**Virtual Lab: Abiotic/Biotic Factors** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Directions:**

Go to:

1. https://www.biologycorner.com/bio2/fishlab/index.html

**Background Information (Read this on your own. It will help you answer the questions related to the lab):**

How do organisms react to changes in abiotic factors? To survive, living things must adapt to nonliving factors in the environment. These nonliving, physical factors, including temperature, climate, air, water, sunlight, and soil, are called abiotic factors. Abiotic factors determine the kind of organisms that are able to live in a certain environment. Temperature influences organisms because it affects their rate of metabolism-the chemical activities that enable organisms to stay alive, grow, and reproduce. Warm-blooded animals, or endotherms, maintain a constant internal body temperature regardless of external temperature. By contrast, the body temperature of cold-blooded animals, or ectotherms, is determined by the temperature of the environment.

Because fish are ectotherms, they can detect and react to very slight temperature changes. Each species of fish has a temperature range that is optimum, or best, for that species. If the water temperature is too far from optimum for a species, those fish will move to an area with a more favorable temperature. In spring, warmer waters signal fish to migrate to new locations or begin spawning. In the fall, cooler waters signal young fish to move away from their nursery grounds. Since water temperature also influences the behavior of fish, ecologists are concerned about thermal pollution. Thermal pollution is caused when factories and power plants release hot water, used to cool machines in their factories, into surrounding water. Thermal pollution raises water temperatures and affects the behavior and health of fish.

In this Virtual Lab, you will observe how temperature affects a fish's metabolism. One way to determine the metabolic rate of a fish is to observe the rate of water movement over the gills. Rapid movement of the operculum, the bony covering over the gills, indicates increased consumption of oxygen, while slow movement indicates decreased consumption. Counting the number of movements can give observers an indication of a fish's metabolic rate.

**Procedure:**

1. Click on the thermometer and record the temperature.

2. Click on the fish and count the number of times it opens and closes its mouth in 30 seconds (use the stopwatch). Record this in your data table.

3. There are totally five steps, follow the instructions for each step.

4. Record the temperature and the number of breaths in the table.

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| Degrees Celsius | Goldfish |
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|  |  |
|  |  |
| 30 |  |

**Journal Questions:**

1. How did the fish’s breathing rate change as the temperature changed?
2. At what temperature did the fish need the most oxygen? How do you know?
3. At what temperature was the fish’s metabolism highest? How do you know?
4. What do you think happens to a fish’s behavior in cold climates during the winter? Explain your answer.
5. What are abiotic factors? Identify at least three abiotic factors in the environment.
6. Why is it important for organisms to be able to adapt to changes in abiotic factors?