The Influence of Exercise on Heart Rate

Challenge

Do you know how to take your pulse? If you've never tried, ask your teacher to help you take your pulse at your wrist or your neck. Have you ever thought about what makes your heart "tick"?

What will we investigate?

We will investigate the influence of physical activity on the heart rate. You will first measure your heart rate while you are at rest. Next, you will measure your heart rate immediately after doing physical activity and observe what happens as you cool off and return to a resting state.

Equipment and Materials

- einstein™Tablet+ or einstein™Labmate+™ paired with a tablet
- Heart Rate sensor

Experimental Setup

1. Turn on the einstein™Tablet+ or einstein™Labmate+™ paired with a tablet.
2. Tap the MiLAB ( ) icon to open the application.

Sensor Setup

Tap the **Setup** cog ( ) and use the table below to set up the measurement parameters:

Sensor: **Measurement:**	Heart rate Beats per minute
Rate:	10/sec
Duration:	Measurement #1: 1 minute Measurement #2: 3 minutes

Experimental Procedure:

Measurement #1: Resting Heart Rate

1. Connect the Heart Rate sensor finger clip ( ) to your einstein™ device.
2. Insert your finger or thumb into the finger clip. Make sure you feel a bump against the fleshy part of your finger.
3. Sit down in a relaxed position and tap the **Run** ( ) button to begin recording data. Observe the graph of your heart rate as it is recorded.
4. When the measurement is done (after 1 minute), give your data set a name and tap **Save** ( ).
5. Repeat this measurement several times.

Understanding the Measurements

Have a look at the table of typical resting heart rates below.

Typical Resting Heart Rates*

Age	Heart Rate (beats per minute)
Newborns	100-170
Infants to 2 years	80-130
2-6 years	70-120
6-10 years	60-110
10-16 years	60-100
Adult athlete	49-60

*Data from http://www.slideshare.net/ProfessorShep/pediatric-cardiovascular-nurs-3340-fall-2014 and http://www.topendsports.com/testing/heart-rate-resting-chart.htm

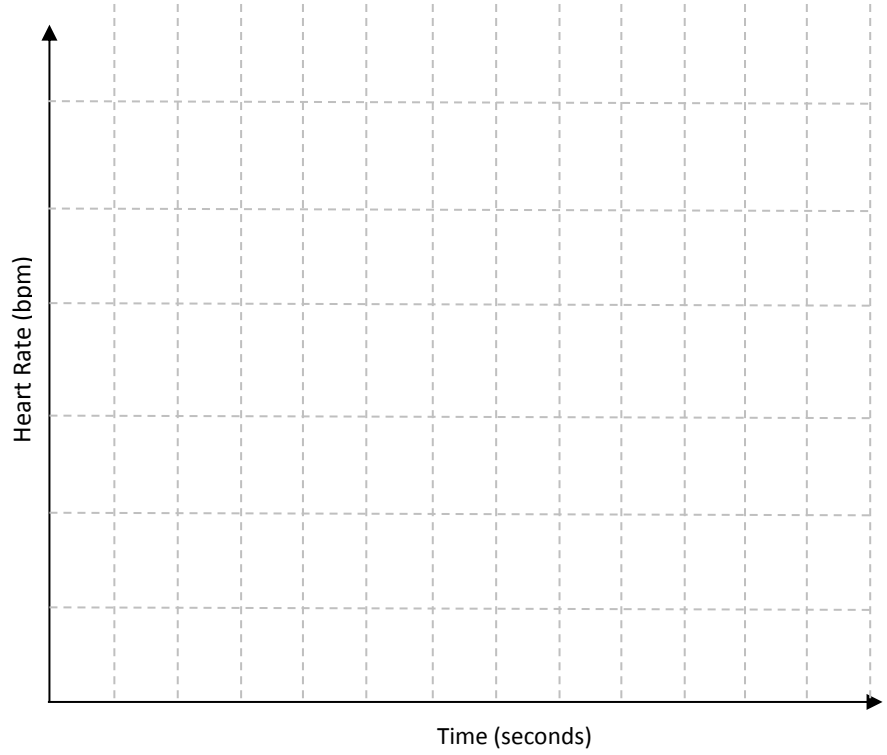
Compare your resting heart rate to the heart rates in the table above and complete the following sentences:

1. My resting heart rate is _____ beats per minute (bpm).
2. My heart rate is in the range: typical for my age/of an adult athlete (circle one).
3. Try to explain why an athlete has a low resting heart rate.

Before You Begin

1. What do you think will happen to your heart rate after doing physical activity:
    a. Your heart rate will go up?
    b. Your heart rate will go down?
    c. Your heart rate will not be affected?
2. Sketch a graph which includes a prediction of your heart rate immediately after physical activity and what you think will happen to your heart rate in the few minutes after the physical activity.

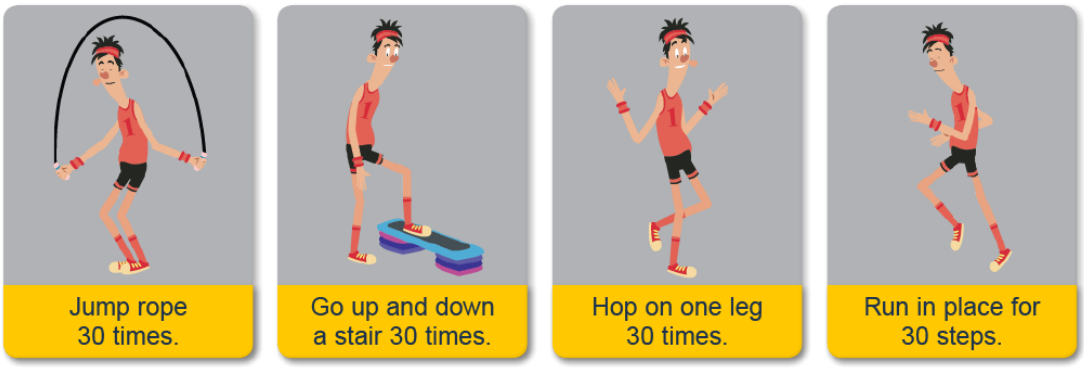
My Heart Rate After Physical Activity



Experimental Procedure

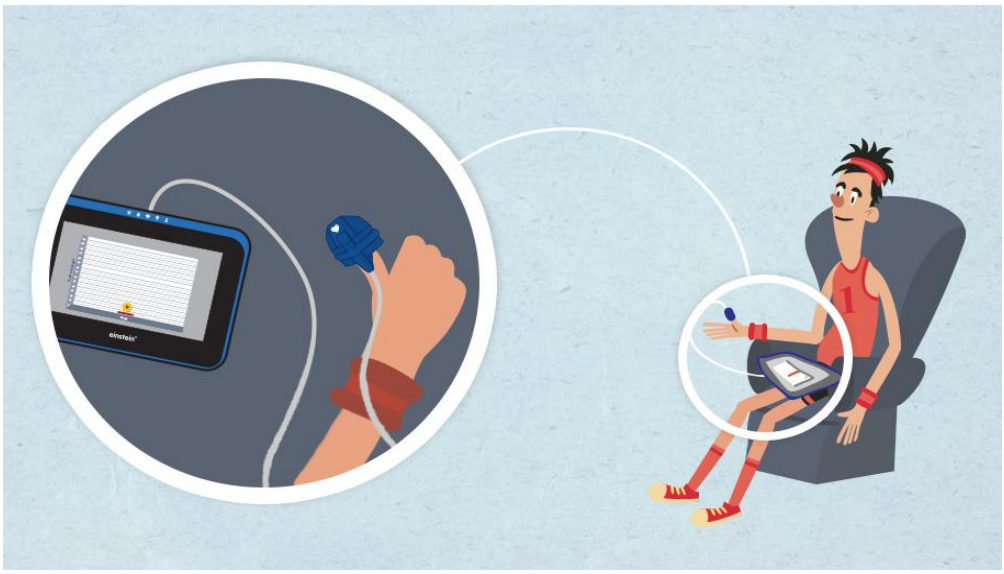
Measurement #2: Heart Rate After Physical Activity

1. Choose one of the following physical activities:



2. Immediately after you finish the physical activity, place the Heart Rate sensor finger clip on the same finger or thumb as before.

3. Sit down in a relaxed position and tap the **Run** ( ) button to begin recording data. Observe the graph of your heart rate as it is recorded.



4. When the measurement is done (after 3 minutes), give your data set a name and tap **Save** ( ).
5. Repeat the activity and the measurement several times.

Understanding the Measurements

1. Compare the results of your investigation to your prediction of what would happen:
   My heart rate went **up/down/remained unchanged** after physical activity. (circle one)
2. Record your results in the table below. Use the graphs from the two measurements to help you:
   a. Tap the graph to bring up a cursor and use it to read your heart rate 5 seconds after the measurement began. Heart Rate after 5 seconds: _____
   b. Slide the cursor along the graph and use it to read your heart rate 180 seconds after the measurement began. Heart Rate after 180 seconds: _____

My Heart Rate Data

When?	Heart Rate (bpm)
At rest	
5 seconds after physical activity	
180 seconds after physical activity	

3. Compare your resting heart rate to your heart rate immediately after physical activity. Did your heart rate:
    a. Go up?
    b. Go down?
    c. Remain unchanged?
4. What happened to your heart rate as you rested after being physically active? Did your heart rate:
    a. Go up?
    b. Go down?
    c. Remain unchanged?
5. Describe the graph of your heart rate during the 3 minutes after you finished doing physical activity. Does the line go up, go down, remain flat or does it do some of each. What does this mean?

In Depth:

Choose the appropriate conclusions which you can draw from your investigation:

a. Physical activity has no effect on your heart rate.
b. Physical activity lowers your heart rate.
c. Physical activity raises your heart rate.
d. When you are physically fit, your heart rate returns to normal quickly.
e. When you are physically fit, your heart rate returns to normal slowly.

Using What You Learned

Group Work

Think of an interesting way you can explain the importance of physical activity for your health. (Examples: A poster, a play, a comic strip, an interview, a presentation, a game a jingle, etc.)

Further Study

Plan an experiment which will investigate other factors which influence your heart rate.