BRITISH COLUMBIA
The Best Place on Earth

Science 10

Examination Booklet
2011/12 Released Exam for T/S

Exam B

DO NOT OPEN ANY EXAMINATION MATERIALS UNTIL INSTRUCTED TO DO SO.

Examination Instructions

1. On your Answer Sheet, fill in the bubble (Form A, B, C, D, E, F, G or H) that corresponds to the letter on this Examination Booklet.
2. Use a pencil to fill in bubbles when answering questions on your Answer Sheet.
3. When the examination begins, remove the data pages located in the centre of this booklet.
4. Read the Examination Rules on the back of this booklet.

Contents: 42 pages
80 selected-response questions

Examination: 2 hours
Additional Time Permitted: 60 minutes

Suggested Time: 120 minutes

INSTRUCTIONS: For each question, select the best answer and record your choice on the **Answer Sheet** provided. Using a pencil, completely fill in the bubble that has the letter corresponding to your answer.

You have **Examination Booklet Form B**. In the box above #1 on your **Answer Sheet**, fill in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	○	●	○	○	○	○	○	○

LIFE SCIENCE — SUSTAINABILITY OF ECOSYSTEMS

REFER TO DATA PAGES

For this section of the examination, refer to:

- **Names, Formulae and Charges of Some Polyatomic Ions on Data Page 5**
- **The Carbon Cycle on Data Page 8**
- **The Phosphorus Cycle on Data Page 9**
- **Biomes of the World on Data Page 10**
- **The Nitrogen Cycle on Data Page 11**

1. Which of the following examples describes a population?

   A. all of the animals in a valley
   B. all of the Pacific rattlesnakes in a valley
   C. all of the rattlesnakes and garter snakes in a valley
   D. all of the grasses, tumbleweed plants, pine trees, chipmunks, snakes and deer in a valley

Use the following photograph to answer question 2.

yeuanhso.com

2. Which world biome is represented by the photograph?

   A. desert
   B. tundra
   C. boreal forest
   D. temperate deciduous forest

Use the following article on wildflowers in the Italian Alps to answer question 3.

Warming Threatens Wildflowers

Climate change is causing wild mountain flowers to move to higher altitudes, and probably to their eventual extinction. Fifty-two species of plants monitored in the Italian Alps are now found 425 metres higher than they were 48 years ago, in response to a 1.5°C rise in temperature. Researchers point out that as some species have already reached the tops of mountains, they will become extinct if the climate continues to warm.

Photographer: Cathy Hart
www.8wwc.org

Adapted from an article, "Warming threatens wildflowers," *The Vancouver Sun*, August 7, 2007.

3. According to the article, an abiotic factor that would cause these wildflowers to become extinct is

   A. competition.
   B. grazing animals.
   C. warm temperature.
   D. pollinating insects.

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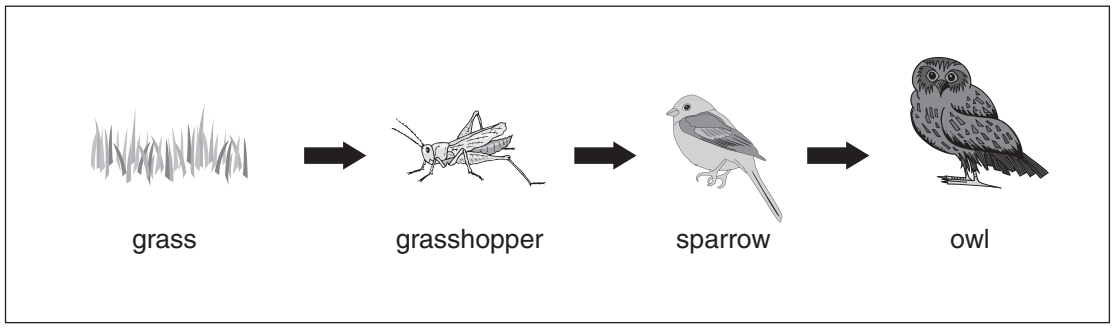
4. You have been asked to design a controlled experiment to test the effect of light on the growth of tomato plants. Which of the following hypotheses is valid?

   A. Bean plants and tomato plants will grow at the same rate when exposed to light.

   B. As the length of time tomato plants are exposed to light increases, their growth increases.

   C. Small tomato plants exposed to 10 hours of light will grow twice as fast as large plants exposed to 5 hours of light.
   D. If the amount of light that tomato plants are exposed to is constant, then an increase in temperature will increase their growth.

Use the following food chain to answer questions 5 to 7.

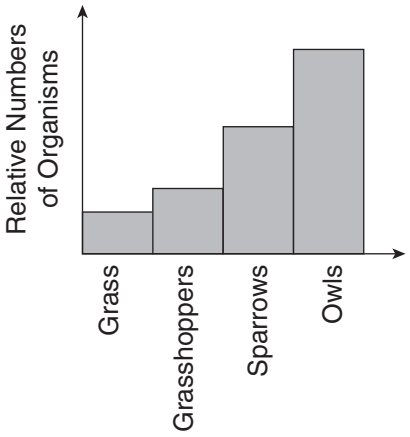


5. The grasshopper is a

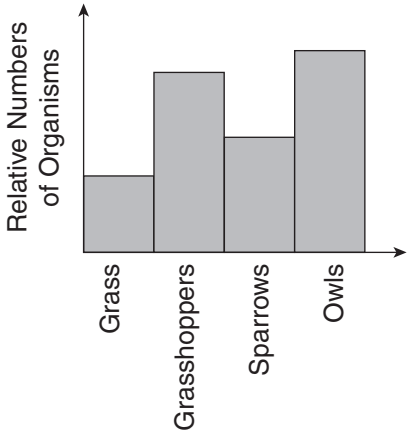
   A. producer.
   B. detrivore.
   C. primary consumer.
   D. secondary consumer.

6. Which of the following graphs represents the relative numbers of organisms in the food chain?

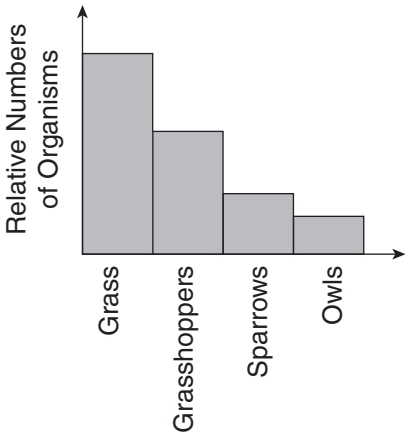
A.



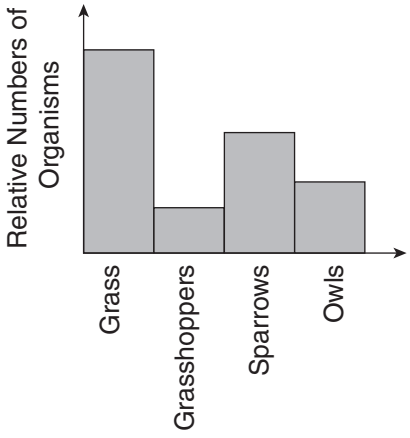
B.



C.



D.



7. The greatest biomagnification of a herbicide applied to grass would be found in

   A. the owl.
   B. the grass.
   C. the sparrow.
   D. the grasshopper.

Use the following information to answer question 8.

Tiny bacteria-carrying nematode worms can be used as a biological control for cockroaches. The worm has no known effect on other soil-dwelling organisms, plants or humans. The worm penetrates the cockroach and releases bacteria which kill the insect. After breeding for several generations inside the corpse, the food supply is exhausted and hundreds of tiny bacteria-carrying worms break out looking for new cockroaches to infect.

8. Mutualism exists between

   A. worms and bacteria.
   B. worms and cockroaches.
   C. bacteria and cockroaches.
   D. cockroaches and humans.

Use the following article on melting permafrost in Canada's north to answer question 9.

Melting Permafrost May be Less of Threat

Climate Change: Moss will grow, then capture and store gas.

The thawing of vast stretches of Canadian permafrost—widely seen as a "ticking time bomb" of climate change because of its expected liberation of billions of tonnes of stored methane and carbon dioxide—may be much less of a threat than previously believed, according to a new study of freshly unfrozen peatlands across Western Canada's northern frontier.

Although the melting of underlying permafrost will release huge amounts of greenhouse gases, researchers who sampled three sites in boreal forests of Alberta, Saskatchewan and Manitoba have discovered that the warmer, softer, wetter soil that results also promotes the growth of new mosses that capture and store about as much carbon from the atmosphere as the thawed ground releases.

Adapted from an article by Randy Boswell, "Melting permafrost may be less of threat," *The Vancouver Sun*, August 14, 2007.

9. How does melting permafrost affect carbon stores in the carbon cycle?

	Carbon stores in organic matter in soil	Carbon stores in terrestrial vegetation
A.	increase	increase
B.	increase	decrease
C.	decrease	increase
D.	decrease	decrease

10. Which of the following is a valid contrast between the phosphorus cycle and the nitrogen cycle?

A. Nitrogen enters terrestrial ecosystems through fertilizers but phophorus does not.

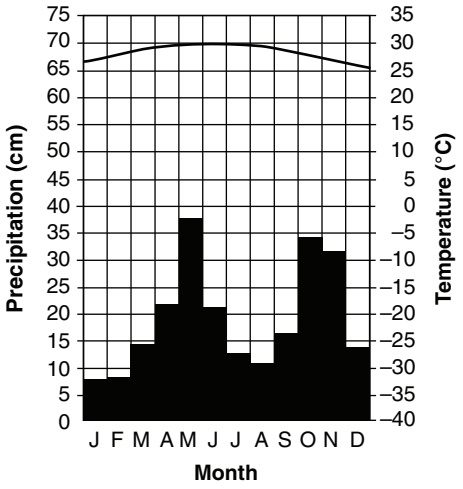
B. Nitrogen enters the atmosphere through bacterial action but phosphorus does not.

C. Nitrogen enters ecosystems through leaching and run-off but phosphorus does not.

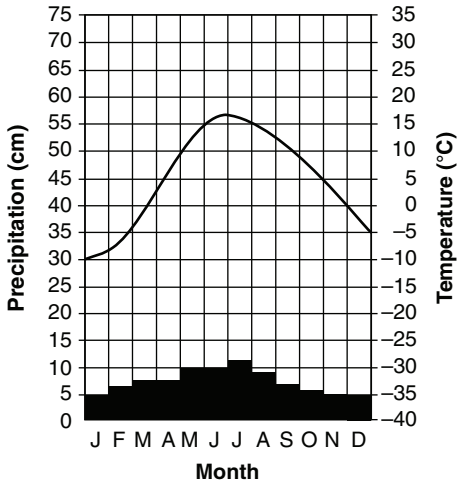
D. Nitrogen enters terrestrial ecosystems through the decay of plant and animal waste but phosphorus does not.

11. Which of the following climatographs represents a city in the desert of the southern hemisphere?

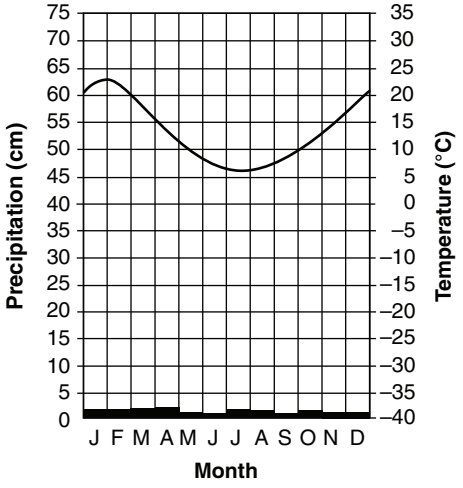
A.



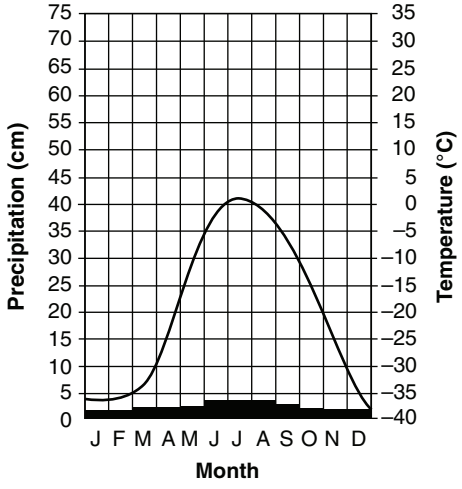
B.



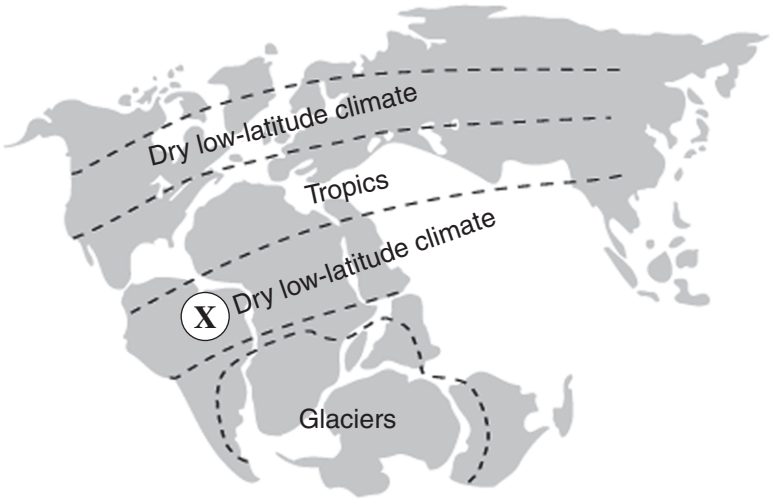
C.



D.



Use the following information to answer question 12.



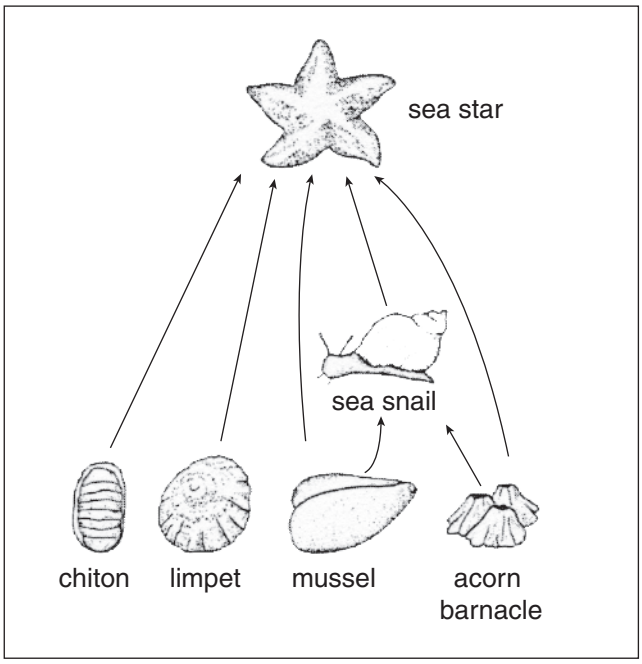
The diagram shows climates of the world 255 million years ago, as determined from the geologic evidence found in rocks of that age. The continents have been arranged to match the edges of the continental shelves.

einstein.byu.edu

12. Which biome exists today and which biome would have existed 255 million years ago, at location (X)?

	Today	255 million years ago
A.	desert	tropical rainforest
B.	desert	desert
C.	tropical rainforest	desert
D.	tropical rainforest	tropical rainforest

Use the following food-web diagram to answer question 13.



13. Which of the following organisms is most likely a keystone species in the community illustrated?

    A. limpet
    B. sea star
    C. sea snail
    D. acorn barnacle

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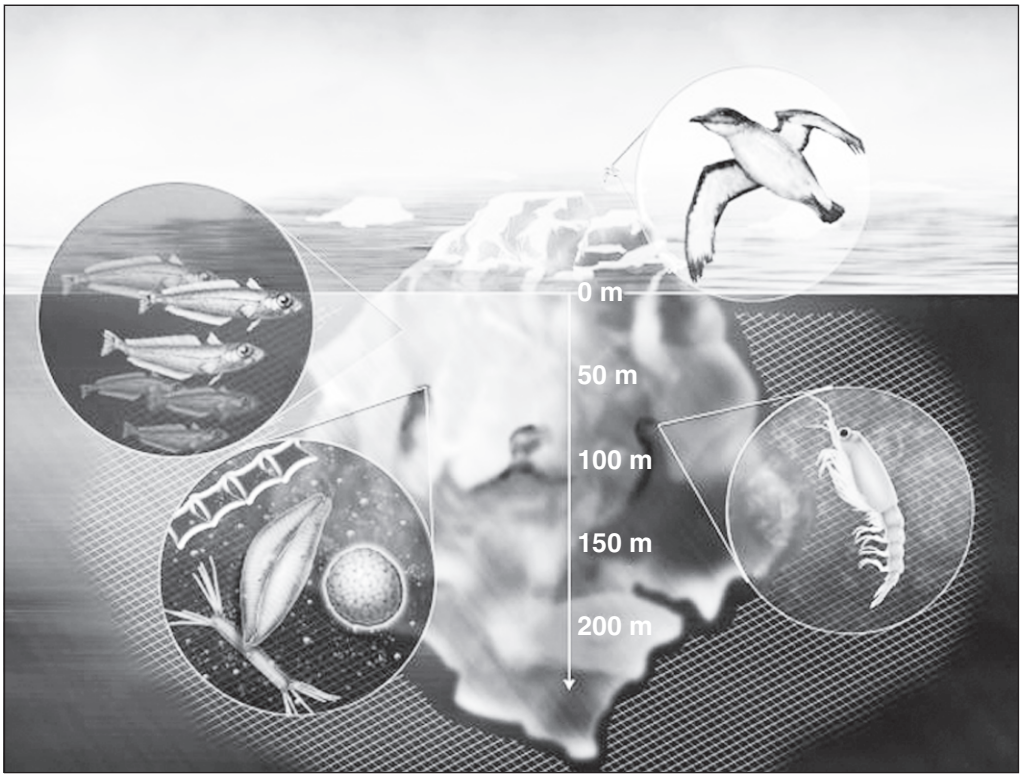
14. The breakdown of organic substances, including pollutants, into simpler compounds through biological action is called

    A. biodiversity.
    B. biodegradation.
    C. bioaccumulation.
    D. biomagnification.

Use the following information about icebergs breaking off Antarctica to answer questions 15 and 16.

Icebergs Breaking Off Antarctica Are Unexpected Hotspots of Biological Productivity.



Icebergs hold trapped nutrients, which they release far out at sea as they melt.

"Global climate change is causing Antarctic ice shelves to shrink and split apart, yielding thousands of free-shifting icebergs in the nearby Weddell Sea," states a news release from the University of California at San Diego. "These floating islands of ice—some as large as 20 kilometres across—are having a major impact on the ecology of the ocean around them, serving as "hotspots" for ocean life, with thriving communities of seabirds above and a web of phytoplankton, krill and fish below."

The researchers found that the release of nutrients trapped by icebergs creates a "halo effect" with significantly increased phytoplankton and krill populations out to a three-kilometre radius around the icebergs. Higher abundance of phytoplankton and krill attracts other forms of sea life and may help offset climate change by absorbing larger amounts of carbon dioxide from the atmosphere.

Adapted from an article by the University of California, San Diego, "Antarctic Icebergs: Hotspots of Ocean Life," *News Wise*, June 20, 2007.

15. What occurs in the “halo” zone around these icebergs?

A. As the prey population decreases, the predator population decreases.
B. As the prey population decreases, the predator population increases.
C. As the prey population increases, the predator population decreases.
D. As the prey population increases, the predator population increases.

16. Which of the following statements describes the effect these icebergs have on the biodiversity around them?

A. The variety found within a species is increasing but the number of different species is decreasing.

B. The variety found within a species is decreasing but the number of different species is increasing.

C. Both the variety found within a species and the number of different species is decreasing.

D. Both the variety found within a species and the number of different species is increasing.

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17. What term refers to information that reflects human experience with the environment gained over many generations?

A. exploitation
B. biodiversity
C. proliferation
D. traditional ecological knowledge

18. Adaptive radiation is most likely to occur

A. when environmental conditions change and the members of a species lack adaptive traits to survive.

B. when environmental conditions remain the same and the proportion of individuals within the species that lack adaptive traits increases.

C. when environmental conditions remain the same and the proportion of individuals within the species that possess similar adaptive traits increases.

D. when environmental conditions change and the adaptive traits of the species favour survival and reproduction of members with different traits.

Use the following photograph of Mount St. Helens following the 1980 eruption to answer question 19.

Courtesy of U.S. Geological Survey

19. During the eruption of Mount St. Helens in 1980, the surrounding forest was covered with volcanic ash and mud flows. Slowly soil formed and pioneer plants followed. Shrubs and trees now also grow there. This is an example of

A. natural selection.
B. biomagnification.
C. primary succession.
D. a climax community.

Use the following information to answer question 20.

American Bullfrog

The American bullfrog can get as big as a chicken and eat a snake. It was brought into BC by an entrepreneur who wanted to start cooking up the legs, but that didn't pan out, so he released them.

www.canada.com

The Threat: This bullfrog eats just about anything, and a lot of it. "They will out-compete and prey upon native frogs," says Mike Dodd with the University of Victoria (UVic). That includes BC's endangered red-legged frog.

The Effort: Besides some physical removal programs, the focus is to keep this pest from spreading. The Bullfrog Project at UVic is trying to raise awareness that people shouldn't move bullfrogs around.

What you can do: Join volunteer efforts to track and eradicate the bullfrog. Visit BullfrogControl.com or call 250-388-5831.

Adapted from an article, "Invasive Species: American Bullfrog," *The Province*, August 5, 2007.

20. Which of the following statements describes the American bullfrog in BC ecosystems?

I	They are a foreign species.
II	They prey upon native species.
III	They eat the prey of native species.

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

Use the following article to answer questions 21 and 22.

The Urban Bird


environment.newscientist.com

Entire populations of birds across Europe are changing their songs in order to be better heard above the noise of the city.

It is well established that some birds are able to change their songs to adapt to different environments. In 2004, researchers showed that individual nightingales made their songs much louder so they could be heard over urban noise. Now, researchers have shown this adaptation is happening within other bird populations in cities around Europe.

Researchers in the Netherlands recorded and compared *Parus major* (a type of song bird) singing in 10 European cities and in nearby forests. The songs are used for attracting mates or defending territory. They found that in all cities, the birds' songs were sung faster and in higher pitches than in nearby forests. Researchers noted that the differences between the urban and rural songs are "remarkably" consistent across all of the sites surveyed.

This is explained by the fact that urban noise pollution, most of which comes from traffic, tends to be at a lower pitch. This drowns out low-pitched birdsong notes.

Another factor contributing to the high-pitched and faster urban songs is the relative openness of city landscapes compared to forests. Earlier work showed that songs in forested habitats were sung lower and more slowly than those in open countryside because these songs are less likely to be lost in reflections in the dense foliage found within forest habitats.

Adapted from an article by Catherine Brahic, "Urban songbirds raise their voices to be heard," *NewScientist.com*, December 4, 2006.

21. The change in bird songs is due to

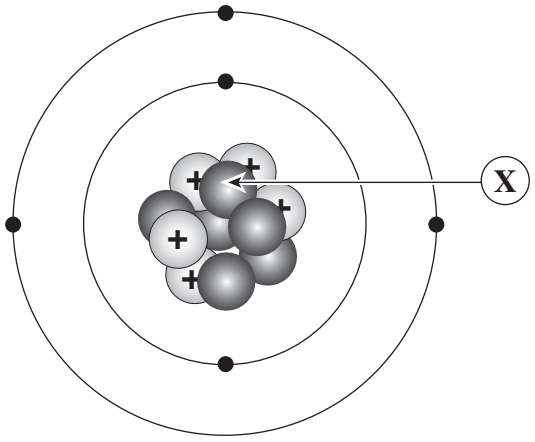
    A. urban noise pollution.
    B. dense foliage in forest habitats.
    C. air pollution in European cities.
    D. a decrease in the songbird population.

22. If the development of different songs among urban and country birds results in two species, this is an example of

    A. natural selection.
    B. a foreign species.
    C. a climax community.
    D. ecological succession.

REFER TO DATA PAGES	For this section of the examination, refer to: • Periodic Table of the Elements on Data Page 2 • pH Scale on Data Page 3 • Alphabetical Listing of the Elements on Data Page 4 • Names, Formulae and Charges of Some Polyatomic Ions, Names and Formulae of Common Acids, and Prefixes on Data Page 5

Use the following diagram of a boron atom to answer question 23.



23. Subatomic particle (X) is

A. an ion.
B. a proton.
C. a neutron.
D. an electron.

24. Which of the following is a list of diatomic elements?

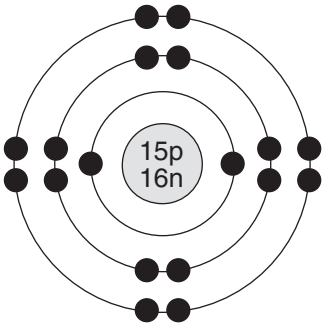
A. $H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2$

B. $H_2, N_2, O_2, Br_2, F_2, C_2, Na_2$

C. $H_2, N_2, O_2, He_2, Ne_2, Cl_2, Br_2$

D. $N_2, Rn_2, O_2, He_2, Cl_2, Ne_2, Br_2$

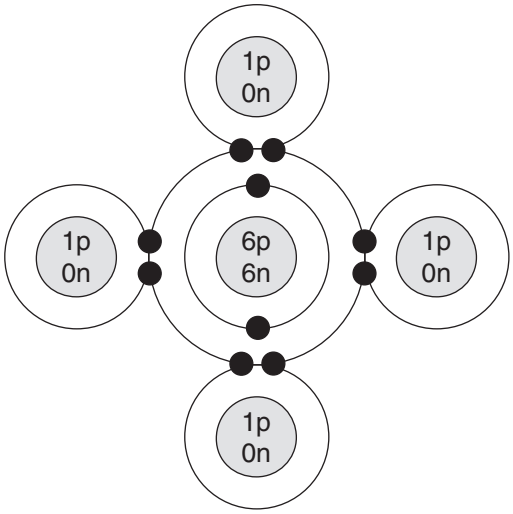
Use the following Bohr model to answer question 25.



25. What is represented by the Bohr model shown above?

A. argon atom
B. gallium ion
C. phosphorus ion
D. phosphorus atom

Use the following Bohr diagram of a molecule to answer questions 26 and 27.



26. The molecule has four covalent bonds.

    A. The statement is supported by the diagram.
    B. The statement is refuted by the diagram.
    C. The statement is neither supported nor refuted by the diagram.

27. How many lone pairs of electrons are in the molecule?

    A. 0
    B. 2
    C. 4
    D. 6

Use the following Lewis diagram for a carbon atom to answer question 28.

28. What do the number of dots represent?

A. the number of protons in the atom
B. the total number of electrons in the atom
C. the number of electrons lost from the atom
D. the number of valence electrons in the atom

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29. An atom of which of the following elements has the most unpaired electrons?

A. neon
B. boron
C. fluorine
D. hydrogen

Use the following Lewis diagram to answer question 30.

30. Which of the following pairs of elements could be represented by X and Y?

	X	Y
A.	beryllium	chlorine
B.	chlorine	hydrogen
C.	hydrogen	carbon
D.	hydrogen	chlorine

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31. Which of the following compounds will conduct electricity and react with magnesium metal to produce hydrogen gas?

A. sodium chloride
B. hydrochloric acid
C. calcium hydroxide
D. sodium hydrogen carbonate

Use the following article to answer questions 32 to 34.

Acid Rain

Normal rainwater is naturally slightly acidic with a pH that ranges between 4.4 and 5.6. This is the result of carbon dioxide in the air reacting to produce weak carbonic acid. Sea spray, rotting vegetation, plankton and, in some locations, volcanoes are important natural sources of CO_2.

If the pH is less than 4.4, precipitation is called **acid rain**. The chief culprit in acid rain is sulfur dioxide from fossil fuel combustion. Sulfuric acid eventually forms when sulfur dioxide reacts with rainwater.

Adapted from an article by Fred Pearce, "Acid rain," *NewScientist.com*, November 5, 1987.

32. Which indicator would be used to determine if a rainwater sample is acid rain?

A. methyl orange
B. indigo carmine
C. phenolphthalein
D. bromthymol blue

33. According to the article, what is the formula of the acid responsible for acid rain?

A. H_2S
B. SO_2
C. H_2CO_3
D. H_2SO_4

34. The "chief culprit" in acid rain is classified as

A. a base.
B. a metal oxide.
C. a non-metal oxide.
D. a diatomic molecule.

35. Calcium phosphate is found in bones and teeth. What is the chemical formula for this compound?

A. Ca_3P_2

B. Ca_3PO_4

C. $Ca_3(PO_3)_2$

D. $Ca_3(PO_4)_2$

36. What is the ion charge for neptunium in the compound Np_2O_5?

A. 3+
B. 4+
C. 5+
D. 6+

37. What is the name for the compound CoSe?

A. cobalt selenide
B. cobalt(I) selenide
C. cobalt(II) selenide
D. cobalt monoselenide

38. What is the chemical formula for diarsenic pentaoxide?

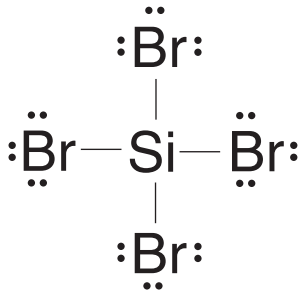
A. AsO

B. As_2O_3

C. As_2O_5

D. As_5O_2

Use the following Lewis diagram to answer question 39.



39. What is the name of the compound shown above?

A. silicon bromide
B. bromine silicide
C. silicon tetrabromide
D. monosilicon bromide

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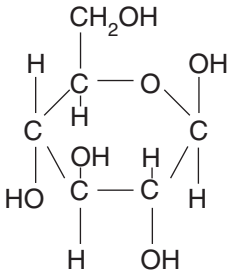
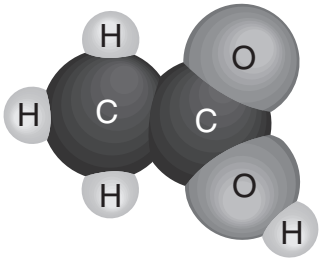
40. Which of the following compounds is inorganic?

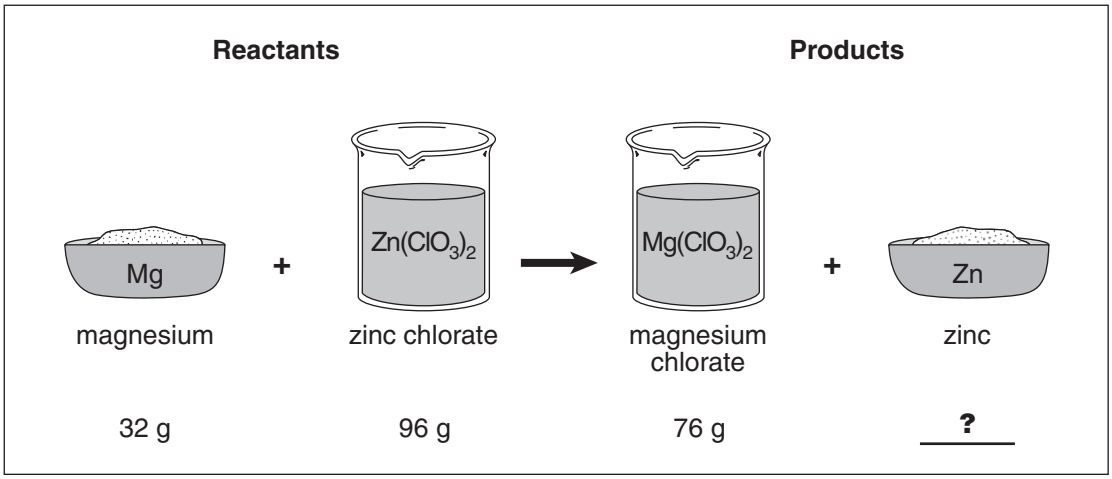
A. CH_3CH_3

B. sodium chloride

C. 

D. 

Use the following experimental set-up to answer question 41.



41. According to the Law of Conservation of Mass, how much zinc was produced?

A. 20 g
B. 44 g
C. 52 g
D. 128 g

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42. What coefficient is needed in front of CO_2 to balance the following combustion reaction?

$$\_\_\_ C_2H_6 + \_\_\_ O_2 \rightarrow \_\_\_ CO_2 + \_\_\_ H_2O$$

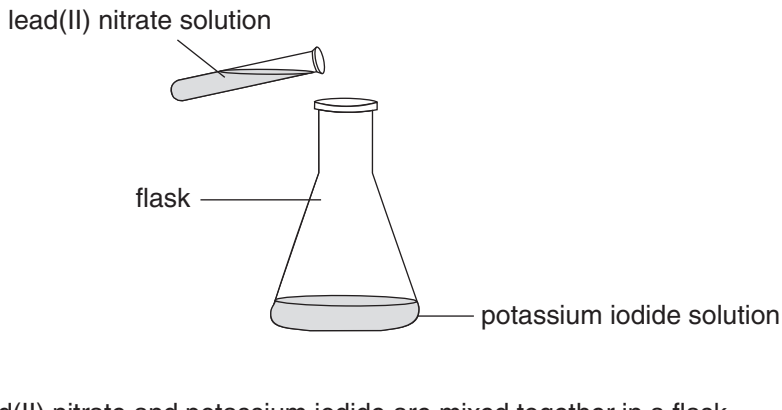
A. 1
B. 4
C. 6
D. 7

43. Magnesium chloride reacts with sodium sulfide to produce magnesium sulphide and sodium chloride. You will find it helpful to write a balanced equation for this reaction in the space provided.

What is the coefficient needed in front of sodium chloride to balance this reaction?

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

Use the following diagram of a lab set-up to answer questions 44 and 45.



Lead(II) nitrate and potassium iodide are mixed together in a flask.

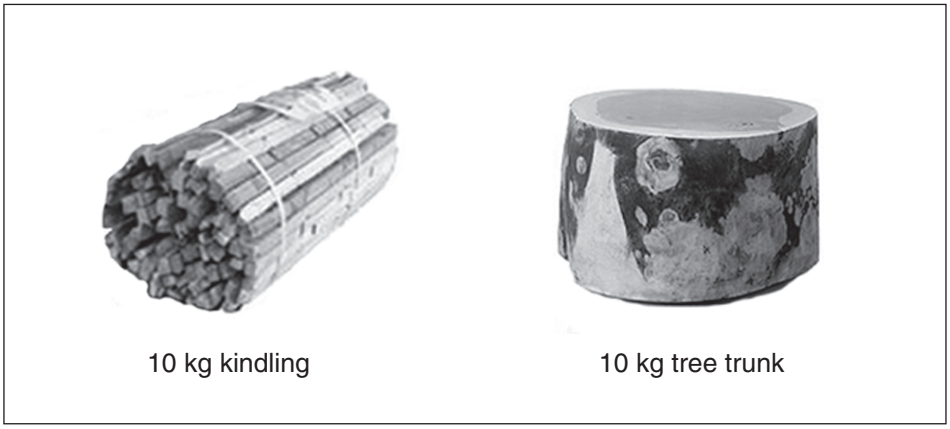
44. What type of chemical reaction would result from the mixing of the two solutions?

A. synthesis
B. neutralization
C. single replacement
D. double replacement

45. Which of the following compounds is a product of the chemical reaction?

A. PbI
B. H_2O
C. KNO_2
D. KNO_3

Use the following photographs of kindling and a tree trunk to answer question 46.



46. Why does the kindling burn faster than the tree trunk?

A. It acts as a catalyst.
B. It has a greater surface area.
C. It contains more thermal energy.
D. It has a greater concentration of wood.

PHYSICAL SCIENCE — RADIOACTIVITY

REFER TO DATA PAGES	**For this section of the examination, refer to:** • **Periodic Table of the Elements on Data Page 2** • **Alphabetical Listing of the Elements on Data Page 4** • **Common Isotope Pairs Chart and Radioactivity Symbols on Data Page 12**

47. What does the mass number of an isotope represent?

A. the number of protons
B. the number of neutrons
C. the number of electrons
D. the total number of protons and neutrons

48. Cobalt-60, $^{60}_{27}\text{Co}$, undergoes beta decay. What is the daughter isotope in this nuclear reaction?

A. $^{59}_{26}\text{Fe}$

B. $^{56}_{25}\text{Mn}$

C. $^{60}_{28}\text{Ni}$

D. $^{59}_{27}\text{Co}$

49. A sealed container contains 200 g of radioactive iodine. After 24 days, the container has only 25 g of radioactive iodine. What is the half-life of this isotope of iodine?

A. 3 days
B. 8 days
C. 12 days
D. 24 days

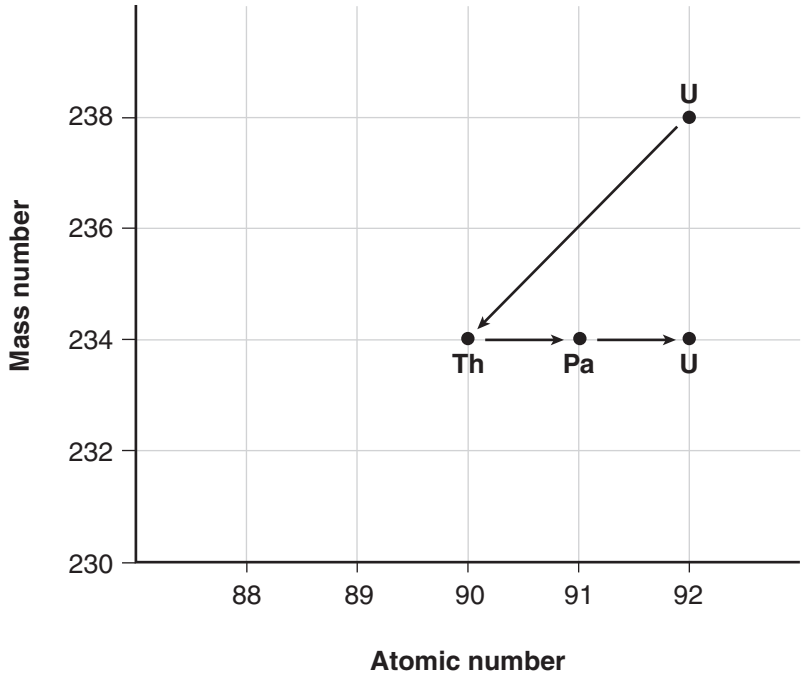
50. A nuclear reaction combines the nucleus of bismuth-209 with a nucleus of nickel-64 to form the element roentgenium-272 as shown below.

$$^{209}_{83}\text{Bi} + {}^{64}_{28}\text{Ni} \rightarrow {}^{272}_{111}\text{Rg} + {}^{1}_{0}\text{n}$$

What type of reaction is occurring?

A. fusion
B. fission
C. beta decay
D. alpha decay

Use the following diagram showing the nuclear decay of U-238 to answer question 51.

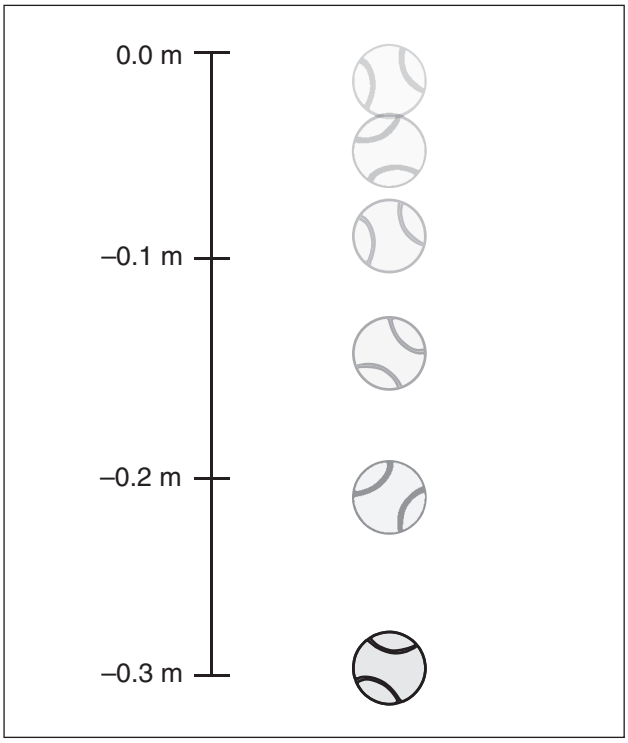


51. Which of the following particles are emitted during the 3-step decay process as U-238 decays to U-234?

A. 2 protons and 4 beta particles
B. 1 alpha particle and 2 protons
C. 2 alpha particles and 2 protons
D. 1 alpha particle and 2 beta particles

REFER TO DATA PAGES	For this section of the examination, refer to: • Units and Abbreviations and Equations of Motion on Data Page 12

Use the following diagram of a falling ball to answer question 52.

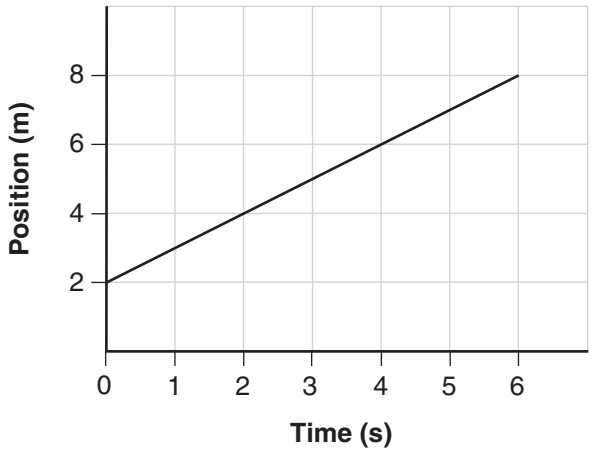


The diagram shows a single ball as it falls.

52. What is the displacement of the ball as it falls from 0.0 m to –0.3 m ?

A. –0.3 m
B. –0.1 m
C. 0.1 m
D. 0.3 m

Use the following position vs. time graph to answer question 53.

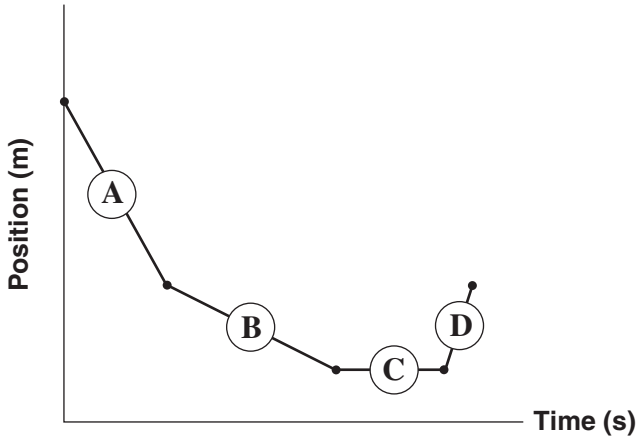


53. Which of the following variables can be determined from the graph?

I	position
II	velocity
III	displacement

A. I only
B. I and III only
C. II and III only
D. I, II and III

Use the following position–time graph for a moving car to answer question 54.



54. During which time interval does the car have the greatest negative velocity?

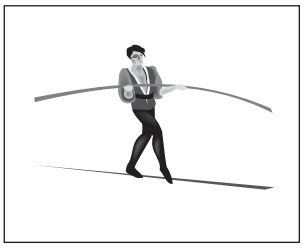
A. (A)

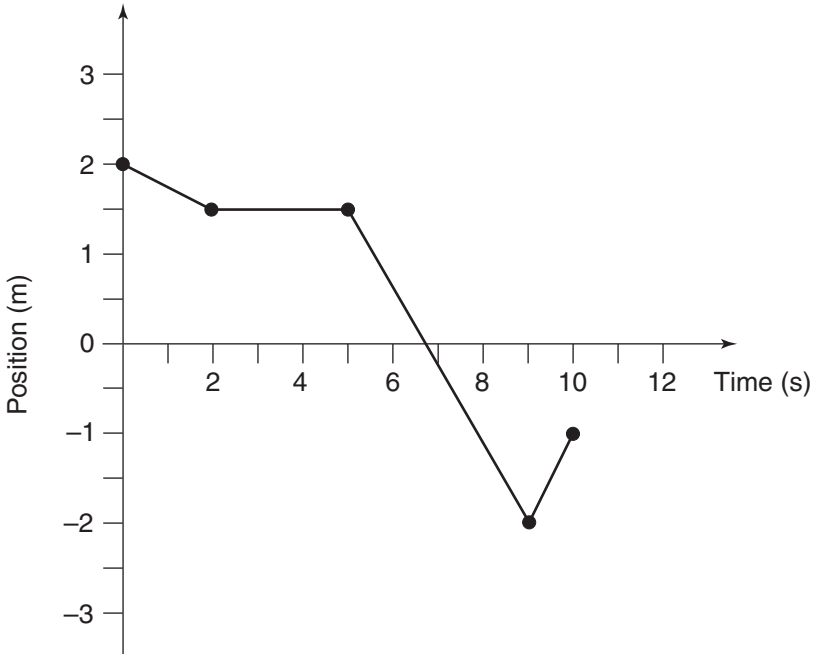
B. (B)

C. (C)

D. (D)

Use the following graphic and position–time graph to answer questions 55 and 56.





55. A tightrope walker starts 2 m from the centre of a rope. Which of the following statements describes the sequence of events that follow?

I	From 0 to 2 s, the walker moves in a negative direction.
II	From 2 to 5 s, the walker stands still.
III	From 5 to 9 s, the walker moves in a positive direction.

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

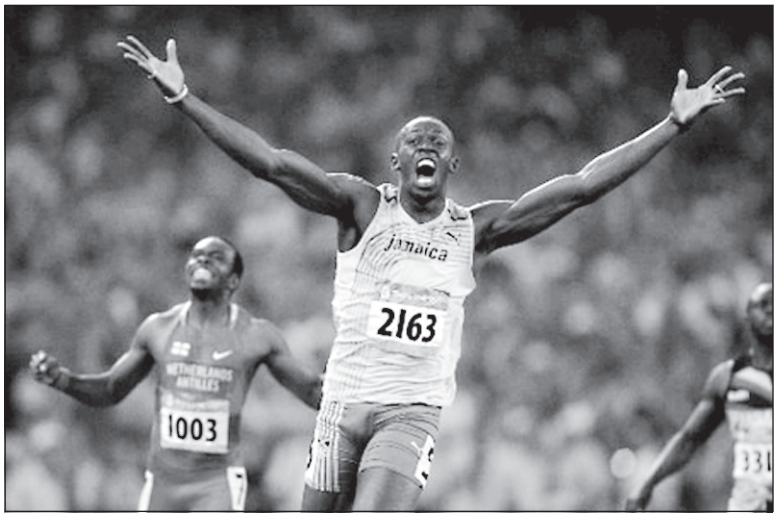
56. During which time interval is the tightrope walker moving with a positive velocity?

A. 0–2 s
B. 2–5 s
C. 5–9 s
D. 9–10 s

57. Which of the following events has the greatest displacement?

A. a boat travelling north at 25 m/s for 8 s
B. a car travelling north at 20 m/s for 10 s
C. a person running north at 4 m/s for 60 s
D. a cyclist travelling north at 10 m/s for 20 s

The following photograph shows Olympian Usain Bolt.



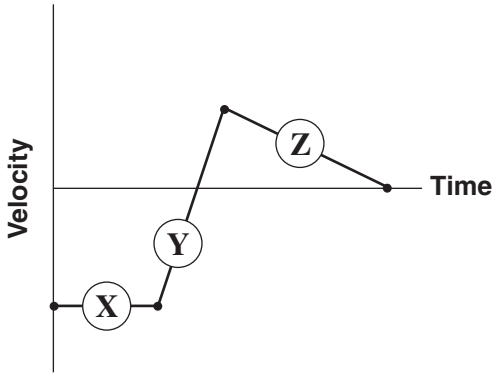
58. In the 2008 Beijing Olympics, Usain Bolt set two world records. He ran the 100 m race in 9.69 s and the 200 m race in 19.30 s. What was his average velocity for each race?

	Average velocity: 100 m race	Average velocity: 200 m race
A.	+0.0969 m/s	+0.0965 m/s
B.	+10.32 m/s	+10.36 m/s
C.	+10.35 m/s	+10.35 m/s
D.	+10.41 m/s	+20.82 m/s

59. A dragonfly travels 100 m north at 8 m/s , then 50 m north at 10 m/s . What is its average velocity?

A. 8.3 m/s north
B. 8.6 m/s north
C. 16.7 m/s north
D. 25.0 m/s north

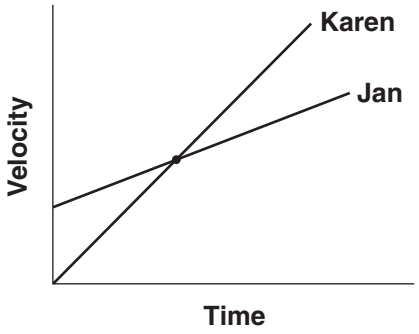
Use the following velocity vs. time graph to answer question 60.



60. The acceleration is negative during

A. interval (X) only.
B. interval (Z) only.
C. intervals (X) and (Y) only.
D. intervals (X), (Y) and (Z).

Use the following velocity vs. time graph illustrating a race between Karen and Jan to answer question 61.



61. At the point where the graph lines cross, Karen and Jan have the same

    A. velocity.
    B. position.
    C. acceleration.
    D. displacement.

---

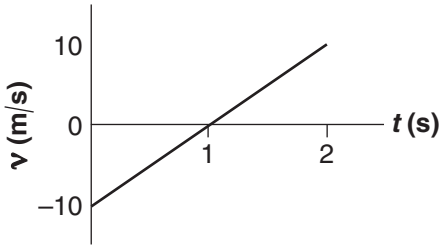
62. The acceleration due to gravity on the Moon is about one-sixth of that on Earth. How would the motion of a ball that is dropped by an astronaut on the Moon compare with the motion of a ball that is dropped from the same height on Earth?

    A. Both balls would have the same acceleration.
    B. Both balls would reach the same maximum speed.
    C. The maximum speed of the ball dropped on the moon would be lower.
    D. The maximum speed of the ball dropped on the moon would be greater.

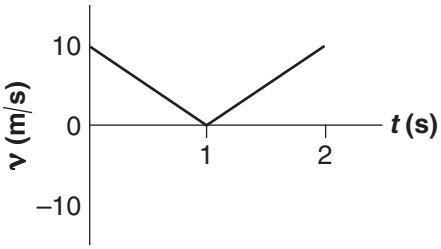
63. A ball thrown upward at $+10$ m/s will reach the top of its path in 1 s where its velocity is 0 m/s. It will return to your hand, reaching a final velocity of -10 m/s.

Which of the following velocity–time graphs represents the ball's motion?

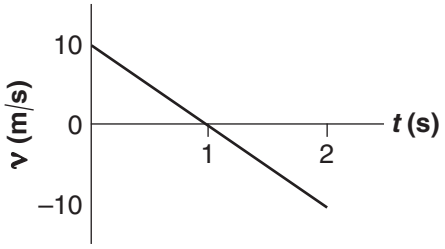
A.



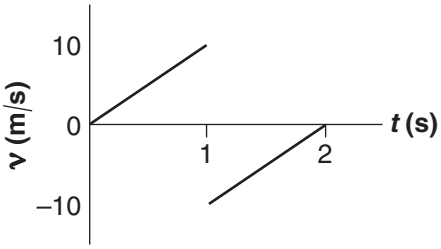
B.



C.



D.



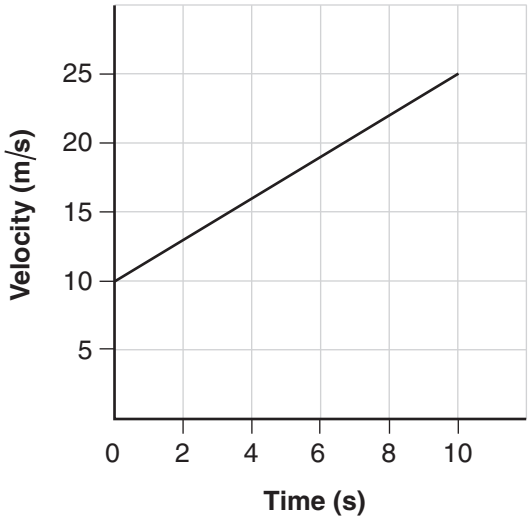
64. A roller coaster car moving at -6 m/s accelerates down a hill and reaches a velocity of -15 m/s in 3 s. What is the change in velocity of the car?

A. -3 m/s
B. -5 m/s
C. -7 m/s
D. -9 m/s

65. A truck driver travelling north on a highway sees an obstruction ahead and slows from $+20$ m/s to $+5$ m/s with an acceleration of -1.5 m/s^2. What was the time interval of acceleration?

A. 3 s
B. 10 s
C. 13 s
D. 17 s

Use the following velocity–time graph of an accelerating car to answer question 66.



66. What is the car's acceleration?

A. $+0.6\,m/s^2$

B. $+1.5\,m/s^2$

C. $+2.5\,m/s^2$

D. $+15.0\,m/s^2$

---

67. Claire kicks a soccer ball, changing its velocity from 0 m/s to +8 m/s in 0.025 s. Calculate the acceleration of the ball.

A. $+0.003\,m/s^2$

B. $+0.2\,m/s^2$

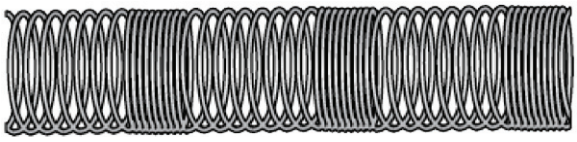
C. $+8\,m/s^2$

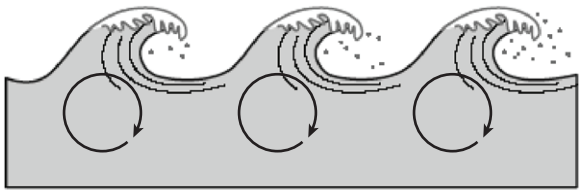
D. $+320\,m/s^2$

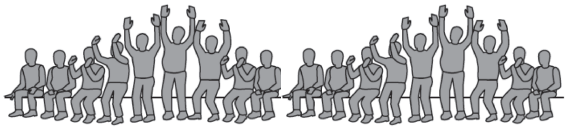
REFER TO DATA PAGES	For this section of the examination, refer to: • Map of the Pacific Coast of North America on Data Page 6 • World Tectonic Plate Boundaries Map on Data Page 7

68. Which of the following illustrations represents the motion of a seismic wave that can travel through all of the Earth's layers?

A. 

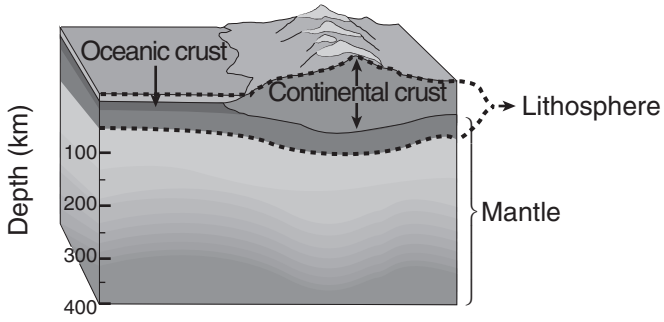
B. 

C. 

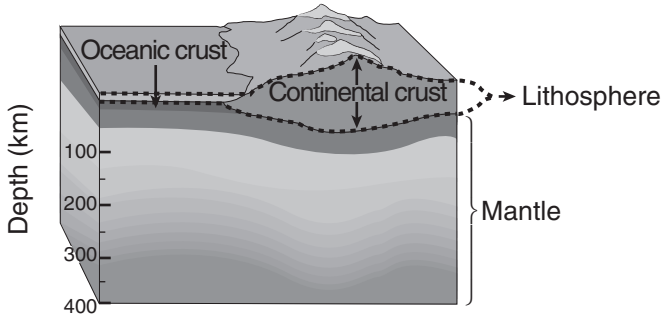
D. 

69. Which of the following diagrams correctly identifies the lithosphere?

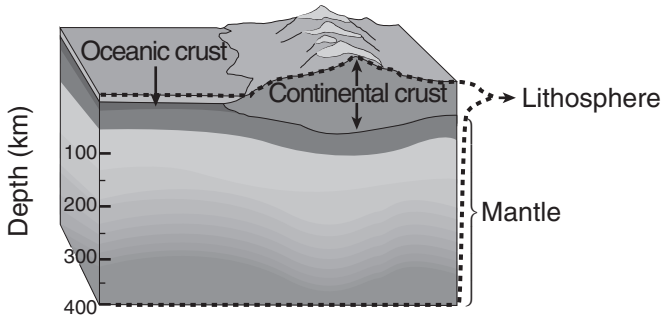
A.



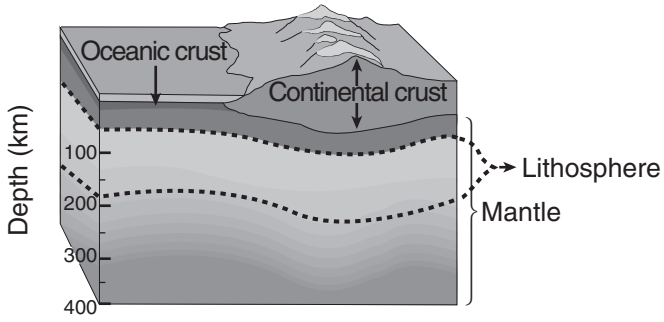
B.



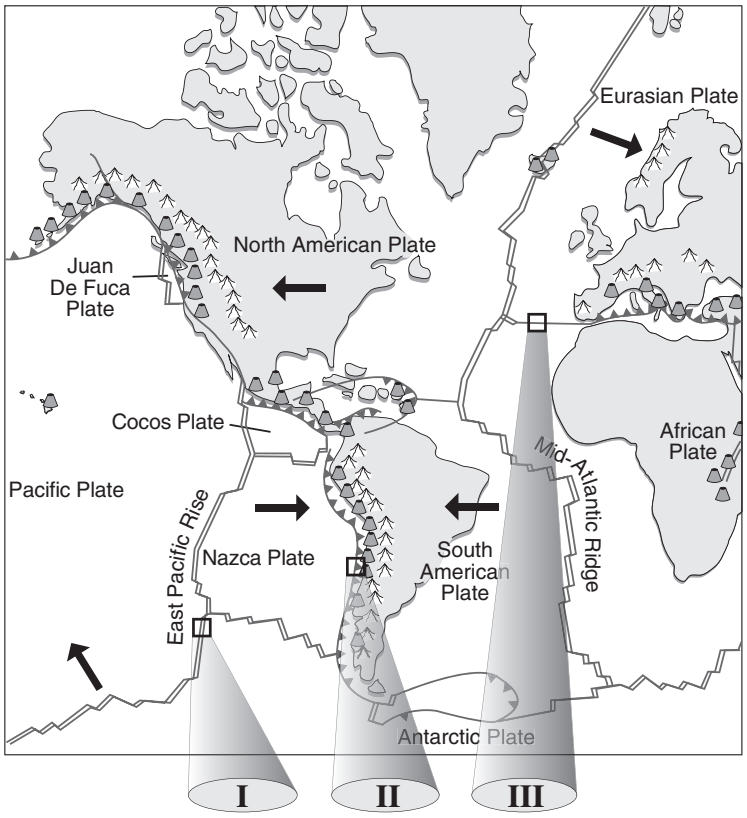
C.



D.



Use the following map showing tectonic plates to answer questions 70 and 71.



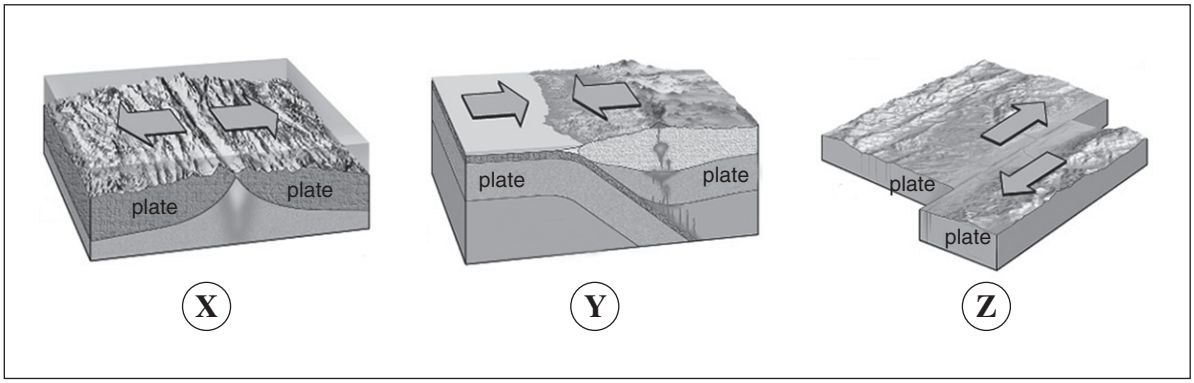
70. What type of plate boundary occurs at location (II)?

A. divergent
B. transform
C. convergent

71. Where on the map is there an oceanic–oceanic plate boundary?

A. I only
B. I and III only
C. II and III only
D. I, II and III

Use the following diagrams showing plate boundaries to answer questions 72 to 74.



72. Identify the mapping symbol associated with the following regions.

	X	Y	Z
A.			
B.			
C.			
D.			

73. What is formed at region (X)?

A. a mid-ocean ridge
B. a subduction zone
C. a deep ocean trench
D. a volcanic island arc

74. What type of earthquakes can occur at region (Z)?

A. deep focus earthquakes only
B. shallow focus earthquakes only
C. intermediate focus earthquakes only
D. shallow, intermediate and deep focus earthquakes

75. Which of the following choices refers to the sinking of the crust into the mantle as a result of both ridge push and gravity?

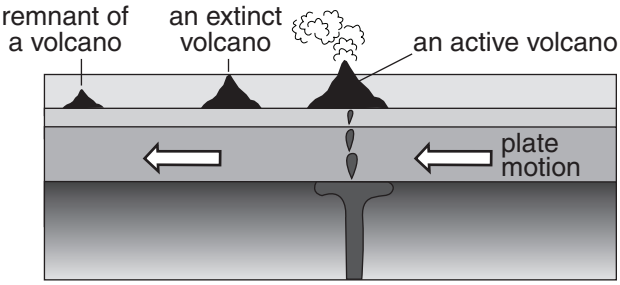
A. hot spot
B. slab pull
C. magnetic reversal
D. formation of a rift valley

76. Which of the following forces are causing the eastward movement of the Nazca Plate?

I	slab pull
II	ridge push
III	mantle convection

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

Use the following diagram to answer question 77.



77. What is responsible for the formation of these volcanoes?

A. a hot spot
B. a transform fault
C. a spreading ridge
D. a subducting plate

Use the following diagram showing how South America fits with Africa to answer question 78.

78. The matching fit of these two coastlines was first used as evidence that

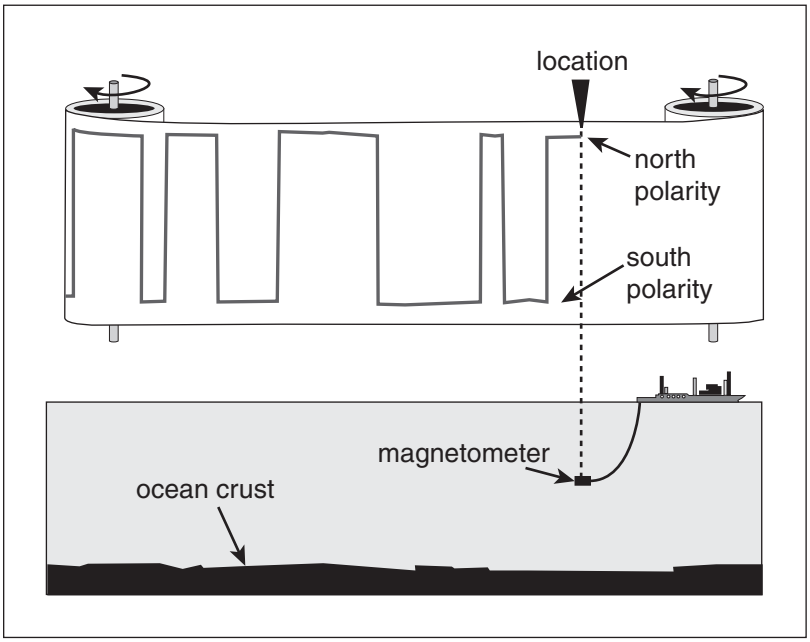
A. Pangea once existed.
B. mantle convection drives plate movement.
C. hot spot volcanoes occur at varied locations on tectonic plates.
D. a mid-ocean ridge formed between South America and Africa.

---

79. Which of the following tectonic features produces the greatest amount of new crust?

A. ocean trenches
B. mid-ocean ridges
C. continental volcanoes
D. continental transform faults

Use the following diagram of the collection of ocean crust magnetometer data to answer question 80.



80. Which of the following geologic features was explained by the pattern of alternating north and south polarities found on the ocean crust?

A. deep-sea trench
B. mid-ocean ridge
C. volcanic island arc
D. hot spot island chain

You have **Examination Booklet Form B**. In the box above #1 on your **Answer Sheet**, ensure you filled in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	○	●	○	○	○	○	○	○

END OF EXAMINATION

Examination Rules

1. The time allotted for this examination is two hours.
   You may, however, take up to 60 minutes of additional time to finish.

2. Answers entered in the Examination Booklet will not be marked.

3. Cheating on an examination will result in a mark of zero. The Ministry of Education considers cheating to have occurred if students break any of the following rules:

   - Students must not be in possession of or have used any secure examination materials prior to the examination session.
   - Students must not communicate with other students during the examination.
   - Students must not give or receive assistance of any kind in answering an examination question during an examination, including allowing their papers to be viewed by others or copying answers from another student's paper.
   - Students must not possess any book, paper or item that might assist in writing an examination, including a dictionary or piece of electronic equipment, that is not specifically authorized for the examination by ministry policy.
   - Students must not copy, plagiarize or present as their own, work done by any other person.
   - Students must immediately follow the invigilator's order to stop writing at the end of the examination time and must not alter an Examination Booklet, Response Booklet or Answer Sheet after the invigilator has asked students to hand in examination papers.
   - Students must not remove any piece of the examination materials from the examination room, including work pages.

4. The use of inappropriate language or content may result in a mark of zero being awarded.

5. Upon completion of the examination, return all examination materials to the supervising invigilator.