

Name _____
Class _____
Parent/Guardian signature _____

Unit C
Environmental Chemistry
Review Package

Program of Studies Requirements.

Go through the requirements stated by Alberta Learning. When YOU feel you have mastered them, check them off.

- | | |
|--|---|
| <input type="checkbox"/> Chemicals essential to life | <input type="checkbox"/> Stability and biodegradability |
| <input type="checkbox"/> Substrates and nutrients | <input type="checkbox"/> Hazards, probabilities, and risk assessment |
| <input type="checkbox"/> Air and water quality | <input type="checkbox"/> Uncertainties in environmental monitoring |
| <input type="checkbox"/> Organic and inorganic material | <input type="checkbox"/> Uncertainties in assessing toxicity and risk |
| <input type="checkbox"/> Acids and bases | |
| <input type="checkbox"/> Ingestion and absorption of materials | |
| <input type="checkbox"/> Concentration and dispersal | |
| <input type="checkbox"/> Evidence of toxicity | |
-
- Identify common organic and inorganic substances that are essential to the health and growth of humans and other living things, and illustrate the roles served by these materials
 - Describe the forms of organic matter synthesized by plants and animals
 - Describe and illustrate processes by which chemicals are introduced to the environment or their concentrations are changed.
 - Describe the uptake of materials by living things through ingestion or absorption, and investigate and describe evidence that some materials are difficult for organisms to break down or eliminate.
 - What substances and in what amounts can substances be released into the environment (how much phosphate can be released into water without significant harm to living things)
 - Identify substrates and nutrient sources for living things
 - Describe and illustrate the use of biological monitoring
 - Identify chemical factors in an environment that might affect the health and distribution of living things in that environment.
 - Apply and interpret measures of chemical concentration in parts per million, billion, or trillion.
 - Identify acids, bases and neutral substances, based on measures of their PH.
 - Describe effects of acids and bases on living things
 - Describe mechanisms for the transfer of materials through air, water, and soil; and identify factors that may accelerate or retard distribution.
 - Describe mechanisms for biodegradation
 - Describe biological impacts of hazardous chemicals on local and global environments.
 - Describe and interpret information on LD50
 - Evaluate evidence that the use of insecticides to control mosquitoes has an effect/has no effect on bird populations.

For the first part of this review package, please make study notes based on the information you have read.



Land Use Conflict

Fact: Urbanization is the expansion and spreading of large towns and cities into rural land. As populations increase, the demand for housing space also increases. As time goes on, more and more people are wanting to live on the outskirts of cities rather than in the middle of cities. In Alberta, this outlying land is often good agricultural land.

Scenario : Mr. Magee is a farmer who owns his farm of 259 hectares (640 acres or 1 section) just outside the city of Eckspan. Agriculturally, the land is very productive. Mr. Magee has farmed his own land for 20 years. Before that, he worked on his father's farm. At the age of 53, he doesn't relish the thought of training for another occupation. Because his land is so close to the city, its market value is very high. The taxes he pays on his land are, therefore, also very high. This combined with the fact that the prices for his farm products are so low, has forced Mr. Magee to realize that he must sell his land. He has set a price and is now aware of all parties who are interested in purchasing his farm. Mr. Magee wants to make the best decision he can; one which will benefit the surrounding community far into the future.

The Players

- | | |
|---------------------|---|
| Mr. Magee | (farmer) must decide who would be the best owner of his farm. |
| Mr. Taylor | (building contractor) wants to develop a housing area to provide homes for a population that is rapidly increasing |
| Ms. McLean | (city engineer) recommends that a sewage treatment plant be constructed to serve that area of the city. The increasing population and the farm's proximity to a river would support such a facility |
| Mr. Cloke | (natural areas rep) wants the land developed as a campground and nature center which would encourage school children and others to visit and learn about environmental matters. |
| Mr. Pozik | (university dept. of agriculture) wants the site turned into an experimental farm which would benefit farmers in the province, and possibly throughout Canada. |
| Ms. Pattison | (recreation director) feels that the farm would be an excellent site for baseball diamonds, a football field, soccer field and possibly, in the future, the site for an ice arena and curling rink. Recreational facilities in the city are becoming more and more crowded as the population continues to rise. |
| Miss Johnson | (city mayor) wants it turned into a badly needed landfill because the present one is nearly full. The land would be temporarily taken out of production for about 10 years, but could be reclaimed back into farmland or even a park. |
| Mrs. Trimm | (Triple r Manufacturing Company) wants to build a recycling facility. Plastics would be the focus, but paper recycling would begin after about a year. |
| Mr. Rogers | (neighbouring farmer) feels that the land can be profitable for him and his young family if they were to purchase it and continue to farm the land. |



1. Read the people who are involved in Mr. Magee's conflict. Match each player with a viewpoint below. Provide support for your decisions.

Ecological _____

Economic _____

Educational _____

Egocentric _____

Health related _____

Recreational _____

Political _____

Scientific _____

Technological _____

Ethical _____

2. Which viewpoint is missing. Make up a person that would take on the personality of the missing viewpoint.

3. Which of the viewpoints is least desirable. Explain your answer.

4. The following are 4 different viewpoints our society might have regarding environmental issues.

Ecological
Political
Moral
Economic

Match them to the issues below.



A. _____ in 1988, pulp and paper mills discharged 600 000 kg of wood wastes into natural waterways every day. Much of this waste was in the form of suspended solids that settled to the bottoms of waterways where they destroyed the habitat and smothered bottom dwelling organisms.

B. _____ in 1994, Canadian farmers spent \$2.3 billion on fertilizers and \$886 million on pesticides. We cannot overlook this important contribution to the business portion of our society.

C. _____ Species and ecosystems do not exist solely to serve human needs. Man does not have the right to eliminate any species from this planet, even if its existence does not seem to have a purpose.

D. _____ City council has decided to delay for another three years the installation of a tertiary stage in our waste water treatment plant. There is no way it can be done without raising taxes again.

5. Found naturally in soil, _____ are nutrients that enhance the growth of plants.
6. Explain what will happen to the oxygen levels in a body of water if phosphates pollute it. Use point form and include all steps.
7. A _____ landfill is a supervised solid waste disposal site, where incoming waste is compacted.
8. Materials that can be broken down (decomposed) and used by organisms are said to be _____.
9. Explain how toxic metals become accumulated in the food chain. Choose a toxic metal and include the term used to explain this process.
10. Provide one equation for the reaction between an acid and a base. This reaction is called _____. (2 marks)

11. What is the difference between diffusion, osmosis, and active transport. (3 marks)

12. The concentration of pollutants in the environment can be changed using different techniques. I've listed them - you tell me how it works.

- A. Dispersion - _____
- B. Dilution - _____
- C. Biodegradation - _____
- D. Phytoremediation - _____
- E. Photolysis - _____



13. Fill in the table below. Use your textbook.

Nutrient	In plants, it's important in:	In humans it's important in:
Nitrogen (N)	✓ ✓	✓ ✓
Phosphorus (P)	✓ ✓	✓ ✓
Potassium (K)	✓ ✓	✓

14. List the four chemicals that are most commonly monitored as indicators of water quality. Provide a short description for each. See page 225.

- A. _____ - _____

- B. _____ - _____

- C. _____ - _____

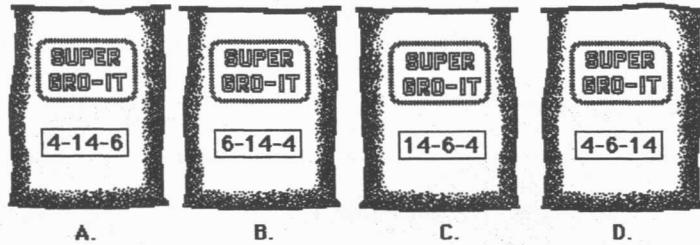
- D. _____ - _____

15. Match the list of organic molecules with the elements that compose them. (3 marks)

- | | |
|------------------------|------------------|
| 1. _____ carbohydrates | A. C, H, O, N |
| 2. _____ proteins | B. C, H, O |
| 3. _____ nucleic acids | C. C, H, O, N, P |



16.



Look at the different fertilizers above. For each on A - D explain what each will contribute to plants or flowers. Please refer to the make-up of each before you answer this question.

17. Fill in the following table by using your book.

Some Substances That Contaminate Ground Water

Substance and Source	Examples
Substances that leak from underground storage tanks and pipelines	
	Bacteria, viruses, protozoans
Household chemicals	
	Pesticides, solvents, petroleum products
Inorganic substances from de-icing roads, agricultural and home use, industrial products and vehicle exhausts	
Minerals in rocks and soil	
	Heavy metals, organic decomposition products



18. Look at the table below. Decide which of the 3 locations would be the best in order to support the greatest diversity of organisms? Please provide at least 2 reasons to support your answer. (2 marks)

Characteristic	Location A	Location B	Location C
Dissolved oxygen	3	7	8
pH	6	5.5	9
Phosphates	low	low	high

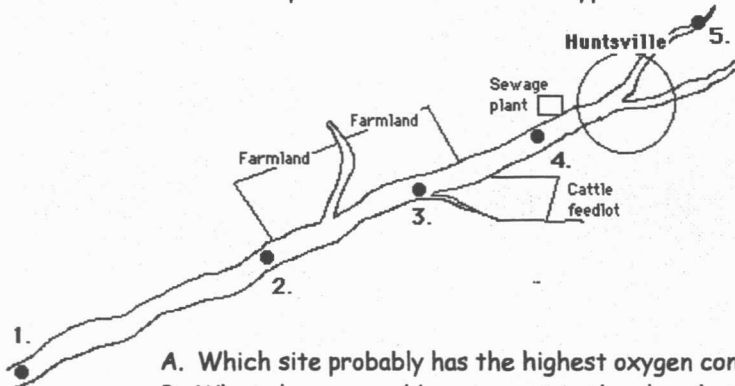
19. Air quality can be measured in two ways. What are they?

A. _____
 B. _____

20. _____ & _____ are the two major pollutants that cause acid rain.

21. What is the difference between the greenhouse effect and the enhanced greenhouse effect?

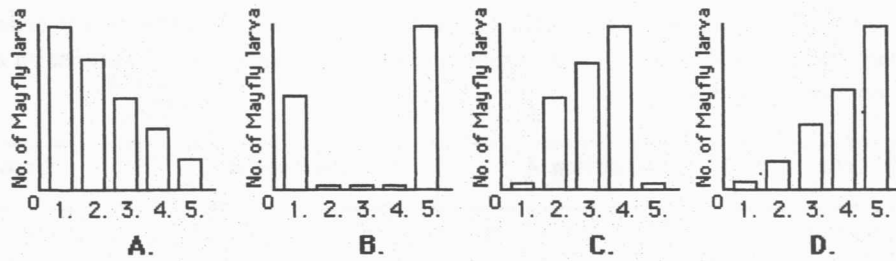
22. The sketch below shows part of a river and some typical activities along its banks.



- A. Which site probably has the highest oxygen concentration? _____
 B. What changes would you expect in the phosphate concentrations when moving downstream from site 4 to site 2?

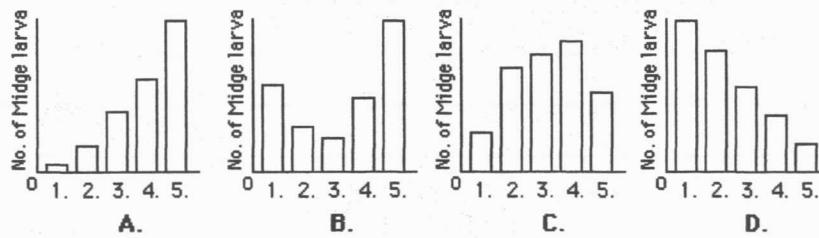
- C. Which of the following graphs shows the changes in mayfly larva at the different sites?





Provide reasoning for your choice

D. which of the following graphs shows the changes in midge larva at the different sites?

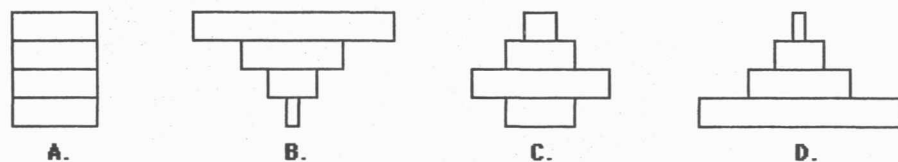


Provide reasoning for your choice

23. Explain **Phytoremediation** and provide one example

24. Housecleaning and gardening can be hazardous to your health. Products that we purchase for use in housecleaning, home improvement, gardening and car maintenance may contain chemicals that could harm us or the environment. Provide 4 examples of household chemicals.

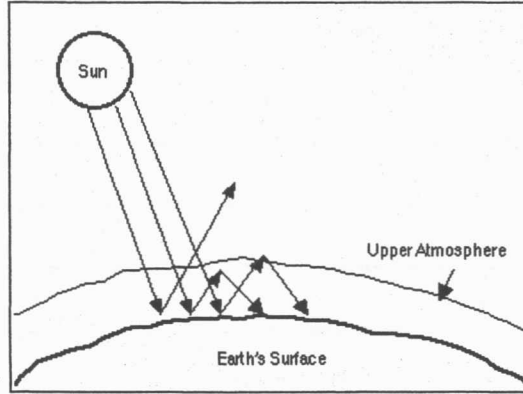
25. For each column, the bottom layer represents the bottom of the food chain, and the size of the box represents the amount of toxic metal.



Which of the above example A - d is representative of **biomagnification**. Provide an example of this phenomena



26.



The diagram illustrates infrared energy being redirected back to the earth after striking molecules in the upper atmosphere. What can the human population do to help reduce the effect of this phenomenon?

27. List and explain what this phenomenon is.

28. The molecules in the upper atmosphere that are bouncing radiation back to earth are

_____.

29. Use the following key to answer questions below.

- a. carbon monoxide
- b. nitrogen dioxide
- c. sulphur dioxide
- d. particulates

Can be carried on air currents and can settle on plants and buildings hundreds of miles from where produced. _____

Can lower the pH of precipitation, resulting in stress on organisms such as fish and salamanders. _____

A yellowish gas visible in the air during rush hours in big cities. _____

A colourless gas produced in large amounts from automobile exhausts. _____

A large amount of this pollutant is produced by natural causes such as forest fires or volcanoes. _____



30. Acids and bases are important chemicals. The following are questions based on acids and bases. Differentiate between the two.

	Acids	Bases
Taste		
feel		
pH		
ion		

31. When you put phosphorus in a body of water lots of things happen to the quality of water. Tell me all that you know and tell it to me in order.

32. Give me 2 examples of storage techniques of hazardous chemicals

33. Provide two examples of safe disposal of household hazardous products.

34. Refer to the diagram on the left to answer the next LAST questions

A. Which organisms are pollution sensitive

B. Which organisms are pollution tolerant

C. Which organisms would be found in water with an oxygen level of 2 or lower?

D. If a body of water was starting to get polluted which organisms would be the first to disappear.

35. Answer the following questions on PPM.

Solute (mL)	Volume of final solution (mL)	Concentration (ppm)
2.0	10000	
0.0009	100	
0.62	10 000	

