**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Environmental Science: 9.1, 9.2, 9.3, 9.4**

**Environmental Science Final Exam**

**Semester 2**

1. Which of the following lists identifies organisms that are producers in food webs?

1. Algae, ferns, sunflowers
2. Mushrooms, bacteria, earthworms
3. Termites, red foxes, grasshoppers
4. Woodpeckers, cardinals, grasshoppers

Part of a desert food web is diagrammed below.



2. Which of the following will **most likely** results if all of the primary consumers are removed from this ecosystem (illustrated in the food web above)?

1. Prairie rattlesnakes will become herbivores.
2. Golden eagle and kit fox populations will decrease.
3. Sagebrush grasshoppers will consume soil bacteria.
4. Silk grass and sand sagebrush (plants) populations will decrease

3. What do the arrows on the above diagram represent?

a. What organism is eating another organism

b. The direction of energy flow

c. Which species is dominant

d. Which species is going to decrease in population

Top of Form

4. Which trophic level is responsible for recycling energy through a food web (breaking it down and giving it to plants)?

1. producer
2. consumer
3. scavenger
4. decomposers

Bottom of Form

|  |  |
| --- | --- |
| **Organism** | **What it eats** |
| **Frog** | **Mayfly** |
| **Lily pad** | **Uses sun for photosynthesis** |
| **Water flea** | **Lily pad, algae** |
| **Snapping Turtle** | **Lily pad, Crayfish, Mayfly, Trout, frog** |
| **Algae** | **Uses sun for photosynthesis** |
| **Trout** | **Mayfly, frog** |
| **Crayfish** | **Mayfly, algae, lily pad** |
| **Bacteria** | **Dead organisms** |
| **Mayfly** | **Algae, lily pad** |

5-7. Use the organisms on the right to create a well-organized food web. Make sure to draw all of the connections. Don’t forget to connect the decomposers.

**8. Frog: eats the mayfly**

Performs Photosynthesis, Cellular Respiration, or Both

Producer, Herbivore, Omnivore, Carnivore, Decomposer

Producer, Decomposer, Primary Consumer, Secondary Consumer, Tertiary Consumer, or Quaternary Consumer

**9. Water flea: eats the lily pad and algae**

Performs Photosynthesis, Cellular Respiration, or Both

Producer, Herbivore, Omnivore, Carnivore, Decomposer

Producer, Decomposer, Primary Consumer, Secondary Consumer, Tertiary Consumer, or Quaternary Consumer

**10. Trout: eats the mayfly and frog**

Performs Photosynthesis, Cellular Respiration, or Both

Producer, Herbivore, Omnivore, Carnivore, Decomposer

Producer, Decomposer, Primary Consumer, Secondary Consumer, Tertiary Consumer, or Quaternary Consumer

**11. ALGAE: uses the sun’s energy to do photosynthesis**

Performs Photosynthesis, Cellular Respiration, or Both

Producer, Herbivore, Omnivore, Carnivore, Decomposer

Producer, Decomposer, Primary Consumer, Secondary Consumer, Tertiary Consumer, or Quaternary Consumer

**12. Snapping Turtle: Lily pad, Crayfish, Mayfly, Trout, frog**

Performs Photosynthesis, Cellular Respiration, or Both

Producer, Herbivore, Omnivore, Carnivore, Decomposer

Producer, Decomposer, Primary Consumer, Secondary Consumer, Tertiary Consumer, or Quaternary Consumer

**Photosynthesis**

13) CHEMICAL EQUATION OF PHOTOSYNTHESIS (**letters and numbers**):

\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_

14) RE-WRITE THE EQUATION USING **WORDS**:

\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_

**Cellular Respiration**

15. CHEMICAL EQUATION OF CELLULAR RESPIRATION (**letters and numbers**):

\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_

16. RE-WRITE THE EQUATION USING **WORDS**:

\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_

17. Which cells in your body do cellular respiration? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18. Last semester, we put a slug, dirt and some plants in their biosphere project. The bottle was sealed up tight with tape but the slug did not die. He was in the bottle for at least a month. Explain how the plant and the slug supported each other with photosynthesis and cellular respiration.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. What is ATP?

1. Sugar that the body breaks down for energy
2. Fatty acid that stores energy for the body
3. Chlorophyll that converts the sun’s energy into chemical energy to be used by the plant
4. Energy used by the body to do everything
5. Adrenaline that gives us energy in scary situations

20. Describe what would happen if too much nitrogen and phosphorus enter a body of water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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21. Which statement describes the relationship between dissolved oxygen and temperature?

1. There is not a relationship between dissolved oxygen and temperature
2. As the dissolved oxygen levels increase, so does temperature
3. As the dissolved oxygen levels increase, temperature decreases
4. As the temperature increases, the dissolved oxygen levels decrease

22. What do you think happens to dissolved oxygen levels in a stream at night? Does it increase or decrease? Explain your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

23. Right after a lot of fecal coliform **bacteria** washes into a stream, would you expect the dissolved oxygen levels to increase or decrease?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

24. What can macroinvertebrates tell scientists about a body of water?

1. the exact source of pollutants
2. the general healthiness of the water
3. how much nitrogen there is
4. where the water is going

25. The best definition of a watershed is:

1. the headwaters (source) of the river
2. area of land where all of the water flows into the same place
3. the river banks
4. a covering for a well

26. Draw the full pH scale and clearly label which part is neutral, acidic, and basic.

27. A change in dissolved oxygen might be related to….**List all that apply.**

1. a change in temperature

b. a change in the flow of the stream

c. a change in the amount of plants in the water

d. a change in the amount of macroinvertebrates and fish in the water

e. an increased amount of decomposition in the water

28. In which organelle does cellular respiration happen? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 In which organelle does photosynthesis happen? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. chloroplast
2. cytoplasm
3. mitochondria
4. ribosome
5. nucleus
6. vacuole

29. What factor would you expect to find a lot of in your stream if you are surrounded by farmland? Explain your answer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The graph below shows the levels of acidity that different kinds of freshwater fish can tolerate. Low pH values mean the water is more acidic.



30. Based on the data, which of the following fish can tolerate the lowest pH?

1. Brown trout
2. Smallmouth bass
3. Fathead minnow
4. Yellow perch

31. Based on the data, which of the following fish would most likely die first due to acid rain pollution?

1. Brown trout
2. Smallmouth bass
3. Fathead minnow
4. Yellow perch

|  |  |  |  |
| --- | --- | --- | --- |
| **Macroinvertebrates** | **Stream 1** | **Stream 2** | **Stream 3** |
| **Pollution Sensitive** | 25 | 0 | 0 |
| **Somewhat Tolerant** | 18 | 0 | 15 |
| **Pollution Tolerant** | 20 | 25 | 23 |

32. Which stream is the healthiest? Explain your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

33. Which stream is the most polluted? Explain your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Watershed Divide Headwaters

Runoff Nonpoint Source Pollution

Tributary Point Source Pollution

River Mouth

34. Label the diagram of the watershed**. Include all of the following labels:**



35. List **THREE** reasons why the riparian zone is important for the health of a stream. BE SPECIFIC!!!

\*\*You may earn an **EXTRA POINT** if you correctly name **FOUR** reasons.\*\*

**1-**

**2-**

**3-**

**Circle the correct response:**

1. A chemical spill from a coal mine next to West Virginia’s Elk River contaminated the tap water of as many as 300,000 West Virginia residents across nine West Virginia counties. What type of pollution is this?
2. Nonpoint Source Pollution
3. Point Source Pollution
4. A nitrate gauge near Wapello, 20 miles above where a tributary connects with the Mississippi River, was recording 25 kilograms (55 pounds) of nitrate per second during the first week of June because farmers were applying more fertilizer than their crops could absorb. What type of pollution is this?
5. Nonpoint Source Pollution
6. Point Source Pollution

**Answer the following questions in COMPLETE SENTENCES:**

1. Describe the relationship between runoff and nonpoint source pollution.
2. What would have more runoff, an urban area (city) or a rural area (country)? Explain your answer.

**Answer the following questions with the correct vocabulary:**

1. A nonliving factor affecting water quality is considered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. A living or once living factor affecting water quality is considered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

42-56. Please label the following as either **BIOTIC or ABIOTIC:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Dissolved Oxygen \_\_\_\_\_\_\_\_\_\_\_\_\_\_Dead Raccoon

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Phosphorus \_\_\_\_\_\_\_\_\_\_\_\_\_\_Water

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Macroinvertebrates \_\_\_\_\_\_\_\_\_\_\_\_\_\_pH

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Flow \_\_\_\_\_\_\_\_\_\_\_\_\_\_Sediment

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Rocks \_\_\_\_\_\_\_\_\_\_\_\_\_\_Poop

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Chlorine \_\_\_\_\_\_\_\_\_\_\_\_\_\_Bones

\_\_\_\_\_\_\_\_\_\_\_\_\_\_Algae \_\_\_\_\_\_\_\_\_\_\_\_\_\_Cigarettes

**Match the factor to its definition.**

|  |  |
| --- | --- |
| 57. \_\_\_\_Temperature | a. A macronutrient that promotes plant growth and has a safe parameter of less than 0.03mg/L |
| 58. \_\_\_\_Flow | b. A factor directly related to water’s ability to hold dissolved oxygen |
| 59. \_\_\_\_Macroinvertebrate | c. A measure of how much water is moving through a specific location in a certain amount of time (often measured in ft3/sec) |
| 60. \_\_\_\_Dissolved Oxygen | d. An organism with no backbone that is large enough to be seen with the naked eye (or greater than 1/2mm) |
| 61. \_\_\_\_Nitrogen | e. A measure of the amount of gaseous oxygen in water.  |
| 62. \_\_\_\_Phosphorous | f. A measure of how acidic or basic a solution is |
| 63. \_\_\_\_Chlorine | g. A macronutrient that promotes plant growth and has a safe parameter of less than 1 mg/L |
| 64. \_\_\_\_pH | h. A micronutrient that helps organisms’ muscles function |

**You do NOT need to use complete sentences to answer the following questions:**

1. Eutrophication can lead to a decrease of what in the stream?
2. Explain the relationship between dissolved oxygen and flow.
3. Explain the relationship between dissolved oxygen and temperature.
4. What happens if there is too much chlorine in a stream?
	1. Fill in the table below with **ONE** source of each of the following factors.

\*\*You can get an EXTRA point for every correct additional source!

|  |  |
| --- | --- |
| Factor | Source |
| Phosphorous |  |
| Chlorine |  |
| Dissolved Oxygen |  |
| E.Coli |  |

73. The Amazon River flows from the mountains and rain forest of Ecuador and Peru to the city of Macapa’ in Brazil. Where would you expect the water to have more pollution, in the headwaters in Ecuador or the river mouth in Brazil? Explain your answer.

**DRAW and LABEL a diagram of eutrophication. Make sure to include labels explaining the effects of excessive amounts of nitrogen and phosphorous on a body of water, photosynthesis, cellular respiration, and decomposition in your explanation.**