ACTIVITY CONTENTS:

Pulse Rate

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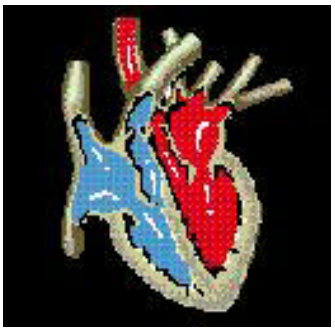
Pulse Rate Introduction

Discovery Question: How does my heart rate change under different conditions?



In this activity you investigate how your pulse changes under different amounts of exercise.

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Thinking About the Question

How does my heart rate change under different conditions?

Have you ever felt your heart racing? Did you think that the pulse rates of students in your class are identical?

Discuss with the other students in your group these two questions: What variables might account for the differences in heart rate among students in your class? What variables might account for variation in your individual heart rate? Make a list as a group to share with the class.

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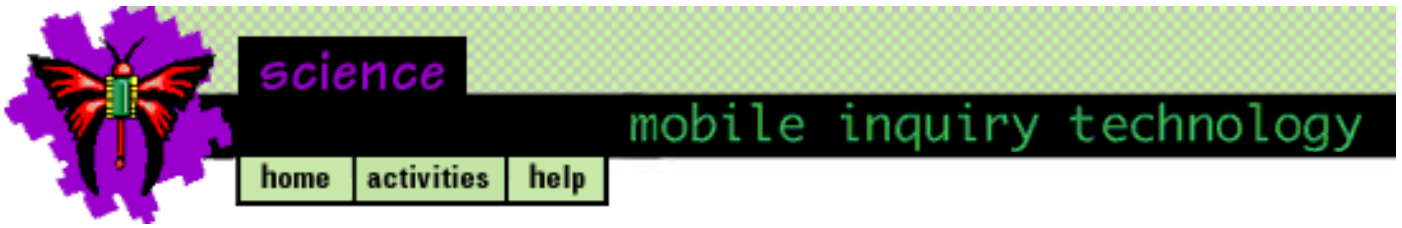

Pulse Rate Materials

- ClarisWorks
- stop watch or clock with a second hand

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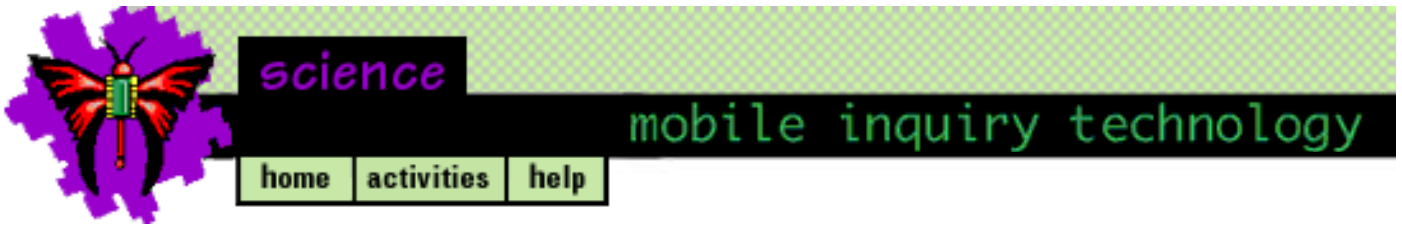
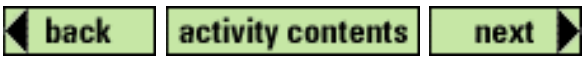


Pulse Rate Safety

Since different people are conditioned for varying levels of physical exertion, stop exercising if you become light headed or dizzy. Reasonable foot attire should be worn while exercising.



Pulse Rate Investigation I

Finding your resting pulse rate

1. Find your pulse rate by placing the tips of your fingers on the radial arteries of your wrist as shown. You may need to move your fingers around your wrist to feel a "strong" beat.

2. Count the number beats during a 15 second time interval while remaining still in a chair.

3. Record the number of beats per 15 seconds in a spreadsheet. Refer to Technical Hints to create a spreadsheet.

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Pulse Rate Investigation II

Determining pulse rate during exercise

Run in place for 1 minute. Immediately count the number of beats during a 15 second time interval.

Record the number of beats per 15 seconds in your spreadsheet. Repeat the process for 2 minute and 4 minute intervals.

Go the "Analysis" to answer questions about your data.

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Pulse Rate Technical Hints

- Creating a spreadsheet
- Performing a product on a spreadsheet
- Performing a Fill Down function
- Creating a line graph
- Adding data to spreadsheet
- Creating a line graph from a larger data group

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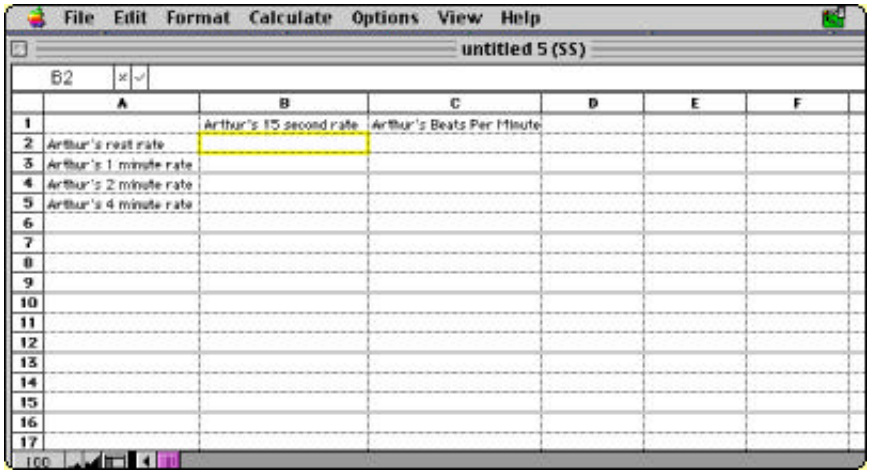
Pulse Rate Technical Hints

To create a spreadsheet:

1. Select Spreadsheet from the menu.
2. Type 15 sec **Rest** Pulse Rate,15 sec **1 min** Pulse Rate, 15 sec **2 min** Pulse Rate, 15 sec **4 min** Pulse Rate in Column A starting with Cell A2.
3. Type **Your Name** 15 second rate in cell B1 and **Your Name** Beats Per Minute in Cell C1. Adjust the width of the column by dragging the parallel bars at the top of the column.
4. Enter your pulse rates according to the type of activity.



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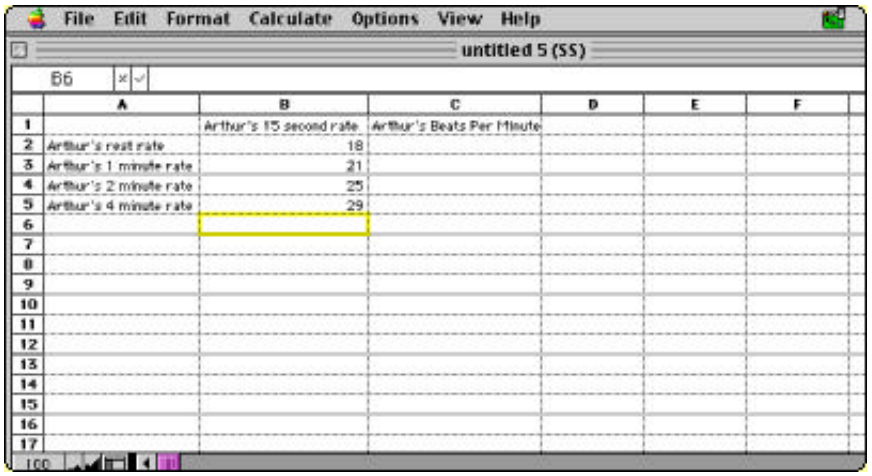
Pulse Rate Technical Hints

To perform a product on a spreadsheet:

1. Type Beats Per Minute (BPM) in Cell C1.
2. Click in Cell C2. Type (=4*B2) in the formula box. Click on the check mark to enter the formula.



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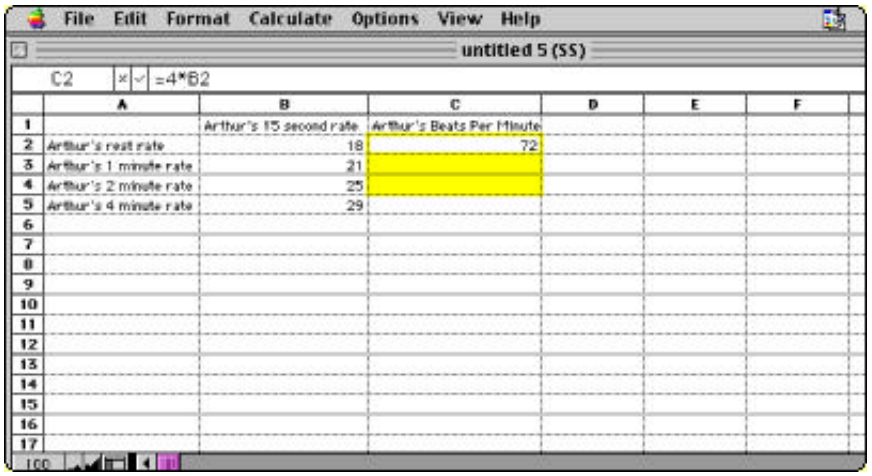
Pulse Rate Technical Hints

To perform a Fill Down function:

1. Highlight the Column C starting with Cell C2.
2. Select Fill Down from the Calculate menu. Click an outside cell.



	A	B	C	D	E	F
1		Arthur's 15 second rate	Arthur's Beats Per Minute			
2	Arthur's rest rate	18	72			
3	Arthur's 1 minute rate	21				
4	Arthur's 2 minute rate	25				
5	Arthur's 4 minute rate	29				
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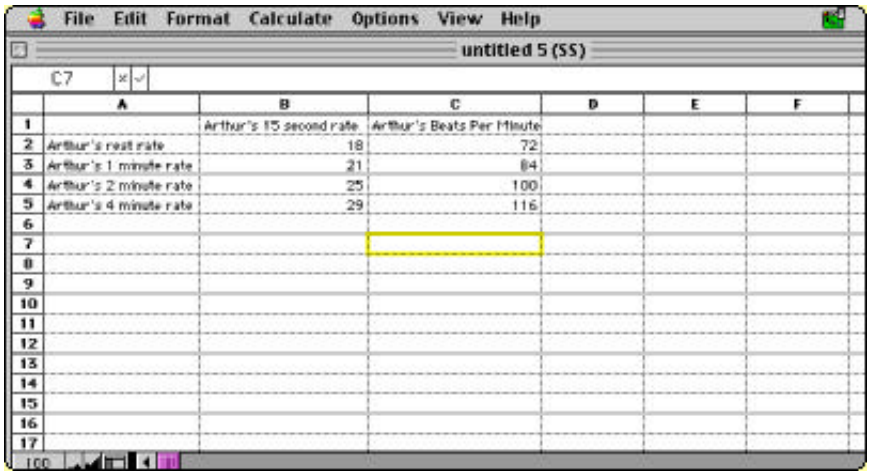
Pulse Rate Technical Hints

To create a line graph:

1. Highlight Column C for BPM data.
2. Select Make Chart from Options menu. Choose Line Graph button. Select Axes button and type BPM for the Y axis. Click OK.



	A	B	C	D	E	F
1		Arthur's 15 second rate	Arthur's Beats Per Minute			
2	Arthur's rest rate	18	72			
3	Arthur's 1 minute rate	21	84			
4	Arthur's 2 minute rate	25	100			
5	Arthur's 4 minute rate	29	116			
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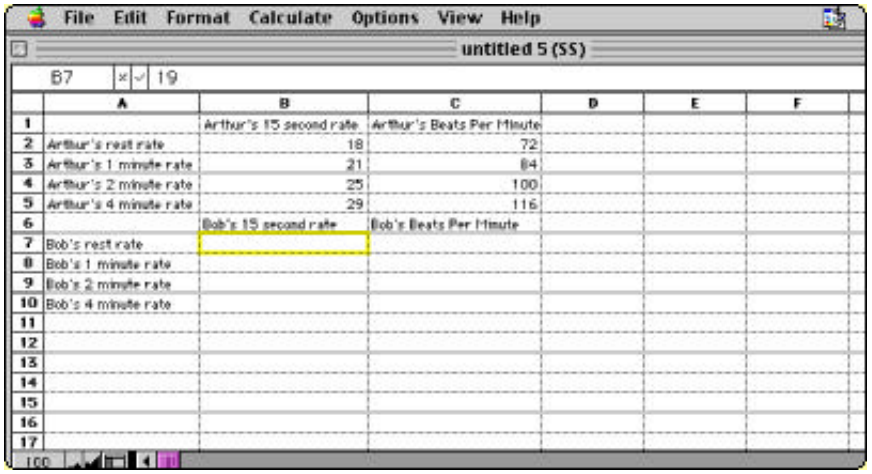
Pulse Rate Technical Hints

To add data to spreadsheet:

1. Reproduce titles on Cell A7. Place name and 15 second rate in Cell C6. Place name and Beats Per Minute in Cell D6.
2. Add data in Column B starting with Cell B7.
3. Click on Cell C7. Type (=4*B7) in the formula box. Click on the check mark.
4. Highlight Column C starting with Cell C7. Select Fill Down from Calculate menu. Click out of the highlighted boxes.



	A	B	C	D	E	F
1		Arthur's 15 second rate	Arthur's Beats Per Minute			
2	Arthur's rest rate	18	72			
3	Arthur's 1 minute rate	21	84			
4	Arthur's 2 minute rate	25	100			
5	Arthur's 4 minute rate	29	116			
6		Bob's 15 second rate	Bob's Beats Per Minute			
7	Bob's rest rate					
8	Bob's 1 minute rate					
9	Bob's 2 minute rate					
10	Bob's 4 minute rate					
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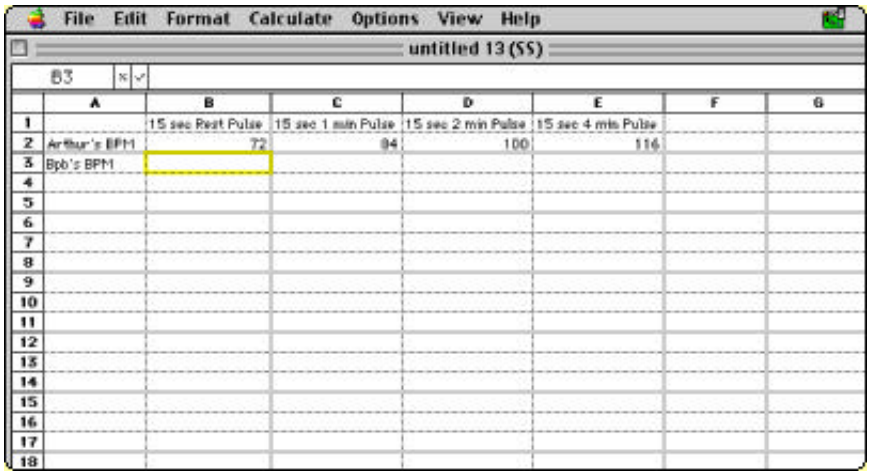
Pulse Rate Technical Hints

To create a line graph for several data sets:

1. Retype the headings of the columns on a new spreadsheet.Starting in Cell B1 type 15 sec Rest Pulse, 15 sec **1 min** Pulse, 15 sec **2 min** Pulse, 15 sec **4 min** Pulse in Row 1.
2. Type each name's **BPM** in Column A starting in Cell A2.
3. Type data from other spreadsheet in the appropriate cell.
4. Highlight all of the data. Select Make Chart from Options menu. Select line graph. Click on Axes button and type BPM for the Y axis.
5. Enlarge the graph if necessary by clicking and dragging on a corner.



	A	B	C	D	E	F	G
1		15 sec Rest Pulse	15 sec 1 min Pulse	15 sec 2 min Pulse	15 sec 4 mts Pulse		
2	Arthur's BPM	72	94	100	116		
3	Bob's BPM						
4							
5							
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Pulse Rate Analysis

1. On your spreadsheet, calculate your rest pulse rate per minute. Refer to Technical Hints to perform a product on a spreadsheet. Find the pulse rate per minute for each exercise duration. Refer to Technical Hints to perform a Fill Down function.

2. Create a line graph to compare your pulse rates under different conditions. Refer to Technical Hints to create a line graph.

Answer the following questions on paper:

3. How does your pulse rate change with the duration of exercise? Do you notice any other patterns or trends in the data?

4. Using the data you have collected to make a prediction about your pulse rate after 3 minutes of exercise and after 5 minutes of exercise. Write a few sentences to explain how you made your prediction. Try it out to test your predictions. How close was your prediction to the actual results? Do you notice any new trends now that you have more data?

5. Find another two teams and compare their pulse rates per minute for each condition. Add their results to your spreadsheet. Refer to Technical Hints to add data to spreadsheet. Make a line graph that includes all of the data from the three teams. Refer to Technical Hints to create a line graph from a larger data group. Write a paragraph comparing your group's data to the data from other groups.

6. Write a paragraph about what you learned from your results about your question. Cite evidence from your spreadsheet and chart to support your conclusion(s).

Pulse Rate Further Investigation

- Investigate your pulse rate while your hand is submerged in cold water. Compare the response over varying amounts of submersion time. Compare the submersion rate compared to your rates during rest and exercise.

- Complete a long-term study to improve your physical fitness. Interview your health teacher, biology teacher, or personal physician to find out the exercises that help to improve cardiovascular circulation. Design and perform a daily exercise program for one month. If you have any physical restrictions, contact your personal physician to approve your plan. Record and compare your heart rate after exercise each day. Did your heart rate decrease after exercise as the month progressed?

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