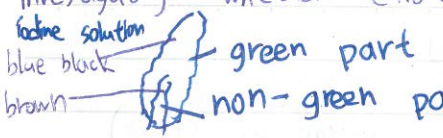
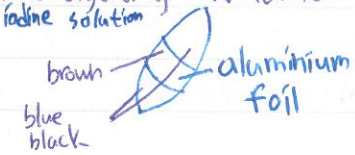
Variegated leaf 斑紫

investigating whether chlorophyll is necessary for photosynthesis



Leaf with aluminium foil

investigating whether light is necessary for photosynthesis



Destarching, put the plant in the dark for at least 24 hours.

(To ensure the starch detected is produced during the experiment)

sodium hydrogencarbonate + water = sodium hydrogencarbonate solution (contain more carbon dioxide than water)

Extension

food chain (→ means eaten by)

grass → rabbit → fox → tiger

- grass: producers (produce energy)
- rabbit, fox, tiger: consumers (obtain energy from other living things)

significance of photosynthesis to other living things

- Providing a source of energy
- supplying oxygen

7.3 respiration

Burning food

chemical energy → thermal energy + light energy

word equation and chemical equation of respiration

food + oxygen → carbon dioxide + water

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

process

Extension

	Photosynthesis	Respiration
Substances used	Carbon dioxide and water	Food (glucose) and oxygen
Substances produced	food and oxygen	carbon dioxide and water
Energy conversion involved	light energy to chemical energy stored in food	chemical energy stored in food to other useful forms. • released slowly • series of chemical reactions

Example

Experimental set-up

carbon dioxide ✓
water ✓
light ✓
Chlorophyll ✓

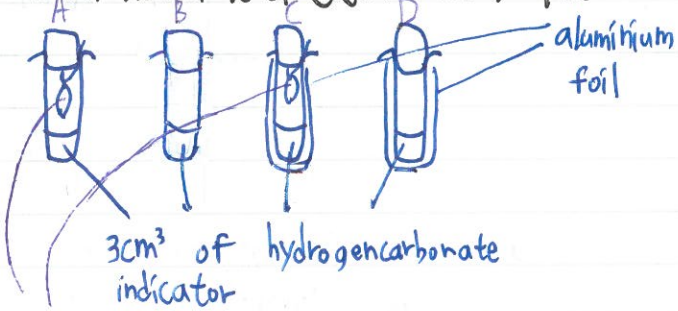
Control set-up

carbon dioxide ✓
water ✓
light X
chlorophyll ✓

independent : presence of light
variable
dependent : presence of starch
variable
Controlled : Presence of carbon dioxide / Presence of water
variable Presence of chlorophyll

7.4 Gas exchange in plants

hydrogencarbonate indicator
Normal level (~0.04%) Red
Higher than normal level (>0.04%) yellow
Lower than normal level (<0.04%) purple



Tubes B and D are control set-ups. They make sure the results in tubes A and C are caused by the presence of the green leaf.

Tube	colour of hydrogencarbonate indicator	
	At the beginning	After one hour
A	Red	purple
B	Red	Red
C	Red	yellow
D	Red	Red

(Plants – Gas exchange through stomata (氣孔) (look like pore)
Extension

light condition	dark condition
photosynthesis ✓ respiration ✓	photosynthesis X respiration
The rate of photosynthesis in plants is higher than the rate of respiration	plants stops carrying out photosynthesis (only respiration)
net uptake – carbon dioxide net release – oxygen	net uptake – oxygen net release – carbon dioxide

7.5 Gas exchange in animals

inhaled air (the air we breathe in)
exhaled air (the air we breathe out)

	inhaled air	exhaled air
oxygen	21%	16%
carbon dioxide	0.04%	4%
water vapour	variable	saturated (飽和)
Temperature		
Noble gases	0.9%	0.9%
Other gases	variable	variable

increase (增加)

Human breathing system

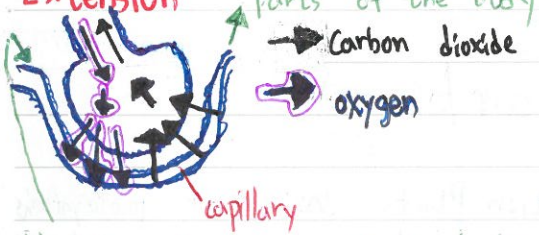
nasal cavity (鼻腔)
nostrill (鼻孔)
trachea (氣管)
bronchus (支氣管) (pl. bronchi)
bronchiole (小氣管)
air sac (氣囊)
intercostal muscle (肋間肌)
rib (肋骨)
lung (肺)
diaphragm (橫膈膜)
capillary (微血管)

Path of air flow when we breathe in:

nostrils → nasal cavity → trachea → bronchi → bronchioles → air sac

In humans, gas exchange takes place at the air sacs

Extension



Cigarette smoke contains over 7000 chemicals

Smoking reduces the efficiency of gas exchange

Tar – reduces the surface area for gas exchange.

Carbon monoxide – reduces the oxygen-carrying ability of blood.

other chemicals – They cause some of the walls of the air sacs to break down. This reduces the surface area for gas exchange

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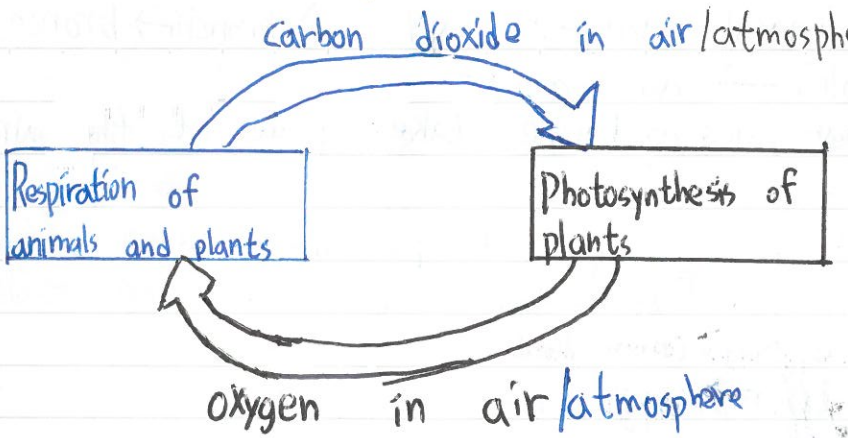
smoking is harmful to health. It cause many diseases such as stroke, lung cancer and heart diseases. So do not smoke!

7.6 Balance of oxygen and carbon dioxide in Nature



Living things carry out respiration. Plants carry out photosynthesis. These two processes keep a balance of oxygen and carbon dioxide in Nature

some human activities (e.g. burning fossil fuels and clearing forests) are disrupting the balance of carbon dioxide in Nature.

The increasing amount of carbon dioxide in the atmosphere enhances the greenhouse effect. This causes the average temperatures of the Earth to increase. This is known as global warming.

Some possible effects of global warming:
- Living things in Polar regions lose their habitats and die
- Flooding of low-lying areas
- Unusual weather patterns, e.g. typhoons, droughts

7.7 Air quality

air pollutants
- sulphur dioxide
- nitrogen oxides
- carbon monoxide
- ozone
- suspended particulates

→ Breathing them in may cause various health problems

AQHI (Air Quality Health Index)
Low – 1, 2, 3
Moderate – 4, 5, 6
High – 7
Very High – 8, 9, 10
Serious – 10+

The AQHIs tell the public the possible health risks caused by air pollutants and help them take precautionary measures

8.6 Household electricity

all electrical appliances are <u>energy converters.</u>

The motors work using the <u>magnetic effect</u> of current
↓
coils

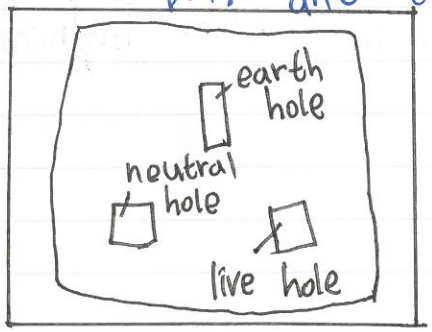
mains voltage
- Hong Kong 220V

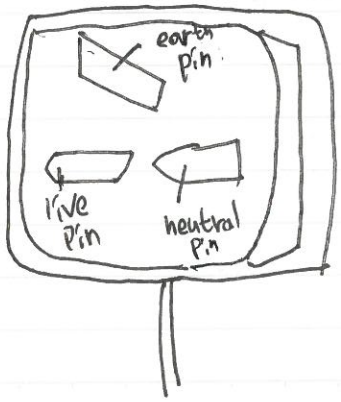
household electricity = mains electricity

Domestic Circuits

All the sockets in home are connected in parallel

Three-pin plugs and the colour coding of wires





colours of the wires

Earth wire	green and yellow
live wire	brown
Neutral wire	blue

Electricity is supplied to our homes through the live wire and the neutral wire

Potential hazards in using electricity

1. Overloading

When the number of branches increases, the current flowing through the cell increases.
Overloading occurs when too many electrical appliances are connected to a mains socket. This is dangerous and should be avoided
Universal adaptor

2. Short Circuits (provides a path with a very low resistance for current to flow) (overheat and damage electrical appliance) — dangerous should be avoided

If the current passing through a fuse is larger than the fuse rating, the fuse will blow and cut off the current. This prevents the circuit from overheating. (ampere)