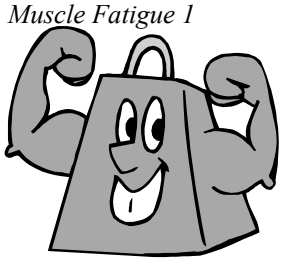


Name_____

Muscle Fatigue

Problem: To demonstrate and explain muscle fatigue.

Background Information:
Skeletal muscles move the bones in the skeleton. When the muscles **contract**, it makes the joints able to move and lets us engage in physical activity of all kinds.

Chemical energy is needed to cause muscles to contract. The chemical energy is a result of **respiration**.

Skeletal muscle is made of two different kinds of fibers: fast twitch (FT) and slow twitch (ST). On the average, we have about half ST fibers and half FT fibers. However, elite athletes have different amounts of ST and FT fibers. Depending on their sport they may have much more of one type than the other.

Fast twitch fibers use up energy very quickly. The muscle fibers contract very fast. They are used in activities that that short, but intense. Stop-and-go, change-of-pace movements in many team sports depend on FT fibers. Sprinting and other quick, forceful movements also use the fast twitch fibers.

Slow twitch fibers do not get tired as quickly. They are used during prolonged, low to moderate intensity activities. Athletes with good endurance and aerobic capacities, like marathon runners and cross-country skiers have very high percentages of ST fibers.

The energy the muscles use comes from carbohydrates, fats and protein. Carbohydrates in the form of glucose are the main energy source for the body.

Energy in the form of fat varies greatly in individuals, and is the next source of energy for the body.

Protein is not stored for the purpose of creating energy; the function of protein is to build molecules in the body. However, when all other energy is used up, the body will use protein for energy.

The brain also uses energy to stay alert and to help a person concentrate. The brain is fueled almost entirely by carbohydrates.

Materials:

Test tube clamps Clock with second hand

Procedure:

1. ***Read through the instructions for performing this experiment***.
2. Create a chart to show the data collected in this experiment. Have your teacher check your chart. Then begin the experiment.
3. Work with a partner.
4. Hold the test tube clamp in the hand that you use to write (your dominant hand).
5. Squeeze the clamp with your thumb and first two fingers until your fingers meet. Relax your grip until the clamp is back in its original position. This is one squeeze.
6. Using the second hand on the clock, your partner will record the number of squeezes you can do every 30 seconds for a total of 150 continuous seconds (5 trials).
7. Count the number of squeezes out loud.
8. At the end of the first 30 second period your partner will record the number of squeezes you made in your data chart. You continue to squeeze the clamp. Record the number of squeezes after 60, 90, 120, and 150 seconds.

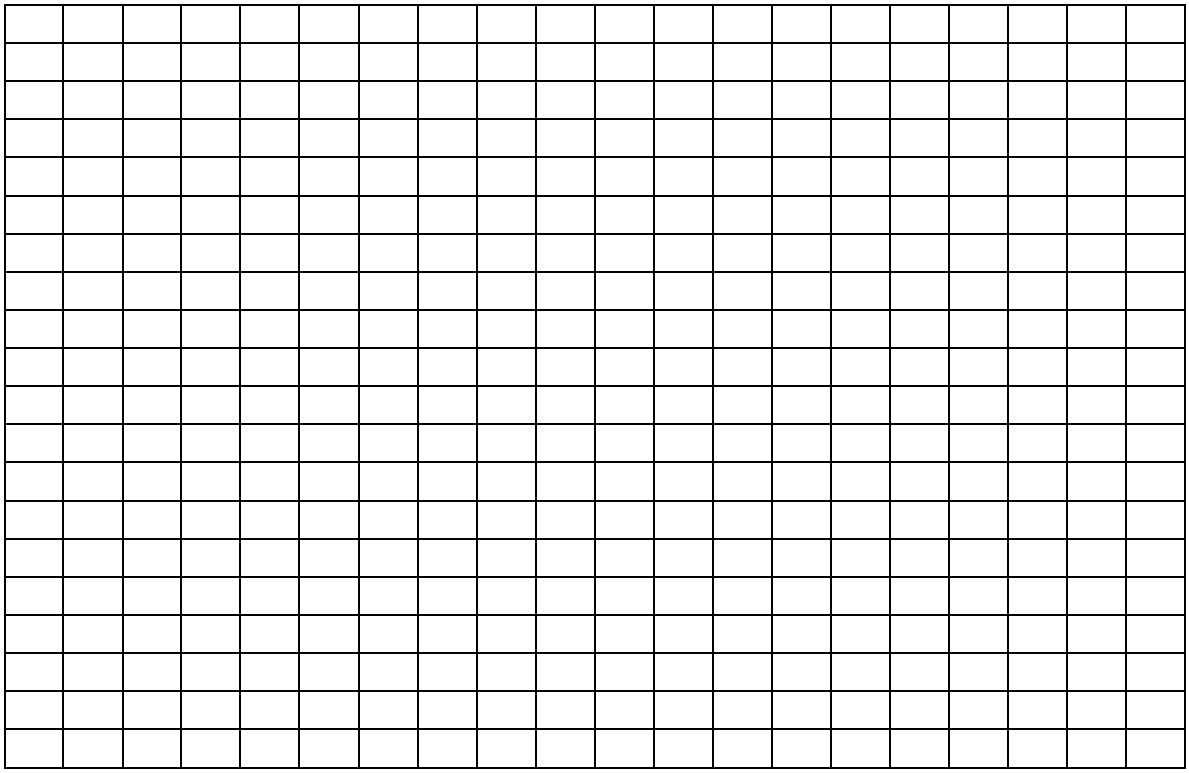
Data:

Make a chart to collect your data here:

Teacher Check:

Create a graph to display your data. What is the best kind of graph to show this data? _____ Why? _____

Have your teacher check this. | *Teacher Check* |



Data Analysis:

Look at your data carefully. What relationship (what does the independent variable have to do with the dependent variable) do you see? Describe the relationship.

_____

_____

Conclusion:

1. What happened to the number of squeezes made per 30 second time period as time passed?

   _____

2. How did your muscles feel at the beginning of the exercise?

   _____

3. How did they feel when you continued to use them, even when they were tired?

   _____

   _____

4. Explain why you think muscles get tired, or fatigued. (Think *energy & respiration*)

   _____

   _____

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