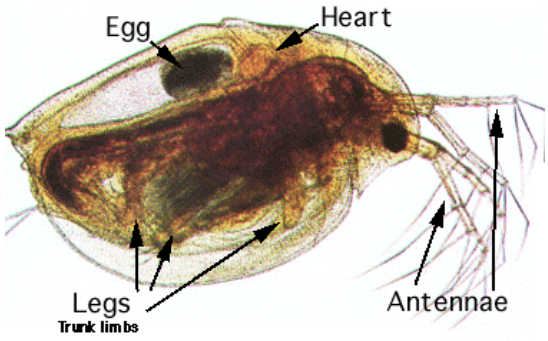
Name _____ Date _____ Block _____

Daphnia Heart Rate LAB

INTRODUCTION

A *Daphnia* is a tiny crustacean (related to shrimp) that has a clear outside skeleton (carapace) and jointed legs. Like other arthropods, its heart is on its back.



The environment challenges each living thing to respond. It includes the air, the water, heat and light, and the chemicals which enter our bodies. Because *Daphnia* are **ECTOTHERMS** (cold-blooded), their body temperature changes with the surrounding environment. Since chemical reactions are speeded up in warmer temps, what would you predict the effect of temperature changes would be on their rate of metabolism (and heart rate)? I PREDICT THAT:

_____

Chemicals which enter their bodies can also change their heart rate by interfering with the chemicals that nerves use to transmit signals. Chemicals that speed up heart rate are known as **stimulants**, whereas chemicals that slow down the heart rate are known as **depressants**.

MATERIALS

- 4 *Daphnia* in culture liquid (per table)
- Transfer pipette
- A clean depression slide
- Compound microscope
- A small container for "used" *Daphnia*
- 1% ethanol in a dropper bottle

PROCEDURE

Keep the light for your microscope OFF as much as possible to avoid overheating your *Daphnia!*

1. Using a clean pipette, carefully transfer a *Daphnia* and ONE drop of liquid onto a slide. Keep the drop small so that the *Daphnia* can't swim out of your field of view.
2. Place the slide under the microscope and focus on the *Daphnia* so that you can see the beating heart. REMEMBER: its heart is on its back!
3. Count the number of heart beats that occur in 10 seconds. Have your lab partner time 10 seconds for you as you count heartbeats. You want to make your measurements quickly, so that the *Daphnia* does not become stressed in the small volume of water.

4. Record the number of heart beats in the data table on the next page. Multiply the number by 6 to get the number of beats per minute.
5. Take at least **three** separate heart rate measurements for each individual *Daphnia* and calculate the average of the three measurements. REMEMBER: if the three numbers are NOT within 10% of each other, repeat your trials!
6. When you have finished recording the heart rate in water (the CONTROL solution), add ONE DROP of the **1% ethanol** solution to the slide. Turn the light OFF and wait 30 seconds.
7. Turn the light back on and count the number of heart beats for 10 seconds again, repeating at least 3 times. Multiply each count by 6 to get the heart rate per minute. Record in data table.
8. Rinse the *Daphnia* into the "used" container, then repeat steps # 3-9 with a new *Daphnia*.

HYPOTHESIS

Dependent Variable *measured*: _____

Independent Variable used: _____

Predict the effect of the independent variable on the dependent variable:

_____

DATA TABLE 1 – Results:

HR = Heart Rate BPM = Beats per Minute

	Water		**Ethanol**	
	10 sec.	**BPM** (x6)	**10 sec.**	**BPM** (x6)
Trial 1				
Trial 2				
Trial 3				
Average				
+/- 10% Range				
Accept DATA? (YES or NO)				

CONCLUSION

Average BPM in Water: _____

Average BPM in Ethanol: _____

Did the ethanol increase or decrease the heart rate? _____

Did the data support your hypothesis? _____

Would you classify the ethanol as a **stimulant** or a **depressant**? _____

Compare your results with your lab partner. Did you get the same results? _____

Was there a difference between your average BPMs and your partners? _____

If yes, why? _____

In the introduction, you made a prediction about how a change in temperature would affect the Daphnia's heart rate. Below, write it out as a hypothesis, then write a procedure to test it:

HYPOTHESIS:

PROCEDURE: