Name: _____ Year: _____

Deep Breaths

Answer key

Working Scientifically Planning Sheets

Problem

When Tammy goes swimming she gets really frustrated that her friends can hold their breath underwater for a lot longer than she can. When they dive for objects sometimes she runs out of breath and has to come up for air after only ten seconds. She wonders why this happens and wishes she could take deeper breaths

Task

1. Firstly you need to do some background research into the topic of breathing and respiration. Complete the background questions BEFORE you commence the actual investigation.
2. In your groups, you are then required to carry out an investigation to test the following:

   Do different people have different vital capacities?
3. You will each be individually required to complete the planning sheets attached and hand this in to receive a LEVEL of achievement for Investigating Scientifically and Life and Living.
4. You will need to determine the method that you will follow in order to complete this task.

NOTE

- In science experiments, you must aim to set them up so that you obtain numerical data for both the *Independent* and the *Dependent* variables. This means that you can plot your data on a graph. By plotting data on a graph, you are then able to see and discuss the relationships between the variables.

Background Research Questions

1. What is breathing?

   The uptake of oxygen and simultaneous elimination of CO_2 & H_2O.

2. What is respiration?

   The exchange of gases between the atmosphere, blood & body cells of an organism.

3. Write the word equation for respiration.

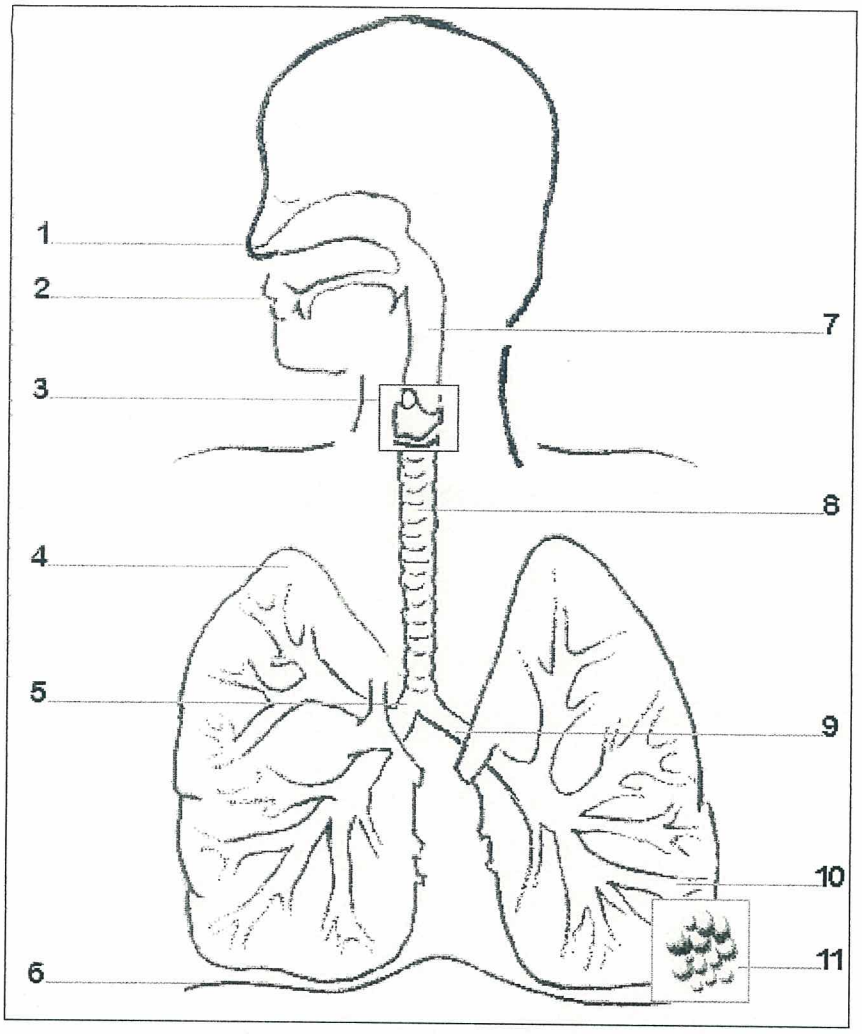
   glucose + oxygen = carbondioxide + water + energy

   $C_6H_{12}O_6 + 6O_2 + 6H_2O + ENERGY$

4. Explain the relationship between the digestive, circulatory and respiratory system in terms of keeping humans alive.

   The respiratory system is responsible for taking in oxygen & expelling CO_2. However it is dependent on the circulatory system to distribute the oxygen that has been taken in by the lungs to the body tissues.

5. Complete the diagram below of the respiratory system.



1. Nose
2. Mouth
3. Larynx
4. Lung
5. right bronchus
6. Diaphragm
7. Pharynx
8. trachea
9. left bronchus
10. bronchiole
11. alveoli

6. Explain in point form the breathing process. You may use diagrams to illustrate your point.

- Air is brought in through the mouth or nasal cavity. Air is moistened & dust particles are trapped by fine hairs.
- The air then travels down the pharynx, larynx & trachea.
- The trachea splits into two bronchi (left & right).
- Air travels through the brochi into smaller divisions called bronchides.
- At the end of the bronchioles are small air sacs (alveoli)
- Gas exchange occurs at this level.

PLANNING

Aim

Variables

Make a list of all the variables you could change in this experiment and those that you could measure.

Change	Measure

To make this a fair test, what variable should you keep the same?

What is the ***independent variable*** that you have been asked to investigate?

eg · height, gender.

What is the ***dependent variable*** in this experiment?

vital lung capacity.

Hypothesis

To design a good hypothesis you need to first set up a variable table – transfer the information above, into the table below.

Independent Variable	Dependent Variable	Controlled Variable(s)

Now that you have chosen your variables, you need to write a hypothesis. This is written as a ***statement*** of fact that links the effect of the independent variable WILL HAVE on the dependent variable. Your whole investigation is designed around your hypothesis. By carrying out your investigation, the data you collect will either support or disprove your hypothesis.

Materials

- Balloons
- Bulldog clips
- Tape measure/ruler

Method

Write down, in numerical order, the steps that you are going to perform in this investigation.

Diagram of Equipment Set up

You must now draw (using pencil and a ruler) an outline of how you set up your equipment.

use pencil & ruler!

CONDUCTING

Results

It is generally best to record you results in a table, as it is then easier to transfer them to a graph. Below the table, record the changes you observed in the variables you stated earlier as well.

Plot a graph of your results.

If the data that you collected for both variables is numerical, then draw a line graph on graph paper.

The dependent variable goes on the vertical axis (Y-axis) and the independent variable goes on the horizontal axis (X-axis).

PROCESSING

Observations

Describe any patterns you can see in your data – either from the graph or from your table of results.

Conclusion

How do you conclude that vital capacity change? Do your results support your hypothesis? Explain.

Do your results support what is in the scientific literature about vital capacity?

EVALUATING

Evaluation

What were the sources of error in your investigation?

Describe how you could improve upon these errors if you were to repeat this experiment again.

Explain how these sources of errors may have affected your results.

What changes would you make to the way in which you have set up your investigation (particularly the independent variables) in order to obtain a better picture of results?