

MiSP Human Physiology Assessment

Name _____

Date _____

Introduction:

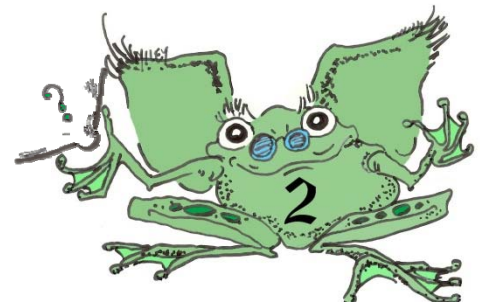
A high school student performed a research project to enter the Intel Science Talent Search. The topic was “the effect of increased oxygen on breathing rate after exercise in mice.”

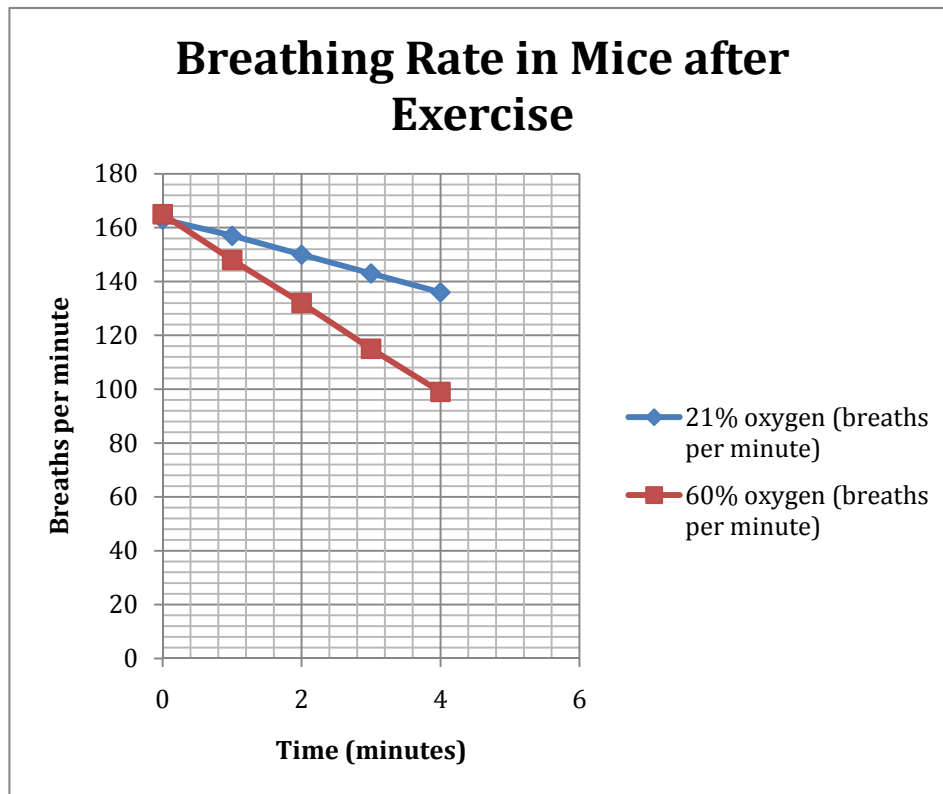
She used 10 mice that she trained to run on an exercise wheel when a red light was turned on. They were trained by giving them a treat after one-half minute (30 seconds) on the wheel. After the 30-second run on the wheel, the student carefully counted breaths by observing the mice’s bodies. The student predicted that a mouse would have an increased breathing rate after running on the wheel for 30 seconds and, after stopping, the breathing rate would return to normal. The average normal resting breathing rate of the mice was 100 breaths per minute.

The student divided the mice into two groups of five. Each mouse ran on the wheel for 30 seconds and its breathing was counted for 4 minutes. One group breathed regular air (21% oxygen). The other group had air with 60% oxygen pumped into their cage during and after the running.

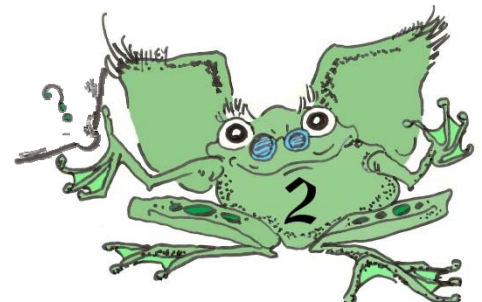
The data:

Group/Oxygen	A/21% Oxygen	B/60% Oxygen
Time (minutes)	Average breathing rate for 5 mice (breaths per minute)	Average breathing rate for 5 mice (breaths per minute)
0	164	165
1	157	148
2	150	132
3	143	115
4	136	99





1. What happened to breathing rates (breaths per minute) in both groups of mice after they stopped running on the wheel?



2. Look at the graph. For which group of mice (A/21% oxygen OR B/60% oxygen) did breathing rate recover (returned to normal or near normal) the fastest? Explain your answer by referring to the graph.

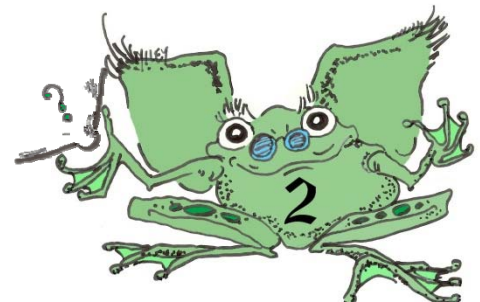
3. Using the graph, predict what the breathing rate of the 21% oxygen group would be doing after 5 minutes:

21% oxygen group after 5 minutes: _____ breaths per minute

4. What should this student researcher conclude about the effect of increased oxygen concentration on breathing rates in mice after exercise?

5. How could this experiment be improved to enable the student to feel more confident in her results?

6. Calculate the unit rates of change (slopes) for the two lines in the graph above. Show the formula, your substitutions, and the answer.



A/21% oxygen	B/60% oxygen

7. Put the two calculated unit rates of change (slopes) into words by filling in the blanks below:

In the graph for mice under the 21% oxygen condition, for each additional one minute after exercise, the average breathing rate (breaths per minute) increased / decreased (circle one) by _____ breaths per minute.

In the graph for mice under the 60% oxygen condition, for each additional one minute after exercise, the average breathing rate (breaths per minute) increased / decreased (circle one) by _____ breaths per minute.

