Breathing rate and heart rate: Do they correlate?

Today you will be exploring whether there is a relationship between your breathing and your pulse.

You will need to work in groups of four for this lab. You will all get turns doing four different jobs:

1. Timekeeper
2. Breath counter
3. Pulse taker
4. Subject (the person being measured)

Materials:

- Jump rope
- Stopwatch
- Pencil and paper for taking notes

Preparation:

Decide who will take which job first.

STEP 1: Collect baseline data

Tell the subject to sit quietly for a few moments.

*Measure resting heart **rate**:*

Using the method shown in the photograph, the pulse taker locates where he or she can feel the subject's pulse. When the timekeeper signals, the pulse taker counts the number of heartbeats in exactly 30 seconds.

*Measure resting breathing **rate**:*

During the same 30 seconds, the breath counter observes the subject and counts the number of breaths he or she takes. Record your data in the table on the next page.

Repeat this procedure so you can find an average for **accuracy**. Remember to convert your data to a unit **rate** (**per** minute) by multiplying by 2.

When you have finished collecting baseline data for the first subject, continue Step 1 by rotating jobs until everyone in your group has had their resting heart **rate** and resting breathing **rate** measured.

STEP 2: Measuring the effects of exercise

Now you are going to measure the effects of exercise at two intensity levels.

The procedure is exactly the same as Step 1, but this time the subjects will be exercising prior to data collection.

Low-intensity test:

Have the subject jump rope (or a similar exercise) at a slow **pace** for one minute. Immediately after he or she completes this task, measure his or her pulse and breathing for 30 seconds. (Don't forgot to convert to a unit **rate**.) Record the data on the next page.

High-intensity test:

Have the subject jump rope (or similar) at a fast **pace** for two minutes. Immediately after he or she completes this task, measure his or her pulse and breathing for 30 seconds. (Don't forgot to convert to a unit **rate**.) Record data on the next page.

When you have finished the low- and high-intensity exercise tests for the first subject, continue Step 2 by rotating jobs so that everyone in your group is measured.

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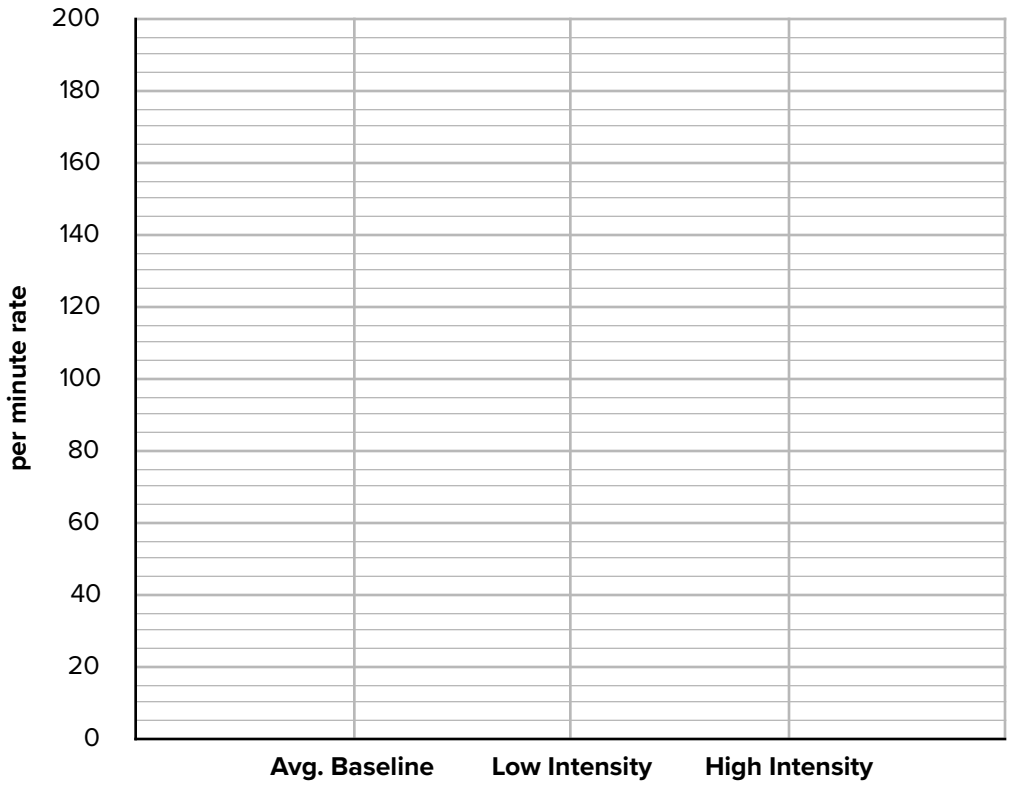
Enter your data from all tests into this table.

	Heart Rate		Breathing Rate	
	30-second sample	***per** minute **rate***	*30-second sample*	***per** minute **rate***
Baseline Test 1				
Baseline Test 2				
Average of Baseline Tests				
Low-Intensity Exercise Test				
High-Intensity Exercise Test				

STEP 3: Graphing your data

After you complete your table, plot your data points on the graph. Use one color to represent heart **rate** and a different color to represent breathing **rate**. If this is not a familiar task to you, ask your teacher to show you a sample graph.



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STEP 4: Consider your data...What might it mean?

1. What effect does exercise have on your breathing **rate**? On your pulse **rate**?

2. Is there a **correlation** between your breathing and pulse **rates**? If so, why do you think this relationship exists?

3. Why did you repeat your measurements when collecting baseline data? Would you have better data if you repeated the other tests too? Why or why not?

4. You have collected quantitative data about what happened when you exercised. Can you add some qualitative data about what happened during the tests? For example, did your face feel hot?

5. On a scale from 1 to 4, **rate** your group's **precision** when collecting data:

☐ disorganized and imprecise (1) ☐ okay, but not great (2) ☐ good with minor exceptions (3) ☐ flawless (4)

Can your group make a claim about something you think is true based on the evidence in your lab work? If so, **MAKE IT**!