  - D. get hot
33. An airplane is like a bird in that both are streamlined in order to reduce
- A. weight
  - B. thrust
  - C. drag
  - D. lift

34. Which of the following objects would have the **most** air resistance or drag when thrown through the air?

A.



B.



C.



D.

