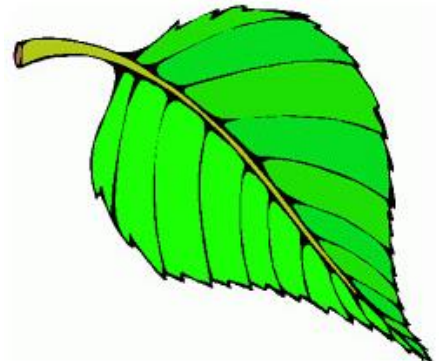
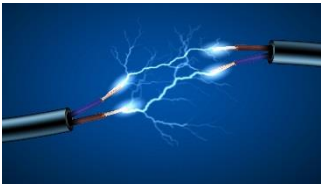


**Braidhurst High School
Science Department**

S2

Homework Booklet



**Write the answers to these questions IN YOUR
HOMEWORK JOTTER. Make sure you include the
heading of the exercise you are doing.**

**Take good care of this booklet. It is NOT to be written
on and must be returned to your teacher at the end of
the year.**

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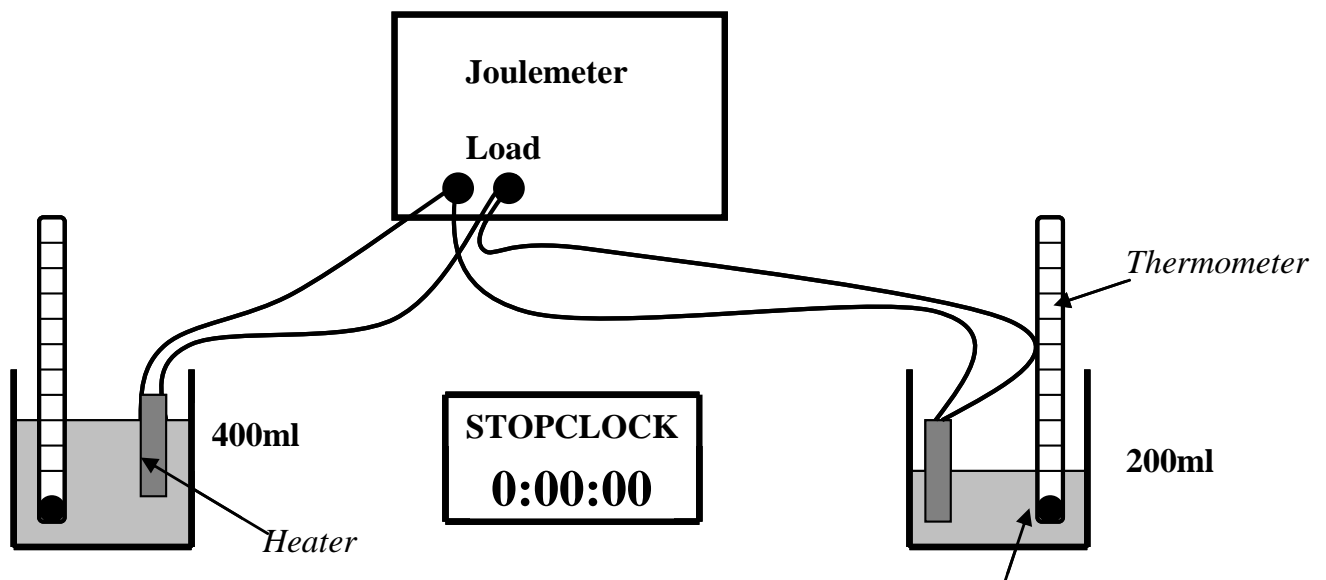
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Heat and Renewables 1: Heat & Temperature

1. What piece of apparatus would you use to measure the temperature of an object?
2. What is the temperature of an object measured in?
3. Copy and complete the following table

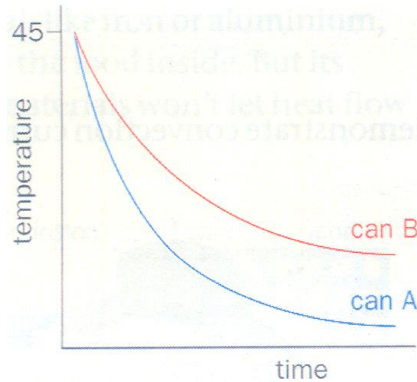
	Temperature (°C)
Crushed ice	
Boiling water	
Air in the classroom	
Human body	

4. Look at the experiment below.
The heaters are identical and supply the same amount of heat energy to the water. In which beaker will the water show the greatest rise in temperature? Explain your answer.



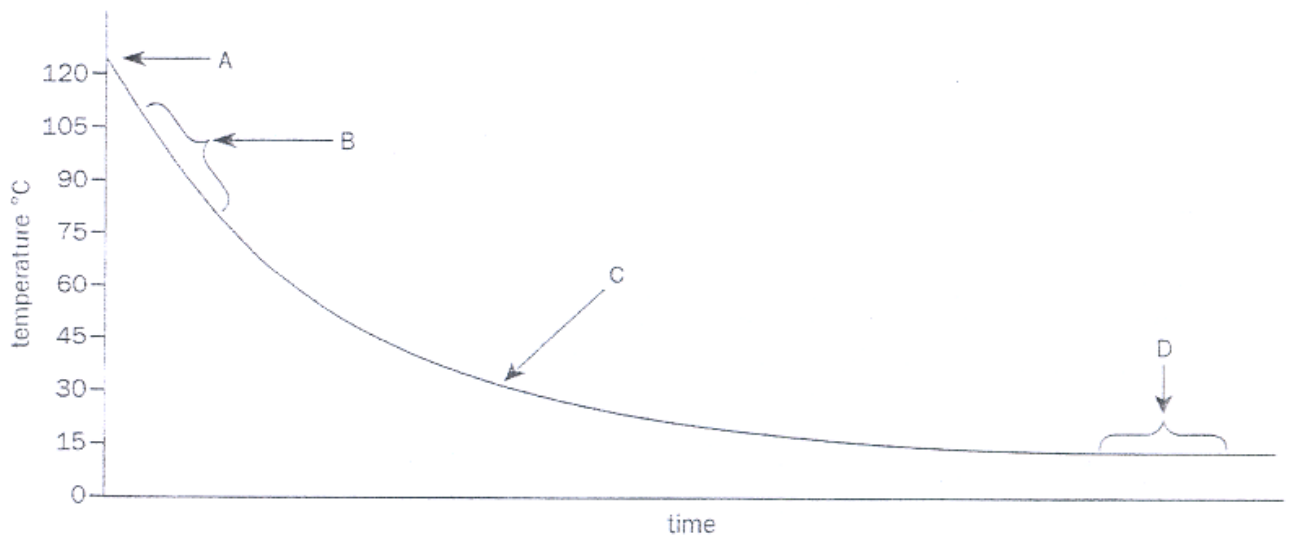
Heat and Renewables 2: Cooling Curves

1. Look at the cooling curve below



Which can, **A** or **B** cools down the quickest?

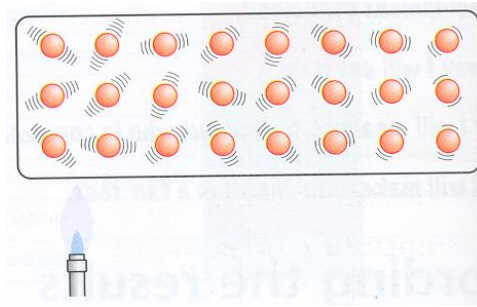
2. Look at the graph below.



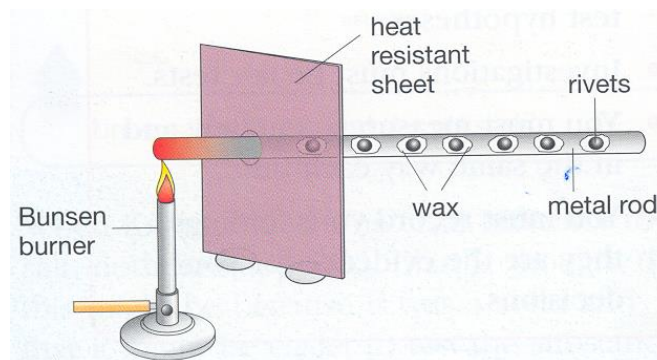
- a. on the graph,
 - i. Where is the heat loss the greatest : **A**, **B**, **C** or **D**?
 - ii. What is the temperature at **point C**?
- b. Use the graph to estimate the temperature of the room.
- c. sketch the graph above in your jotter. On the graph **draw a cooling curve** showing the **same starting temperature** but a **higher room temperature**.

Heat and Renewables 3: Conduction of Heat Energy

1. Through what state of matter does heat travel by conduction?
2. The diagram below shows how the particles are arranged in a metal rod. Look closely at the diagram and describe how heat from the Bunsen travels along the rod.



3. Describe what will happen to the rivets in the experiment below.

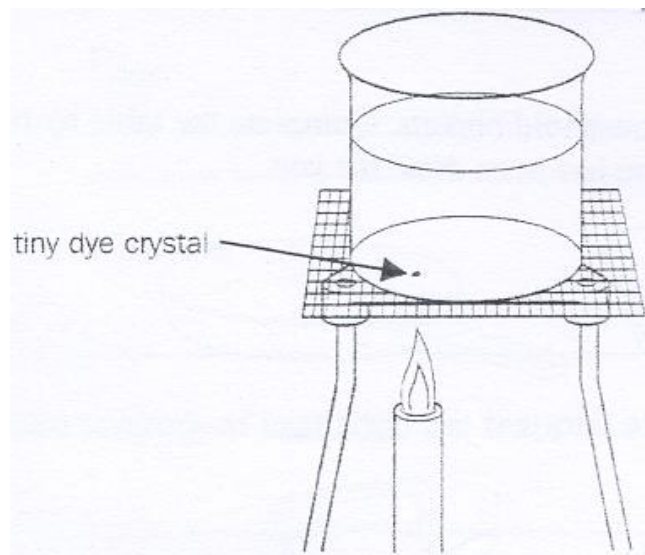


4. Why does a metal spoon feel colder to the touch than a plastic spoon?
5. All metals are conductors of heat energy but some metals conduct better than others. From the experiment below, what metal is the best conductor of heat energy?

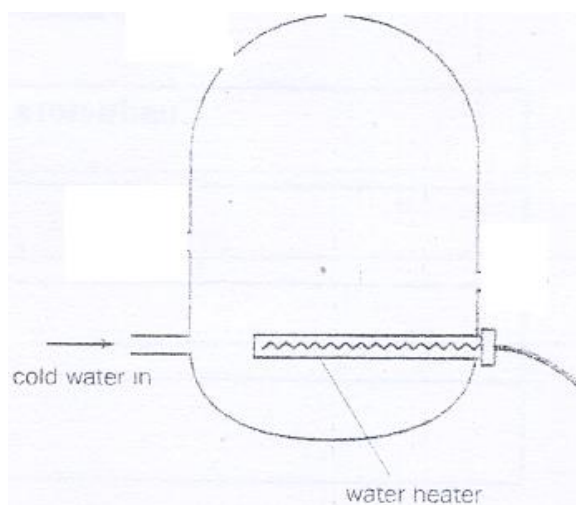


Heat and Renewables 4: Convection of Heat Energy

1. What single word can be used to describe a liquid or gas?
Why do you think this word is used?
(think about moving particles)
2. Why do you think convection cannot take place in solids?
3. Copy the diagram of the beaker below and draw the path taken by the colour from the tiny crystal.

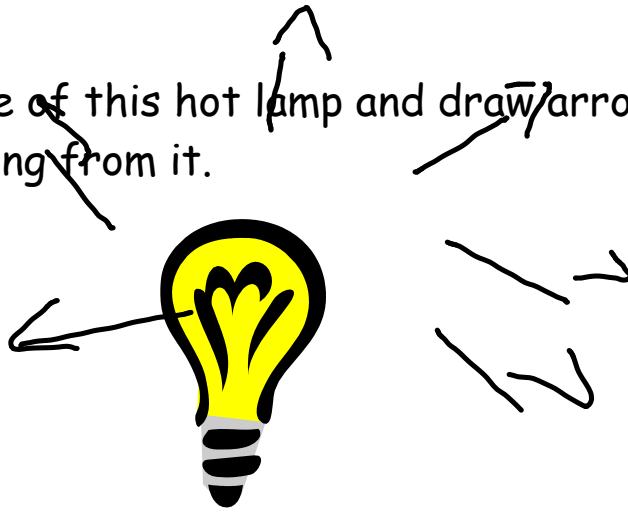


4. Explain why the heating element is at the bottom of the hot water storage tank.

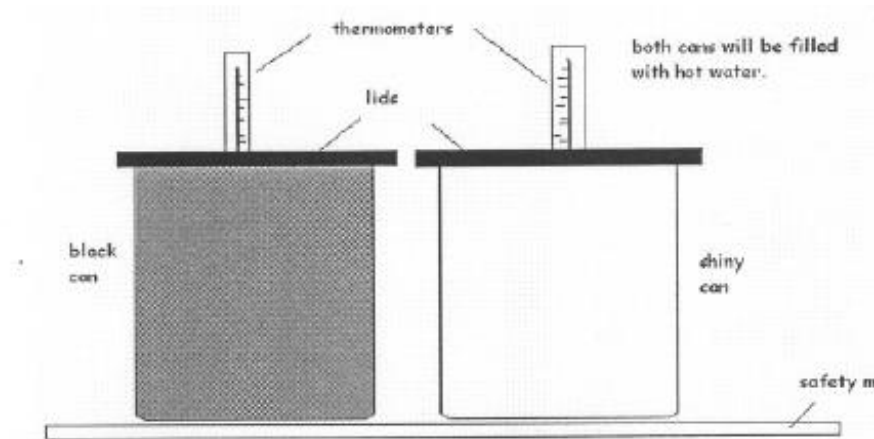
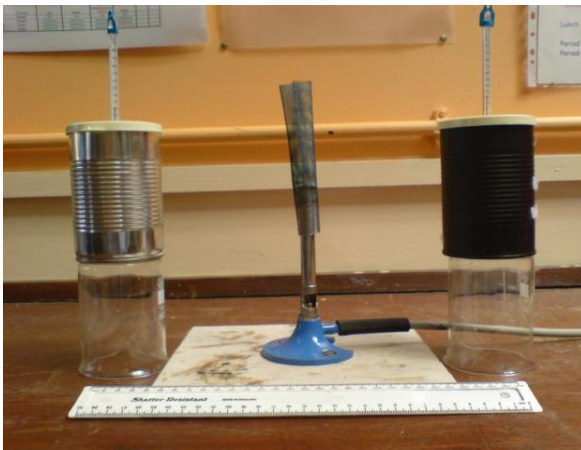


Heat and Renewables 5: Radiation of Heat Energy

1. Heat can travel in waves. What name is given to this type of radiation?
2. Copy the picture of this hot lamp and draw arrows to represent the heat radiating from it.



3. In the experiment below, what colour of can **absorbed** the most heat energy?
4. In the experiment below, what colour of can **radiated** the most heat energy?



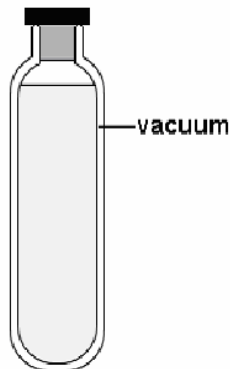
5. Can heat energy travel through a vacuum like space? How do you know?

Heat and Renewables 6: Reducing Heat Loss

1. What types of materials (metals or non metals) are the best insulators?
2. Describe 2 ways we use trapped air as insulation to keep our bodies warm.
3. How does the Polar Bear below keep warm in Arctic conditions?



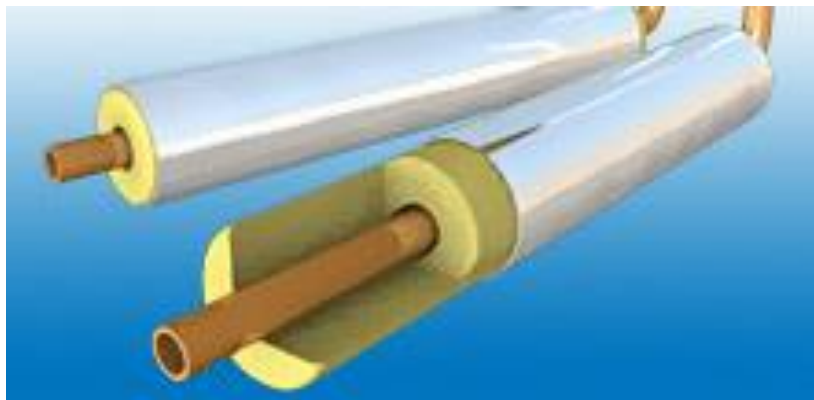
4. A vacuum flask can keep hot things hot and cold things cold.



Explain why the vacuum prevents heat loss by convection and conduction.

Heat and Renewables 7: Insulating buildings

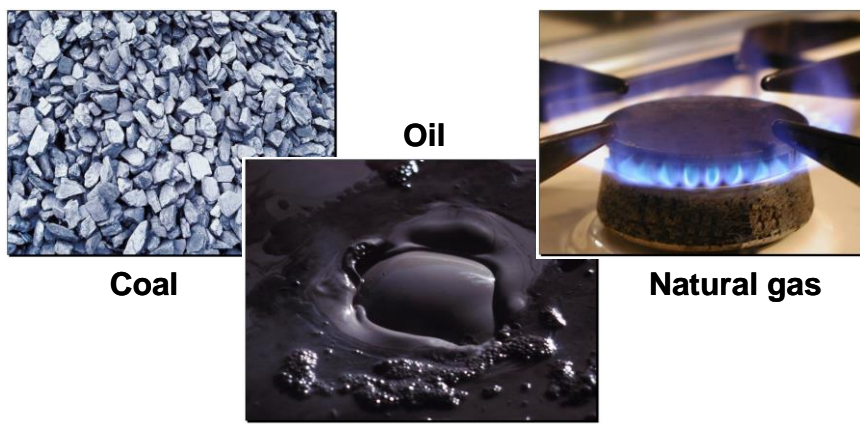
1. Name 4 ways heat can be lost from your home.
2. Choose two of these ways and state how you could insulate against heat loss.
3. Look at the diagram below showing how hot water pipes can be insulated in your home.



- a. Why do hot water pipes need to be insulated?
- b. What type of material is used to 'lag' (insulate) pipes and why is this material good at the job?

Heat and Renewables 8: Energy use in the home

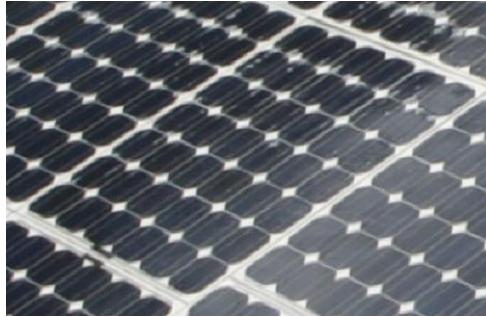
1. What do you use energy for in your home?
2. Where does most of our electrical energy come from at present?
3. The pictures below show the fossil fuels which are burned in power stations to produce electricity.



- a. Why are they called ***Fossil Fuels***?
- b. Why do we describe them as ***non-renewable*** sources of energy?
- c. Other than the fact they are non-renewable, what other disadvantages are there for us relying on fossil fuels for our energy needs in the future?
- d. Name one other non-renewable source of energy (what other type of power station do we have at present)?

Heat and Renewables 9: Renewable Energy

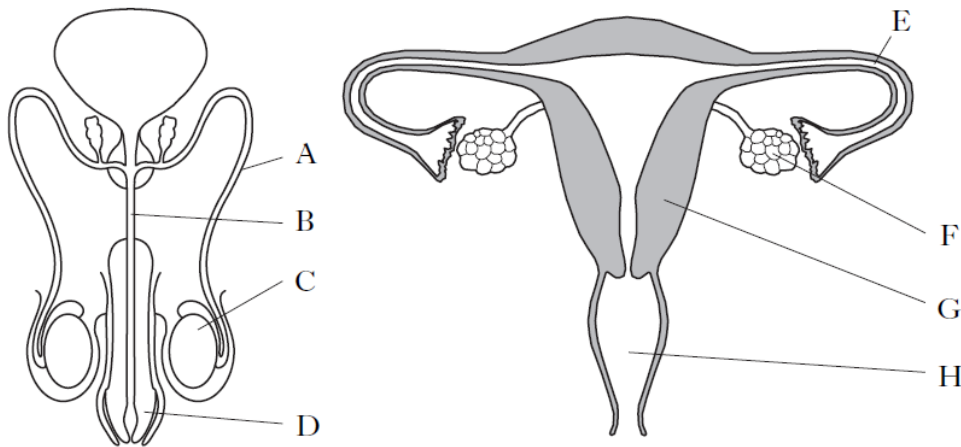
1. Name **3** renewable sources of energy.
2. Why is Scotland very suitable for generating electricity from water (hydroelectric, wave power & tidal power)?
3. What advantages and disadvantages are there for generating electricity from wind?
4. The diagram below shows solar cells.



- a. What energy change takes place in a solar cell?
- b. The electrical voltage produced by a solar cell can be measured using a voltmeter. What factors will affect the electrical energy produced by a solar cell?

Reproduction 1: Human Reproductive System

1. The diagrams below show the human male and female reproductive systems.



Copy and complete the table below into your jotter by inserting the missing letters, names and functions of the reproductive organs.

<i>Letter</i>	<i>Name</i>	<i>Function</i>
	Testes	
E		Where fertilisation takes place
F		

2. Write the names of the male and female sex cells in your jotter.

Male sex cell _____ Female sex cell _____

3. The placenta plays an important role in an embryo's development.

In your jotter, write the names of **two** essential, non-harmful substances, which are transferred **from mother to baby** via the placenta.

4. Why are women advised **not** to smoke when pregnant?

Write your answer in your jotter

Reproduction 2: Genetic Inheritance

1. Use the **letters** from the grid below to identify the **two** characteristics, which we **do not** inherit from our parents.

A. eye colour	B. presence of operation scars	C. height
D. finger prints	E. being male or female	F. ability to tongue roll

Copy and complete the sentence below into your jotter:

The characteristics we do not inherit are _____ and _____.

2. Use **letters** from the second grid to answer the questions below.

A. genes	B. nucleus	C. chromosome
D. cells	E. DNA	F. inheritance

Answer the following questions in your jotter:

- Where in a cell are chromosomes found?
- What are chromosomes made of?
- What are the sections of chromosomes, which code for different characteristics called?

3. DNA profiling (DNA fingerprinting) has a number of uses.

For example, it can be used to compare a DNA sample left at a crime scene with that of a suspect or victim, to look for a match.

Write **one other** use of DNA profiling into your jotter.

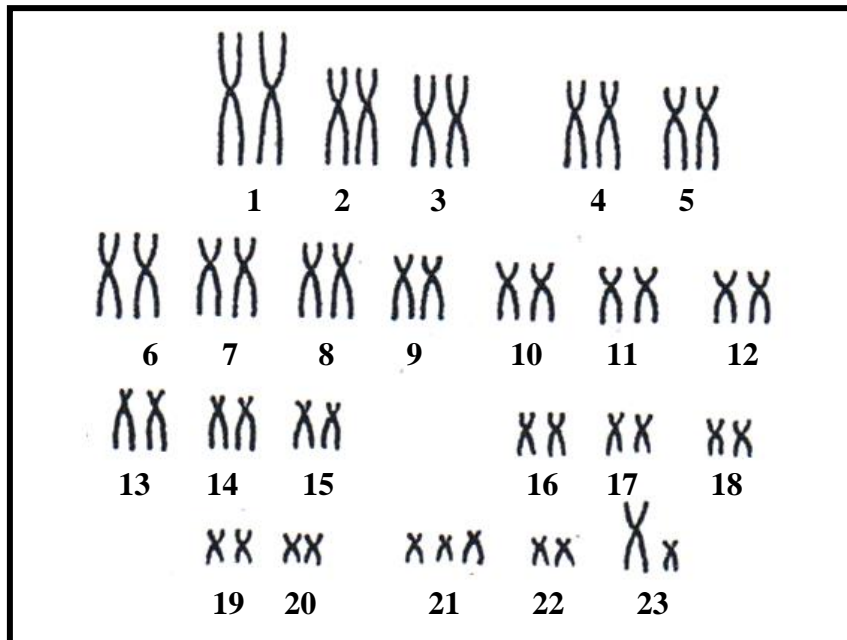
Reproduction 3: Chromosomes

1. In humans, how **many** chromosomes are found in;

a. Body cells _____ b. Sex cells (gametes) _____

Write the answers in your jotter.

2. The diagram below is called a karyotype and shows the chromosomes found in the body cells of person A.



Look at the diagram and answer the following questions in your jotter.

a. **Identify** the sex (gender) of person A.

b. Explain your choice of answer to the previous question.

Acids & Alkalis 1 – The pH Scale

1. Copy and complete the sentence:

An indicator is a substance that changes _____ when in contact with certain substances.

2. What is the name of the liquid indicator used to test whether something is an acid, alkali or neutral?

3. After adding an indicator, how do we work out the pH of a substance?

4. Name a common laboratory acid.

5. What is the pH range for alkalis?

6. What would be the pH of water?

7. A boy tested 3 solutions with pH paper. His results are in the table below. Copy and complete the table.

Solution	Colour of pH paper	Type of solution
A	Dark Blue	
B	Red	
C	Pale green	

Acids & Alkalis 2 - Everyday Acids & Alkalis

1. Are all acids dangerous?
2. Which household acid goes very well with chips?
3. Where in your body do you find acid?
4. What type of substance is a cleaning chemical likely to be? Acid or alkali?
5. A girl in 2A carried out an experiment in class using 4 solutions. These were lemon juice, bleach, salt solution and cola. The results she achieved are in the following table. Copy and complete this table.

Name of solution	Colour of pH paper	pH value	Type of solution
	Yellow	5	Acid
Salt solution		7	
	Purple		Alkali
Lemon Juice	Orange		

Acids & Alkalis 3 – Dilution of Acids & Alkalis

For questions 1-4, write either INCREASES or DECREASES in your jotter:

1. When water is added to any solution, what does this do to its concentration?
2. When water is added to an acid, what does this do to its acidity?
3. When water is added to an alkali, does this do to its pH?
4. When water is added to an acid, what does this do its pH?
5. An acid of pH 1 is diluted several times with water. Which of the following could be the pH of the final solution; 6,7 or 8?
6. The pH of three samples of an alkali are measured using pH paper and a pH chart. A has a pH of 9, B has a pH of 14 and C has a pH of 10. Rank them in order of **alkalinity**, with the highest first.

Acids & Alkalis 4 – Acids + Alkalis

1. A boy started to neutralise an acid with an alkali. What would happen to the pH as the alkali was added?

Copy and complete:

2. An acid can be neutralised by an alkali because they _____ each other out.

3. Which is an example of an alkali;

Sodium chloride or Sodium hydroxide?

4. When an acid is neutralised by an alkali, there are two products. What are they?

5. Write down the chemical word equation for the neutralisation of hydrochloric acid with potassium hydroxide, which produces potassium chloride and water.

Acids & Alkalis 5: Acids + Metal Oxides

1. What happens to the pH of an acid as a metal oxide is added to it?

2. Copy and complete the following chemical word equation by naming the salt produced in the reaction:

sulphuric acid + calcium oxide \rightarrow _____ + water

3. A girl has neutralised an acid using a solid metal oxide. However, there is still some of the metal oxide present. Draw a **labelled diagram** showing the apparatus she would use to separate the metal oxide from the salt solution produced.

4. After neutralisation, the salt product is still dissolved in water. What would you have to do to be left with only the salt?

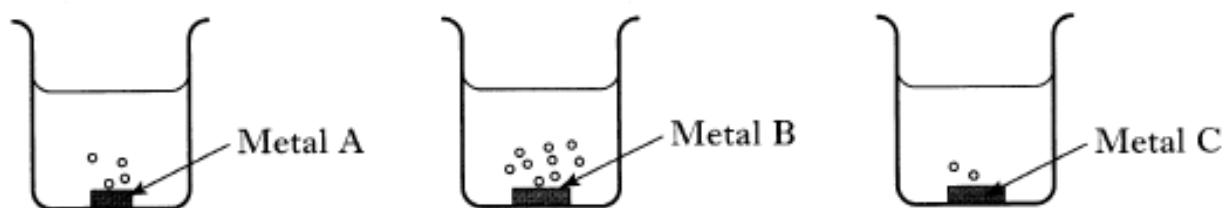
Acids & Alkalis 6: Acids + Metal Carbonates

1. When metal carbonates neutralise an acid, there are three products. What are they?
2. A boy is neutralising sulfuric acid with copper carbonate. Without using pH indicator, how will he know when the reaction has ended and the acid has been neutralised?
3. A gas is produced when a metal carbonate is added to an acid. If this is bubbled through lime water, what would you see happening?
4. Copy and complete the following table showing the salts produced during neutralisation reactions. The first one is done for you.

Acid	Metal carbonate	Salt produced
Hydrochloric acid	Copper carbonate	Copper chloride
Nitric acid	Copper carbonate	
	Calcium carbonate	Calcium sulfate
Hydrochloric acid		Zinc chloride

Acids & Alkalis 7 – Acids + Metals

1. What gas is produced when a metal reacts with an acid? What is the test for this gas?
2. Name 3 metals which we would never add to acid in the lab because they react violently with water.
3. Name a metal which would not react with a dilute acid.
4. Other than the gas produced, what is the other product when a metal reacts with an acid?
5. Class 2A carried out an experiment where they were adding different metals to acid. Here is a picture of what they saw.



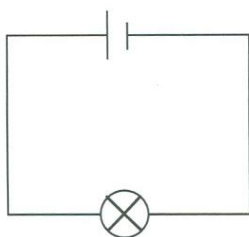
Place the metals in order of increasing reactivity.

Acids & Alkalis 8 - Uses of Neutralisation Reactions

1. A farmer tested his soil and its pH was 4.5. To grow healthy crops he needs a pH of 6. What can he add to the soil to increase the pH of the soil?
2. What type of substance must this be?
3. What makes the pH of lakes and rivers acidic?
4. What do indigestion tablets do to the acidity of our stomachs?
5. Why would you not treat a bee sting with vinegar?
6. Plants need the elements potassium, phosphorus and nitrogen to grow healthily. If they cannot get these from the soil, we can provide them in fertilisers. Ammonium nitrate is a fertiliser with lots of nitrogen in it. It can be made by neutralisation of an acid with an alkali. What type of substance must ammonium nitrate be?
7. Why are toothpastes usually alkalis?

Electricity 1 - Circuits & Symbols

1. A pupil switches the following circuit on.

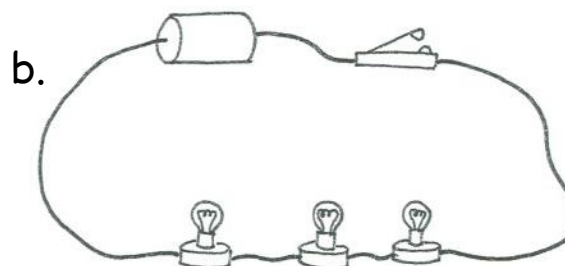
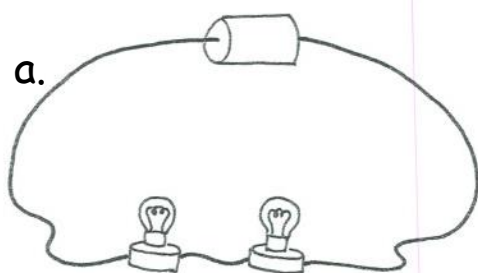


- a. Which type of energy does the lamp give out?

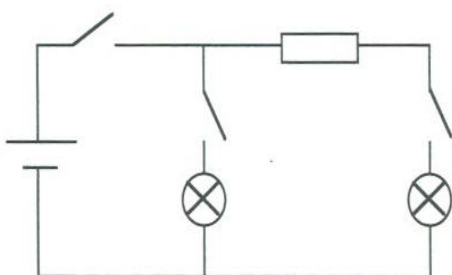
- b. Which component in the circuit is supplying the energy?
2. Name the following circuit components



3. Billy has drawn pictures of two circuits. Use circuit symbols to draw proper circuit diagrams of each of Billy's drawings.

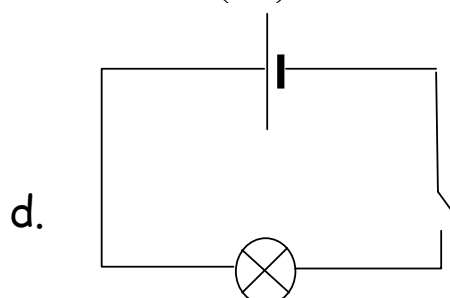
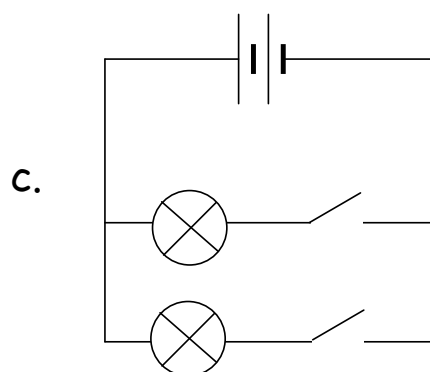
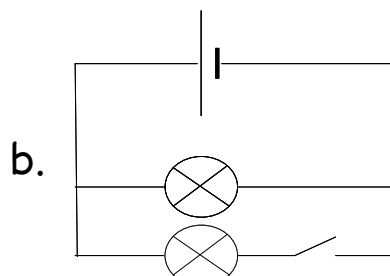
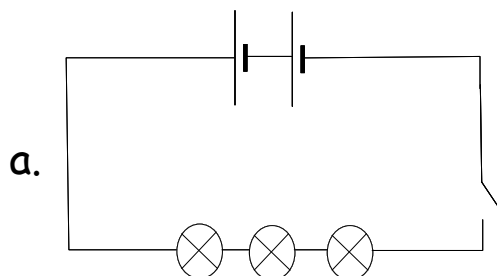


4. A student builds the circuit shown below



- a. How many switches did he use?
- b. How many lamps did he use?
- c. Which other circuit components did he use?

5. Say whether each of the circuits below is series or parallel:



Electricity 2 - Measuring Electric Current

1. Copy and complete the paragraph using the words below

electrons *conductors* *metals* *insulators*

non-metals *negative* *charges* *current*

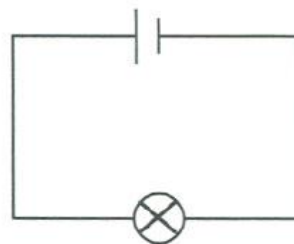
The flow of electricity round a circuit is called an electric _____.

Electricity is really the flow of _____. Metals have a lot of free electrons and allow electricity to flow through them easily. They are called _____. Insulators do not allow electric current to flow through them easily and are usually _____. The electrons which flow in an electric circuit have a _____ charge and we sometimes talk of current as being the flow of _____ round a circuit.

2. In your jotter, draw the circuit symbol for an ammeter and state what units current is measured in.

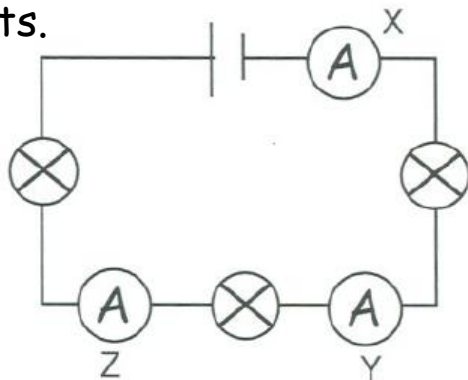
3. A student builds this circuit.

However, he has forgotten to include the device which will tell



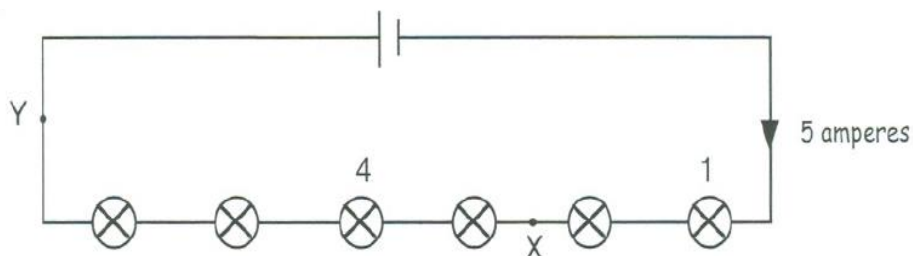
him the current in the circuit. Redraw the circuit in your jotter showing the device properly placed in the circuit.

4. In the circuit below 3 lamps are connected in series. Ammeters are placed at 3 points.



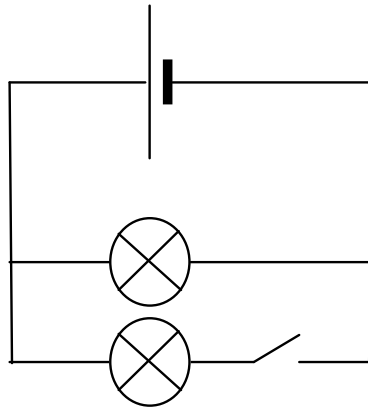
The current measured by ammeter X is 2 amperes.
What is the current measured by ammeter Y and Z?

5. The diagram below shows 6 lamps connected to a battery. The current at one point is shown.

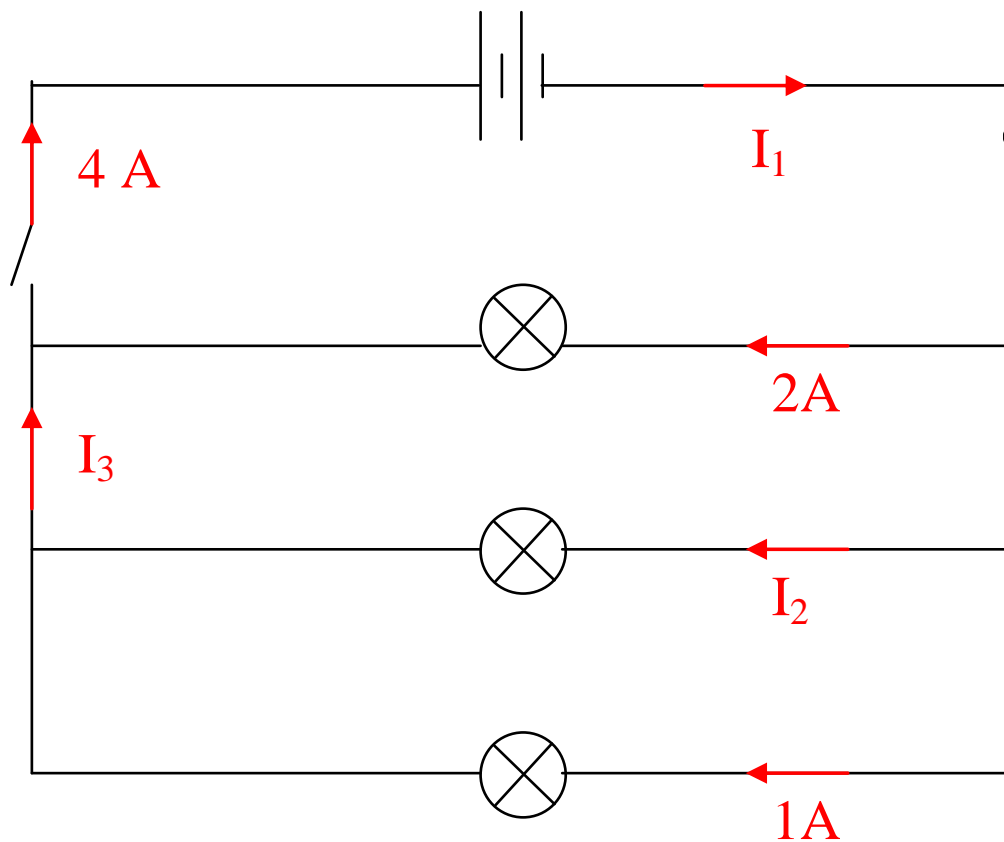


- What is the current through lamp 1?
 - What is the current through lamp 4?
 - What is the current through lamp X?
 - What is the current through lamp Y?
 - What can you say about the current at all points in a series circuit?
6. A student sets up the following circuit. Redraw the circuit in the

space provided to show how she would measure the total circuit current.



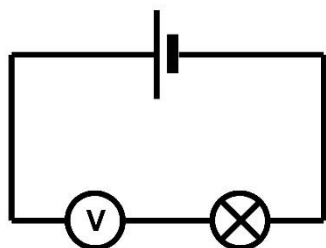
7. Copy and complete the table with the currents I_1 , I_2 & I_3 :



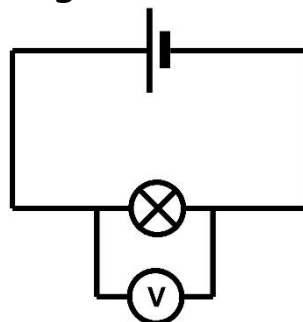
Position	Current (A)
I_1	
I_2	
I_3	

Electricity 3 - Measuring Voltage

1. Which of the circuit diagrams below shows the right way to connect a voltmeter to measure voltage across a bulb?



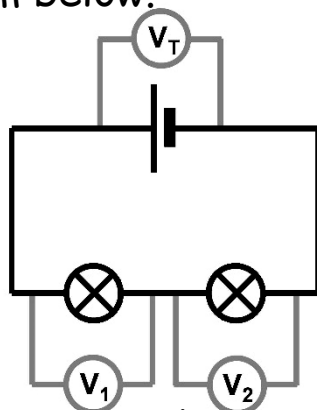
A



B

2. What units do we use to measure voltage?

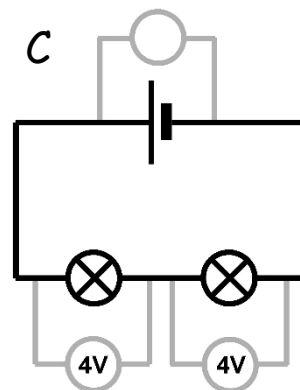
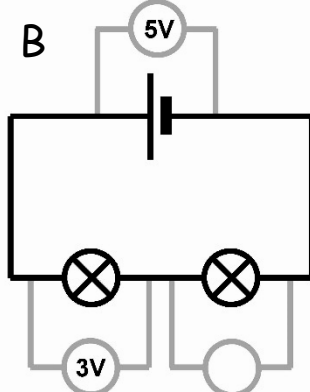
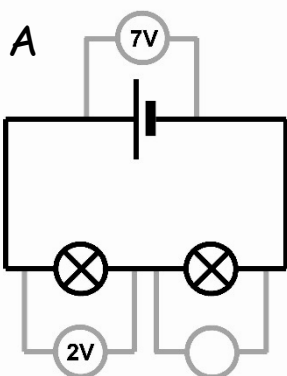
3. Look at the diagram below.



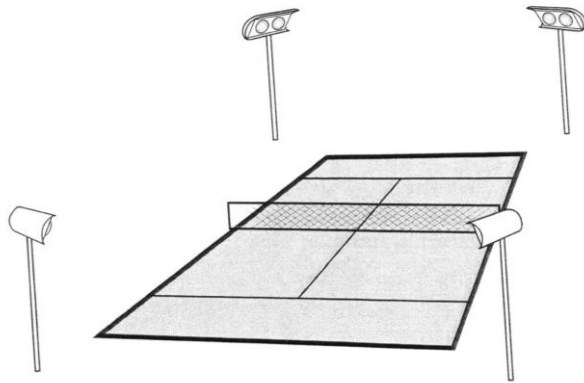
- a. How would you work out the total voltage (V_T) of the series circuit?

- b. There are two bulbs in the series circuit above. If the voltage across one bulb is 3 volts and the voltage across the other bulb is 4 volts. What is the total voltage from the battery?

4. What are the missing voltages in the circuits shown below?

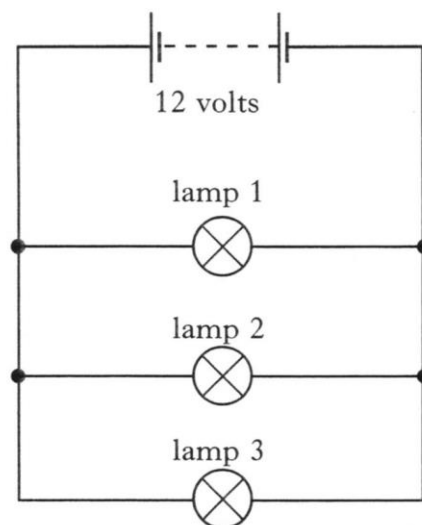


5. A tennis court has four columns of floodlights



The lamps are connected in parallel. Give **two** advantages of connecting the lamps in parallel.

5. Three **identical** lamps are connected as shown in the circuit below



The battery supplies a voltage of 12 V and provides a current of 3 Amperes to the circuit. Copy and complete the table below to show the current in each lamp and the voltage across each lamp

	<i>Lamp 1</i>	<i>Lamp 2</i>	<i>Lamp 3</i>
<i>Current (amperes)</i>			
<i>Voltage (volts)</i>			

Electricity 4 - Measuring Electrical Resistance

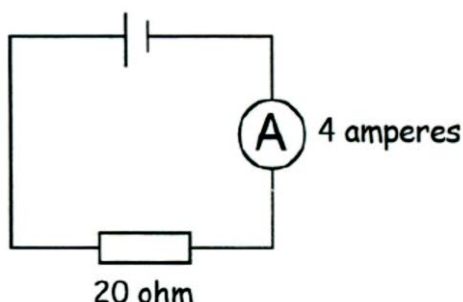
1. A pupil wishes to measure the resistance of a resistor. 

- What device is used to measure the resistance of a resistor?
- Draw its circuit symbol in your jotter.
- What is the unit of resistance?

2. The heating element on an electric fire can be thought of as a resistor. The resistor converts electrical energy into which other type of energy?

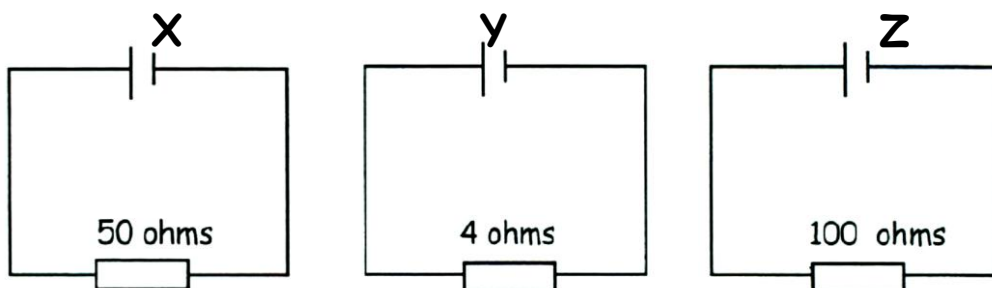


3. In the circuit below we have a 20 ohm resistor connected to a battery. The ammeter is reading a current of 4 amperes.



If the 20 ohm resistor is replaced with a bigger resistor would the current increase, decrease or stay the same?

4. Here are three circuits



- In which circuit is the resistance the largest?
- In which circuit will the current be the smallest?

c. In which circuit will the current be the largest?

5. Copy and complete the table below and place these materials in the correct column.

Copper

plastic

rubber

aluminium

gold

cork

iron

polystyrene

Conductor (Low Resistance)	Insulator (High Resistance)

6. Draw the circuit symbol for a variable resistor in the box below.

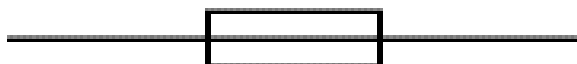
7. Copy and complete the sentences below:

A variable resistor can be used to control the _____ of an electric motor.

A variable resistor can be used to control the _____ of a lamp.

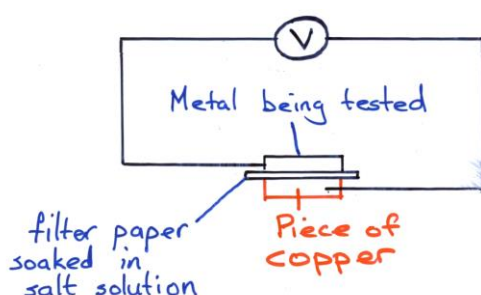
8. List three appliances in your home that use resistance wire for heating.

9. Name the component below and explain how it breaks the circuit when too high a current flows.



Electricity 5 - Cells

- 1a. A chemical cell is made to produce electricity. What name is given to the solution used in the cell?
- b. As well as a solution, what else is needed to make a cell?
2. What happens to the voltage produced by a cell when the concentration of the solution is **increased**?
- 3a. In the experiment below, how could we produce a **bigger** voltage?



- b. What would be the voltage produced if the metal being tested was also copper?
- 4a. the following metals were put into a cell with copper. Starting with the biggest voltage produced, place the metals in order.

Iron, Zinc, Gold, Magnesium, Silver, Tin, Lead, Aluminium
- b. What name is given to this list of metals?
5. A lead acid battery is used in a car. How does this battery recharge?
6. Name three electrical or electronic devices that use rechargeable batteries.

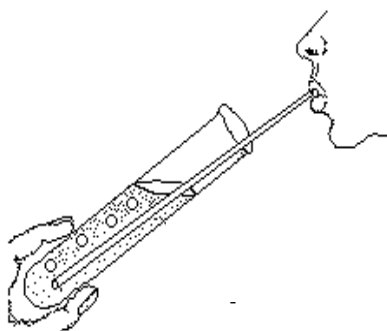
Human Body Systems 1 - The Need for Energy

5. Cells need energy for movement. Give one other reason why living cells need energy.
6. a. What is the name of the process, which uses oxygen to release energy from food?

b. Copy and complete the equation below to show this reaction.

Oxygen + _____ \rightarrow _____ + _____ + Energy

7. Look at the diagram below, which shows a pupil blowing into a test tube containing a clear liquid.



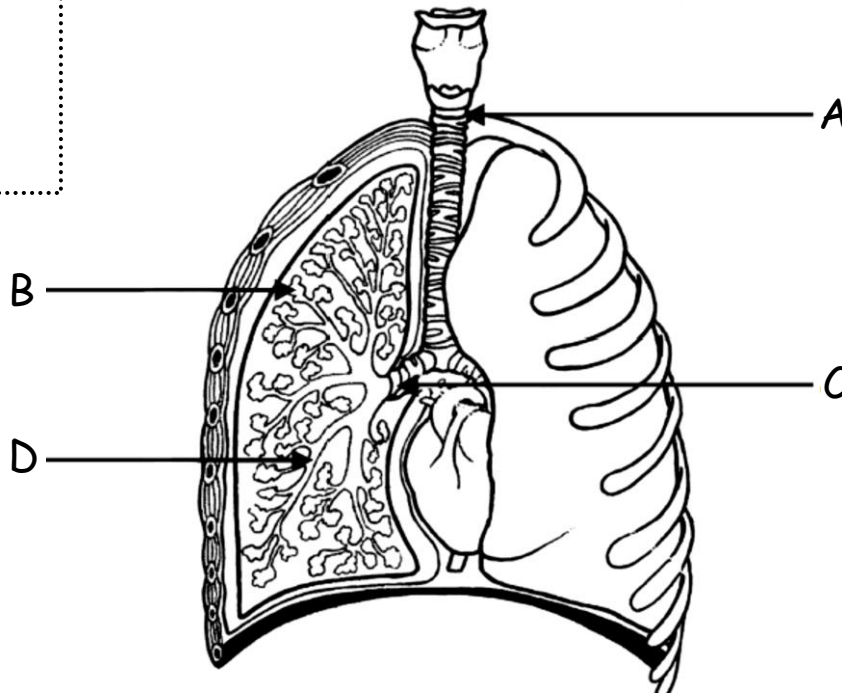
The liquid in the test tube is used to detect the gas produced during the reaction which releases energy from food.

- a. Name this gas.
- b. State the colour change that takes place in the liquid.

Human Body Systems 2 - Breathing

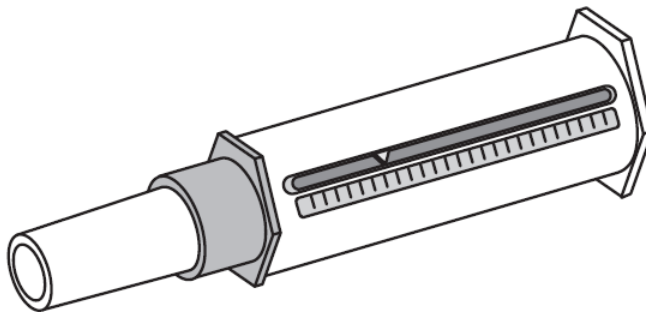
4. Using the diagram of the lungs below, match the words from the word box and the letters below:

Bronchiole
Bronchi
Windpipe
Air sac



5. Using the 4 words in the word box, state the pathway carbon dioxide takes as it leaves the lungs, ending with the mouth/nose.

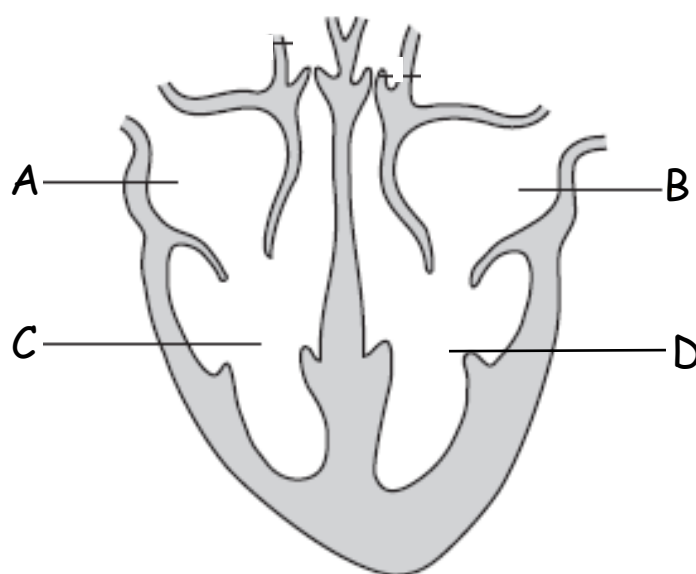
6. a Name the piece of equipment shown below



- b. What medical condition is this equipment used to detect?

Human Body Systems 3 - Circulation

1. a. Complete the diagram below by labelling the heart chambers.



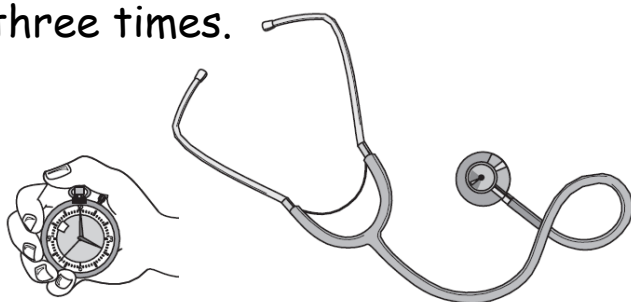
Left Atrium
Right Atrium
Left Ventricle
Right Ventricle

- b. In the diagram above the left side of the heart is thicker than the right. What is the reason for the difference in thickness?
2. Arteries and veins are both types of blood vessel. Copy the table below and join the two columns with 4 lines to show the correct function and a feature of each.

Type of Blood Vessel	Function / Feature
Artery	Carry blood away from the heart
	Have valves
Vein	A pulse can be felt
	Carry blood back to the heart.

- b. What do valves prevent?
- c. Name the other type of blood vessel found in the body.

3. a. During exercise, heart rate increases. What is the time it takes for heart rate to return to normal after exercise called?
- b. Apart from heart rate, what other rate returns to normal after exercise has stopped?
4. A pupil decided to measure their heart rate using a stethoscope and a stopwatch. To make his result more reliable he repeated the experiment three times.



His results are shown in the table below.

<i>Measurement</i>	<i>Number of beats in 60 Seconds</i>
1	63
2	63
3	72

Use this information to calculate his **average** pulse rate per minute.

Human Body Systems 4 - The Need for Food

3. Food is needed by the human body for a number of reasons.

In your jotter, match the food group on the left with the role it plays in the body on the right.

Food Group
Fat
Vitamins & Minerals
Protein
Carbohydrate

Role in the Body
Provides energy
Needed for growth & repair
Prevents against deficiency diseases

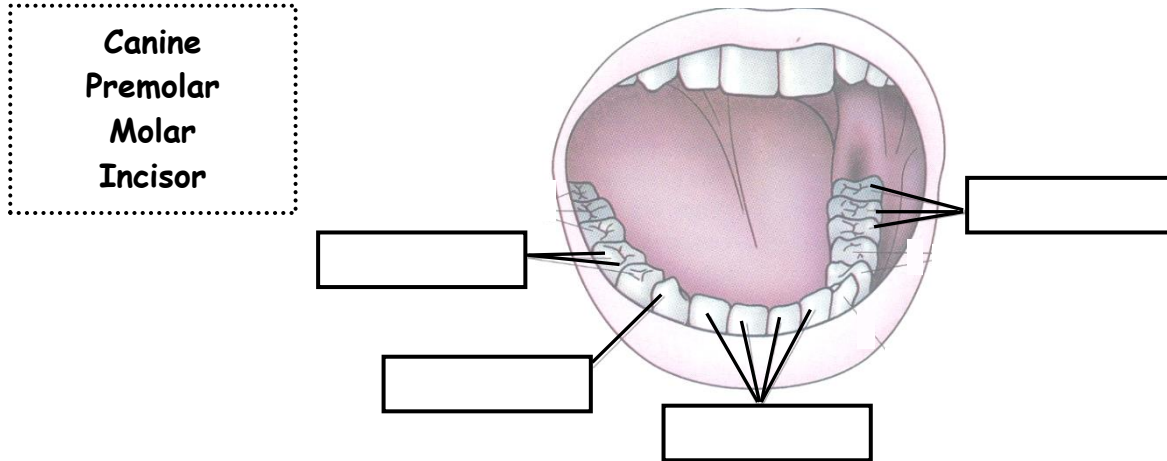
4. Tests can be performed to determine the type of food present in a sample. Copy and complete the sentences below using words from the grid below:

A. Benedict's reagent	B. Biuret reagent	C. Black
D. Violet	E. Fat	F. Starch

- a. When glucose is present _____ changes from a blue colour to brick red.
- b. When the test for protein is positive the reagent changes from blue to _____.
- c. A translucent spot appears on filter paper when _____ is rubbed on it.
5. Which of the three main food groups (carbohydrates, fats and proteins) provides the body with the highest volume of energy per gram?

Human Body Systems 5 - Digestion

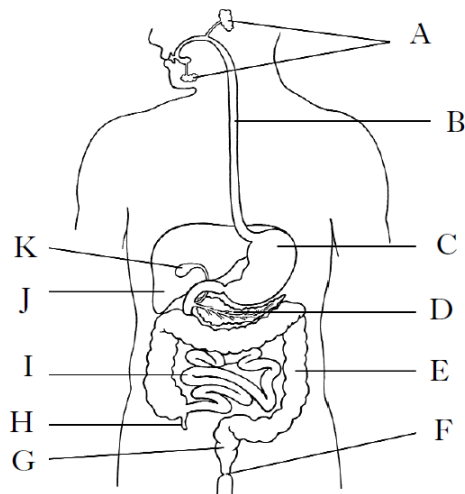
1. The mechanical breakdown of food starts in the mouth.
 - a. Label the diagram below to show the four types of teeth found in the human mouth.



- b. Which type of tooth is used for gripping food?
2. Copy and complete the sentence below to give the correct definition of term digestion.

Digestion is the break down of _____ insoluble molecules of food into _____ soluble molecules of food.

3. The diagram below shows the human digestive system.

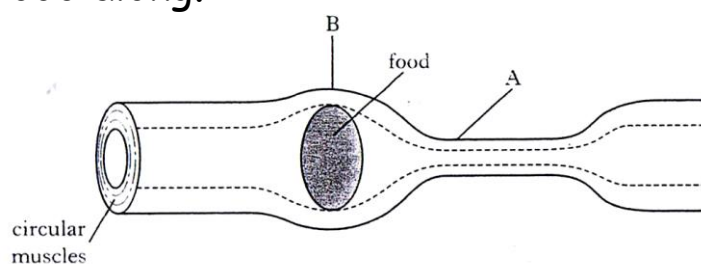


- a. Copy and complete the table to identify the following parts of the digestive system.

Part of Digestive System	Letter
Oesophagus	
Pancreas	
	K
	C

- b. What is the main function of part E of the diagram?

4. The diagram below shows the muscles in the gut wall contract (B) behind the food and relax (A) in front of the food, pushing the food along.

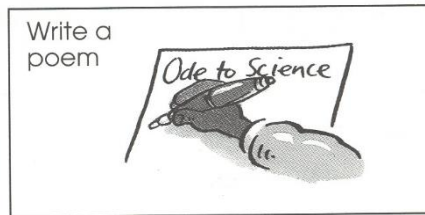
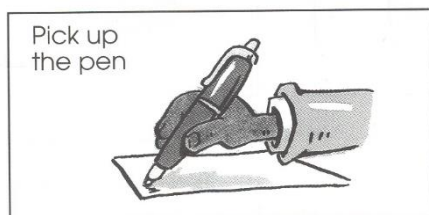
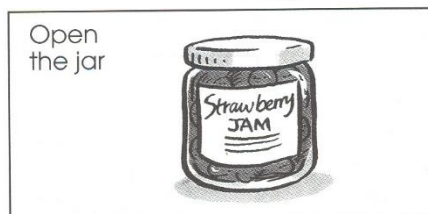


What name is given to this process?

5. The structure of the small intestine makes it very efficient at absorbing the products of digestion. Give two structural features of the small intestine, which aid its function.

Forces & Friction 1 - What is a Force?

1. Which forces are being used in each picture below (pushing, pulling or twisting)? Write each description in your jotter along with the force that is being used.

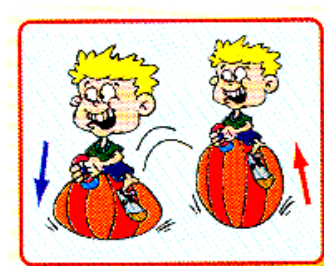
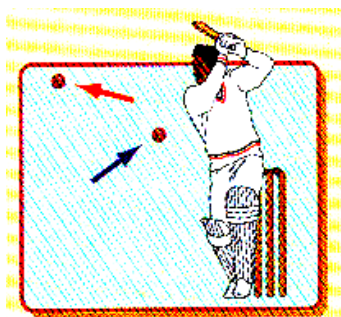


2. What is the size of a force measured in?
3. Name the piece of equipment that is used to measure the size of a force?
4. In your jotter, for each of the pictures, state what the force is doing to the object. Match each picture with each of the effects below.

CHANGE DIRECTION

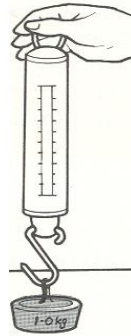
CHANGE SHAPE

CHANGE SPEED

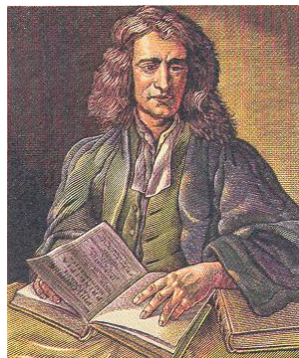


Forces & Friction 2 - What are Balanced Forces?

1. What is this piece of equipment?



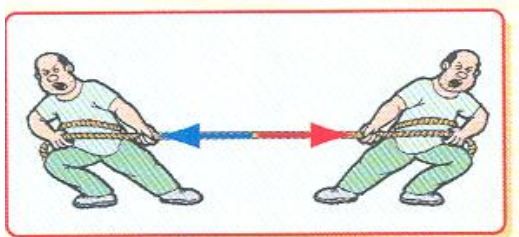
2. This is a famous scientist who discovered the 'laws of motion'. Who is he?



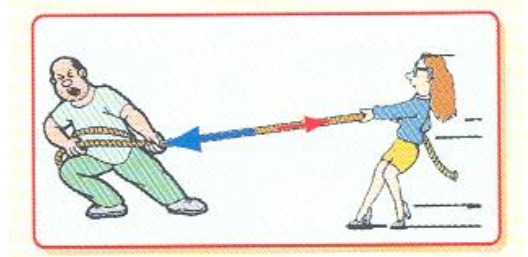
3. Describe the motion of an object if **balanced forces** act on it. There are two possibilities.

4. Which of the situations below show **balanced forces** acting on an object?

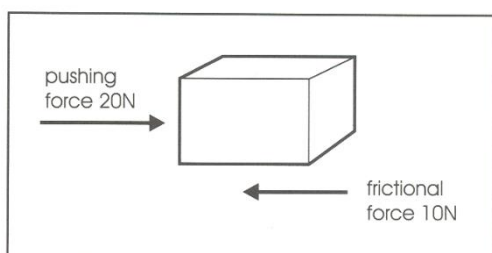
a.



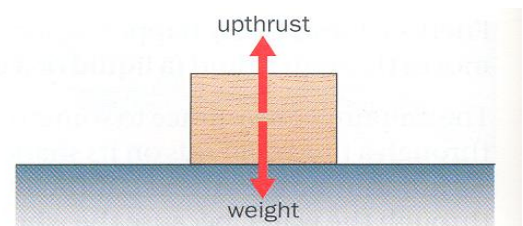
b.



c.



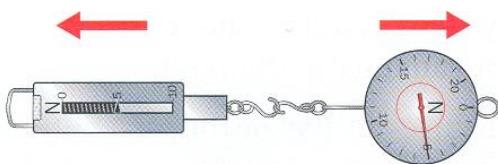
d.



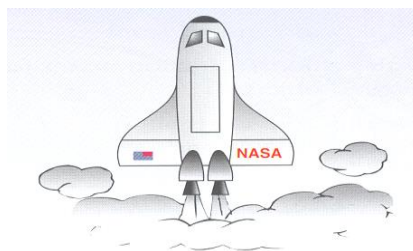
Forces & Friction 3 - What are Unbalanced Forces?

1. When **unbalanced forces** act on an object, what are the two possible outcomes in terms of motion.
2. In each of the situations below, state whether the forces acting on the object are balanced or unbalanced.

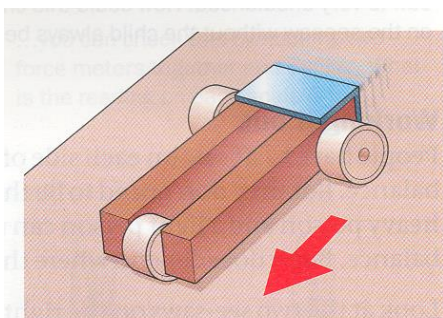
a.



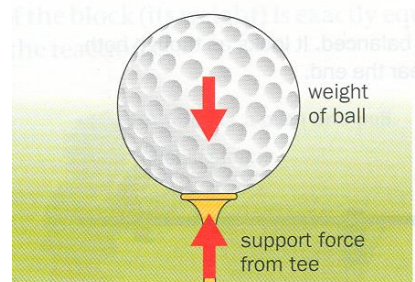
b.



c.

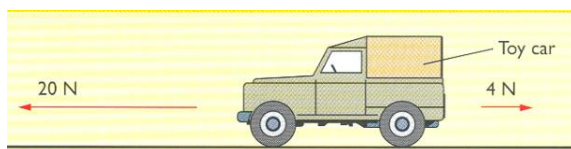


d.



3. Calculate the size of the unbalanced force acting on these objects. Also include the direction the object will move in due to the unbalanced force ('to the left' or 'to the right').

a.



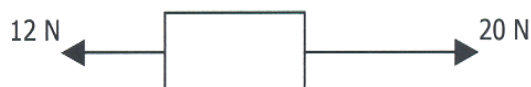
b.



c.



d.



Forces & Friction 4 - Mass, Weight & Gravity

1.
 - a. What is meant by the **mass** of an object?
 - b. What is the **mass** of an object measured in?
 - c. What piece of equipment would you use to measure the **mass** of an object?
2.
 - a. What is meant by the **weight** of an object?
 - b. What is the **weight** of an object measured in?
 - c. What piece of equipment would you use to measure the **weight** of an object?
3. A girl has a mass of 45kg on Earth. What will be her mass on the moon?

Forces & Friction 5 - Mass & Weight on Different Planets

1. Look at the table below showing how the gravitational field strength on some planets compares with the Earth.

	Moon	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus
mass compared with Earth	0.01	0.06	0.82	1	0.11	317.89	95.14	14.52
diameter (km)	3500	5000	12 000	12 750	7000	140 000	120 000	52 000
gravitational field compared with Earth	0.17	0.38	0.90	1	0.34	2.64	1.16	1.11

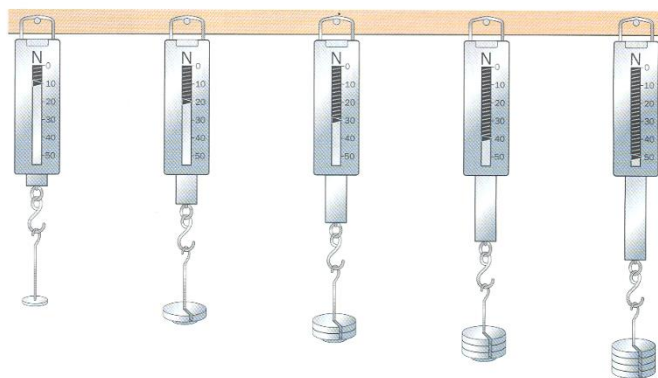
- a. What is the relationship between the mass of a planet and its gravitational field strength?

b. If the gravitational field strength on Earth is 10 Newtons per kilogram (N/kg), use the table above to calculate the gravitational field strength on the moon?

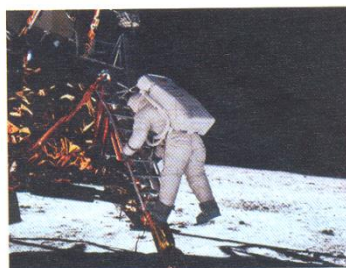
2. a. What is **gravity**?

b. Where on Earth does gravity pull an object towards?

3. What is the mass suspended from each of the Newton Balances.
(remember : **weight = 10 x mass**)



4. On the moon, the gravitational field strength is a sixth of that on Earth. Using this information, explain why the astronaut feels lighter and can jump higher on the moon.



5. The gravitational field strength on the moon is less than on Earth and on Jupiter it is more than on Earth. Using the words: 'increases', 'decreases' or 'stays the same', state what will happen to :

a. The **weight** of an object on :

(i) The Moon

(ii) Jupiter

b. The **mass** of an object on :

(i) The Moon

(ii) Jupiter

Forces & Friction 6 - Potential Energy

1. What is meant by the term **POTENTIAL ENERGY**?
2. What are the three main types of Potential Energy?
3. What type of potential energy does each of the following have?

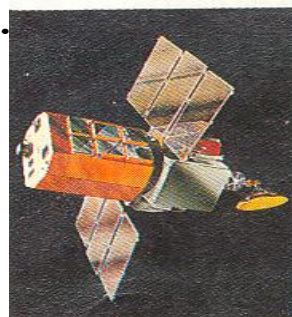
a.



b.



c.



d.



e.



f.



4. The **gravitational potential energy** an object has depends on 3 factors. One is the size of the force of gravity. What are the other two?
5. Food contains chemical potential energy. All food that we eat has to have a nutritional label like the one below. Look at the label for soup and answer the questions that follow.

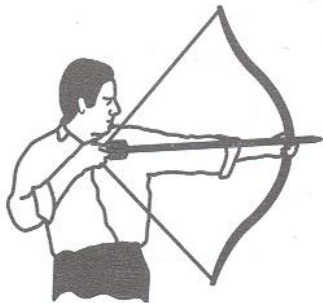
ENERGY INFORMATION	NUTRITION INFORMATION		
	Typical values	per serving	per 100g as served
	Energy	577kJ/138kcal	220kJ/53kcal
	Protein	1.8g	0.7g
	Carbohydrate	17.8g	6.8g
	of which sugars	3.6g	1.4g
	Fat	6.6g	2.5g
	of which saturates	3.4g	1.3g
	Fibre	2.6g	0.8g
	Sodium	0.52g	0.20g
	salt equivalent based on total sodium	1.30g	0.50g

- a. What is chemical potential energy measured in?
- b. What does the chemical potential energy of a substance depend on?

6. A boy of mass 50kg gains 1000 Joules of gravitational potential energy when he climbs a set of stairs 2m high.



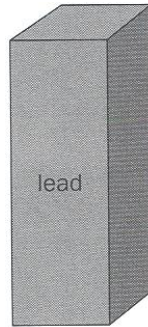
- a. What could the boy do to gain 2000 Joules of gravitational potential energy? *(there is more than one correct answer)*
- b. If 100g of Smarties contains 100 Joules of chemical potential energy, how much would he have to eat to get enough energy to climb the stairs?
7. When the man lets go of the arrow, what type of energy does the elastic potential energy change into?



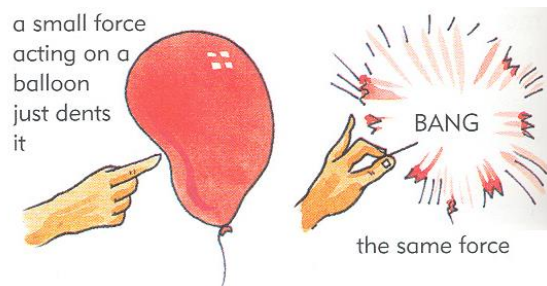
HINT : What does the arrow do?

Forces & Friction 7 - Pressure

1. What two pieces of information would you need to calculate the pressure this box exerts on the floor?



2. What is pressure measured in?
3. Look at the pictures of the balloons below. Why does this happen? You must use the words pressure, area and force.



4. Explain why the foot with the ski on does not sink into the snow but the one with just the boot does.



5. Using the words below, copy and complete the following passage about pressure.

metre squared pascals newtons pressure area force

If you spread a force out over a large area you get a smaller _____. To get a large pressure you need a large _____ acting on a small _____. Pressure is measured in _____ per _____ (N/m^2). These units are also called _____ (Pa).

6. To calculate pressure, we can use the following equation :

$$\text{pressure} = \frac{\text{force}}{\text{area}} \quad \left(\begin{array}{l} \text{On your calculator:} \\ \text{pressure} = \text{force} \div \text{area} \end{array} \right)$$

Use the equation to find the pressure exerted by these objects

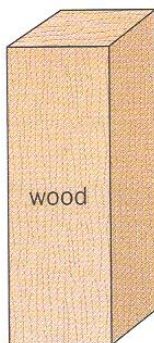
a.



weight (force) = 220N

Area = 3m^2

b.



weight (force) = 110N

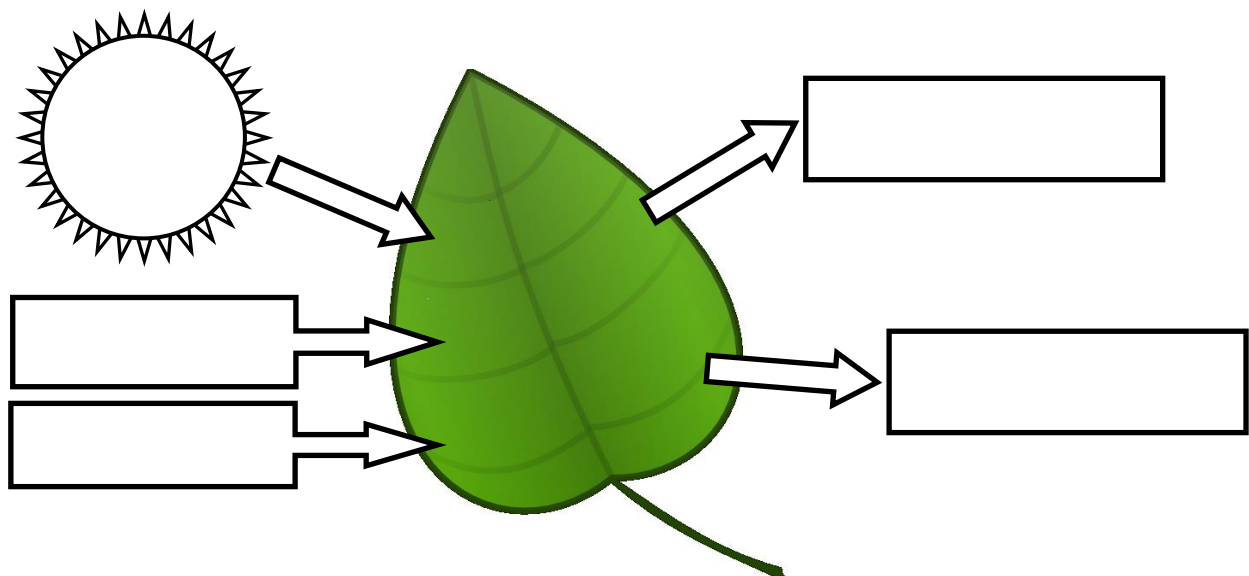
Area = 3m^2

Biosphere 1: Photosynthesis

1. Copy and complete the following sentence in your jotter:

Plants need L----, C----- D----- and W---- for Photosynthesis.

2. What is the name of the chemical in the leaves of green plants that is used to trap the sunlight during photosynthesis?
3. Name the gas produced by green plants during photosynthesis and describe how we can test this gas to find out what it is.
4. Name the food that is stored by green plants after photosynthesis and describe how to test the food to find out what it is.
5. Copy and complete the digram below into your jotter to show the raw materials and products of photosynthesis:



Biosphere 2: Photosynthesis (continued)

Graph paper is required for this exercise

1. Copy and complete the two processes show below that show photosynthesis in plants and aerobic respiration in animals:

Photosynthesis

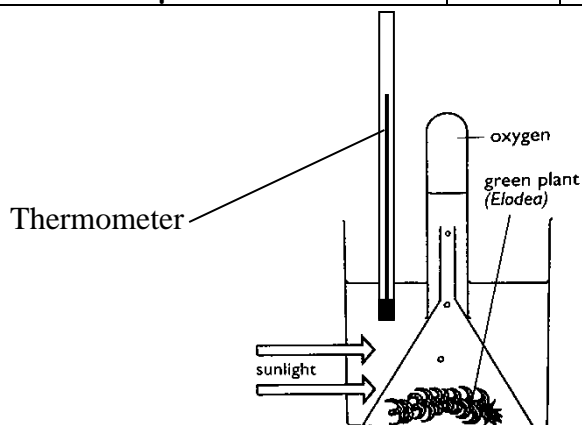
Water + _____ \longrightarrow _____ + Oxygen

Aerobic Respiration

_____ + Oxygen \longrightarrow _____ + _____

2. The results of the experiment to show how the rate of photosynthesis is affected by temperature are shown in the table below.

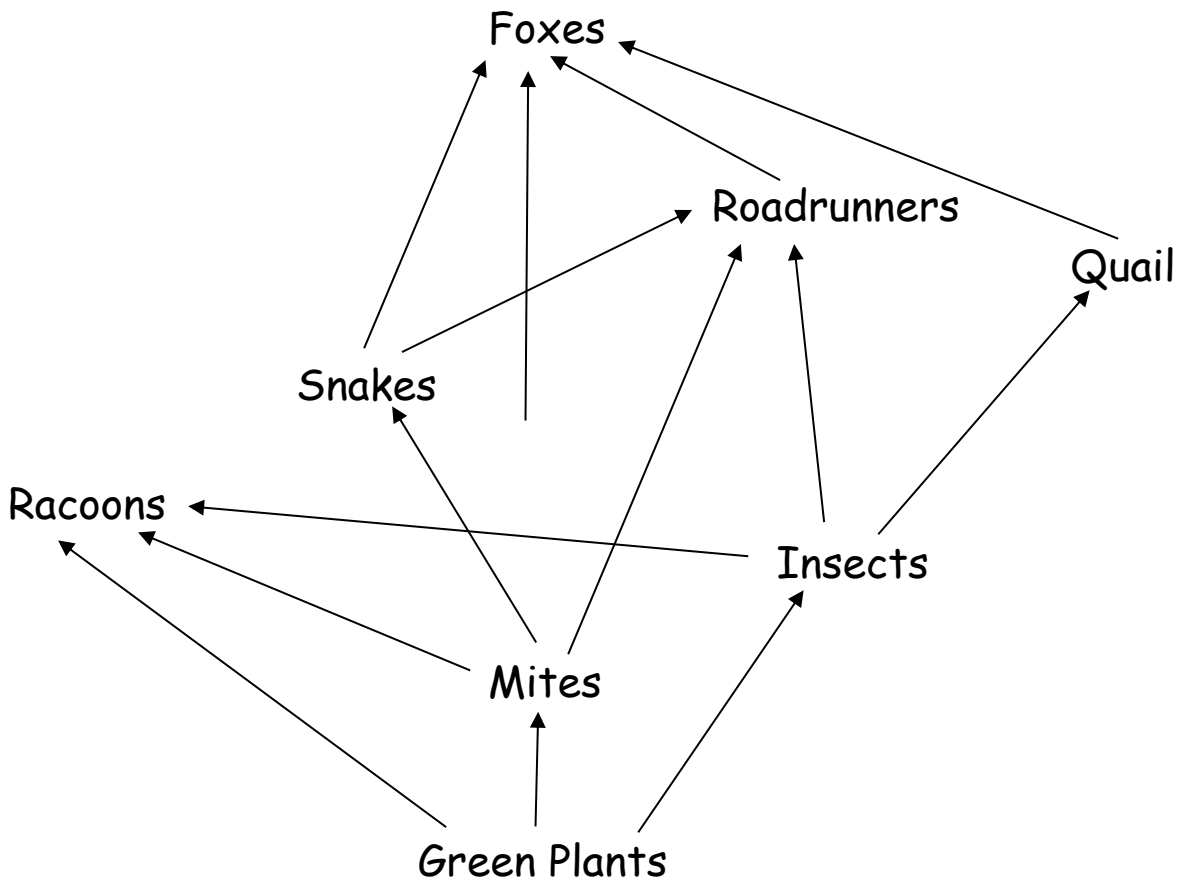
Temperature (°C)	0	10	20	30	40	50
Number of bubbles per minute	2	15	30	30	12	8



- a. Draw a line graph in your jotter to show the results of the experiment.
- b. From your graph suggest what the ideal temperature would be.
- c. Suggest what result you would get if the temperature was 60 degrees.

Biosphere 3 - Energy Flow and Pyramids

1. (a) The diagram below shows part of a woodland food web.

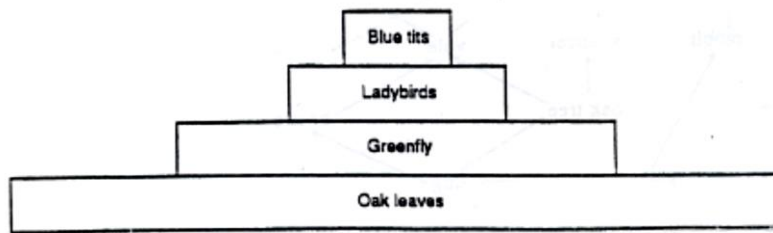


- (i) Name the **producer** shown in the diagram.
 - (ii) Identify the **omnivore** in the above food web.
 - (iii) What do the **arrows** in a food chain represent?
 - (iv) From the above food web extract a **food chain** that contains 3 organisms.
- (b) Mice obtain energy from the food they eat. Some of this food is used for **growth**. State **two other ways** in which mice use this energy.

(c) Competition occurs when different organisms have a need for the same food source. Describe one example of competition between two organisms in the food web above.

(d) Plants will compete with each other for light. Name one other factor plants compete for.

2. The pyramid of biomass refers to part of a food chain in an oak tree



(i) Explain what the pyramid tells us about the populations in the food chain.

(ii) Describe one possible effect of the removal of the ladybirds from the food chain.

Biosphere 4 - Measuring Abiotic Factors

1. Draw and name the piece of equipment used to measure **light intensity**, describe how it is used and describe how errors are avoided.

2. Draw and name the piece of equipment used to measure **soil moisture**, describe how it is used and describe how errors are avoided.

3. Draw and name the piece of equipment used to measure **soil temperature**, describe how it is used and describe how errors are avoided.

Biosphere 5 - Sampling Techniques

1. What is the word used to describe where an animal lives?
2. Using a named example of a place where an animal lives, give three features of it and name an organism that lives there.
3. A quadrat can be used to sample plants in an area. Give 2 rules for using a quadrat.
4. A pitfall trap can be used to sample small animals that live on the ground. Give 2 rules for using a pitfall trap.
6. A pupil sets up a pitfall trap and empties it three days later. He finds only 1 large beetle. What might have happened?

Biosphere 6 - Biological Keys

4. (a) The table below shows some features of five British butterflies.

<i>Butterfly species</i>	<i>Wing shading</i>	<i>Wing tip</i>	<i>Wing spots</i>
Large White	pale	black	yes
Orange Tip	pale	orange	no
Peacock	dark	blue	yes
Red Admiral	dark	white	yes
Wood White	pale	black	no

Use the table to complete the paired statement key below in your jotter:

- 1 Pale wing shading go to 2

Dark wing shading

A

2

B

C

Orange wing tip **Orange Tip**

3. Spots on wings **Large White**

No spots on wings

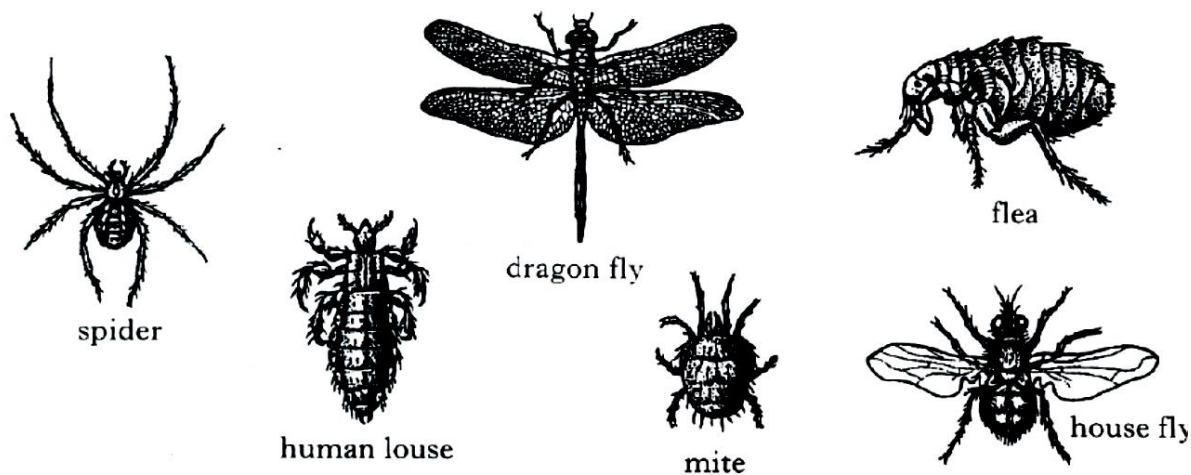
D

4. Blue wing tip **Peacock**

E

F

3.(a) Use the information from the diagrams of invertebrates to complete the following paired statement key (letters A,B,C and D)



- 1 Wings present Go to A
 Wings absent Go to 3

- 2 One pair of wings house fly
 B dragon fly

- 3 Four pairs of legs Go to 4
 Three pairs of legs Go to 5

- 4 Body clearly divided into two parts C
 Body not clearly divided into two parts D

- 5 Hooked claw on legs human louse
 No claw on legs flea

(b) Give two features mentioned in the key which the human louse and the flea have in common.

Dear Parent / Guardian,

Homework is an important part of your child's education in science.

It helps improve understanding of the topics covered, as well as preparing them for assessments.

It also allows you to engage with your child and see what work they are covering in class.

The science department would really appreciate your support in ensuring your child completes homework to the best of his/her abilities.

Please sign homework exercises to confirm you have seen the work is complete.

Feel free to write any comments or questions in the jotter too.

Thank you,

The Science Department
Braidhurst High School