

BIOLOGY SELF-STUDY MATERIALS

Senior Three

Topic: Gaseous Exchange

By the end of this topic, you should be able to demonstrate the mechanism of breathing.

Introduction

Breathing involves two actions; breathing in (inhalation) and breathing out (exhalation) of air.

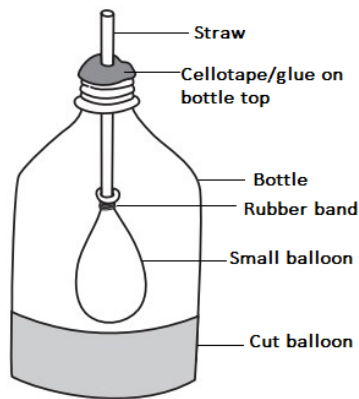
Activity: Demonstrating breathing

In the following activity, you are going to make a model and use it to demonstrate breathing in the human respiratory system.

Things you will need: 2 balloons (one small and one large), straw, empty plastic bottle, rubber band/ string.

Set up of the experiment

- i) Measure 7 cm from the bottom of the water bottle and cut it off.
- ii) Insert a straw of length 5 cm into the open end of the small balloon.
- iii) Tie the balloon onto the straw using a rubber band. Make sure not to squeeze/ block the straw.
- iv) Pierce a hole - the size of the straw - on the bottle top (cover of the bottle).
- v) Insert the remaining open end of the straw through the hole at the bottle cap. Glue / cellotape the straw to make it firm on the cap.
- vi) Cut the larger balloon in half. Keep the bottom half.
- vii) Attach the bottom half of the larger balloon firmly around the cut end of the bottle.



Procedure

Part A

1. What do the following represent?
 - i) Balloon in the bottle
 - ii) Straw
 - iii) Bottle
 - iv) Piece of balloon at the bottom of the bottle

2. Pull the larger balloon at the bottom downwards.
 - i) What does this action represent in the human respiratory system?
 - ii) Why should the bottom of the balloon be pulled?
 - iii) State what you have observed.
 - iv) Explain your observation.
 - v) What is the equivalent of this action in breathing process?

3. Now release the balloon to return to original position.
 - i) What is this action equivalent to?
 - ii) What do you notice?
 - iii) Give reasons for your observation.

4. What is the scientific principle behind the breathing action?

Part B

1. Fill your mouth with water.
2. Push the water from your mouth into the small balloon through the straw.
3. Pull the larger balloon at the bottom downwards and then release it back to its position.
4. What do you observe?
5. Give reasons for your observation.

Follow-up activity

Corona virus causes accumulation of fluid in the human lungs. Patients suffering from Corona virus disease – 19 (COVID-19) have difficulty in breathing. How do you explain this?