Name _____Date _____ Period _____

Investigating Muscle Fatigue – Aerobic / Anaerobic Respiration

Purpose: In this activity students will investigate cellular respiration, and the factors that affect skeletal muscle fatigue.

Objectives:

- To observe skeletal muscle fatigue
- To explain the relationship between muscle fatigue, cellular respiration, both aerobic and anaerobic respiration
- To chart and interpret the results obtained.

Background Information:

Just as an automobile must be supplied with gasoline as a source of energy before it can move, so too your muscles require energy in order to contract. This energy, in the form of ATP, can be produced with oxygen (aerobic respiration) or without oxygen (anaerobic respiration). In animal cells the anaerobic process is called *lactic acid fermentation*, and it occurs when there isn't any oxygen available in the cells for aerobic respiration. The build up of lactic acid, as a product of this anaerobic respiration, reaches a point where the muscles have a reduced ability to contract, until eventually exhaustion sets in and contraction of the muscle will stop. This is muscle fatigue. Similarly, in the case of the automobile when the waste products (exhaust) cannot be removed and is built up inside the engine, the automobile will stop (stall).

Materials: clothes pin, timer
Note: Tests could measure the number of open and closed fists in 20 second intervals or over 200 seconds.

Procedure:

1. Pair up with a partner. Open and close your fist as many times as you can.

2. The number of times in 20 seconds is recorded. Students should attempt to squeeze quickly and completely to get the maximum number of squeezes for each trial.

3. Repeat this process for nine more, 20 second trials recording the result for each trial. Do not rest the fingers between trials so you can get a rate over time to complete a **line graph**.

4. Repeat steps for the non-dominant hand.

Preparing your graph: You should have two sets of data points on the same graph, one with the dominant hand, and one with the non-dominant hand. Be sure you label the axis, have a key, use proper units, and give your graph a title

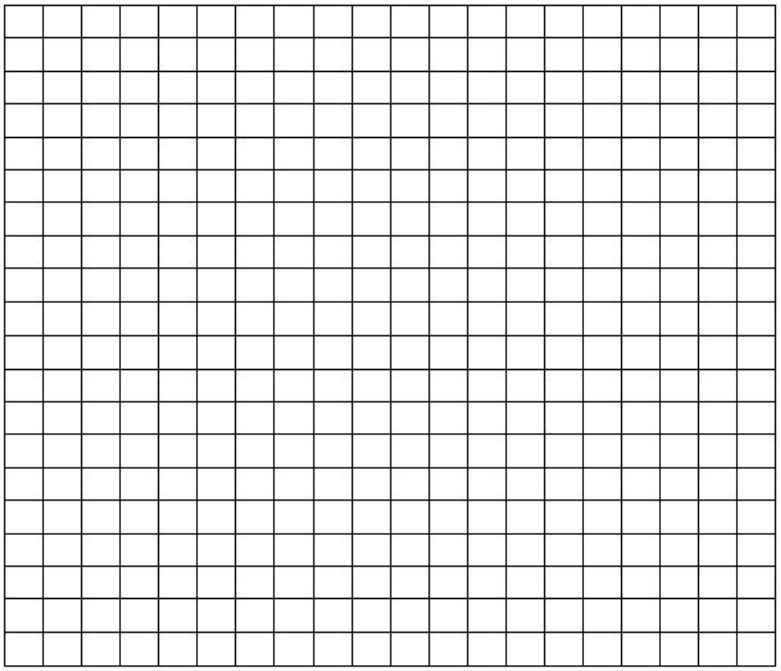
Name _____Date _____ Period ____

Data Collection

_____

Title

Trial	# of Squeezes in 20 Seconds: Dominant Hand	# of Squeezes in 20 Seconds: Non-Dominant Hand
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		



Conclusion Questions

Key	
Dominant Hand	
Non- Dominant Hand	

1. Graph your data
2. Describe two situations, other than this activity, when your muscles burn from the build up of lactic acid.

    a.

    b.

3. Write the chemical equation for **cellular respiration**.

4. What is another name for anaerobic respiration that occurs in your body?

4. Write the chemical equation for **anaerobic respiration?**

5. Why are your muscles going into anaerobic respiration?

6. What other organisms do anaerobic respiration?

7. Infer how cellular respiration is critical to the survival of all species.