

Teacher Packs in Experimental Science

Bio Pack 7

Demonstration of Breathing in humans

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Curriculum areas covered:

Year 2 Semester 2 Unit 2.0 of the science curriculum for designated Science and Mathematics Colleges of Education, Ghana.

Title: Respiratory system: Demonstration of Breathing in humans

Target group: Diploma students

Also suitable for: Senior High School students

Learning outcomes:

1. Knowledge and Understanding

KN1 Understand how the structures and organs involved in external respiration function

KN2 explain how breathing takes place in humans

2. Cognitive skills

CS1 Use appropriate materials to demonstrate how the human respiratory system works.

CS2 relate the parts of the breathing model to the parts of the respiratory system

3. Key Skills

KS1 constructing biological models

KS2 observing

KS3 manipulating

KS4 drawing

4. Practical Skills

PS1 Construct the model of the thorax and set up experiment to show how air is inhaled and exhaled.

PS2 Make observations, record and interpret results of an experiment.

PS3 draw the model of the thorax and relate the parts labeled to the human respiratory system

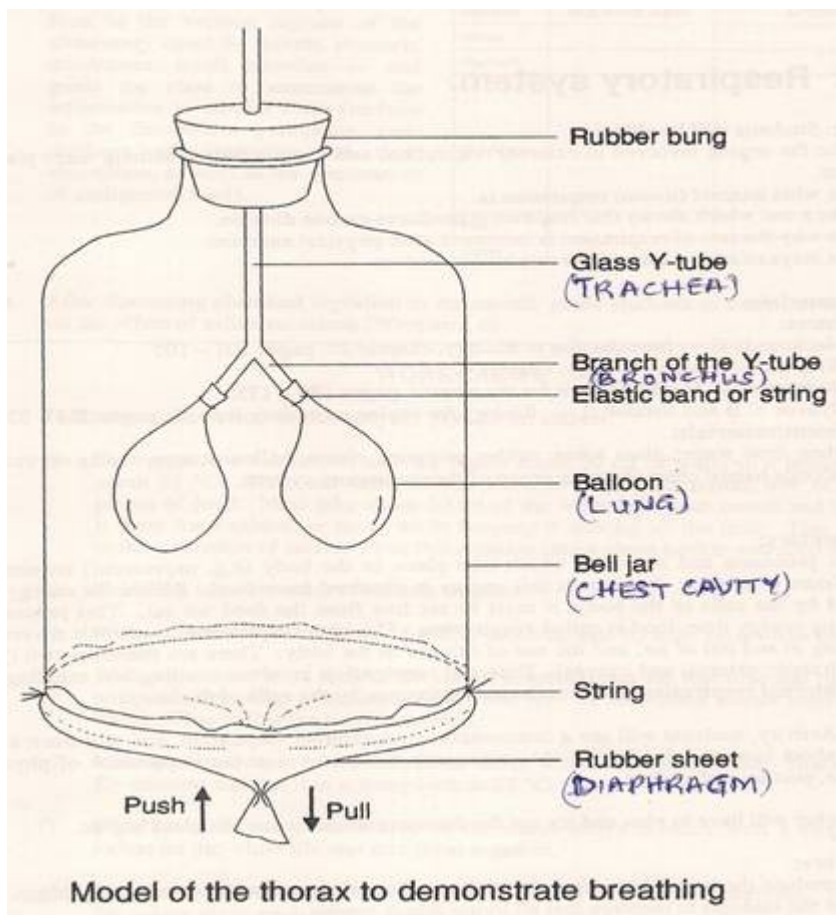
A. Teacher's Guide

This pack is to introduce students to parts of the human respiratory system and to demonstrate breathing.

- Ensure students bring empty plastic water bottles and drinking straws to class
- Provide razor blades (preferably new ones) & knife
- Provide balloons, strings and rubber sheets
- Guide students to construct a model of the thorax, using the materials assembled
- Instruct students to follow the experimental procedure strictly

Sample Assessment Questions

- Match the parts of the model to corresponding parts of the human respiratory system
(Answer: refer to the diagram below)
- With the aid of the model of the thorax, explain how breathing takes place in humans.
(Answer: refer to the background information and the diagram below)
- Suggest a way of caring for the human respiratory system.
(Answer: the use of nose mask in a dusty environment)



B. Students' Guide

Background Information

Various processes and activities (e.g. movement) which take place in the human body require the expenditure of energy. This energy used by the cells, is obtained from the food we eat. The process of liberating this energy from the food is called **Respiration**. Respiration in humans involves breathing of air which passes to and from the lungs through the trachea, bronchi, bronchioles and alveoli (air sacs). The volume of the thoracic cavity will increase when the external intercostals muscle contract to cause the ribs and sternum to move upwards and outwards. Also the diaphragm contracts by pulling downwards and flattens. This will lead to a decrease in the pressure around the lungs. Atmospheric pressure forces air into the lungs through the nostrils. In the breathing out process, the movements described for the breathing in are reversed.

Equipment /Materials

- Knife / Scissors / Razor blade
- Y- tubing (plastic / glass)
- Rubber stopper
- Balloons
- Rubber sheet / cellophane material
- String
- Bell jar / large empty plastic water bottle
- Drinking straw

Other requirements

A Sketch book, Notebook, Pencils for drawing and pens for taking notes, Erasers

Experimental Procedure

- Assemble the following materials: empty plastic water bottle, balloons, string, rubber sheet, Y- drinking plastic or similar tubing
- Prepare a model of the thorax using the materials assembled (refer to diagram)
- Demonstrate the breathing (inhalation and exhalation) process by pushing and pulling out the handle of the rubber sheet
- Draw and label your model in your sketch book
- Relate your drawing to the chart of the human respiratory system.

Reflection on the experiment

Take some time to reflect on the activity carried out. Ensure that you have understood the procedure followed. If clarification is needed, discuss it with your teacher or colleagues.

Answer the following questions:

- Do you think this activity could be done in a different way? Give reasons for your answer.
- What other things can you do to enhance your knowledge of the breathing mechanism in humans? Discuss with your group.

C. Assessment – Student's Sheet

On completion of the experiment, you should answer the following questions:

1. What are the functions of the following in the model of the thorax?

- I) Rubber sheet
- II) Balloon
- III) Plastic bottle
- IV) Y – tubing

(CS2)

2. Explain how air is drawn into the lung

(KN1)

3. With the aid of the model of the thorax, explain how breathing takes place in humans
(KN2)

D. Extensions to the experiment

Use other model(s) to describe the process of breathing in humans

E. Useful links

Mensah, S. K. (1992) Source Book for Science Teachers (Biology). Cape Coast: Institute of Education

F. Health & Safety

- You are responsible for your immediate working area
- At the end of the activity, ensure that your bench is clean and free of rubber sheets, strings, straws and bottles and other plastic waste
- Be careful when handling razor blades and knives
- Wash hands well after the experiment

G. Evaluation

- Describe the structures and organs involved in external respiration
- List **all** the parts of the human respiratory system
- Prepare and draw the model of the thorax to demonstrate exhalation in humans
- Draw and fully label the human respiratory system
- Relate the labels of the model of the thorax to the chart of the human respiratory system
- Suggest 2 ways of preventing 4 named disorders of the human respiratory system.