

Name _____ Period _____ Assignment # _____

How do physiological changes affect minute ventilation?

- 1) What were some strengths of the way you planned or carried out your investigation? (What made it scientific?)

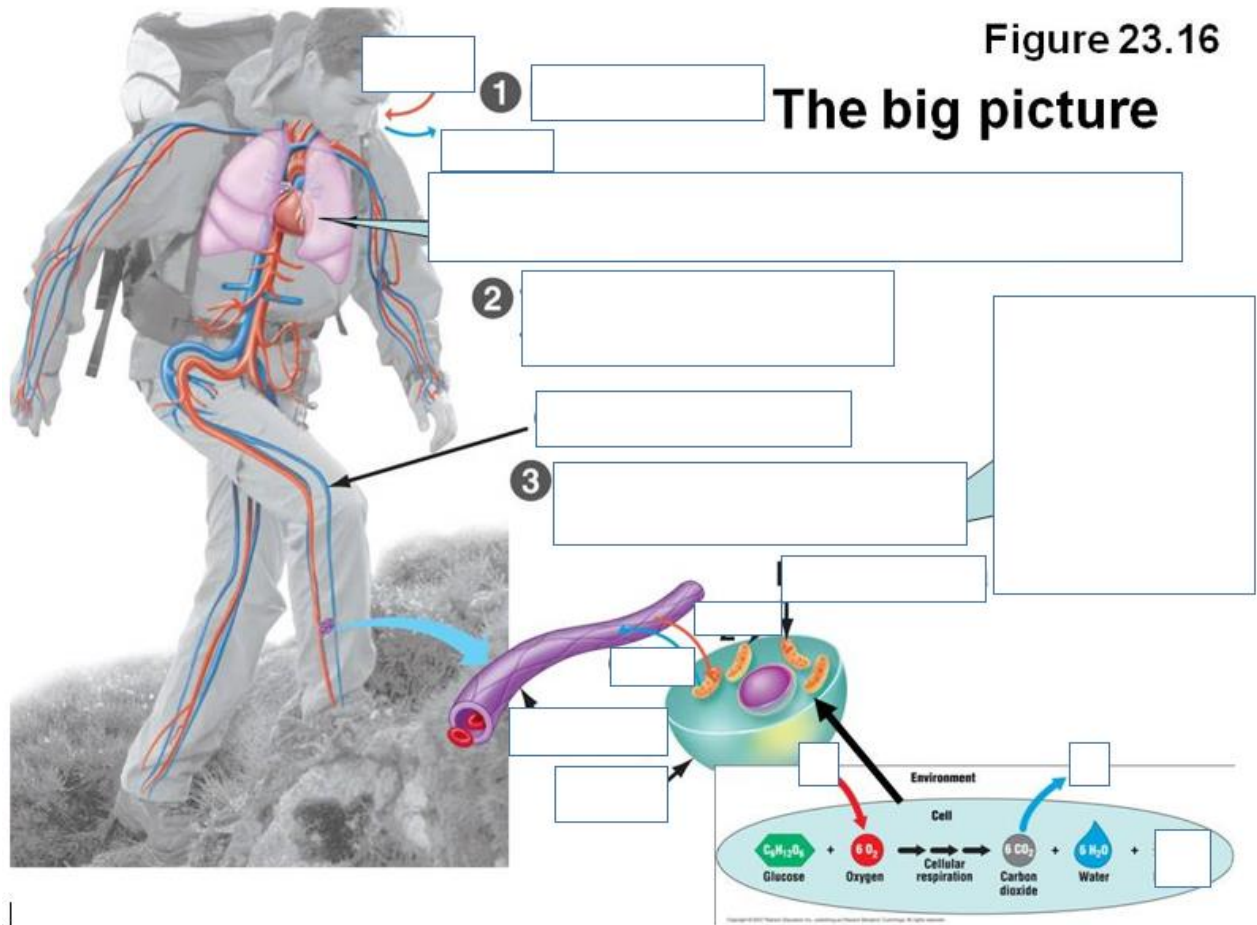
- 2) What were some weaknesses of the way you planned and carried out your investigation? (What made it less scientific?)

- 3) What rules should we make in order to ensure that our next investigation is scientific?

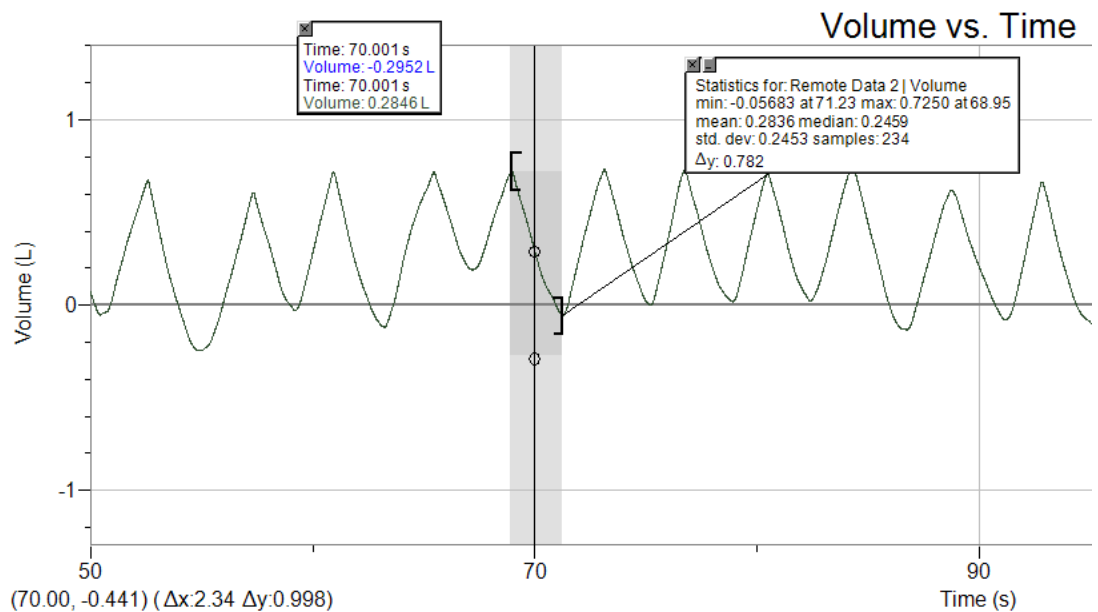
- 4) Tidal volume increased by 250mL after hypoventilation. Is this an observation or an inference? Explain how you know.

- 5) Minute ventilation increased because of a decrease in blood pH. Is this an observation or an inference? Explain how you know.

- 6) Complete the image below with the following: O₂ (used 3 times), CO₂ (used 3 times), transport of gases by the circulatory system, circulatory system, breathing, exchange of gases in the body across capillaries/tissues, exchange of gases in the lungs across alveoli/capillaries, mitochondria, capillary, servicing of cells within the body tissues, cell

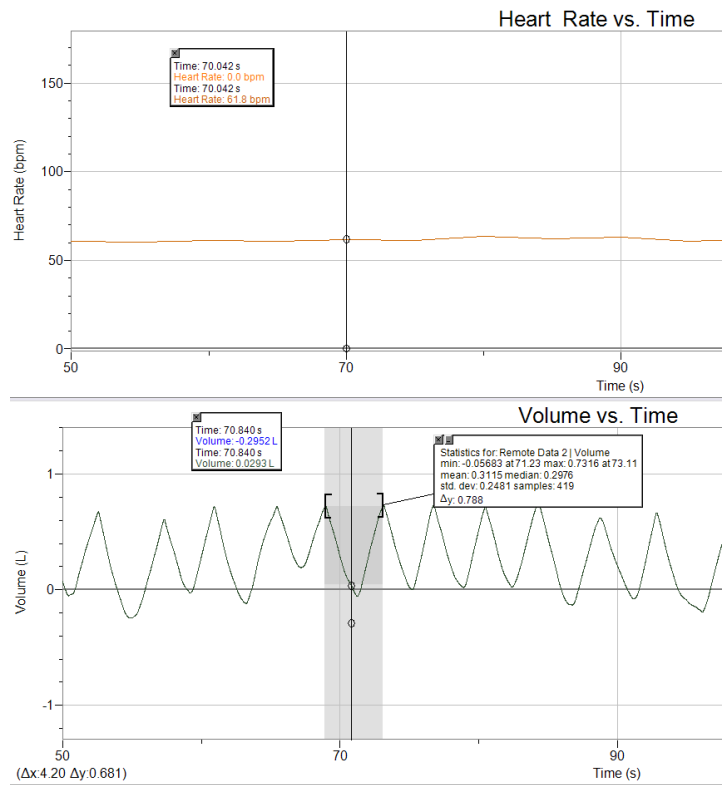


- 7) What is the tidal volume?

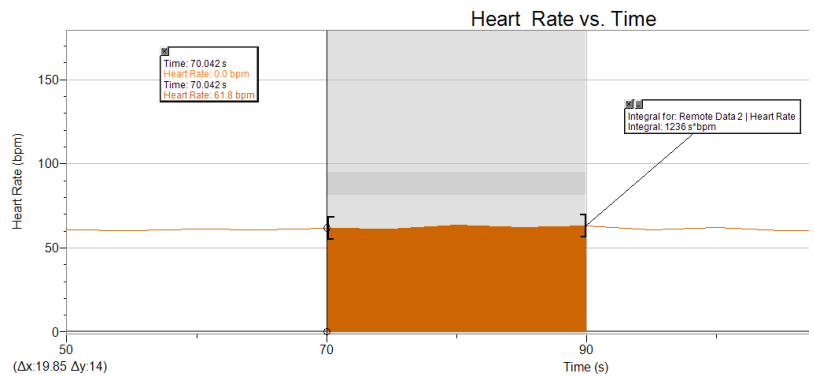


- 8) Calculate the ventilation rate for the time highlighted (breaths/minute)

9) What is the heart rate and minute volume at 70 seconds?

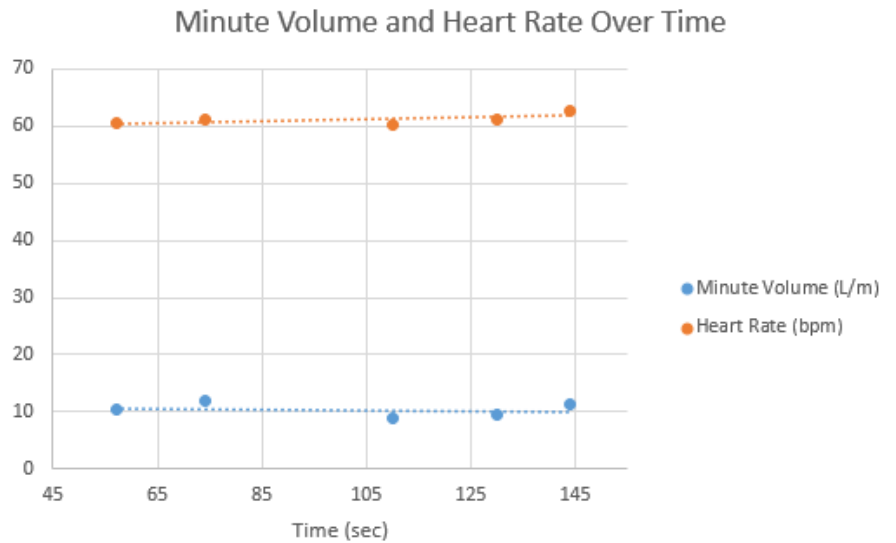


10) What is the average heart rate from 70 to 90 seconds?



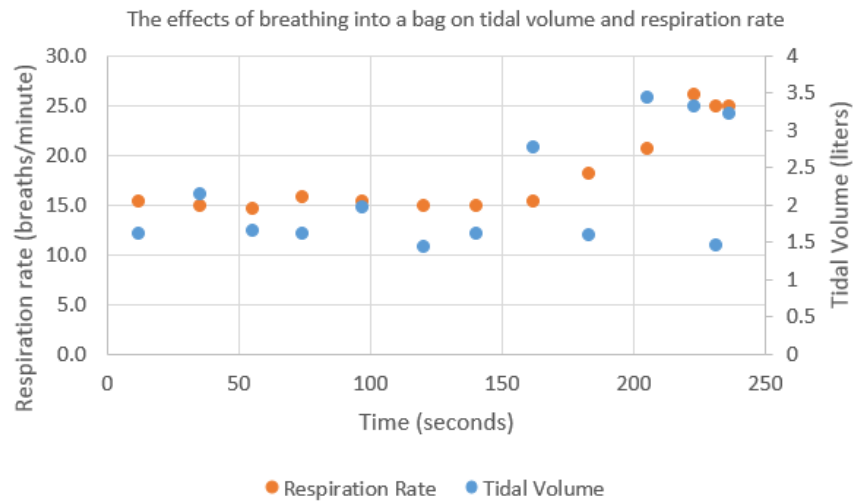
11) If we want to know how respiration is changing, we calculate minute volume. Explain why knowing tidal volume is insufficient for knowing how respiration is changing and why knowing ventilation rate is insufficient.

12) The graph to the right represents the control condition. Explain why the data is consistent with this claim.



13) Explain why we need a control group

14) Write down 5 observations about the graph to the right



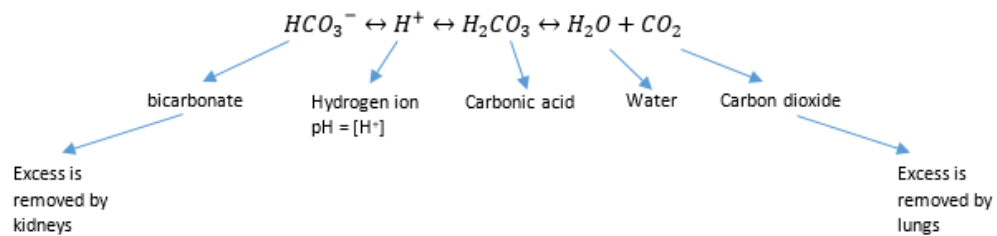
15) How does breathing into a bag affect tidal volume and ventilation rate?

16) What is happening to the amount of oxygen in the bag over time?

17) What is happening to the amount of carbon dioxide in the bag over time?

18) Why is the amount of carbon dioxide and oxygen in the bag changing?

19) Let's imagine a situation where we could keep the body supplied with an adequate supply of oxygen by alternative means. Justify why breathing into a bag increases tidal volume and ventilation rate?



20) If you started to hypoventilate, predict what would happen to the following and explain why:

- Cellular respiration
- Blood O_2 concentration
- Blood CO_2 concentration

21) If you started to hyperventilate, predict what would happen to the following and explain why:

- Cellular respiration
- Blood O_2 concentration

- Blood CO₂ concentration

Patterns

22) How was the following demonstrated in this lab?

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.
- Mathematical representations are needed to identify some patterns.
- Empirical evidence is needed to identify patterns.

Cause and effect: Mechanism and Prediction

23) How was the following demonstrated in this lab?

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.
- Changes in systems may have various causes that may not have equal effects.

Scale, Proportion, and Quantity

24) How was the following demonstrated in this lab?

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.
- Some systems can only be studied indirectly as they are too small, too large, too fast, or too slow to observe directly.

Systems and System Models

25) How was the following demonstrated in this lab?

- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.

Energy and Matter: Flows, Cycles, and Conservation

26) How was the following demonstrated in this lab?

- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system

Structure and Function

27) How was the following demonstrated in this lab?

- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

Stability and Change

28) How was the following demonstrated in this lab?

- Much of science deals with constructing explanations of how things change and how they remain stable
- Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible
- Feedback (negative or positive) can stabilize or destabilize a system.