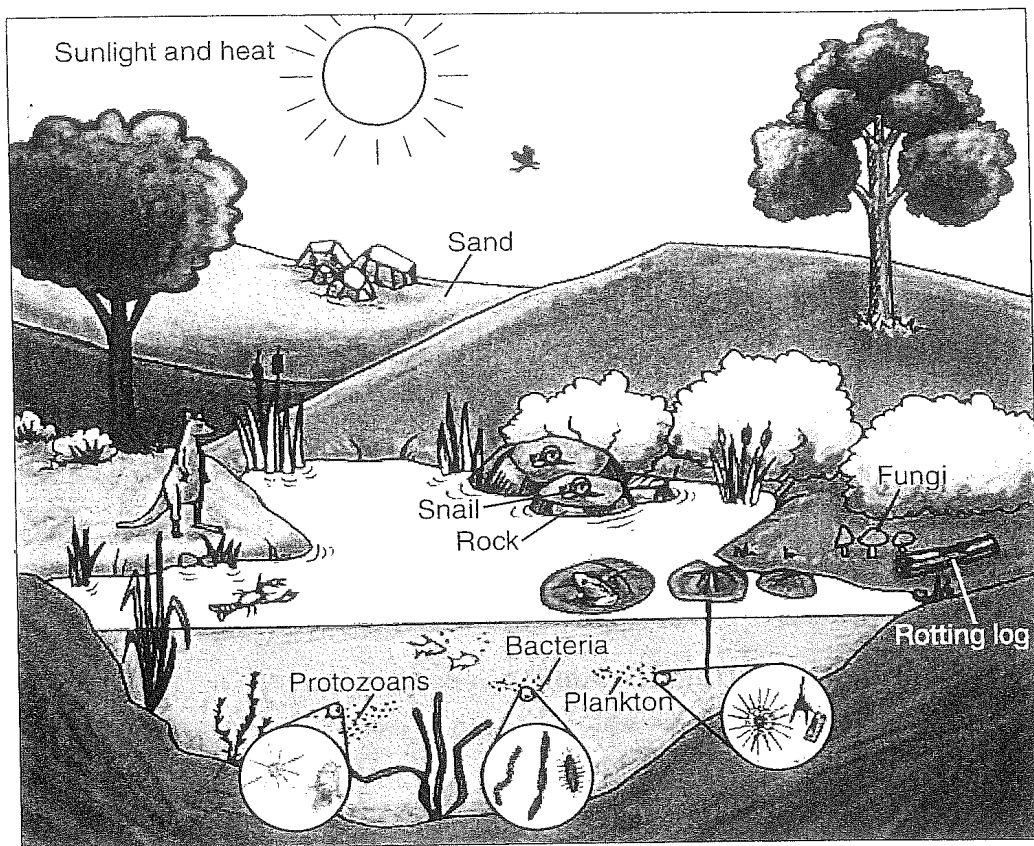


Science 10: Provincial Example Bonanza

1. A specific biome has low growing plants with flexible stalks that bend in the wind. In this biome rapidly moving fires affect the soil only to a shallow depth. The biome is
- A. desert.
  - B. grassland.
  - C. tropical rainforest.
  - D. temperate deciduous forest.

Use the following diagram of a pond and its surroundings to answer questions 2 and 3.



© Westone Services

Abiotic factors include

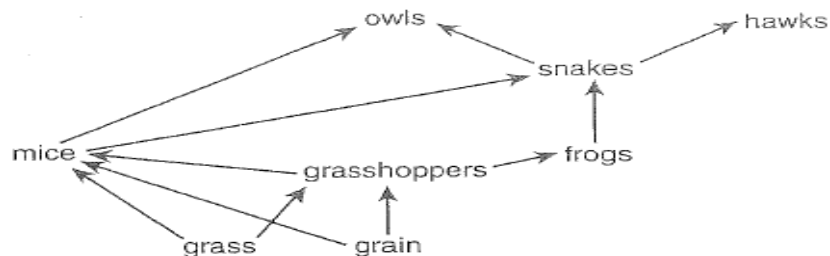
- A. rocks and snails.
- B. sunlight and heat.
- C. plankton and water.
- D. fungi and the rotting log.

A scientist observing all the different species in the area would be studying

- A. a biome.
- B. a population.
- C. a community.
- D. an ecosystem.

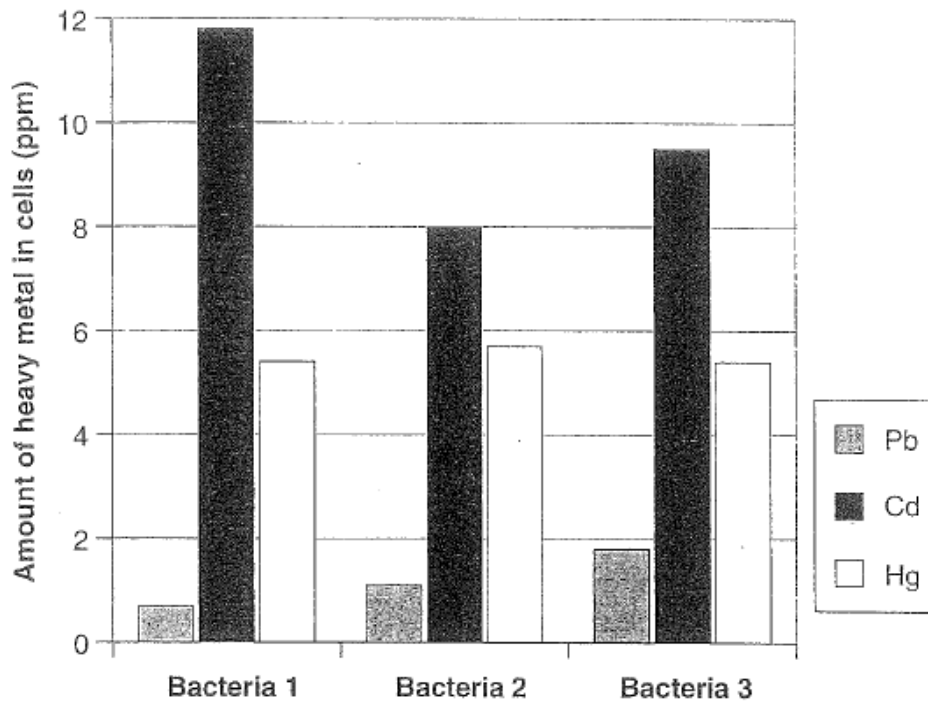
4. Which trophic level contains the greatest amount of energy?
- first trophic level
  - second trophic level
  - third trophic level
  - fourth trophic level
7. Which of the following is an example of predation?
- solar energy causing grass to grow
  - a tree removing minerals from the soil
  - baleen whales eating millions of microscopic organisms
  - bacteria in root nodules of legumes absorbing nitrogen from the atmosphere
8. What form of nitrogen is absorbed by plants?
- $N_2$
  - NO
  - $NO_2^-$
  - $NO_3^-$
9. Carbon trapped within the lithosphere can be released directly into the atmosphere through
- respiration.
  - sedimentation.
  - volcanic eruptions.
  - evaporation from the oceans.

Use the following food web to answer question 14.



14. If a herbicide was sprayed on the grain, the greatest biomagnification of the herbicide would occur in which of the following populations?
- frogs
  - hawks
  - snakes
  - grasshoppers

Use the following diagram and information to answer question 13.



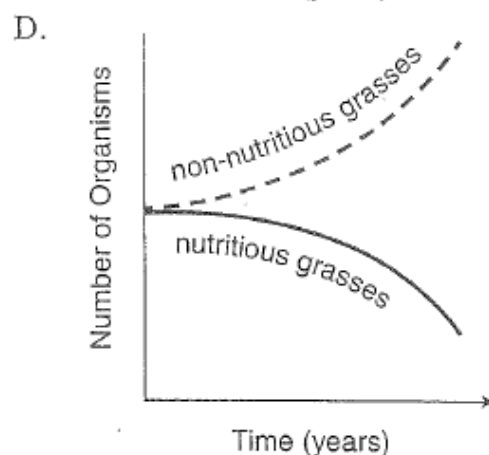
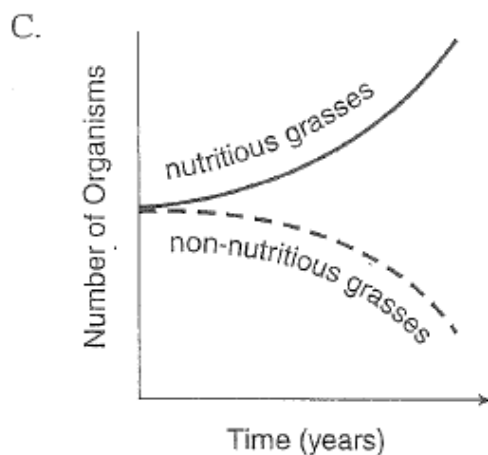
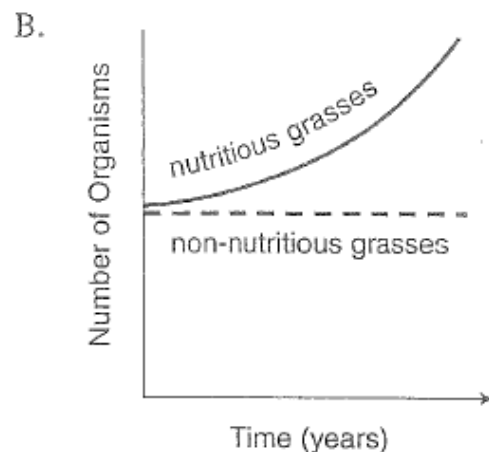
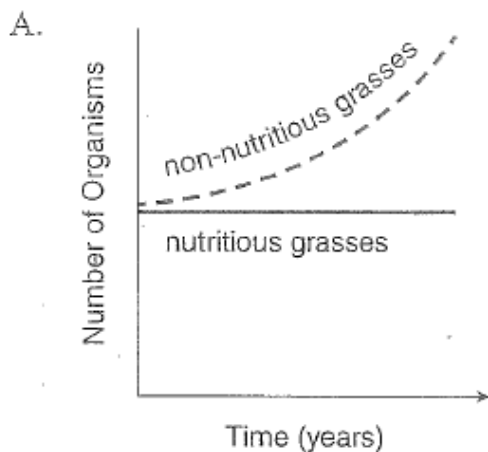
Scientists working in the field of water remediation tested the ability of three types of bacteria to remove lead, cadmium and mercury from waste water and absorb these heavy metals into their cells. The graph shows how much lead, cadmium and mercury each type of bacteria was able to absorb into its cells.

13. Which of the following conclusions is supported by the data?
- A. Bacteria 1 bioaccumulates the greatest amount of lead.
  - B. Bacteria 2 bioaccumulates the greatest amount of cadmium.
  - C. Bacteria 3 bioaccumulates the greatest amount of all three metals.
  - D. Bacteria 1, 2 and 3 bioaccumulate approximately the same amount of mercury.

Grasslands are a mixture of different grass species. These species can coexist in the same ecosystem as long as no species has an advantage. However, as some species of grass are less nutritious than others and grazing animals know which grasses are best to eat and which are not, they select the most nutritious species and leave the rest uneaten.

Adapted from a book by Gerald G. Marten, *Human Ecology—Basic Concepts for Sustainable Development*, © 2001 Gerry Marten.  
[www.gerrymarten.com/human-ecology/chapter06.html](http://www.gerrymarten.com/human-ecology/chapter06.html)

5. The biological relationship between various species of grass in a grassland ecosystem is called
- A. predation.
  - B. competition.
  - C. proliferation.
  - D. adaptive radiation.
16. Which of the following graphs shows how the populations of nutritious and non-nutritious grasses would be affected if the number of herbivores increased?



## The role of fire in a lodgepole pine forest



Before



After

National Park Service

The pictures show a lodgepole pine forest 23 years before and 10 years after a forest fire.

Fire actually plays a key role in rejuvenating the lodgepole pine forest. New stands of pine are so densely populated that some trees die. This self-thinning results in many dead trees in the stand as shown in the first picture above. Over time these dead trees accumulate becoming fuel for forest fires. Mature trees have thin bark which is easily penetrated by fire, killing the living trees. The pines' seeds are trapped inside cones sealed with resin. Forest fires melt the cone-sealing resin allowing the seeds to be released.

The lodgepole pine is native to B.C. and was introduced to New Zealand in 1880. It spread vigorously to cover 150 000 hectares of what was once grassland. The lodgepole pine is an invasive foreign species in the grassland ecosystem and is prohibited from cultivation or distribution.

17. Which of the following adaptations allow the lodgepole pine to repopulate a forest ecosystem after a forest fire?
  - A. thick bark
  - B. thin pine needles
  - C. dense mature stands
  - D. seed cones coated with resin
  
18. Which of the following impacts does the lodgepole pine have on the grasslands of New Zealand?
  - A. Increases biodiversity.
  - B. Preys upon native species.
  - C. Out-competes native species.
  - D. Increases the nutrients, sunlight, and other resources for native species.

22. Which of the following are effects of the deforestation of a tropical rainforest?

I	habitat loss
II	soil erosion
III	increased biodiversity

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

23. Which of the following particles are found in the nucleus of an atom?

- A. uncharged electrons and positively charged protons
- B. uncharged neutrons and positively charged protons
- C. positively charged neutrons and negatively charged protons
- D. positively charged protons and negatively charged neutrons

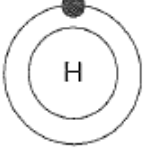
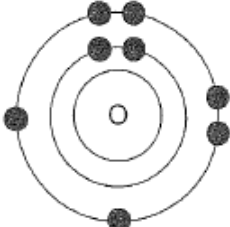
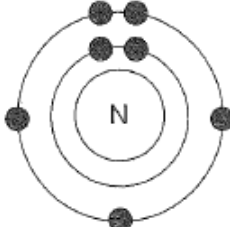
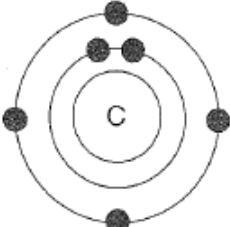
24. Which of the following elements exists naturally as a diatomic molecule?

- A. helium
- B. sodium
- C. fluorine
- D. magnesium

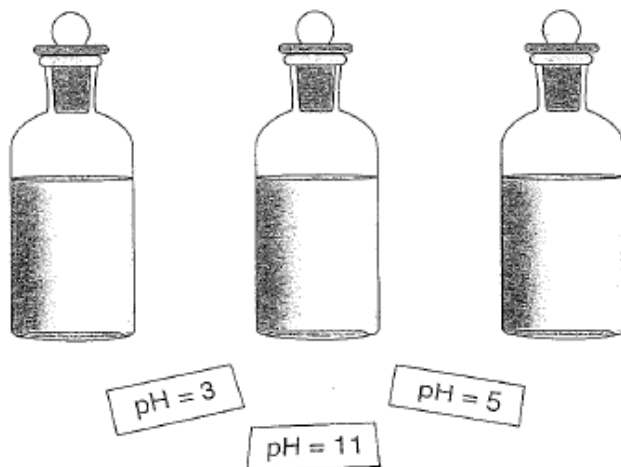
25. Which of the following processes describes the formation of an ion from an atom?

- A. a neutral particle loses electrons
- B. a negatively charged particle gains protons
- C. a positively charged particle gains electrons
- D. a negatively charged particle loses electrons

27. Which of the following correctly identifies the number of valence electrons found in each atom?

				
	Hydrogen	Oxygen	Nitrogen	Carbon
A.	1	6	3	4
B.	1	6	5	4
C.	1	8	7	6
D.	2	8	8	8

30. A little bit of a mix up has occurred in a chemical supply room. A teacher made up three solutions, each with a different pH (pH = 3, pH = 5 and pH = 11), but forgot to label the bottles.



Which of the following indicators could be used to correctly determine the pH of each solution so that they can be properly labeled?

- A. litmus and bromthymol blue  
 B. indigo carmine and phenolphthalein  
 C. methyl orange and bromthymol blue  
 D. phenolphthalein and bromthymol blue
31. Which of the following represents a compound capable of turning blue litmus red?
- A. KBr  
 B.  $\text{H}_2\text{O}$   
 C. LiOH  
 D.  $\text{H}_3\text{PO}_4$

32. Each of the following compounds is dissolved in water.

- Calcium oxide
- Sodium chloride
- Nitrogen monoxide

Rank the solutions from lowest pH to highest pH.

	Lowest	----->	Highest
A.	Nitrogen monoxide	Calcium oxide	Sodium chloride
B.	Calcium oxide	Sodium chloride	Nitrogen monoxide
C.	Sodium chloride	Nitrogen monoxide	Calcium oxide
D.	Nitrogen monoxide	Sodium chloride	Calcium oxide

33. In 1790, Adair Crawford discovered a new element with the following properties:

- silvery colour
- a soft, reactive metal
- ignites spontaneously in air
- forms ions with a 2+ charge
- chloride salts burn with a brilliant crimson colour

Which of the following elements did Adair Crawford discover?

- A. copper
- B. sodium
- C. strontium
- D. aluminium

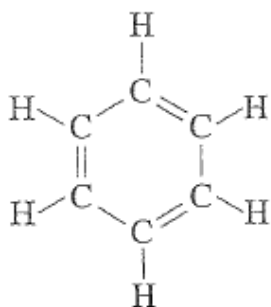
34. Which chemical name is correctly matched with its chemical formula?

- A. lithium fluoride =  $\text{LiF}_3$
- B. sodium nitride =  $\text{Na}_3\text{N}$
- C. calcium bromide =  $\text{Ca}_2\text{Br}$
- D. magnesium chloride =  $\text{MgCl}$



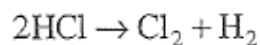
36. What is the chemical name of  $\text{Cr}_2\text{S}_3$ ?
- A. chromium sulfide
  - B. chromium(II) sulfide
  - C. chromium(III) sulfide
  - D. dichromium trisulfide
37. Manganese(III) phosphate is applied to steel surfaces in order to prevent corrosion. Which of the following is the formula for manganese(III) phosphate?
- A.  $\text{MnP}$
  - B.  $\text{MnPO}_4$
  - C.  $\text{Mn}_3\text{PO}_4$
  - D.  $\text{Mn}(\text{PO}_4)_3$
35.  $\text{BeO}$  is used in the production of high-performance gas lasers. What is the name of this compound?
- A. beryllium oxide
  - B. beryllium(II) oxide
  - C. beryllium monoxide
  - D. beryllium(I) dioxide
38. What is the name of the compound  $\text{Si}_2\text{H}_6$ ?
- A. silicon(III) hydride
  - B. silicon(VI) hydride
  - C. silicon hexahydride
  - D. disilicon hexahydride
39. What is the formula for phosphorus triiodide?
- A.  $\text{PI}$
  - B.  $\text{PI}_3$
  - C.  $\text{P}_3\text{I}$
  - D.  $\text{PTi}$

Use the following model to answer question 40.



40. Which of the following is represented?

- A. an ionic compound
- B. a diatomic molecule
- C. an organic compound
- D. an inorganic compound



41. Which of the following statements is supported by the Law of Conservation of Mass?

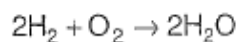
- A. The masses of  $\text{Cl}_2$  and  $\text{H}_2$  produced are equal.
- B. The masses of  $\text{HCl}$  reacted and  $\text{H}_2$  produced are equal.
- C. The masses of  $\text{HCl}$  reacted and  $\text{Cl}_2$  produced are equal.
- D. The mass of  $\text{HCl}$  reacted is equal to the combined masses of  $\text{Cl}_2$  and  $\text{H}_2$  produced.



43. Which of the following sets of products will complete the balanced equation?

- A.  $\text{FeBr}_3 + \text{I}_2$
- B.  $\text{FeBr}_3 + 3\text{I}_2$
- C.  $2\text{FeBr}_3 + 3\text{I}_2$
- D.  $2\text{FeBr}_3 + 6\text{I}_2$

Hydrogen and oxygen react as follows:



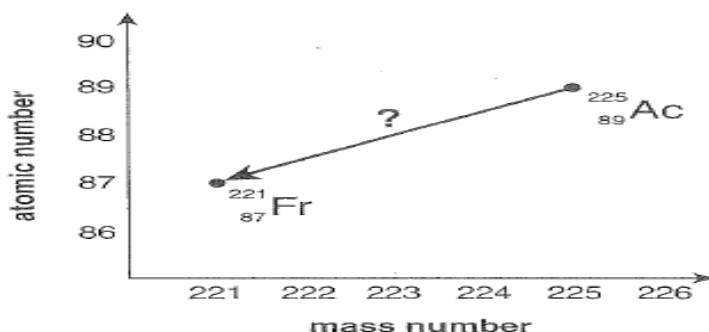
45. What type of reaction is shown above?
- A. synthesis
  - B. neutralization
  - C. decomposition
  - D. single replacement
46. Have you ever wondered how they get a soft syrupy centre into a chocolate bar? The secret involves the use of a chemical catalyst called "invertase" which transforms solid caramel into a liquid syrup.

What is the role of the catalyst "invertase"?

- A. It increases the rate of the reaction.
- B. It increases the temperature of the reaction.
- C. It increases the surface area of the products.
- D. It increases the concentration of the reactants.

47. What is the standard isotope notation for nitrogen-15?

- A.  ${}^7_8\text{N}$
- B.  ${}^8_7\text{N}$
- C.  ${}^{15}_7\text{N}$
- D.  ${}^{15}_8\text{N}$



What radioactive process is shown on the graph?

- A. fusion
- B. fission
- C.  $\alpha$ -decay
- D.  $\beta$ -decay



49. What is the daughter isotope in the above radioactive decay?

- A. helium-2
- B. helium-4
- C. beryllium-4
- D. beryllium-8

Xenon-133 is used by doctors to test lung function since it is chemically inert and will not be absorbed by the body. It decays by beta-particle emission, with a half life of 5 days.

50. A sample containing 20 g of xenon-133 is stored for 15 days. How much xenon-133 will remain?

- A. 1.3 g
- B. 2.5 g
- C. 5.0 g
- D. 6.7 g

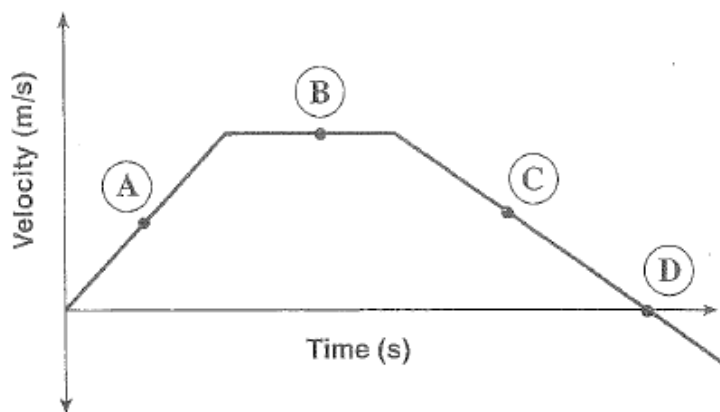
51. In a fission reaction, a neutron reacts with uranium-235, causing it to split into two smaller nuclei, krypton-89 and barium-144. How many neutrons are on the product side of the balanced nuclear equation?

- A. 1 neutron
- B. 2 neutrons
- C. 3 neutrons
- D. 4 neutrons

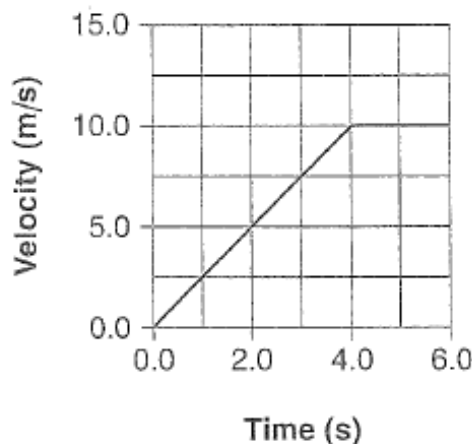
60. Which two quantities could be used to find the acceleration of a car that is slowing down?

- A. initial velocity and time
- B. change in velocity and time
- C. initial velocity and final velocity
- D. change in velocity and final velocity

Use the following velocity–time graph for the motion of a hummingbird to answer question 61.



61. At which point on the graph is the hummingbird's acceleration zero?

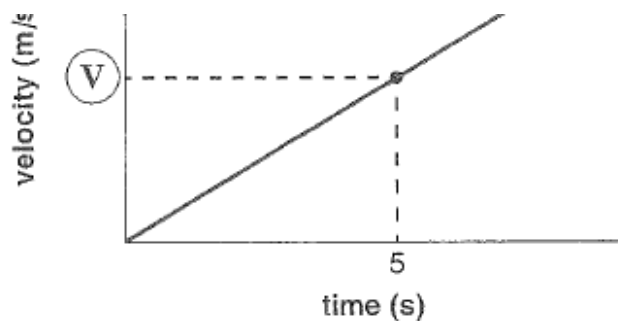


What is the acceleration of the ball at 2 s?

- A.  $0 \text{ m/s}^2$
- B.  $+2 \text{ m/s}^2$
- C.  $+2.5 \text{ m/s}^2$
- D.  $+5.0 \text{ m/s}^2$

53. Which of the following situations is an example of positive acceleration?

- A. A cyclist travelling at  $+7 \text{ km/h}$ .
- B. A skater moving at  $+5 \text{ m/s}$  skids to a stop.
- C. A motorist travelling  $-10 \text{ m/s}$  comes to rest.
- D. A jogger running  $-3 \text{ m/s}$  accelerates to  $-4 \text{ m/s}$ .

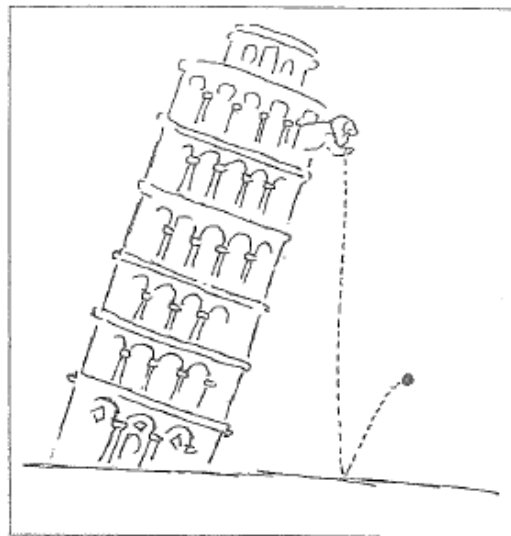


The slope of this graph is  $1.2 \text{ m/s}^2$ . What is the velocity at  $\textcircled{V}$  on the graph?

- A.  $0.24 \text{ m/s}$
  - B.  $4.2 \text{ m/s}$
  - C.  $5.0 \text{ m/s}$
  - D.  $6.0 \text{ m/s}$
65. In 1971 on the moon, Apollo 15 Commander David Scott held out a hammer, and dropped it. It took  $1.3 \text{ s}$  to reach a velocity of  $-2.1 \text{ m/s}$ .
- What was the hammer's acceleration?
- A.  $-0.8 \text{ m/s}^2$
  - B.  $-0.62 \text{ m/s}^2$
  - C.  $-1.6 \text{ m/s}^2$
  - D.  $-2.7 \text{ m/s}^2$
66. An arrow is fired from a crossbow and accelerates from rest at  $193 \text{ m/s}^2$ . What length of time is required for the arrow to reach a velocity of  $124 \text{ m/s}$ ?
- A.  $0.011 \text{ s}$
  - B.  $0.64 \text{ s}$
  - C.  $1.56 \text{ s}$
  - D.  $69 \text{ s}$
67. Imagine Galileo throws a ball downwards from the top of the Leaning Tower of Pisa. Gravity accelerates it downwards at  $9.8 \text{ m/s}^2$ . The ball hits the ground in  $1.5$  seconds, with a downward velocity of  $40 \text{ m/s}$ .

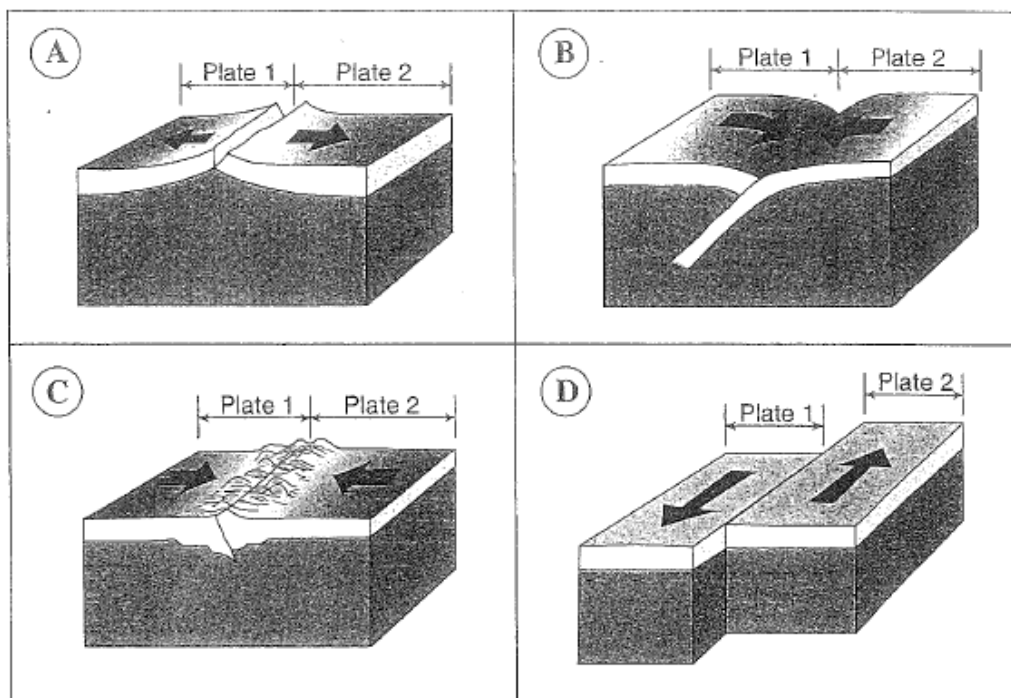
What downward velocity did he originally give the ball?

- A.  $6.5 \text{ m/s}$
- B.  $15 \text{ m/s}$
- C.  $25 \text{ m/s}$
- D.  $27 \text{ m/s}$



68. Which of the following occur **only** at subduction zones?

- A. trenches
- B. volcanoes
- C. rift valleys
- D. earthquakes

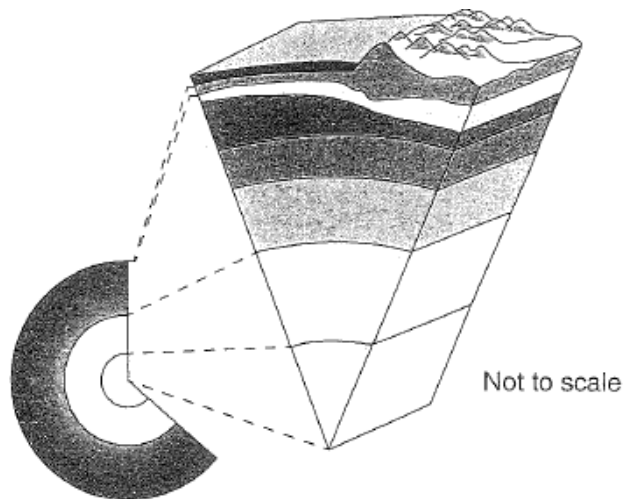


69. Which of the diagrams shows a spreading ridge?

70. At which plate boundary would deep earthquakes occur?

71. Which of the following has convection currents that cause tectonic plates to move?

- A. the crust
- B. the mantle
- C. the inner core
- D. the lithosphere



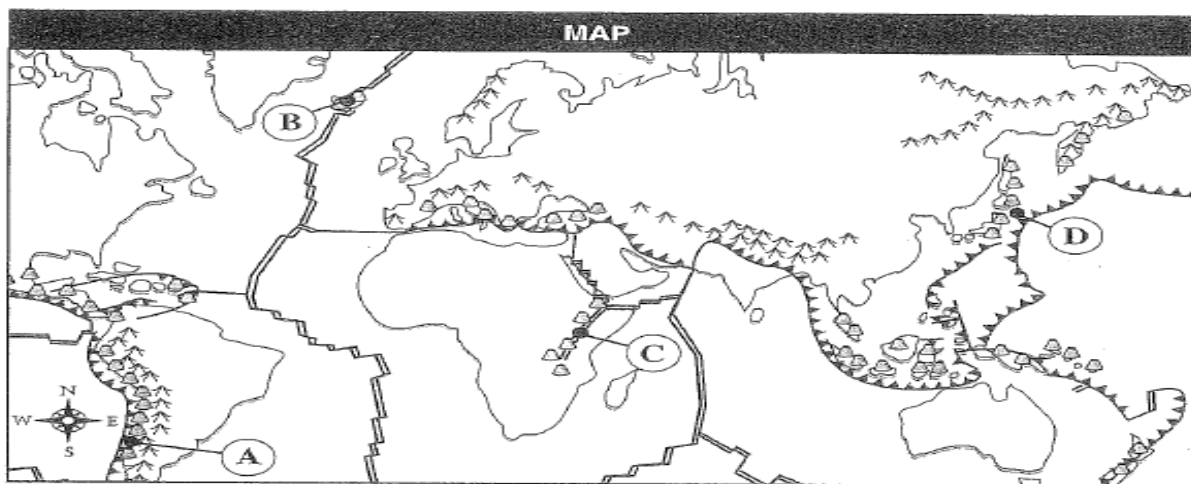
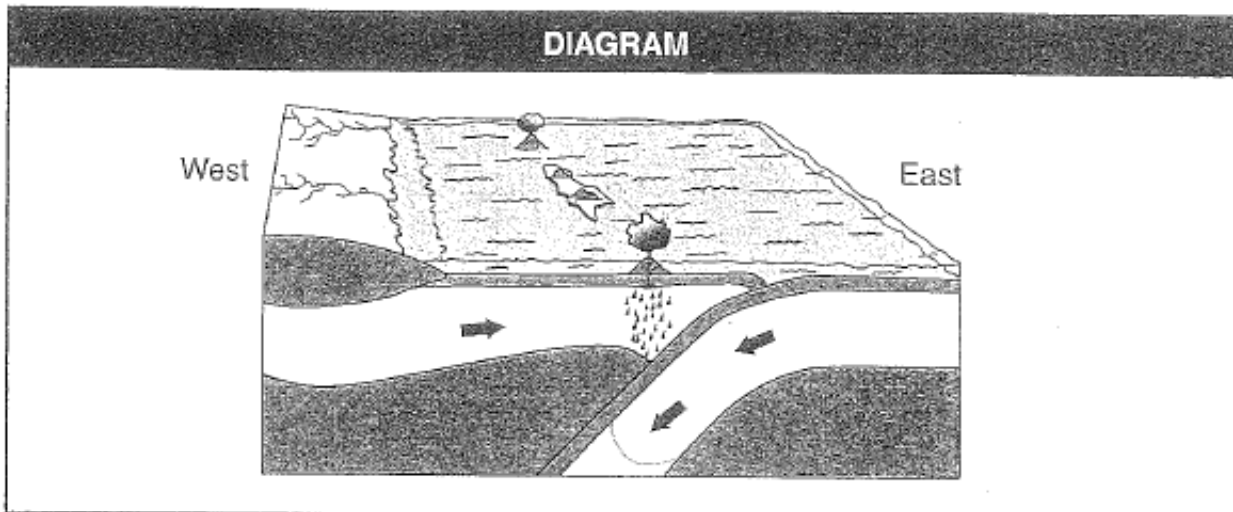
72. The model above was developed using evidence from

- A. seismic waves.
- B. paleoglaciatioin.
- C. magnetic reversals.
- D. matching geologic formations.

73. Which of the following descriptions compares the African Rift Valley to the East Pacific Rise?

	<b>African Rift Valley</b>	<b>East Pacific Rise</b>
A.	continental–continental divergent plate boundary	oceanic–oceanic divergent plate boundary
B.	continental–continental divergent plate boundary	oceanic–oceanic convergent plate boundary
C.	continental–continental convergent plate boundary	oceanic–oceanic convergent plate boundary
D.	continental–continental transform plate boundary	oceanic–oceanic transform plate boundary





74. What process is illustrated in the diagram?
- slab pull
  - ridge push
  - the formation of new seafloor
  - movement at a transform fault
75. At which location indicated on the map would the process shown in the diagram occur?
76. Which of the following geological events would occur at all locations with active volcanoes?
- seismic activity
  - tectonic plate divergence
  - movement along a transform fault
  - formation of a continental volcanic belt

77. Which of the following thermal energy sources does **not** fuel hot spot activity?

- A. radioactivity
- B. seismic waves
- C. thermal energy from the core
- D. residual energy from the earth's formation

Use the following three diagrams to answer question 78.

Diagram I

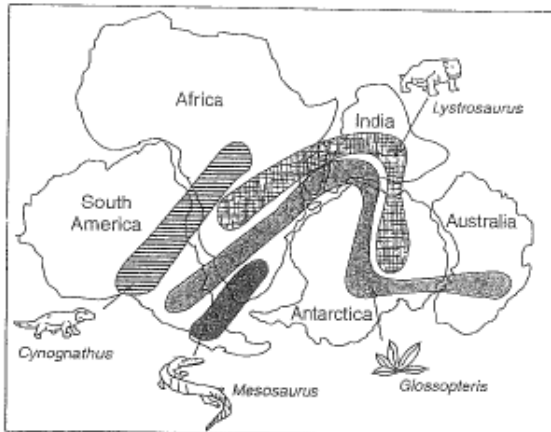


Diagram II

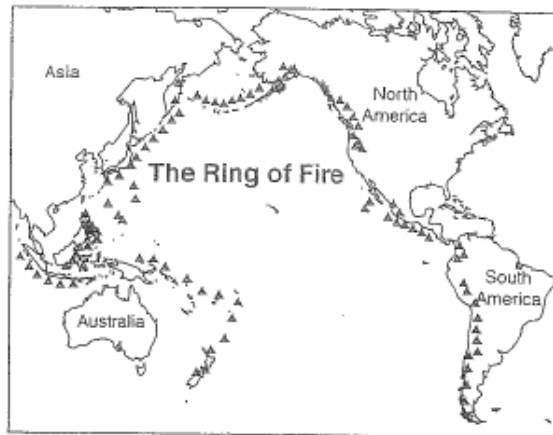
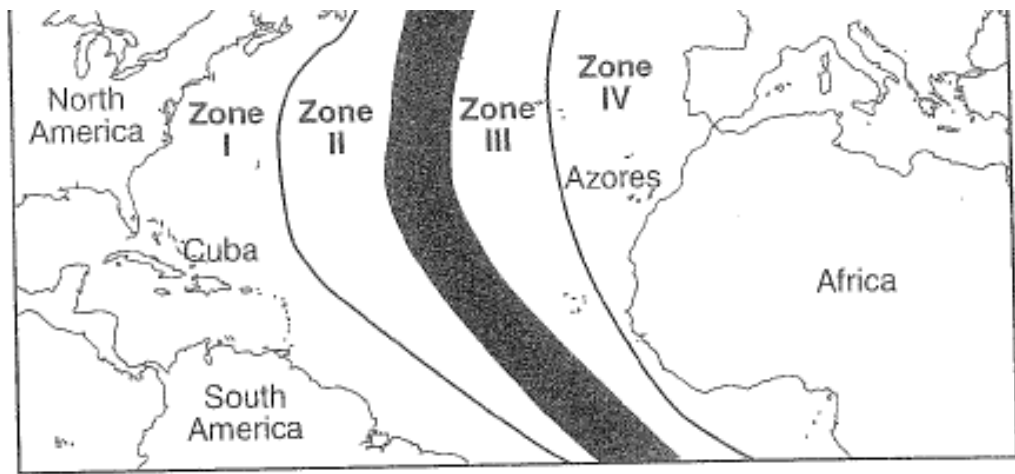


Diagram III



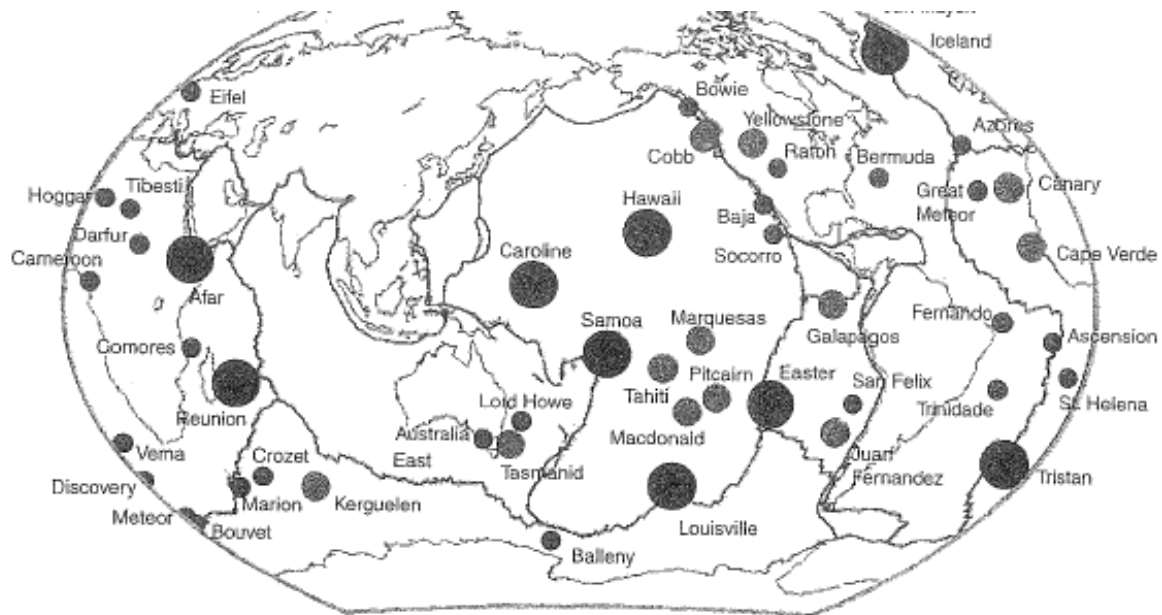
78. Which of the diagrams represent evidence that was originally used by Wegener to support the Theory of Continental Drift?

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



79. Magnetic reversal patterns on the ocean floor would be similar in zones

- A. I and II.
- B. I and III.
- C. II and III.
- D. III and IV.



80. Which of the following statements describes the location of hot spots?

- A. They occur at any location on a plate and at plate boundaries.
- B. They occur only at convergent and divergent plate boundaries.
- C. They occur at any location on a plate, but not at plate boundaries.
- D. They occur only at convergent, divergent and transform plate boundaries.