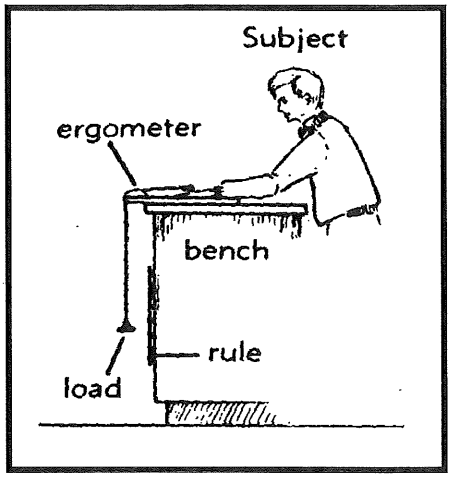
Activity 16: Muscle Endurance

Background Information:
Muscle strength and muscle endurance are very different abilities. Consider a weight lifter (strength) and a long distance runner (endurance). Different sports require both strength and endurance in differing proportions. This activity follows on from the previous one and both can be done simultaneously.

Purpose:
- to test the endurance of an individual muscle or muscle group.

Materials:
string
set of brass weights (150 g)
masking tape
timer
access to gym equipment for leg strength activity

Procedure:
Finger muscle endurance



a. Sit comfortably at a desk.
b. Your arm is to be taped to the desk so that your fingers overhang the edge to the first knuckle of the middle finger. Make sure the hand is taped so that the fingers flex upwards.
c. Tape down all fingers except the middle finger.
d. Tie a piece of string to the middle finger.
e. Connect the brass weight hook with 150 g to the other end of the string.
f. When the fingers are relaxed the weights hang over the edge of the desk.
g. Gently flex the middle finger to lift the weight.

Beware: DON'T JERK THE WEIGHTS UP. The lift should be gentle and smooth.

Let the weights down gently; DON'T DROP THE WEIGHTS.

h. The weights are to be lifted at a rate of one lift per second. Have one group member call the seconds to help keep the rate.
i. Time how long it takes for the person to consistently fall below the required lifting rate.
j. Collected data from at least 5 people.

Leg muscle endurance (This requires the use of gym equipment.)

k. Select the leg flex or leg extension machine for this part of the activity.
l. Sit the person comfortably on the machine.
m. Starting at a comfortable weight, have the person lift it to the maximum height.

Beware: DON'T JERK THE WEIGHTS UP. The lift should be gentle and smooth.

Let the weights down gently; DON'T DROP THE WEIGHTS.

n. The lifting rate should be one lift every 2 seconds. Have one group member call the seconds to help keep the rate.

o. Record the time it takes for the person to drop consistently below the required lifting rate.
p. Collect data from at least 5 other people.

Results:
Construct an appropriate table to record the times of all 5 people for both the finger and muscle endurance activities.

Questions:

1. Which muscle, the finger or the leg muscle) had the greater endurance?

2. Why does the endurance of a muscle decrease over time?

3. Was there a difference in the data between males and females? Explain

4. Compare the two sets of data. (You may have to perform a simple calculation for this to be possible). Is there a difference between the finger and leg muscle endurance times?

5. State the location of the muscles that are used in the finger action. Explain how you know these muscles are being used.

6. How are the muscles connected to the bones of the fingers and legs?

7. What physical symptom/s prevent the person from lifting the weights at the required rate?

8. Muscles contract to pull on bones, which act as levers, to create movement. Levers have a fulcrum (point that doesn't move), load point (where the weight acts) and an effort point (where the muscle pulls on the bone. Draw a simple diagram to indicate where each of these is located on the arm in this activity.

9. Name two sports (not mentioned above) that depend on:

   a. muscle strength

   b. muscle endurance

10. When would you require both strength and endurance in your muscles?

Extension

1. Find out what substances must be supplied to muscle cells for them to contract efficiently.

2. Find out the name of the toxic substance produced by muscles cells when they are not supplied with these essential substances.