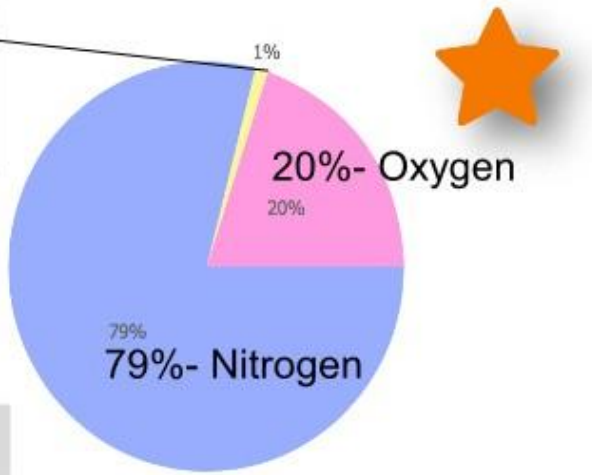
Chapter 5 – Air And The Respiratory System

OXYGEN **Use for:**

1%
. CO
. Water Vapour
. Other gasses



(1) Combustion (_____)

(2) **Respiration** (_____)

→ Breathe OUT = CO + Water

O + Digested Food = Energy + CO + Water Vapour

(3) **Rusting** = O + Water Vapour

(4) **Decomposition** = _____

→ Combustion & Decomposition OUT = CO + Heat

Test for Oxygen: _____

NITROGEN

Use for:

(1) Fertilisers

(2) Explosives & Fireworks

(3) Put out fire

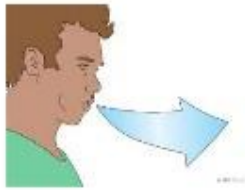
(4) Liquid Nitrogen used to make ice-cream

CARBON DIOXIDE

Use for:

(1) Photosynthesis → Oxygen OUT

(2) Breathing OUT

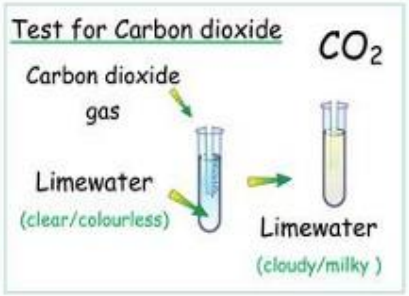


(3) Fizzy Drinks

(4) Extinguisher

(5) Solidified CO = Dry Ice

Test for CO: _____

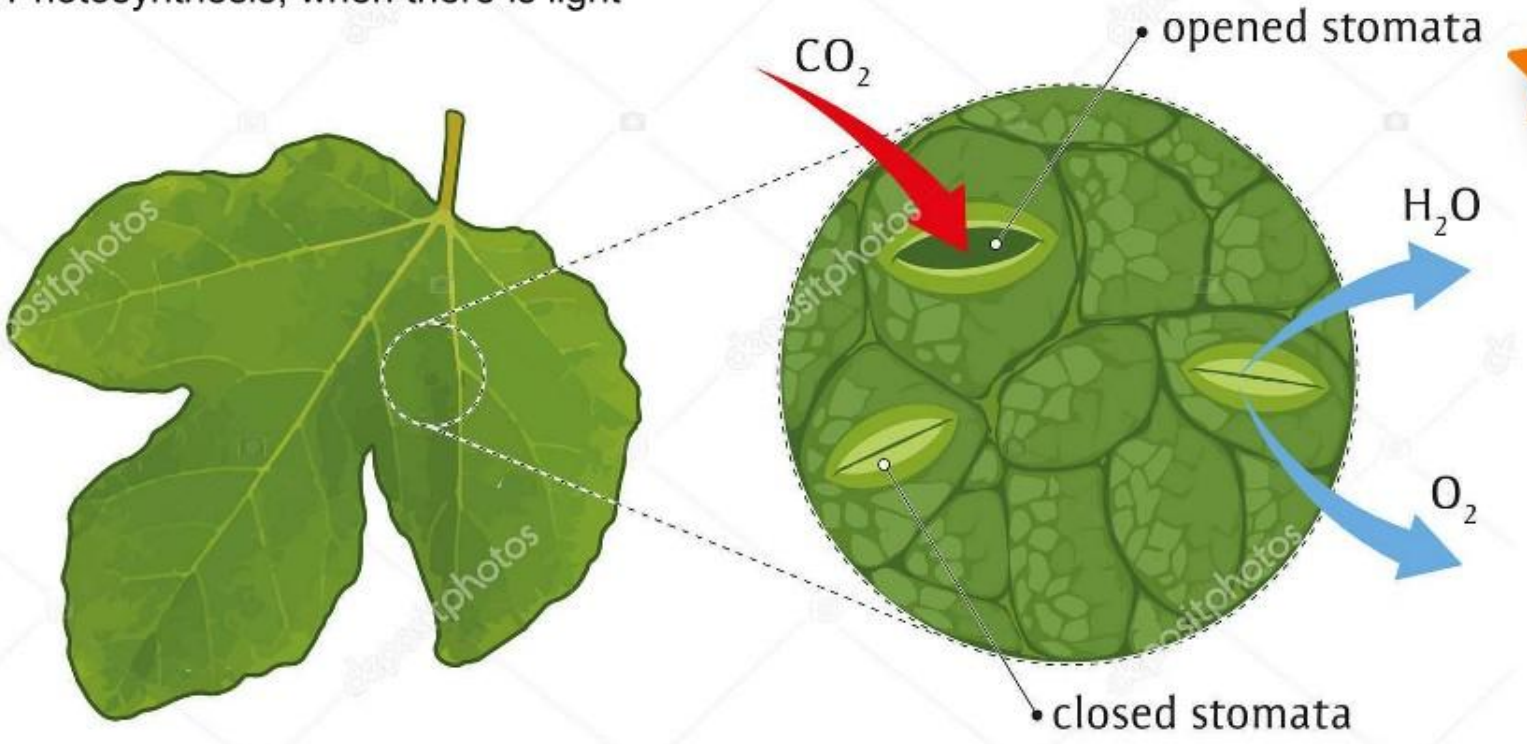


Respiratory System in Plants

. Plant breathe all the time
. Photosynthesis, when there is light

STOMATA Function

_____



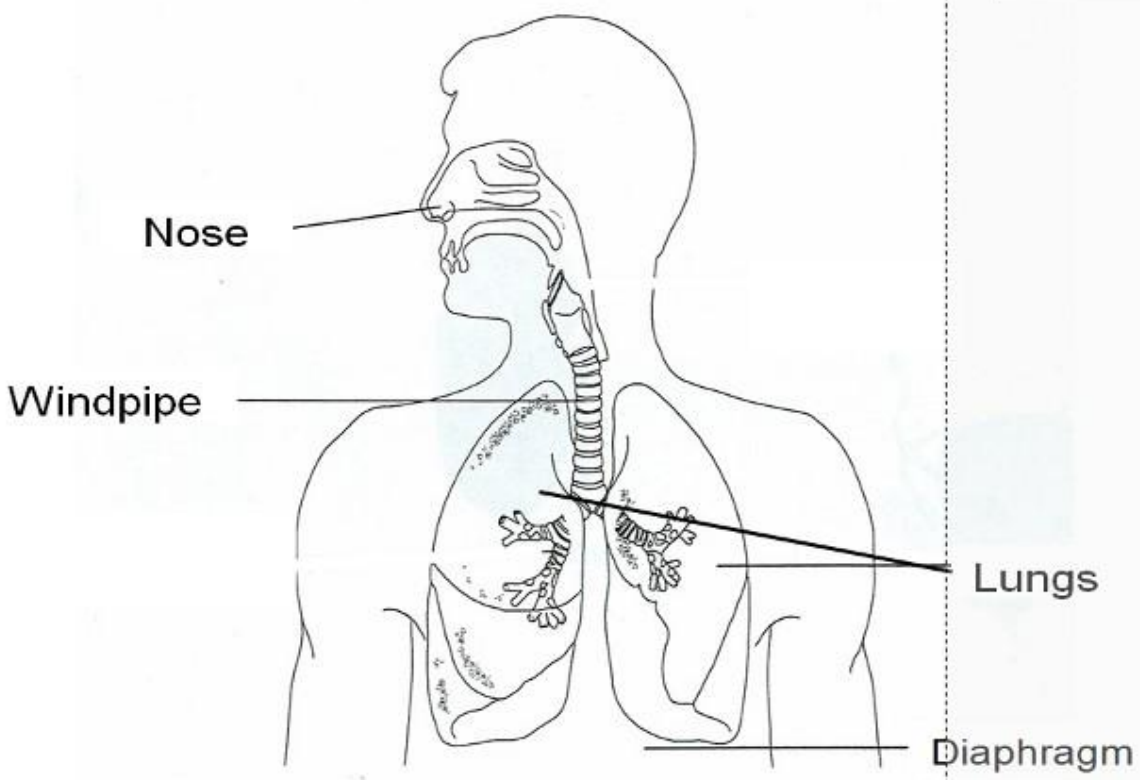
When Plants RESPIRE:

IN _____ OUT _____

When Plants MAKE FOOD:

IN _____ OUT _____

Respiratory System In Humans



Process

Nose

↓

Windpipe

↓

Lungs

↓

Diaphragm

Other Respiratory Systems

	3 Examples
(1) Gills	
(2) Gill Chambers	
(3) Moist Skin	
(4) Breathing Tube	
(5) Air Bubble	
(6) Blowholes	
(7) Snout	
(8) Breathing Holes (also known Spiracles)	

EXPERIMENTS

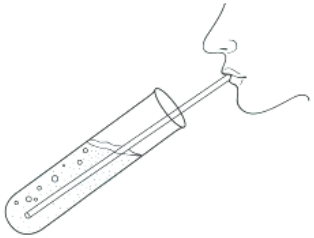
Experiment 1

Materials needed:

- Limewater
- 2 beakers
- 1 straw

Steps:

1. Pour an equal amount of limewater into both beakers.
2. Use the straw to blow air into one beaker of limewater.
3. Leave the other beaker untouched.
4. Record and explain your observation.



- What did your observe about the limewater in both beakers?

  The limewater in the beaker that air was blown into turned chalky while the other beaker of limewater that was untouched remained clear.

- Explain your observation.

  The air that we breathe out contains a large amount of carbon dioxide and limewater turns chalky in the presence of carbon dioxide.

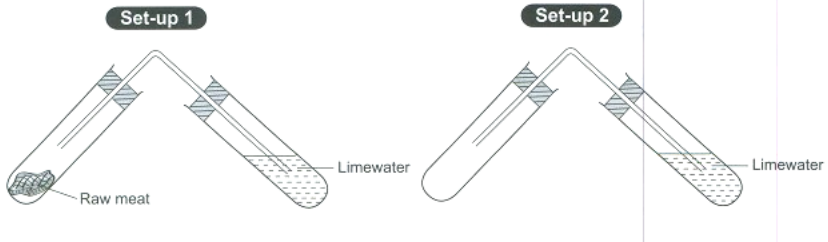
Experiment 2

Materials needed:

- 4 test tubes
- 2 delivery tubes
- 2 stoppers
- Limewater
- Raw meat

Steps:

1. Put some raw meat into one of the test tubes.
2. Prepare the two set-ups shown below.
3. Observe what happens after a few days.



- What can be observed about the limewater after a few days?

  The limewater in Set-up 1 turned chalky while the lime water in Set-up 2 remained clear.

- Explain your observation.

  The decomposition of the raw meat in Set-up 1 released carbon dioxide which turned the limewater chalky.

EXPERIMENTS

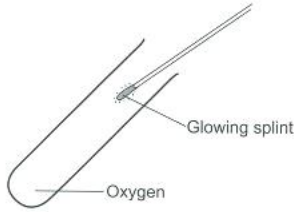
Experiment 3

Materials needed:

- A test tube filled with oxygen
- A glowing splint

Steps:

1. Place the glowing splint into the test tube of oxygen.



- What did you observe about the glowing splint?

  The glowing splint rekindles (lights up again).

- Explain your observation.

  The oxygen in the test tube caused the glowing splint to rekindle as oxygen is flammable and is needed for burning.

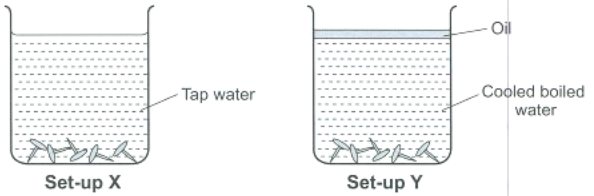
Experiment 4

Materials needed:

- Iron nails
- 2 beakers
- Tap water
- Cooled boiled water
- Oil

Steps:

1. Fill one beaker with tap water and the other beaker with the same amount of cooled boiled water.
2. Place 5 nails into each of the beakers.
3. Pour a layer of oil over the water in the beaker with cooled boiled water.



- What can be observed about the iron nails after a few days?

  The iron nails in Set-up X turned rusty while the iron nails in Set-up Y remained the same.

- Explain your observation.

  The tap water contains dissolved oxygen which caused the nails to rust. The cooled boiled water did not have dissolved oxygen and the layer of oil prevented oxygen in the surrounding air from dissolving into the water. Thus, the nails in Set-up Y did not have the oxygen needed to make them rust.

EXPERIMENTS

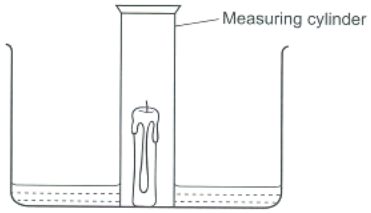
Experiment 5

Materials needed:

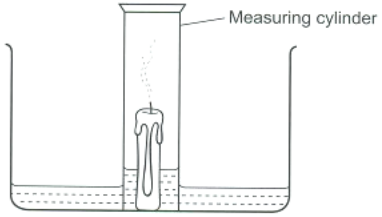
- 1 candle
- 1 measuring cylinder
- 1 basin of water

Steps:

1. Set up the experiment as shown below.



2. Remove the measuring cylinder.
3. Light the candle.
4. Immediately cover the candle with the same measuring cylinder.



- What can be observed about the candle flame?

The candle flame remained lit for a while before it extinguished.

Experiment 5

- Explain your observation.

Oxygen is needed for burning. When the oxygen in the air that was in the measuring cylinder was used up, the flame extinguished.

- What can be observed about the water level in the measuring cylinder after the flame went out, when compared to the start of the experiment?

The water level in the measuring cylinder was higher after the flame had extinguished.

- Explain your observation.

As the oxygen was used up, the remaining air occupied less space in the measuring cylinder, so water entered to fill up the space.

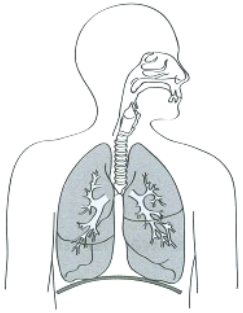
- What can be concluded about the amount of oxygen in the air from this experiment?

Oxygen makes up only part of the composition of air.

WORKED EXAMPLES

Example 1

The diagram below shows part of the human respiratory system.



(a) In the diagram above, **label** and **name** clearly the part that allows air to flow from the nostrils to the lungs. (1m)

(b) A mirror turns misty when you breathe into it. What does that tell you about the air you breathe out? (1m)

Thought Process:

Topic : Air and The Respiratory System

Key Concept(s) : The human respiratory system is mainly made up of the nose, windpipe, lungs and diaphragm.

Air from the nose travels down the windpipe into our lungs.

Exhaled air contains more water vapour than inhaled air.

Exhaled air is warmer than room temperature.

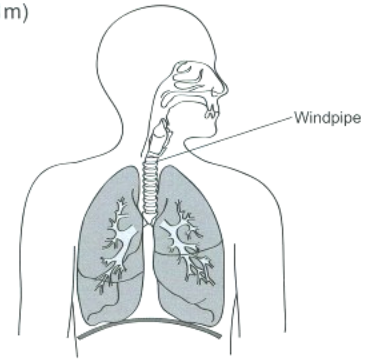
Key Words / Key Phrases : (a) windpipe

(b) warmer than room temperature, contains water vapour

Process Skills : Observing, Communicating, Inferring, Analysing

Example 1

(a) (1m)

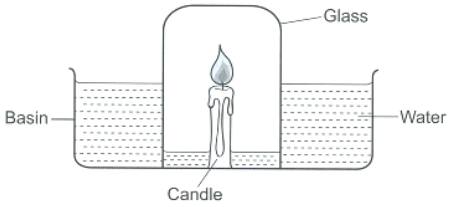


(b) The air that we breathe out is **warmer than the room temperature and it contains water vapour**. (1m)

WORKED EXAMPLES

Example 2

Study the diagram below.



(a) What can be observed about the candle flame after a few minutes? (1m)

(b) Explain your answer in (a). (1m)

(c) What will happen to the water level in the glass? (1m)

Thought Process:

Topic	:	Air and The Respiratory System
Key Concept(s)	:	Oxygen is needed for combustion (burning).
Key Words / Key Phrases	:	(a) extinguished (b) oxygen is needed for burning, oxygen is used up, flame extinguished (c) increase
Process Skills	:	Observing, Communicating, Inferring, Predicting, Analysing

Answers:

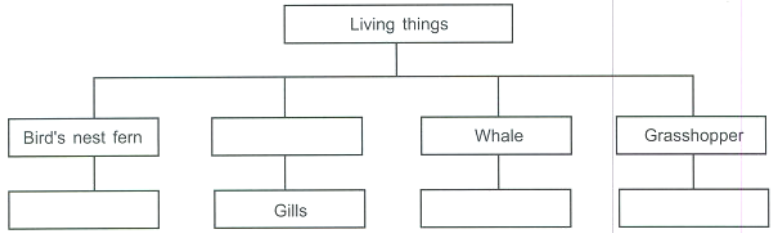
(a) The candle flame **extinguished**. (1m)

(b) **Oxygen is needed for burning**. When the **oxygen** in the air that was in the glass was **used up**, the **flame extinguished**. (1m)

(c) The water level **increased**. (1m)

Example 3

The following classification chart shows different groups of living things and the parts which enable gaseous exchange to take place. **Complete** the chart by filling in the boxes with the correct words. (2m)



Thought Process:

Topic	:	Air and Respiratory System
Key Concept(s)	:	Fish breathe through gills. Aquatic mammals like dolphin and whale breathe through lungs. Most insects breathe through breathing holes (spiracles). Plants breathe through tiny opening called stomata.
Key Words / Key Phrases	:	stomata, fish(any type), lungs, spiracles
Process Skills	:	Observing, Communicating, Generating possibilities

Answers: