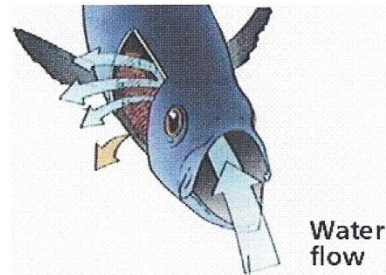


## Effect of Temperature on the Respiration Rate of Goldfish

### Background

Organisms respond to changes in their environment. They respond in order to maintain **homeostasis** – stable, internal conditions of the organism. If organisms do not adjust themselves to the changing environment, the changes may be severe enough to kill the organism. An example of a response mechanism to maintain homeostasis deals with thermoregulation (maintaining a constant temperature) in humans. If we become warm, we increase our sweat production. As the sweat evaporates away from our skin, it cools us down. If we become cold, we begin to shiver. These quick muscle contractions generate heat, warming us up. We can only adjust to slight variations in temperature as drastic changes can lead to our eventual death.

In this activity, we will investigate how changing water temperatures affect the respiration (breathing rate) of goldfish. Fish obtain their oxygen from the water. The water must pass across their gills. In order to get the water moving across the gills, fish are constantly taking water into their mouths and forcing it out through the slits in the back of their 'necks' where the gills are located. Every time a fish opens and closes its mouth, it is forcing the water to move.



### Objectives

- Use prior knowledge to develop a **hypothesis** about physiological changes resulting from environmental temperature changes;
- Design and carry out an experiment to test your hypotheses.
- Observe the physiological changes that occur as a result of changes in water temperature.
- Study the physiological processes and record measurements the same way that physiologists do.
- Gain an understanding of the importance of using animals in research.

### Life Science Class fish respiration rates

**Lab will be experiments with fish breathing rates using living goldfish. Prior to class, please answer these questions:**

- 1) Look up the normal resting breathing rate of a fish (we will use goldfish in class) \_\_\_\_\_

*Without looking at any sources, answer the following questions as to what you think will happen. After experimenting in class, you will see if your hypothetical guess is correct!*

- 2) What do you think will happen to the breathing rate if the water is warmed up 10 degrees? Will the breathing rate go up or down? \_\_\_\_\_

- 3) What do you think will happen to the breathing rate if the water is cooled 10 degrees from where we started? \_\_\_\_\_