

Science

Grade 9
Achievement Test

2000

Grade 9 Achievement Test

Science

Description

This test consists of 55 machine-scored questions: 50 multiple-choice questions, each worth one mark, and 5 numerical-response questions, each worth one mark.

This test was developed to be completed in 75 minutes; however, you may take an additional 30 minutes to complete the test.

You may write in this booklet if you find it helpful. Make sure answers are placed on the answer sheet.

Instructions

- Calculators are recommended but not required.
- Read each question carefully.
- Use **only** an **HB** pencil to mark your answer.
- If you change an answer, **erase** your first mark **completely**.
- Try to answer every question.
- Now turn this page and read detailed instructions for answering multiple-choice and numerical-response questions.

Multiple Choice

- Each question has four possible answers from which you are to choose the **correct** or **best** answer.

Example

This test is for the subject of

- A. mathematics
- B. science
- C. language arts
- D. social studies

Answer Sheet

☐ A ☒ B ☐ C ☐ D

- Locate the question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

Numerical Response

- Record your answer on the answer sheet provided by writing it in the boxes and then filling in the corresponding circles.
- Enter the first digit of your answer in the left-hand box and leave any unused boxes blank.

Examples

Calculation Questions and Solutions

A mechanic used a hydraulic press to compress a spring. If the hydraulic press exerts a pressure of 50.0 N/cm^2 and the surface area of the spring is 1.25 cm^2 , the force exerted on the spring is _____ N (newtons).

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

Answer: 62.5 N (newtons)

Record 62.5 on the answer sheet

→

6	2	.	5
---	---	---	---

☐ • ☒

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

A block of wood is floating in a pan of distilled water. If $\frac{1}{4}$ of the block remains out of the water, the block has a specific gravity of _____.

Record your answer **to the nearest hundredth or two decimal places** in the numerical-response section on the answer sheet.

Answer: 0.75

Record 0.75 on the answer sheet →

0	.	7	5
---	---	---	---

•	•		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	•
6	6	6	6
7	7	•	7
8	8	8	8
9	9	9	9

Correct-Order Question and Solution

The following is a list of electrical appliances.

- 1 refrigerator
- 2 oven
- 3 blender
- 4 toaster

When the appliances listed above are placed in alphabetical order, the order is

_____, _____, _____, and _____.

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

Answer: 3214

Record 3214 on the answer sheet →

3	2	1	4
---	---	---	---

•	•		
0	0	0	0
1	1	•	1
2	•	2	2
•	3	3	3
4	4	4	•
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Selection Question and Solution

The following illustrations are of animals that live in Alberta.



1



2



3



4

Identify each illustration, as numbered above, with its name, as given below.

_____ moose _____ goat _____ deer _____ sheep

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

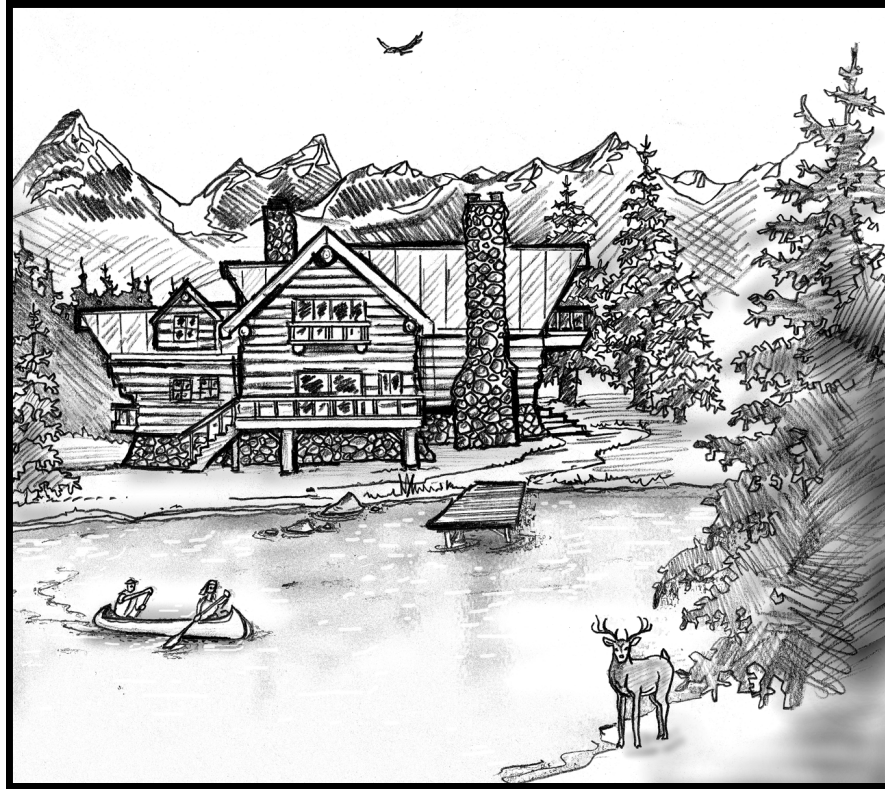
Answer: 2431

Record 2431 on the answer sheet →

2	4	3	1
---	---	---	---

•	•		
0	0	0	0
1	1	1	•
•	2	2	2
3	3	•	3
4	•	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

The Adventure Holidays Company is planning to develop a guest resort.



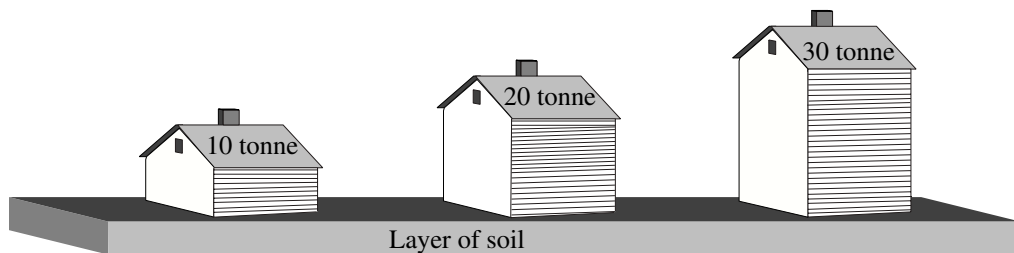
The company must conduct a study of what impact the construction of the resort will have on the environment. They have hired a scientist to do this for them.

1. In order for the scientist to perform a **controlled** study of the area, there must be
 - A. careful supervision of the site
 - B. procedures that are computer-generated
 - C. data collected at the location before the resort is built
 - D. careful monitoring of the equipment used to collect the measurements

2. The scientist obtained four rock samples that have equal masses. Samples I and II were unbroken pieces, and samples III and IV were powdered. The scientist placed samples I and III into weak acid solutions and samples II and IV into strong acid solutions. Which of the four rock samples **most likely** underwent the fastest reaction?
- A. Sample I
B. Sample II
C. Sample III
D. Sample IV

Use the following information to answer question 3.

The scientist knew that variations in soil temperature will affect soil compaction under buildings.



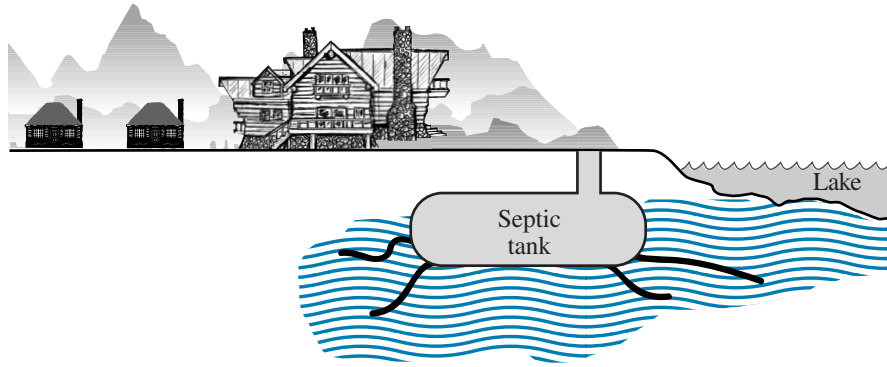
The scientist referred to a chart that showed the amount of soil compaction that would result at different temperatures under three buildings that have the same base but different masses.

Average soil temperature °C	Amount of Soil Compaction (mm)		
	10-tonne building	20-tonne building	30-tonne building
+20	20	40	60
0	10	20	30
-20	5	10	15
-40	1	1	2

3. If the average winter soil temperature in the area is -10°C , approximately how much soil compaction would occur under a 15-tonne building?
- A. 5 mm
B. 11 mm
C. 15 mm
D. 25 mm

Use the following information to answer question 4.

The scientist examined drawings of the proposed site. They showed a large septic tank that would be used for the disposing of human waste. The septic tank and septic field would be located underground.



4. The scientist expressed concern that some waste could leach from the septic field and seep into the ground water, thus affecting the lake by
- A. increasing the dissolved oxygen
 - B. increasing the rate of algae growth
 - C. decreasing the turbidity level of the water
 - D. decreasing the rate of aquatic decomposition
-
5. The scientist recommended that a septic tank not be used. He explained that a tertiary sewage treatment system would be better because it would
- A. increase the amount of sediments in the wastewater
 - B. increase the levels of water-soluble poisons in the wastewater
 - C. decrease the amount of coarse particles in the wastewater
 - D. decrease levels of nitrates and phosphates in the wastewater
6. One method of controlling solid landfill waste from the resort is to incinerate it. The scientist recommended **not** using incineration because
- A. ozone is produced by the incinerator
 - B. the process of incineration is too costly
 - C. the emissions of incineration affect the quality of air
 - D. a large water supply is needed to cool the incinerator

Use the following information to answer question 7.

The scientist was concerned that if the resort uses detergents containing phosphates, the wastewater could affect the water quality of a nearby stream. The scientist suggested that the resort regularly test the stream to monitor the following factors:

- I. the amount of dissolved oxygen
- II. the amount of bacteria
- III. the number of different species
- IV. the flow rate

7. The scientist was concerned that over a long period of time, the use of detergents containing phosphates could affect the stream by causing a **decrease** in factors
- A. I and III
 - B. I and IV
 - C. II and III
 - D. III and IV

Use the following information to answer numerical-response question 1.

Before the resort was built, a public meeting was held to consider impacts that the resort would have on the area. Several interest groups presented possible impacts from the following perspectives:

- 1** Environmental
- 2** Political
- 3** Economic
- 4** Recreational

Numerical Response

- 1.** Match each of the perspectives, as numbered above, with the possible impacts given below. Use each number only once.

improved
sport fishing

extensive
flooding

new water
supply

change in cost
of electricity

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

Using the recommendations of the scientist, the Adventure Holidays Company began construction of the resort.

Use the following information to answer numerical-response question 2.

Electrical energy for the resort will be supplied by a hydroelectric power plant.

Some Forms of Energy

- 1** Electrical
- 2** Mechanical
- 3** Light
- 4** Gravitational

Numerical Response

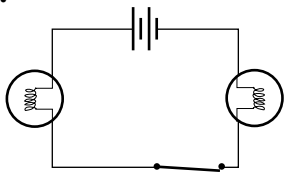
- 2.** The potential energy in river water is converted into useable energy for the resort. List the energy forms, as numbered above, in the sequence in which they would occur as they change from one form to another to become useable energy at the resort. Use each number only once.

_____ to _____ to _____ to _____
river water useable energy

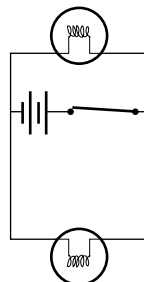
Record **all four digits** of your answer in the numerical-response section on the answer sheet.

8. The hydroelectric power plant must change the amount of energy it produces in order to supply the new resort with electricity. It can do this by
- A. increasing the rotational speed of the generators
 - B. decreasing the pressure of the water behind the dam
 - C. increasing the diameter of the pipe carrying the water through the dam
 - D. decreasing the speed of the water as it goes through the generator
9. Each cabin will have a security light that is operated by a light-sensitive cell. A light-sensitive cell acts as a
- A. semiconductor
 - B. resistor
 - C. variable resistor
 - D. switch
10. A circuit diagram that represents the front and back door lights of a cabin wired in parallel is

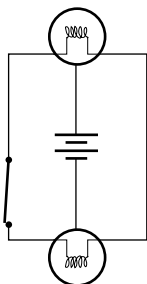
A.



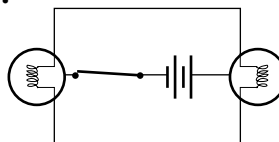
B.



C.

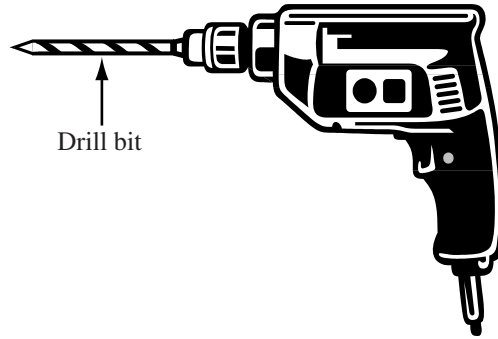


D.



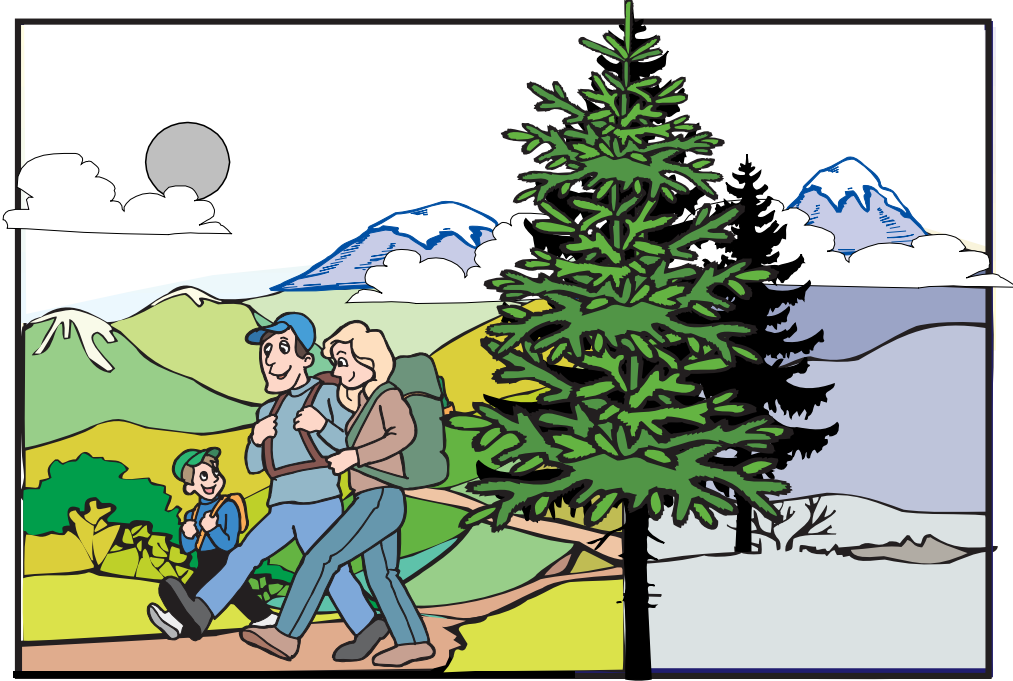
Use the following information to answer question 11.

To install lights in a cabin, holes need to be drilled with an electric drill like the one shown below.



11. In order for the drill bit in the electric drill to turn, the current in the electromagnet **must** produce a magnetic field
- A. parallel to the field produced by the permanent magnet
 - B. weaker than the field produced by the permanent magnet
 - C. stronger than the field produced by the permanent magnet
 - D. opposite to the field produced by the permanent magnet
-
12. Electricity flows through superconductors much more easily than through other types of conductors because superconductors have a low
- A. resistance
 - B. conductivity
 - C. amperage
 - D. density

The resort has completed its construction and is now ready for its grand opening. Your family decides to be among the first vacationers to holiday at the resort and to explore the surrounding area.



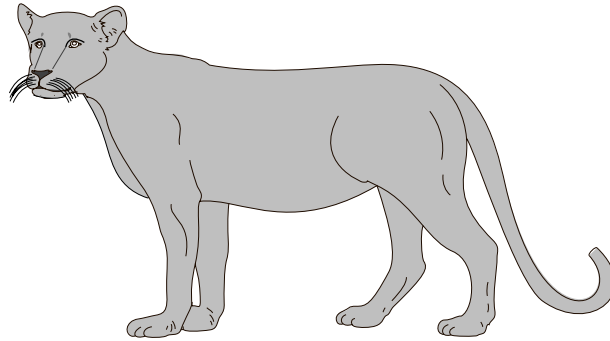
Use the following information to answer question 13.

To be environmentally friendly, the resort practices the “four Rs” of waste management: reducing, reusing, recycling, and recovering.

- 13.** One way in which the resort could practice reducing would be to
- A.** incinerate waste
 - B.** buy food in bulk
 - C.** return aluminum cans to a depot
 - D.** decrease the size of their waste disposal site
-
- 14.** On a hike in the forest, you notice different types of trees. The leaves of coniferous trees are needle-shaped, and the leaves of deciduous trees are larger and flatter. The needles of the coniferous trees have an adaptation that allows them to
- A.** protect the tree from getting too much sunlight
 - B.** increase the rate of transpiration
 - C.** increase the rate of photosynthesis
 - D.** reduce water loss by conserving water

Use the following information to answer question 15.

On your hike, far in the distance, you see a wild cat coming out of the trees. Your guide book has a dichotomous key that you use to identify the wild cat.



1. a. Cat with short tail..... go to 2
b. Cat with long tail go to 3
2. a. Ears with small tufts of hair on top..... *Lynx canadensis*
b. Small pointed ears..... *Lynx rufus*
3. a. Coat shading varies..... go to 4
b. Coat all one shade..... *Puma concolor*
4. a. Coat is striped *Felis nigripes*
b. Coat is spotted..... *Felis sylvestris*

15. The wild cat you saw, as pictured above, is **most likely**

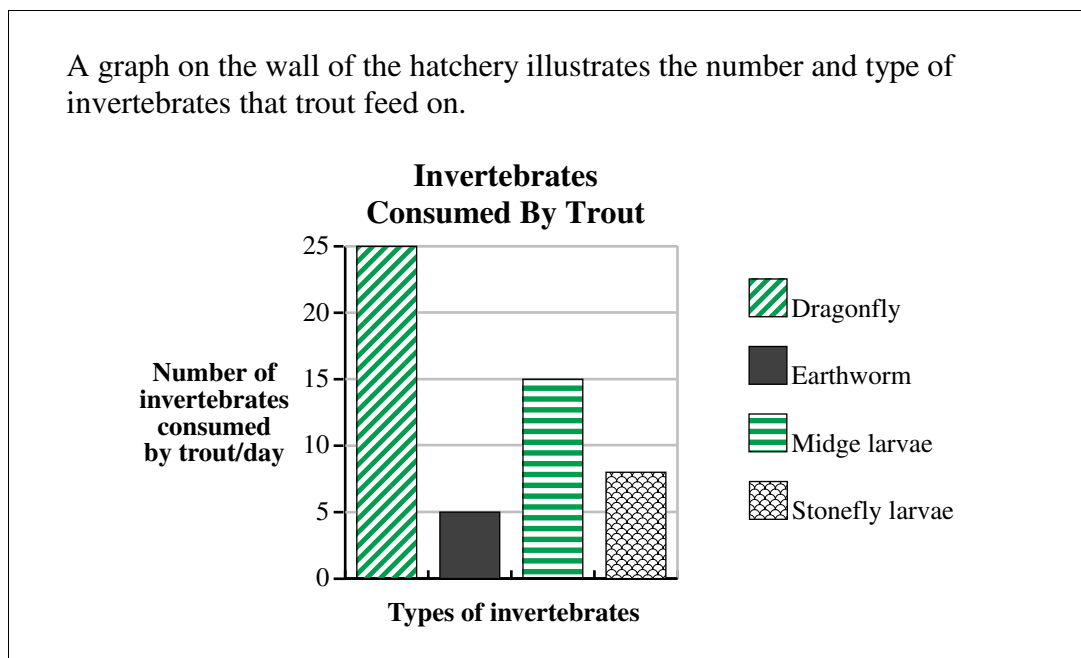
- A. *Lynx canadensis*
 - B. *Lynx rufus*
 - C. *Felis nigripes*
 - D. *Puma concolor*
-

16. While swimming in a lake, you notice that although the water is cold, the water closest to the surface is warmest. Warm water stays near the surface because it

- A. is less dense than cold water
- B. is more dense than cold water
- C. has a higher viscosity than cold water
- D. has a lower viscosity than cold water

17. While touring a trout hatchery, you learn that one of the projects is designed to develop trout that can survive in habitats with low concentrations of oxygen. The offspring of the trout that survive are placed in environments with low concentrations of dissolved oxygen. This process, repeated with each generation, is called
- A. adaptive evolution
 - B. natural selection
 - C. selective evolution
 - D. selective breeding

Use the following information to answer question 18.



18. Your guide tells you that a large amount of sediment entered the stream during the construction of the resort. Since that time, the trout population in the stream has decreased. You infer that this **most likely** happened because the
- A. worms were covered by silt
 - B. trout were unable to smell the midge larvae
 - C. trout could not see the dragonflies flying above the water
 - D. temperature of the water decreased because of heat absorption

19. The chances of a species, such as trout, becoming extinct are **increased** if there is
- A. little diversity within that species
 - B. abundant food available in the area
 - C. a natural habitat that remains undisturbed by man
 - D. a decrease in the number of that species' predators

Use the following information to answer question 20.

After returning from your tour, you go down to the lake and join a group of people roasting marshmallows on metal rods of equal length and diameter. After heating a marshmallow for two minutes with a rod made from one metal, your hand is much hotter than it is after heating a marshmallow for two minutes with a second rod made from another metal.

20. In terms of heat transfer, this suggests that the
- A. first metal radiates heat better than the second metal
 - B. first metal conducts heat better than the second metal
 - C. second metal conducts heat better than the first metal
 - D. second metal radiates heat better than the first metal
-
21. About an hour after you finish your dinner, you start experiencing pains in your stomach. You conclude that you have acid indigestion. To **best** neutralize the excess acid being produced, you should eat something
- A. acidic
 - B. salty
 - C. basic
 - D. fatty

One of the more popular things to do at the Adventure Holidays Resort is exploring on an all-terrain vehicle (ATV).



Use the following information to answer question 22.

The resort mechanic is about to change the oil on one of the ATVs. He finds four unlabelled cans of oil. To check the viscosity of the oil, he labels the cans W, X, Y, and Z. He then pours the oil through a funnel for 20 s, one can at a time, into a container that measures the volume of the oil. He records his results.

Volume of Oil Flow in 20 Seconds

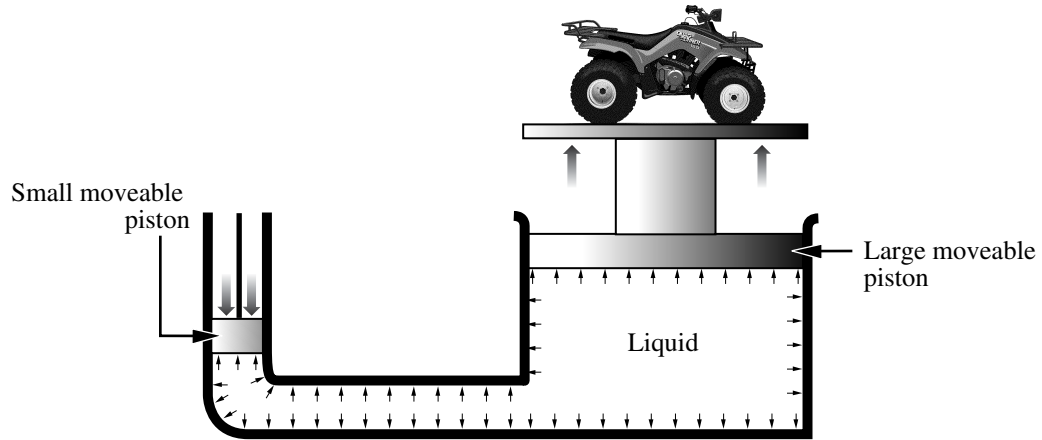
Can of Oil	Time (s)	Volume (mL)
W	20	22
X	20	51
Y	20	62
Z	20	30

22. The mechanic determines that the oil with the **highest** viscosity is in the can labelled

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

Use the following information to answer questions 23 and 24.

To change the oil on an ATV, the mechanic uses a hydraulic hoist to lift it up. The diagram below models how a hydraulic hoist works.



23. To lift a vehicle, a hydraulic hoist must create an upward
- A. force equal to the downward force of the vehicle
 - B. force greater than the downward force of the vehicle
 - C. pressure less than the downward pressure of the vehicle
 - D. pressure greater than the downward pressure of the vehicle
24. A hydraulic hoist uses a liquid instead of a gas because
- A. liquids expand less than gases
 - B. liquids compress less than gases
 - C. liquids have a higher viscosity than gases
 - D. liquid particles are farther apart than gas particles

Use the following information to answer question 25.

While changing the oil on an ATV, the mechanic notices that the metal on the muffler is corroding at a faster rate than any other metal on the vehicle. He knows that rapid corrosion could be caused by some of the characteristics of exhaust gases.

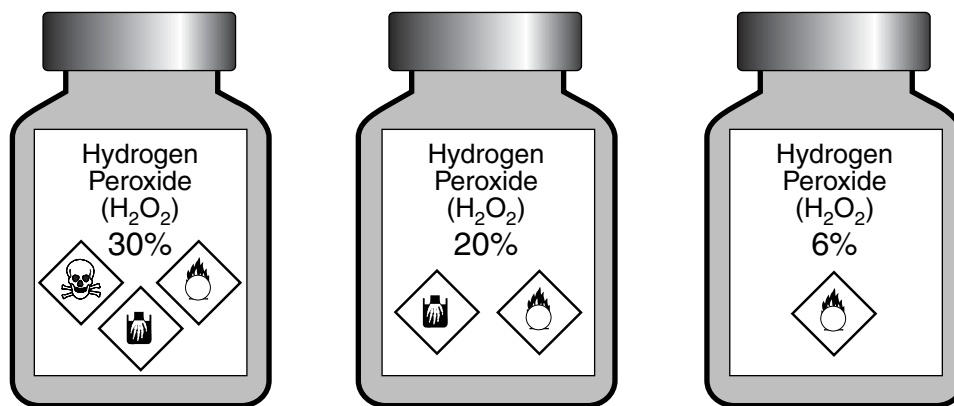
Characteristics of Exhaust Gases

- I.** presence of water vapour
- II.** high temperature
- III.** presence of carbon monoxide
- IV.** acidic nature
- V.** strong odour

- 25.** The characteristics of exhaust gas that would increase the rate of corrosion of the muffler are
- A.** I and III
 - B.** III and V
 - C.** I, II, and IV
 - D.** I, IV, and V

Use the following information to answer question 26.

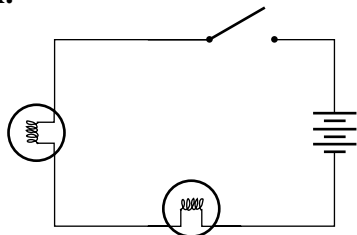
While checking the muffler, the mechanic accidentally cut his finger. He has three bottles of hydrogen peroxide (H_2O_2) that he could use to sterilize the cut.



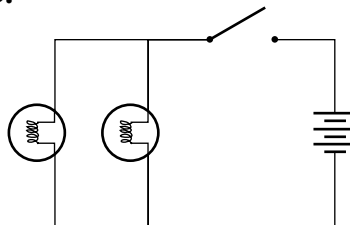
26. After reading the labels on the bottles, the mechanic concludes that as the percentage of H_2O_2 in water decreases, the solution becomes
- A. less flammable
 - B. more concentrated
 - C. more corrosive
 - D. less poisonous
-
27. The mechanic adds ethylene glycol (antifreeze) to an ATV's radiator. Ethylene glycol is produced when ethylene is reacted with oxygen and water. Which of the following word equations describes this reaction?
- A. Ethylene glycol \rightarrow water + oxygen + ethylene
 - B. Water + oxygen \rightarrow ethylene + ethylene glycol
 - C. Oxygen + water + ethylene \rightarrow ethylene glycol
 - D. Ethylene + water \rightarrow ethylene glycol + water

28. While servicing an ATV, the mechanic checks to see if the headlights provide sufficient light. Which of the following diagrams illustrates a circuit that would provide the brightest lights for an ATV?

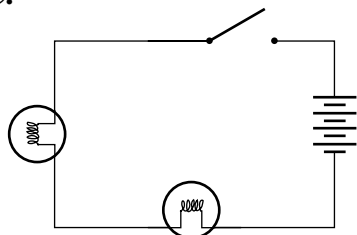
A.



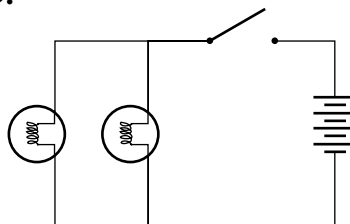
B.



C.



D.



Use the following information to answer question 29.

Unfortunately, exhaust from ATVs can form acid rain through the following reaction:

nitrogen dioxide gas (NO_2) created in the vehicle engine mixes with water vapour (H_2O) in the air to form nitric acid (HNO_3) and nitrous acid (HNO_2)

29. The products in this reaction are
- A. nitrogen dioxide and water vapour
 - B. nitric acid and nitrous acid
 - C. water vapour and nitric acid
 - D. nitrogen dioxide and nitric acid

Use the following information to answer question 30.

In a magazine called “All-Terrain Vehicle,” the mechanic reads an article that explains that pure alcohol can be used as a fuel similar to gasoline. It can be used in specially adapted engines and does not pollute the atmosphere. Pure alcohol can be produced from sugar beets and yeast, but costs more to produce than gasoline.

30. Which of the following perspectives are represented in this article?

- A. Economic and educational
 - B. Environmental and educational
 - C. Environmental and economic
 - D. Technological and educational
-

Use the information to answer numerical-response question 3.

The mechanic decides to adapt some ATV engines to use alcohol as a fuel. He will store the alcohol in an underground fuel storage tank with a volume of 10 000 L. The mechanic knows that the density of pure alcohol is 0.79 g/mL.

Numerical Response

3. A volume of 10 000 L of pure alcohol has a mass of _____ kg.

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

Use the following information to answer question 31.

It is not uncommon for ground squirrels to be killed by ATVs. At another resort, data on the number of ground squirrels killed by ATVs was collected over a five-year period.

Year	Ground squirrel population	Number of ground squirrels killed
1994	125	25
1995	132	21
1996	140	14
1997	150	11
1998	180	7

31. From the point of view of natural selection, environmentalists inferred that the
- A. remaining ground squirrels had learned to avoid ATVs
 - B. slower ground squirrels were taught to stay away from ATVs
 - C. faster ground squirrels passed on their survival traits to their offspring
 - D. faster ground squirrels survived and taught their offspring to avoid being hit

The lake in front of the resort is deep and has very clear water, which makes it ideal for scuba diving.



Use the following information to answer question 32.

In order to keep warm while diving, scuba divers wear a wet suit.

The resort's Activities Director reads about the following four types of wet suits.

Suit	Insulating materials	Average thickness of materials (cm)	R.S.I. value of materials/cm
1	neoprene	1.0	0.10
	water	0.3	0.02
2	neoprene	1.0	0.10
	air	1.0	0.15
3	rubber	1.5	0.05
	water	0.2	0.02
4	rubber	1.5	0.05
	air	0.6	0.15

32. Which suit would provide the greatest insulating value?

- A. Suit 1
- B. Suit 2
- C. Suit 3
- D. Suit 4

Use the following information to answer question 33.

To explain how a wet suit keeps you warm, the Activities Director demonstrates different methods of heat transfer, as shown below. The crumpled piece of paper represents “heat.”

Method 1: The paper is thrown.



Method 2: The paper is carried from one person to another person.



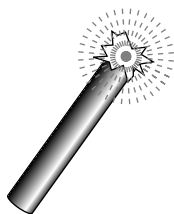
Method 3: The paper is passed from one person to another.



33. The three methods of heat transfer illustrated above **best** correspond to, respectively,
- A. convection, radiation, and conduction
 - B. radiation, convection, and conduction
 - C. conduction, radiation, and convection
 - D. convection, conduction, and radiation

Use the following information to answer question 34.

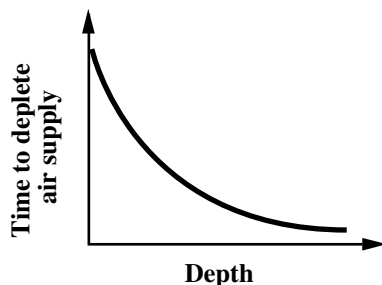
The Activities Director gives you a sodium flare to help you see better during your dive. You know that a reaction between the sodium and the water will cause the flare to glow brightly.



34. The reaction that occurs between the sodium and the water is an example of a
- A. physical change in which energy is absorbed
 - B. physical change in which energy is released
 - C. chemical change in which energy is absorbed
 - D. chemical change in which energy is released
-

Use the following information to answer question 35.

Your diving instructor explains that the greater the depth of your dive, the faster you use the air in your diving tank.



35. The reason that the rate of air consumption is greater at greater depths is that
- A. the air is compressed and therefore requires more space
 - B. the increased water pressure on the diving tanks forces more air out
 - C. more air must be supplied to the lungs to keep them inflated
 - D. more air must be supplied to fill the increased size of the lungs

Use the following information to answer numerical-response question 4.

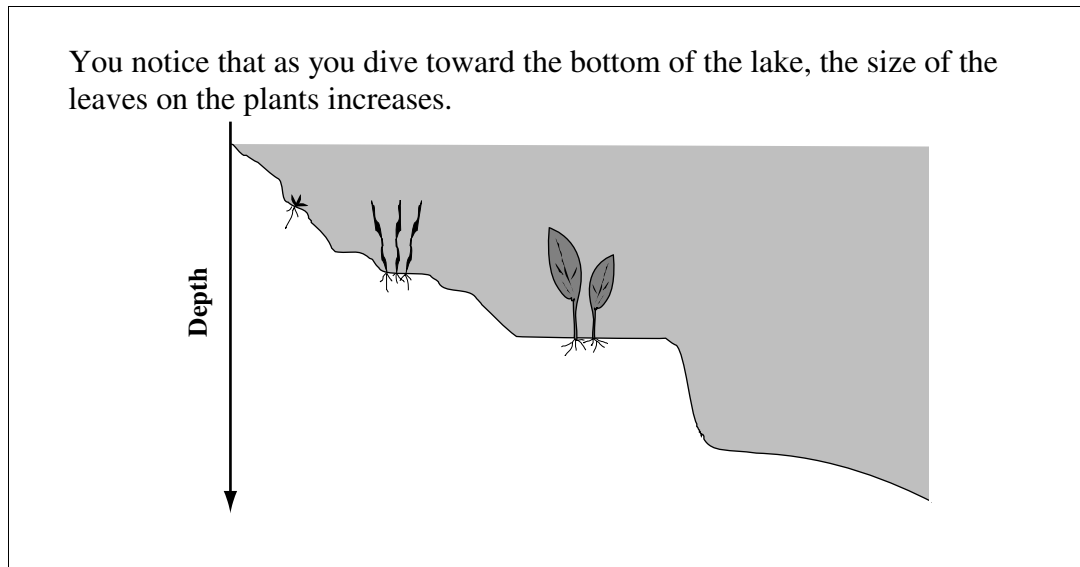
When preparing for your dive, you load the raft. A label on the side of the raft tells you that its volume is 240.5 L. You calculate that the mass of the raft, your instructor, and you is 145.2 kg.

Numerical Response

- 4.** When your instructor and you are in the raft, the maximum mass of equipment that you could add to the raft before it exceeds the density of water is _____ kg. (Round your answer to one decimal place.)

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

Use the following information to answer question 36.



36. The differences in leaf size at different depths is a result of a
- A. behavioural adaptation to different levels of light
 - B. structural adaptation to different levels of light
 - C. behavioural adaptation to different oxygen levels
 - D. structural adaptation to different oxygen levels
-

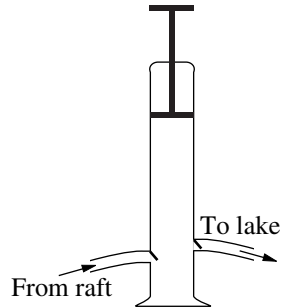
Use the following information to answer question 37.

During your dive, you are amazed by the number and variety of organisms you see. You notice a bottom-dwelling animal that has long feathery arms. Floating among the arms of this animal are dead plant and animal debris.

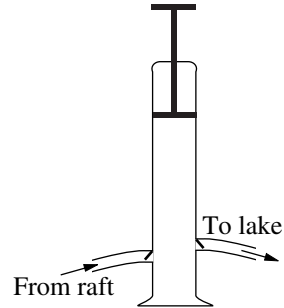
37. In order to collect food, this animal has adaptations that allow it to
- A. increase its surface area to carry out photosynthesis
 - B. help it withstand the cold water temperatures
 - C. create water currents toward its mouth
 - D. increase its surface area to allow for more transpiration

38. Water collects in the raft. Which of the following diagrams shows the position that the valves in a pump could be in if water were being pulled in from the raft and discharged out into the lake at the same time?

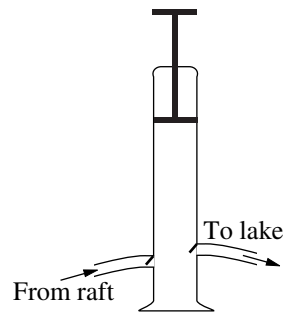
A.



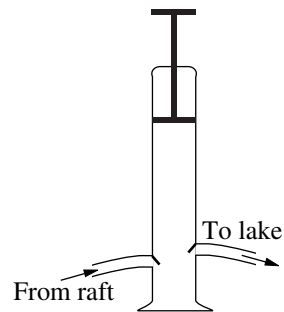
B.



C.



D.



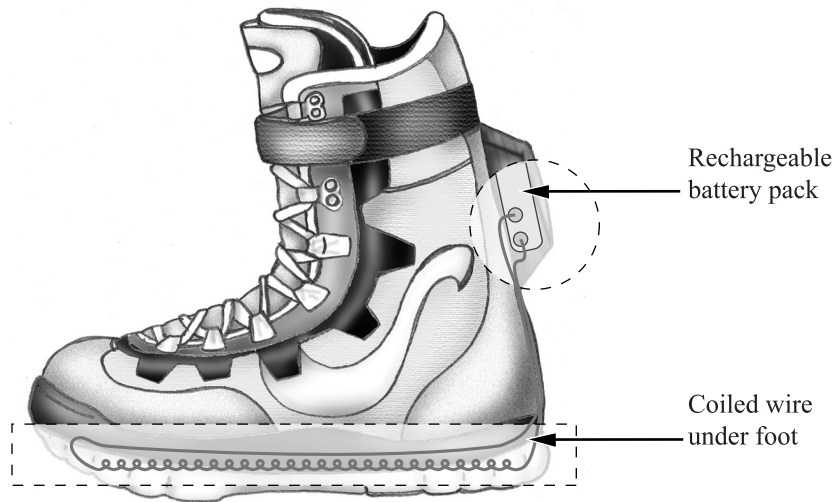
Because of the great summer holiday your family had at the Adventure Holidays Resort, your family decided to return for a winter vacation to take advantage of the mountain terrain and enjoy winter sports.



Snowboard!!!

Use the following information to answer questions 39 and 40.

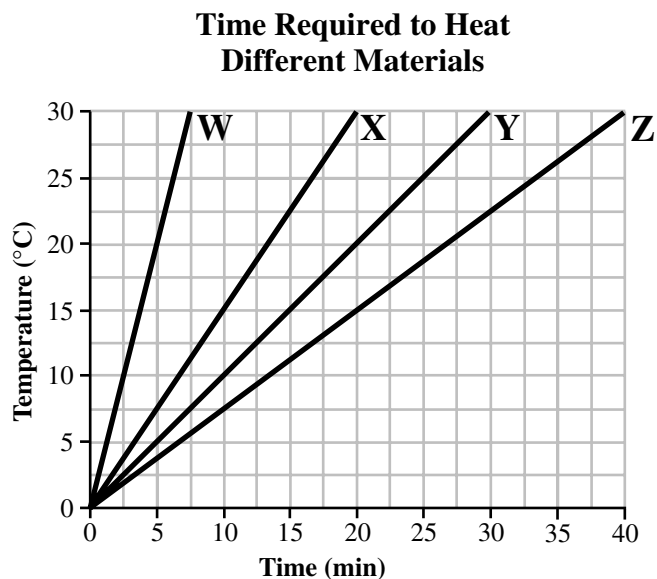
The resort rents you snowboarding boots that are equipped with heating coils that run through the soles of the boots.



39. In order for the coiled wires to give off heat, they must be constructed of a material that
- A. has a high specific heat capacity
 - B. has a low specific heat capacity
 - C. offers high resistance
 - D. offers low resistance

Use the following additional information to answer question 40.

At the rental shop, you see the following graph of four materials of equal mass that were tested to determine which would be the best to use in the soles of boots. The graph illustrates the time it takes to heat each of the materials to 30°C.

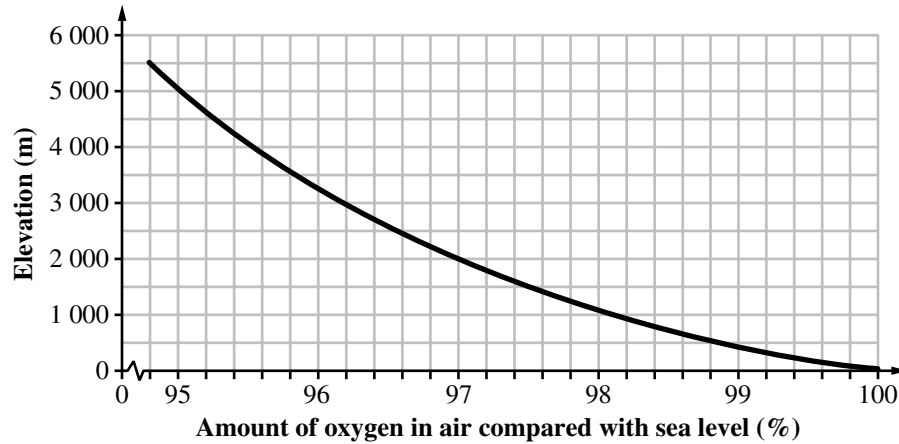


40. You infer from the graph that the material that would keep your feet warmest for the longest time is labelled
- A. W
 - B. X
 - C. Y
 - D. Z

Use the following information to answer questions 41 and 42.

At the chair lift, you notice a chart on oxygen levels and elevation. You know that a person will have difficulty breathing when the air contains less than 97% of the oxygen it has at sea level.

**Percentage of Oxygen in Air
at Different Elevations**



41. Which of the following statements describes the relationship between the percentage of oxygen available and elevation?
- A. As elevation increases, the percentage of oxygen available increases.
 - B. As elevation decreases, the percentage of oxygen available decreases.
 - C. As elevation increases, the percentage of oxygen available decreases.
 - D. As elevation decreases, the percentage of oxygen available remains the same.
42. What is the maximum elevation a person could reach before experiencing difficulty in breathing?
- A. 1 000 m
 - B. 2 000 m
 - C. 3 000 m
 - D. 4 000 m

43. On your way up the chair lift, you experience a popping sensation in your ears. This experience is a result of
- A. a decrease in atmospheric pressure outside the ear
 - B. an increase in atmospheric pressure outside the ear
 - C. a decrease of atmospheric pressure inside the ear
 - D. an increase of atmospheric pressure inside the ear

Use the following information to answer question 44.

Your friend is wearing the same type of jacket as you are, but for some reason, you don't seem to be as warm. Your friend's jacket is dark and yours is light.



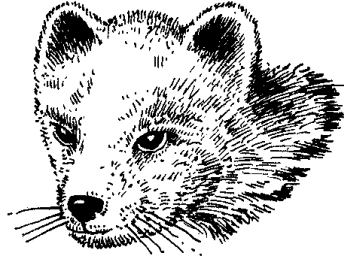
44. The reason that you don't seem to be as warm as your friend is because your friend's jacket is
- A. absorbing the sun's rays and yours is reflecting them
 - B. reflecting the sun's rays and yours is absorbing them
 - C. conducting heat away from his body faster than yours is
 - D. convecting the heat to his body faster than yours is

Use the following information to answer question 45.

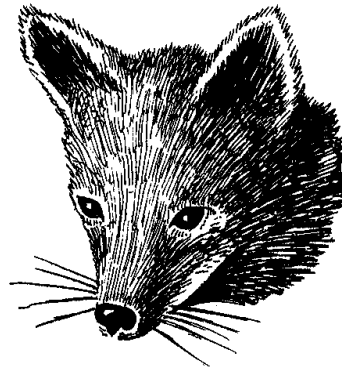
While taking a rest on the side of the hill, you notice a small fox. Foxes in the area have adaptations to limit heat loss in this cold environment.

45. The fox you **most likely** saw was

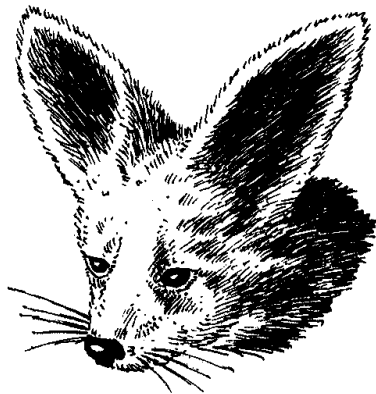
A.



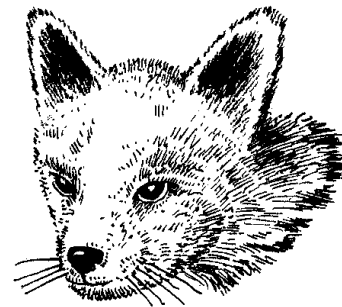
B.



C.



D.



46. Just a few metres from the fox, a rabbit runs out. Rabbits have brown fur in summer and white fur in winter. This characteristic is an example of

- A. sexual dimorphism
- B. polymorphism
- C. structural adaptation
- D. behavioural adaptation

Use the following information to answer question 47.

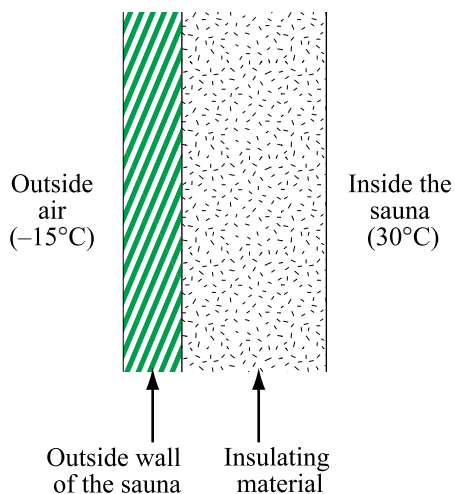
Workers at the resort are preparing for snowboard races by testing the timing equipment. A laser unit shines a beam of light across the starting gate. As a competitor crosses the beam, the circuit is momentarily broken and the timing mechanism is activated.

47. This timing device operates using a

- A. gravitational electric process
- B. thermal electric process
- C. mechanical electric process
- D. photoelectric process

Use the following information to answer question 48.

After snowboarding, you go to the resort's sauna hut. A cross section of the wall of the sauna hut is shown below.



48. Heat transfer through the wall will **mainly** occur from

- A. the outside air into the sauna by radiation
- B. the outside air into the sauna by conduction
- C. inside the sauna to the outside by conduction
- D. inside the sauna to the outside by radiation

Use the following information to answer numerical-response question 5.

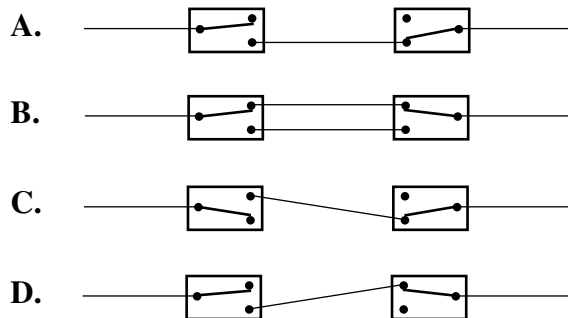
The sauna hut had to be insulated from the cold air. It was insulated with 7 cm of polyurethane (R.S.I. value = 0.38/cm).

Numerical Response

- 5.** The total R.S.I. value of the 7 cm of the polyurethane insulation is _____.
(Round your answer to two decimal places).

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

- 49.** The lights in the sauna are controlled by switches at two different locations. Which of the following diagrams illustrates this?



Use the following information to answer question 50.

After your sauna, you walk down to the frozen lake and notice a moose walking across the ice-covered lake.

- 50.** A structural adaptation of moose that enables them to reduce heat loss is
- A.** migrating south when they get cold
 - B.** growing a thick undercoat of winter hair
 - C.** having large ears to help locate food sources
 - D.** changing colour in the winter

***You have now completed the test.
If you have time, you may wish to check your answers.***

KEY
2000 Grade 9 Science
Achievement Test

Item	Key	Item	Key
1	C	27	C
2	D	28	D
3	B	29	B
4	B	30	C
5	D	NR3	7900
6	C	31	C
7	A	32	B
NR1	4123	33	B
NR2	4213	34	D
8	A	35	C
9	D	NR4	95.3
10	B	36	B
11	D	37	C
12	A	38	A
13	B	39	C
14	D	40	D
15	D	41	C
16	A	42	B
17	D	43	A
18	C	44	A
19	A	45	A
20	B	46	C
21	C	47	D
22	A	48	C
23	B	NR5	2.66
24	B	49	B
25	C	50	B
26	D		

November 17, 1999