

QUESTIONS and ANALYSIS:

1. Graph the temperature and heart rate data from the *Medaka* observations.

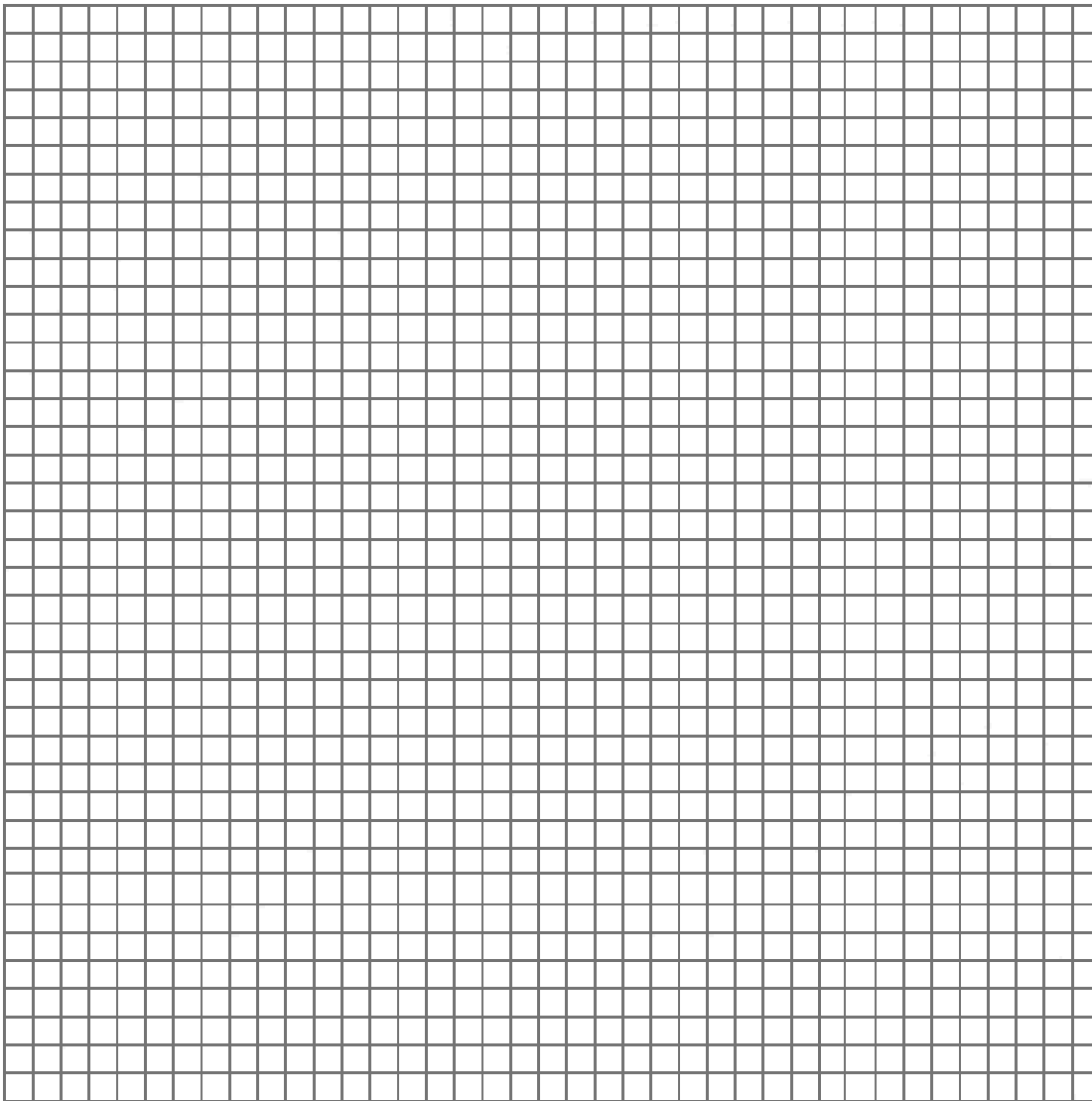
a. The independent variable is: _____

Use this to label the X-axis.

b. The dependent variable is: _____

Use this to label the Y-axis.

Title: _____



Name: _____

2. Why does temperature affect heart rate in ectothermic organisms?

3. Discuss what results you might obtain if you repeated this experiment two additional times using an endothermic organism starting with the **thermoneutral** zone of that species and then either increasing (one time) **or** decreasing (the other time) the environmental temperature.

4. Describe at least three different ways (metabolic or physical) that an **endothermic** organism can regulate its temperature.

5. Calculate Q_{10} for *Medaka* at **three** separate intervals during our investigation. SHOW YOUR WORK BELOW IN THE SPACES PROVIDED! SET UP THE CALCULATIONS!

For a 10° C interval, the heart rate Q_{10} can be calculated using sample data as follows:

$$Q_{10} = \frac{\text{rate at higher temperature}}{\text{rate at lower temperature}}$$

A general formula that can be used with **any** temperature interval is:

$$Q_{10} = \frac{k_2}{k_1}^{(10/t_2 - t_1)}$$

where:

t_2 = higher measurement temperature

t_1 = lower measurement temperature

k_2 = rate at temperature t_2

k_1 = rate at temperature t_1

Interval 1:

Interval 2:

Interval 3:

6. What do your calculations above tell you about the metabolic rates of *Medaka*?
