Name _____ Date _____ Period _____

DOES EXERCISE AFFECT YOUR BREATHING?

PURPOSE:

The purpose of this lab is for students to determine whether or not exercise (running) has an effect on breathing.

HYPOTHESIS:

_____

_____

_____

MATERIALS PER GROUP:

3 balloons, triple-beam balance, tape, string, meter-stick

FORMULAS:

Radius = $C/2\pi$ = Circumference ÷ 6.28
Volume = $4/3\ \pi r^3$ = 4.19 X Radius X Radius X Radius

PROCEDURE:

1. Use the balance to determine the mass of an empty balloon.

2. Blow 1 deep breath into the balloon.

3. Use the balance to determine the mass of the balloon. To determine the mass of the air, subtract the mass of the empty balloon. Fill in the data table with your results. If necessary, secure the balloon the balance using a small piece of tape.

4. Use the string and meter-stick to determine the circumference of the widest part of the balloon. Then calculate the radius using the above formula. Finally, use the radius to calculate the volume of the balloon. Fill in the data table with your results.

5. Blow 5 deep breaths into a second balloon. Repeat steps 3 and 4 for the second balloon.

6. Go outside and run 1 mile. As soon as you have finished running, blow 5 deep breaths into a third balloon.

7. Return to the classroom and repeat steps 3 and 4 for the third balloon.

DATA TABLE:

Mass of empty balloon = _____

	BALLOON 1 1 deep breath before running	BALLOON 2 5 deep breaths before running	BALLOON 3 5 deep breaths after running
mass of balloon with air (g)			
mass of the air only (g)			
circumference of balloon (cm)			
radius of balloon (cm)			
volume of balloon (cm^3)			

ANALYSIS QUESTIONS:

1. How did the mass of the balloon change as it was filled with more air? (HINT: Compare balloons 1 and 2.)

2. How did the circumference, radius, and volume of the balloon change as it was filled with more air? (HINT: Compare balloons 1 and 2.)

3. How did the mass of the balloon change after you ran 1 mile? (HINT: Compare balloons 2 and 3.)

4. How did the circumference, radius, and volume of the balloon change after you ran 1 mile? (HINT: Compare balloons 2 and 3.)

5. Is there any evidence from your data table that suggests that there is a relationship between exercise and breathing rate?

6. Is the relationship between exercise and breathing rate DIRECT or INVERSE? Choose one answer and briefly explain your choice.

7. Name one or two ways in which this lab could be improved.