G9 Science: Class 7 Homework

1. Explain the difference between food chains and food webs. Which one is more realistic and why? **[3 marks**]

2. As you go from one trophic level to the next, the amount of available energy decreases. Explain where the energy has gone. **[3 marks]**

3. Bison, zebra and kangaroos are three large mammals. Explain why they have similar ecological niches but cannot be shown in the same food web. **[2 marks]**

4. Explain the ways humans impact the carbon cycle. If it is a negative impact, brainstorm a solution to reduce or eliminate it. **[4 marks]**

5. Plants need nitrogen to produce proteins and other important chemicals. Describe how nitrogen in the atmosphere makes its way into plants. **[3 marks]**

6. Describe some ways that climate change might influence the water cycle. **[3 marks]**

7. Order Canada's terrestrial biomes (exclude Mountain Range) from wettest to driest. **[4 marks]**

8. Order Canada's terrestrial biomes (exclude Mountain Range) from warmest to coldest. **[4 marks]**

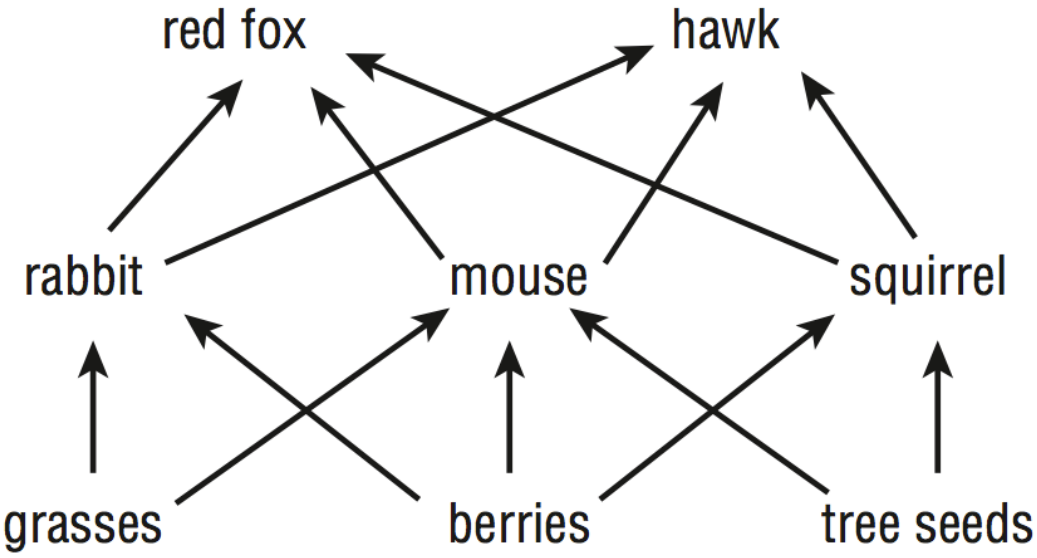
9. Which abiotic factors are the most influential in determining what type of biome occurs in a particular region? **[2 marks]**

10. Why do the open oceans not support rich ecosystems and large numbers of fish? **[2 marks]**

11. Explain why species living in the intertidal zone have to be unusually tough. **[2 marks]**

Challenge Problems

12. Using the food web below, answer the following questions.



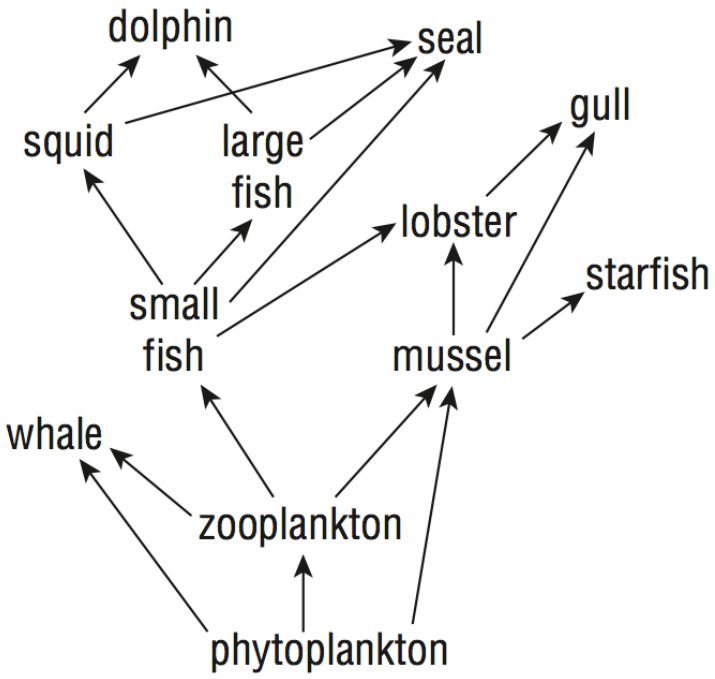
a. On the food web, classify each organism as a producer, herbivore, carnivore or omnivore. **[8 marks]**

b. Construct a trophic level pyramid, assigning each organism to a trophic level. **[3 marks]**

c. If the red fox were killed by rabies, what species would benefit and why? **[4 marks]**

d. If the red fox were killed by rabies, what species might decline and why? **[3 marks]**

13. Using the food web below, answer the following questions.



a. What trophic level is zooplankton in? **[1 mark]**

b. What trophic level is the squid in? **[1 mark]**

c. Which organisms within the food web would be directly affected by the overharvesting of large fish? **[2 marks]**

d. Predict how the elimination of whales would affect the populations of small fish and squid. **[2 marks]**

e. If the seal population increased significantly, how would this affect the dolphin population? **[2 marks]**

14. Use the following data to draw a pyramid of numbers showing each trophic level. **[7 marks]**

    An ecosystem contains 100 000 grass plants, 30 000 grasshoppers, 5000 snails, 4000 slugs, 80 shrews, 15 moles and 8 owls. Grasshoppers, snails and slugs are all herbivores. Shrews and moles are secondary consumers. Owls are tertiary consumers.

15. As more and more cottages were built around a small lake, people noticed that there was a buildup of green algae in the spring and the water was not as clear as it used to be. They also noticed that fishing was poor. Classify the nutrient level in this lake and explain what could account for these environmental changes. **[3 marks]**

16. Draw a food web for the following scenario: In a specific terrestrial food web, grasses are the organisms that convert radiant energy from the sun into glucose through the process of photosynthesis. Grass is then eaten by insects, mice, rabbits, and deer. Shrew and mice both eat the insects. Snakes eat both shrew and mice. Cougars eat mice, rabbits and deer. **[9 marks]**

17. Fish stocks around the world have been drastically reduced due to unsustainable fishing practices. Fishing wild species almost always results in by-catch, which is unintentionally catching fish species other than the target fish species. As a result, the fish populations are depleting. Many countries are turning to fish farms, also known as aquaculture, in which the fish are housed in underwater cages and farmed.

    Making management decisions about fishing depends on the knowledge of wild fish populations. One method is to keep track of the total mass or tonnage of fish caught in commercial fisheries to observe how fish populations are doing. The data below are taken from the Fisheries and Oceans Statistical Services archives, which shows the total mass of fish caught in Canada between 1985-2006.

Year	Cod	Redfish	Herring
1985	492767	89283	219167
1986	478730	104320	203086
1987	471897	104774	284626
1988	479131	104828	310283
1989	435373	100604	270035
1990	401257	109164	301328
1991	321833	116109	256485
1992	198078	125103	251433
1993	84767	109329	242968
1994	26270	75070	247777
1995	14661	39624	220472
1996	16447	45200	211568
1997	31418	39277	218525
1998	39201	47691	216836
1999	56314	43683	214679
2000	46888	44306	233785
2001	40913	41583	224914
2002	36434	36268	219648
2003	23573	36268	229613
2004	26049	32431	229613
2005	27693	34273	192041
2006	28266	32525	182194

Table 1: Wild Fish Harvests 1985-2006 (tonnes)

Year	Salmon	Trout
1985	---	1899
1986	---	2167
1987	---	2842
1988	---	3259
1989	---	3614
1990	---	4497
1991	34109	2839
1992	30325	3511
1993	36670	3718
1994	36083	4004
1995	42515	4429
1996	45624	6615
1997	57775	5930
1998	58618	6022
1999	72890	6574
2000	82195	6514
2001	105606	6513
2002	126321	6833
2003	99961	5253
2004	90646	4858
2005	98369	4878
2006	118058	5033

Table 2: Aquaculture Harvests 1985-2006 (tonnes)

a. Create a line graph for the data in Table 1 by hand or on a computer program (please print your graph). Graph the data for all three species on one graph by using a different colour for each species. Include axis labels, a legend and a title. **[6 marks]**

b. Create a line graph for the data in Table 2 by hand or on a computer program (please print your graph). Graph the data for both species on one graph by using a different colour for each species. Include axis labels, a legend and a title. **[5 marks]**

c. What trends do you see in the wild fish data? **[3 marks]**

d. Some wild fish populations change more drastically than others. Suggest reasons for this. **[3 marks]**

e. What inferences can you draw about the sustainability of the wild stocks over time? **[2 marks]**

f. What trends do you see in the farmed fish data? **[2 marks]**

g. What do the data from the farmed fish stocks suggest about the sustainability of aquaculture? **[2 marks]**

h. What are some controversies and issues with raising fish in aquacultures? **[3 marks]**