

Chemistry Review

Elements are substances that cannot be broken down into simpler materials

Compounds are substances that are formed from two or more elements

Mixtures are combinations of two or more pure substances that do not combine chemically

Every atom is composed of 3 kinds of subatomic particles:

The atomic number is the:

The mass number is:

An isotope is:

The atomic mass is:

Bohr diagrams show the arrangement of:

An element with an atomic number of 9 is:

Its Bohr diagram would look like:

No. Of protons

No. Of electrons

No. Of neutrons

The Bohr diagram of this atom's ion would look like:

An ion can be made by:

Chemical families are:

Alkali metals form _____ ion because _____. This family is located :

Alkaline Earth Metals form _____ ions because _____. This family is located:

Halogens form _____ ions because _____. This family is located:

Noble Gases don't _____ ions because _____. This family is located:

How many neutrons does the average copper atom have? Explain

A chemical bond is a force that _____

Ionic bonds form between:

Electrons are _____

Covalent bonds form between:

Electrons are _____

Diatomic molecules are:

The elements that form diatomic molecules are:

Three types of ionic bonds: Binary ionic compounds

Ionic compounds with multivalent elements

Ionic compounds with polyatomic ions

The page in your data booklet of polyatomic ions:

Examples of positive polyatomic ions: (name and formula)

The steps in writing formulas are:

Write name of compound or formula for compound (all ionic)

Iron (III) oxide

Ammonium chloride

Nickle (II) sulphide

Magnesium phosphate

Calcium nitride

Aluminum nitrate

NaF



Molecular compounds are:

Steps to writing molecular formulas are;

Formulas for :

Di hydrogen monosulphide

Tetraphosphorus hexoxide

Arsenic pentachloride



The charge on Cu in copper (I) chloride is

CaCl_2 and NaCl both contain chloride ions. Explain why different number of chloride ions are needed to make each compound.

	Behaviour in Water	Range on pH scale	Example (chemical formula and name)
Acids			
Bases			

Inorganic compounds are:

Organic Compounds are:

pH Scale

The acid name for H_2SO_4

Lewis diagrams can be drawn for molecules. They illustrate how atoms come together to form _____ bonds. _____ bonds CAN also be drawn but this is normally not done.

Dots are arranged around an element's symbol that represents the valence _____

The octet rule is;

Lone electron pairs are:

Bonding pairs are:

Draw a Lewis diagram for: F, O



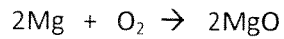
According to the octet rule, how many more electrons does the fluorine atom need to complete its valence shell?

Draw the structural formula for F_2O

What is so special about Carbon?

What is a hydrocarbon?

Draw the structural formula for C_2H_6



What are the reactants?

What are the products?

How does this follow the Law of Conservation?

Write the balanced reaction for the following; State what type of reaction each is

Zinc + hydrochloric acid \rightarrow zinc chloride + hydrogen

Chlorine + potassium bromide \rightarrow potassium chloride + bromine

Water \rightarrow hydrogen and oxygen

Silver nitrate + sodium chloride \rightarrow silver chloride + sodium nitrate

Given:	6 (NH ₄) ₂ SO ₄	How many:	Molecules?	Atoms of N?
		Atoms of H?	Atoms of S?	Atoms of O?
		Total number of atoms????		

Using A,B,C,and D as well as H for acid and OH for Base write the general form for each of the following.
Synthesis has been done for you.

Synthesis A + B \rightarrow AB

Decomposition

Single Replacement

Double Replacement

Acid-Base Neutralization

Combustion

Indicators are:

Indicator	Colour	In Acid	In Base
Phenolphthalein			
Bromothymol Blue			
Red Litmus Paper			
Blue Litmus Paper			

If a metal oxide such as MgO or CaO is placed in water then it will turn _____ (acidic/basic). This can be determined by having a positive test in phenolphthalein as it will turn _____

If a non-metal oxide is placed in water then it will turn _____ (acidic/basic). This can be determined by having a positive test in bromothymol blue as it will turn _____

Explain the Kinetic Molecular Theory.

What are four ways to increase the rate of a chemical reaction? Explain each.


Radiation

- Describe the relationship between frequency and wavelength of electromagnetic radiation. What do all electromagnetic radiations have in common?
- Consider the imaginary nuclei with symbols A, B, C, and D written below. Use them to answer questions a-e which follow.

14	15	18	15
A	B	C	D
7	7	8	9

- What is the atomic mass of A? What does this mean?
- What is the number of neutrons in B? How did you determine this?
- What is the atomic number of C? What does this mean?
- Which is likely to be radioactive? A or B? Why?
- The letters that must represent different isotopes of the same element are
i) A, B ii) C, D iii) B, D iv) A, B, D

- From the list below, identify the symbols used to describe alpha, beta and gamma rays.

a) 0	b) -1	c) 0	d) 4	e) 0
e	e	e	He	
-1	0	+1	2	0

- Consider the radioactive nucleus ${}^{19}_{8}\text{O}$ that results from beta decay

- The complete symbol for the nucleus that results from its decay is
i) ${}^{19}\text{O}$ ii) ${}^{19}\text{N}$ iii) ${}^{19}\text{F}$ iv) ${}^{18}\text{O}$

O	N	F	O
9	7	9	8

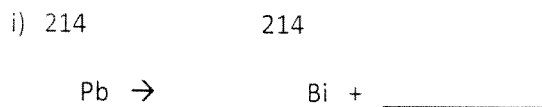
- The complete symbol of the ray emitted from this decay is
a) 0 b) -1 c) 0 d) 4 e) 0

e	e	e	He
-1	0	+1	2
			-1

- What is the name of process that produced this decay from the nucleus?

- State the differences between alpha, beta, and gamma emissions from a point of view of what it can penetrate (go through).

5. Complete the following nuclear decay reactions correctly by filling in the blank.



6. State some negative effects of radiation. State some positive effects of radiation

7. Radioactive dating is used frequently by archeologists and geologists to date fossils and rocks. This is often referred to as RADIOMETRIC DATING. Use your data booklet half-lives table to answer and explain the following questions.

Which radioisotope would not be useful in radiometric dating when

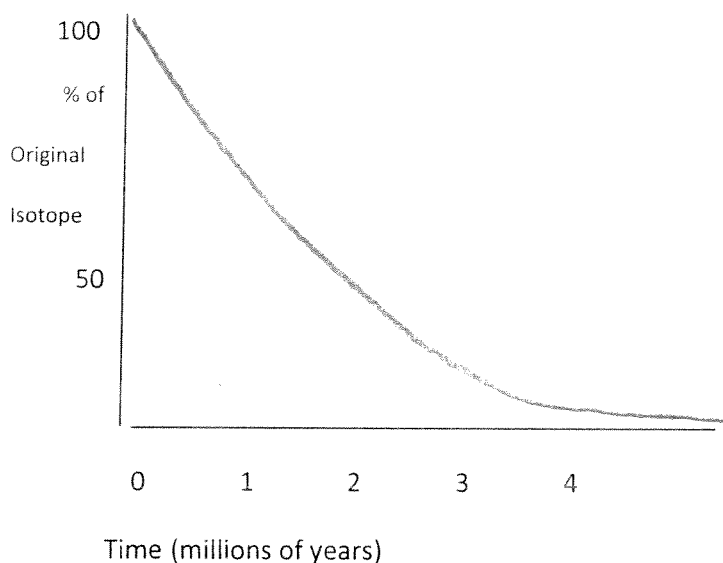
a. testing materials that were once living?

b. testing inorganic materials (matter that has never been alive)

c. dating rocks older than 1 billion years old such as meteorites?

D. dating materials much younger than 1000 years old?

8. Decay Graph of a Radioactive Isotope



a. What is the half-life of the element?

b. After two half-lives, what age would the sample be?

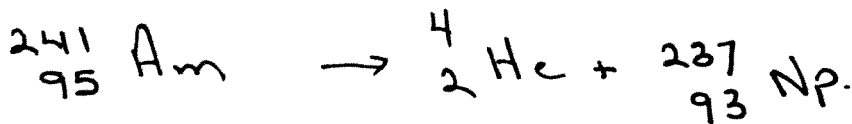
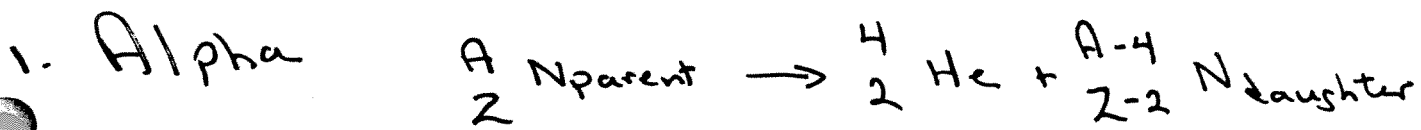
c. How many complete half-lives has the sample gone through after 60 million years?

d. What percentage of daughter material is present after 10 million years?

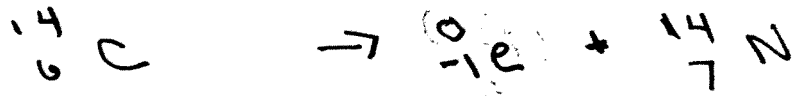
9. Explain the difference between fission and fusion.

10. What are the roles of moderators and control rods during nuclear fission ?

Types of Nuclear Reaction

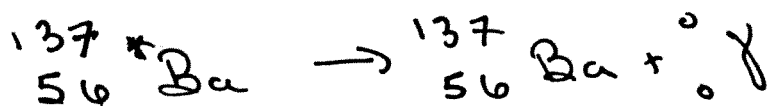


2. Beta

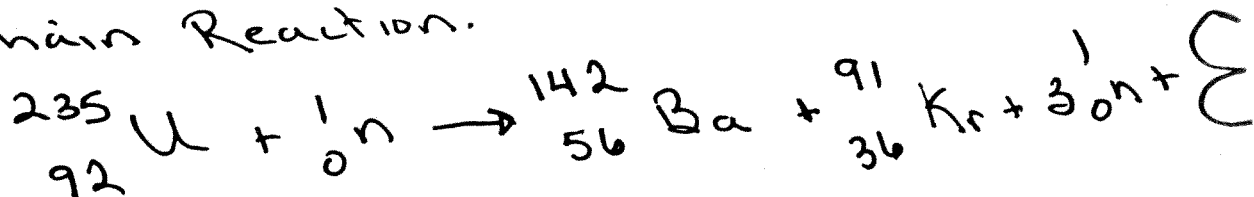


a neutron becomes a proton and an electron

3. Gamma

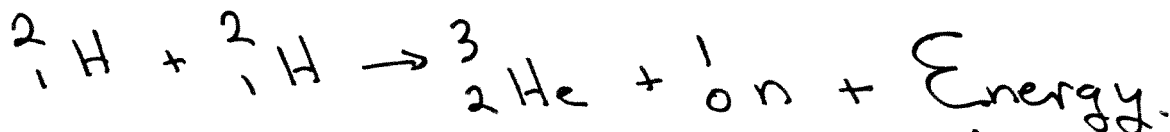


4. Fission is done under controlled conditions at a nuclear power plant. A neutron strikes Uranium to release Energy and more neutrons causing a Chain Reaction.



Fission means to: _____

5. Fusion is when small atoms join together to form larger atoms and releases lots of E. Occurs in _____ and _____

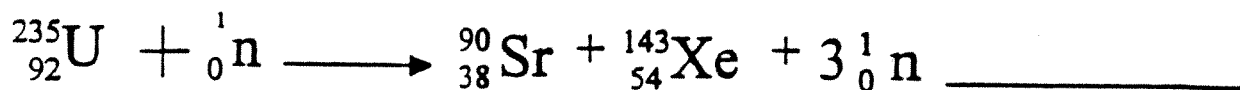


Artificial Radioactivity - occurs when a stable nucleus is bombarded with a neutron or an alpha particle



1. Classify the following reactions as nuclear fusion, nuclear fission, alpha or beta decay.

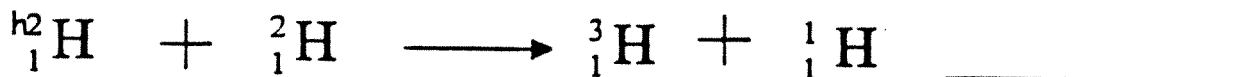
a)



b)

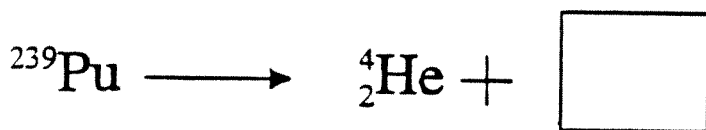


c)



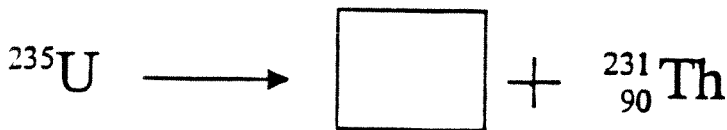
2. Predict the products of the following nuclear reactions and classify each reaction type as fission, fusion, alpha, or beta as required.

a)



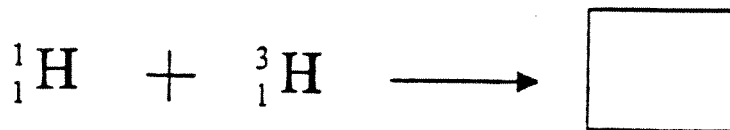
Alpha, Beta, or Gamma

b)



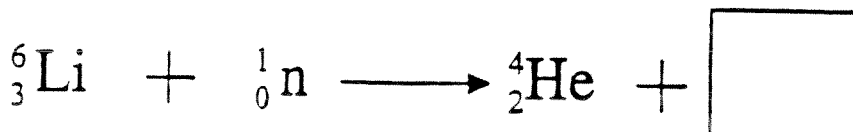
Alpha, Beta, or Gamma

c)

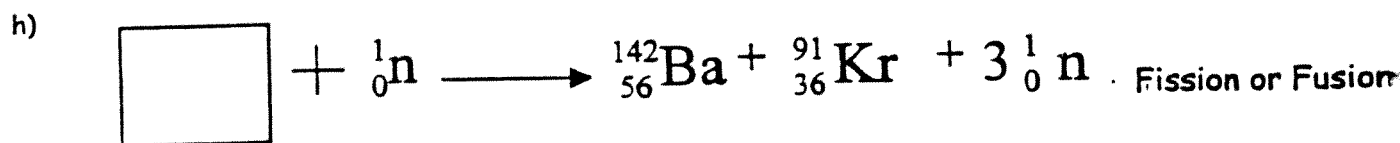
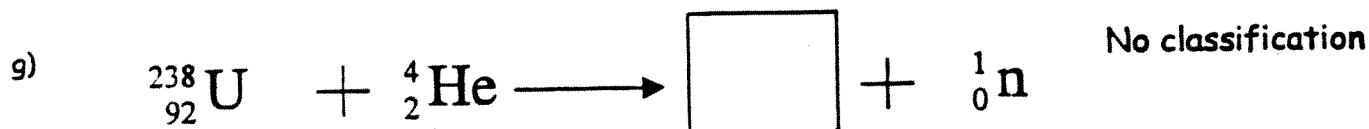
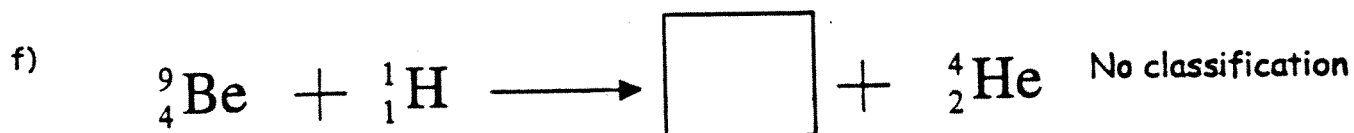
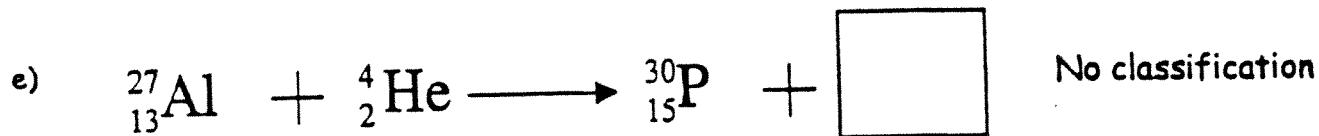


Fission or Fusion

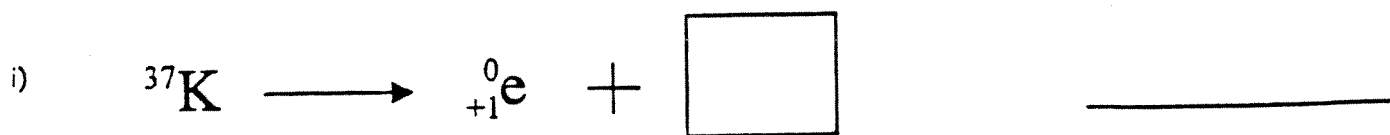
d)



Fission or Fusion



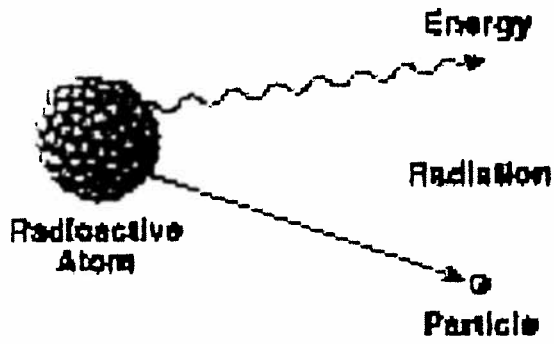
Bonus



The above reaction emits a type of particle we have not discussed.
Can you think of an appropriate name for this particle?



10.3 – Radioactive Decay



The nuclei of some isotopes are _____ and _____.
 A nucleus that emits radiation is undergoing _____.

Method of Decay	Radiation	Electric Charge	What is it?	Characteristics

Writing balanced nuclear equations:

Two rules:

1)

2)

Examples:

SCIENCE 10 - BIOLOGY REVIEW PACKAGE

NAME: _____

Complete the short answer questions on a separate piece of paper.

- 1) Arrange the following terms in order of complexity, and give an example of each: ecosystem, biosphere, organism, community, population
- 2)



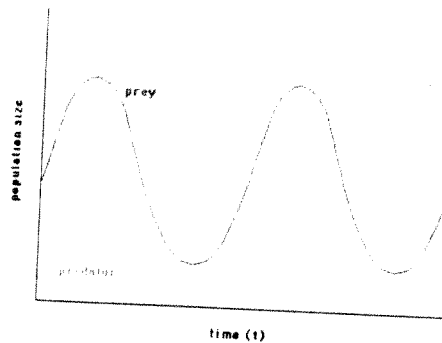
For the pond ecosystem on the left, identify two biotic factors and two abiotic factors.

What is meant by the term dynamic equilibrium?

What might be a limiting factor for the pond ecosystem?

3. Draw a simple food chain. Include the following terms in your food chain: producer, autotroph, consumer, heterotroph, herbivore, primary consumer, carnivore, secondary consumer, tertiary consumer, detritivore, decomposer. Give an example of each.

4. What does this graph represent? How might this graph look different if you were using real populations in nature?



5. Complete the following table:

Type of symbiosis	Definition	Example
Mutualism		
Commensalism		
Parasitism		

6. Explain the term "trophic level" in your own words. What type of food is eaten by a consumer in the second trophic level?

7. How might the shape of an energy pyramid differ throughout the year in an area that has a cold winter and a warm winter?

8. If there are 25,000kJ of energy in one trophic level, how much energy will be passed on to the next trophic level?

9. What is the difference between weather and climate?

10. Explain generally how latitude, elevation, and distance from a body of water can influence climate.

11. Why does Vancouver have four distinct seasons? Why wouldn't a city on the equator have four distinct seasons?

12. Your textbook describes 8 terrestrial biomes. Which biome corresponds with the following:

- a) highest annual precipitation
- b) lowest annual temperature
- c) fewest number of herbivores
- d) most consistent annual temperature
- e) forest with the shortest growing season

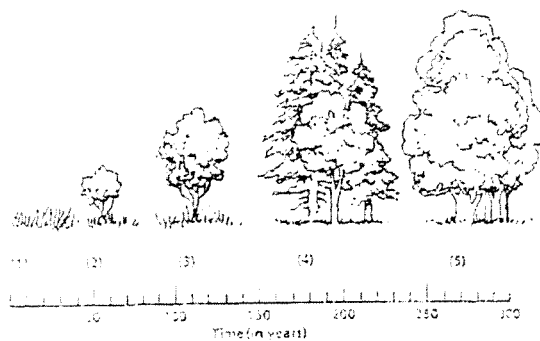
13. Define the following terms: adaptation, natural selection, mimicry, coevolution, extinction, extirpation, keystone species, and biodiversity

14. Give an example of interspecific competition and an example of intraspecific competition. How can competition lead to resource partitioning?

15. The finches on the Galapagos Islands have different shaped beaks to enable them to eat different foods, or different parts of the same food. What is the name of the process that led to the different shaped beaks?

16. Give one example of a foreign plant species in BC and one example of a foreign animal species. How have these organisms impacted native species?

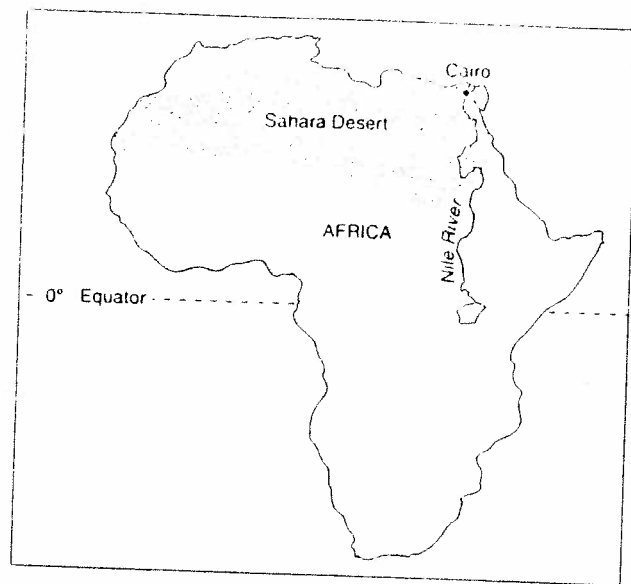
17.



What does this picture represent? Would it be primary or secondary? Explain.

18. Compare organic and inorganic matter.

19. Identify the organic molecule that matches the following descriptions: a) forms structural components of energy; b) provide immediate energy; c) controls body functions; d) provides insulation against heat loss; e) long-term storage of energy
20. Compare photosynthesis and cellular respiration. How are they different? How are they connected?
21. Look at the carbon cycle diagram on p.87 (or in your data booklet). Use your finger to trace the path of a carbon atom over time. Give an example of a carbon sink and a carbon reservoir.
22. There is a good chance that the carbon atoms in your body used to be in a prehistoric plant that existed during the dinosaur age! Explain how they may have got from the prehistoric plant to your cells.
23. What is the "greenhouse effect"? How have human activities led to an enhanced greenhouse effect?
24. Look at the nitrogen cycle diagram on p.93 (or in your data booklet). Use your finger to trace the path of a nitrogen atom over time. If possible, identify what the nitrogen is bonded to and what it is called. For example, NH_3 , ammonia, is released from a volcano...
25. What role do legumes, alders and lupins play in the nitrogen cycle?
26. Draw a simple diagram of the nitrogen cycle using the following terms: nitrogen fixation, nitrification, decomposition, denitrification
27. What is the main difference between the phosphorus cycle and the other biogeochemical cycles?
28. Explain the difference between the short and long phosphorus cycles.
29. What is the role of mycorrhizae?
30. How does the phosphorus in animals re-enter the phosphorus cycle?
31. Give some examples of how weather related phenomena and geological events can affect ecosystems.
32. What is acid rain and how does it form?
33. Review Tables 1,2 and 3 from Section 5.2 and be able to give some examples of air, water and land pollution.
34. DDT was used as a pesticide. It leached through the soil into water. In the water it was present in a concentration of 0.000003 ppm (parts per million). In fish-eating birds it was found in concentrations over 25 ppm. Why is it so much more concentrated in the birds? What is this process called?
35. What are heavy metals and why should we be concerned about them in our environment?



1. Which of the following is an example of a biome?
 - A. the Equator
 - B. the Nile River
 - C. the city of Cairo
 - D. the Sahara Desert

2. Which of the following is a characteristic of the boreal forest biome?
 - A. coniferous trees
 - B. a permafrost layer
 - C. a constant temperature throughout the year
 - D. annual rainfall of more than 250 cm per year

3. An ecologist wants to gather information about a stream along a mountainside. Which of the following is a biotic factor?
 - A. water flow rate
 - B. mineral deposits
 - C. water temperature
 - D. variety of life forms

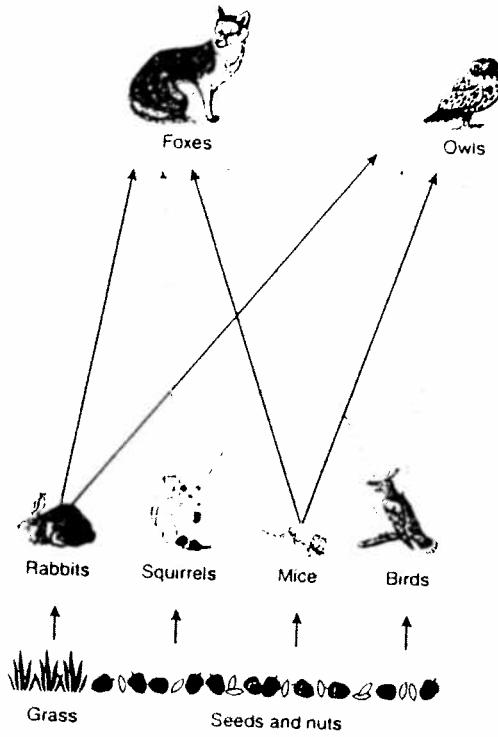
Use the following image of a honeybee pollinating a flower as it gathers food to answer question 4.



From America's Beekeepers "Hives," May, 1993
National Geographic magazine

4. What relationship exists between the honeybee and the flower?
 - A. predation
 - B. parasitism
 - C. mutualism
 - D. commensalism

Use the following illustration to answer question 5.

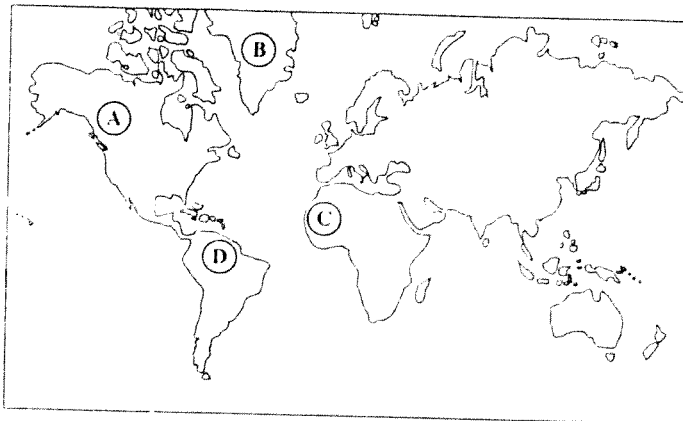


5. Which of the following is likely to occur if a large number of squirrels are removed from the area?
- A. an increase in the fox population
 - B. an increase in the owl population
 - C. a decrease in the plant population
 - D. a decrease in the rabbit population
6. Which of the following contain the greatest carbon stores in gigatonnes of carbon?
- A. marine life
 - B. oil and gas deposits
 - C. organic matter in soil
 - D. marine sediments and sedimentary rocks
7. Which of the following elements have these three characteristics in common?
- dissolved in water
 - stored in sediments
 - present in the atmosphere
- A. carbon and nitrogen
 - B. carbon and phosphorus
 - C. nitrogen and phosphorus
 - D. carbon, nitrogen and phosphorus
8. Which of the following do nitrogen fixation and the decomposition of organic wastes have in common?
- A. Both enrich the soil.
 - B. Both are part of the carbon cycle.
 - C. Both decrease levels of nitrogen in the soil.
 - D. Both are responsible for increased levels of carbon dioxide in the atmosphere.

9. Which of the following best explains the distribution of temperate rainforests?

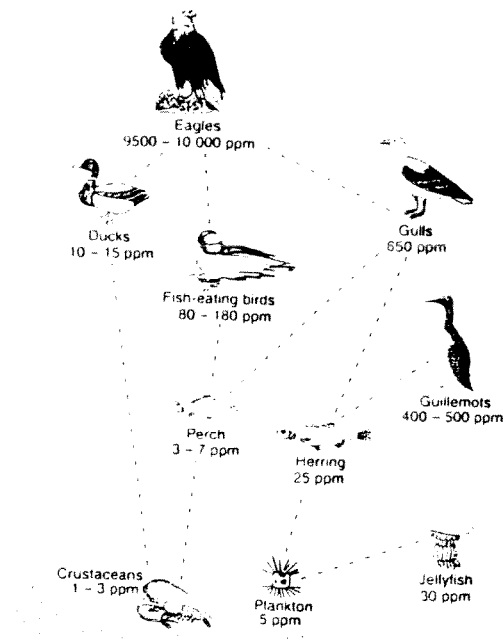
- A. warm, moist air near the equator
- B. intense solar radiation causing arid conditions
- C. presence of large numbers of small herbivores
- D. presence of coastal mountains causing high annual precipitation

10. In which of the following locations is the annual precipitation the greatest?



- A. A
- B. B
- C. C
- D. D

Use the following diagram of PCB levels in a community to answer question 11.



11. Which statement best explains the relatively high level of PCBs in eagles compared to those of guillemots?

- A. Both species are carnivores.
- B. Guillemots eat more herring than eagles do.
- C. Levels of PCBs are higher in marine environments.
- D. Eagles occupy a higher trophic level than guillemots.

Use the following article to answer question 12.

"Sorry, no eel pie today"

Eel pie, jellied eels, eel Florentine. The eels used in these dishes used to be abundant in Europe's ponds and streams but they may soon disappear.

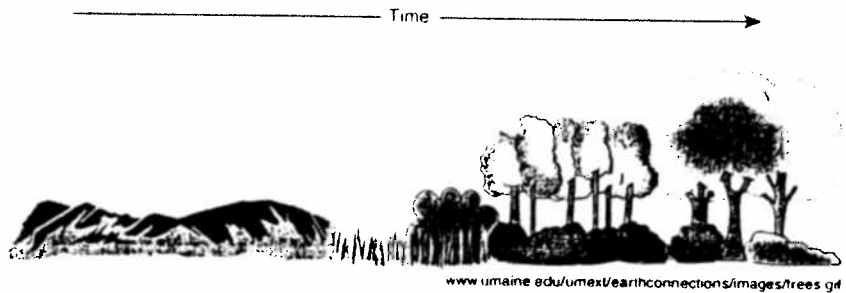
The problem is that it only takes small amounts of polychlorinated biphenyls (PCBs), a common chemical pollutant, to kill eel embryos. Most European eels already have enough PCBs in them to stop them from reproducing.

Overfishing was previously thought to have been the cause of the crash in the eel population. However, now that spawning has been observed in captivity, it has been found that a mother eel transfers PCBs from her body fat to her eggs. As a result, eel embryos die even when their mothers have PCB levels considered safe for human consumption.

Adapted from *New Scientist Print Edition*, March 11, 2006.

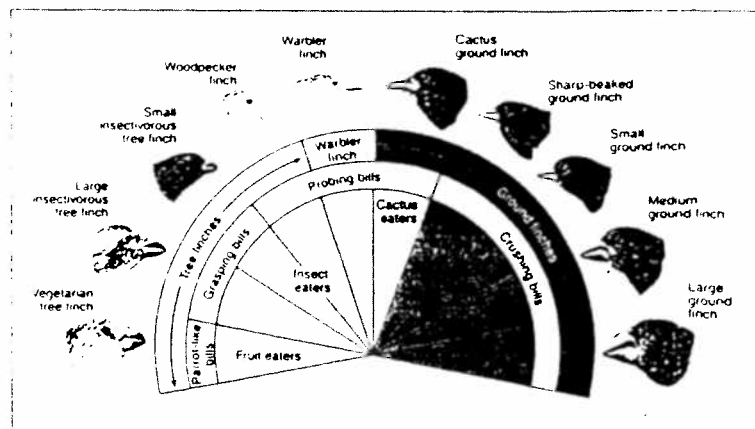
12. Which of the following is responsible for the observed decrease in the European eel population?
- overfishing
 - loss of spawning grounds
 - PCB concentrations in eel eggs
 - increased predation on eel eggs

Use the following diagram of change over time to answer question 13.



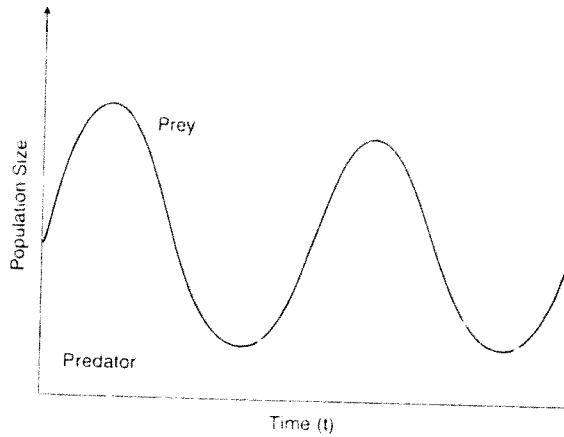
13. The diagram illustrates which of the following?
- biodegradation
 - natural selection
 - adaptive radiation
 - ecological succession

Use the following diagram to answer question 14.



14. The finches on the Galapagos Islands are different from island to island because of which of the following?
- different ages
 - different sizes
 - different predators
 - different food sources

Use the following graph showing the relationship between predator and prey to answer questions 15 and 16.



15. The increase in the predator population size lags behind the increase in the prey population size.
- A. The statement is supported by the graph.
 - B. The statement is refuted by the graph.
 - C. The statement is neither supported nor refuted by the graph.

16. Which of the following situations contributes to the shape of the graph?

I	When the prey population is small, the predators have more difficulty capturing food and their population starts to decline.
II	In response to predator decline, the prey population starts to increase.
III	Both predator and prey populations increase until the increased number of predators causes the prey population to decline.
IV	As the predator population increases and eats more prey, the reduced prey population will lead to starvation among predators.

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

Use the following article to answer question 17.

Were Volcanoes the Crucible of Life?

New research by scientists shows that volcanoes produce large quantities of biologically available nitrogen.

Some bacteria and fungi have evolved the ability to fix nitrogen themselves, and these biological processes, along with mankind's activities (such as the burning of fossil fuels), are the major sources of fixed nitrogen in present-day ecosystems.



Where did the nitrogen that enabled life to evolve come from in the first place? Previously, lightning and asteroid impacts have been suggested as the major fixed nitrogen sources in the Earth's atmosphere of about three billion years ago; volcanism had not previously been thought of as an important process.

New work shows that the high temperatures associated with volcanic activity might also have played an important role in helping to fix nitrogen. Higher levels of fixed nitrogen were found in volcanic plumes than in the surrounding air.

This shows that the heat from volcanoes allows the nitrogen and oxygen in the atmosphere to react together to form fixed nitrogen. The results suggest that volcanism may have been at least as important as lightning and asteroid impacts in converting atmospheric nitrogen into fixed nitrogen on the early Earth.

Adapted from <http://131.111.150.52/news/press/dpp/2004100402>, 4 October 2004.
Photo: <http://www.arenal.net/costa-rica-screensaver/arenal-volcano-screensaver.jpg>

17. Which of the following describes nitrogen fixation in an active volcanic environment?
- A. Heat from the volcano provides the energy to fix nitrogen.
 - B. Plants growing on cooling ashflows have the ability to fix nitrogen.
 - C. The burning of organic material on the slopes of volcanoes fixes nitrogen.
 - D. Bacteria and fungi on the flanks of the volcano have the ability to fix nitrogen.
18. Which of the following natural phenomena is most likely to cause widespread disease in human populations?
- A. fire
 - B. El Niño
 - C. flooding
 - D. timber pest infestation
19. Which of the following explains why foreign species may be successful in a new ecosystem?
- A. Predators of the foreign species are absent.
 - B. The foreign species prevents natural selection.
 - C. A native species becomes a parasite on the foreign species.
 - D. The foreign species causes adaptive radiation of native populations.

Use the following article to answer questions 20 and 21.

In March of 1989, the *Exxon Valdez* oil tanker spilled millions of litres of crude oil into the waters of Prince William Sound in Alaska. The spill killed many organisms, including an estimated 250 000 seabirds, 2800 sea otters, 300 harbour seals, 250 bald eagles and as many as 22 killer whales. Billions of salmon and herring eggs, as well as tidal plants and animals, were also smothered in oil.

Most of the fish and wildlife species that were affected have not fully recovered. Of the many species affected by the spill, only the river otter and bald eagle have returned to previous levels.

Killer whales, harbour seals and common loons have shown little sign of recovery in the area. Several other species, including sea otters and Pacific herring have made significant progress toward recovery, but are still not at the levels seen before the incident.

20. Which of the following organisms recovered most quickly after the oil spill?
- A. harbour seals and salmon
 - B. river otters and bald eagles
 - C. killer whales and bald eagles
 - D. sea otters and Pacific herring
21. Which of the following describes the initial impact of the oil spill on the ecosystem?
- A. Several animal species became extinct.
 - B. Adaptive radiation occurred in the seashore community.
 - C. There was an increase in the rate of ecological succession.
 - D. There was a reduction in the population of certain organisms.