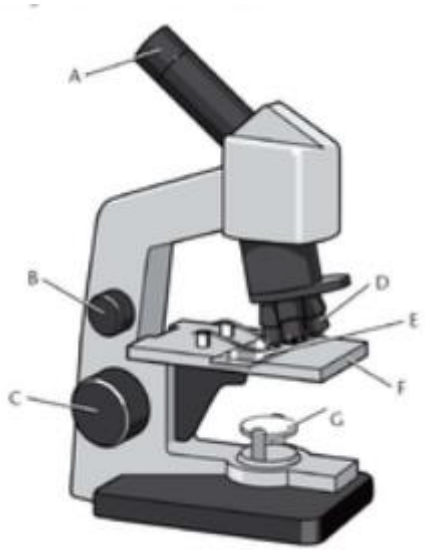
Revision Placemats
CE13+ Science

Cells and organisation

Draw an animal cell and label the 4 organelles.

Draw a plant cell and label the 7 organelles.

Label the diagram of the light microscope:



What are the functions of the following:
(Underline the organelles only found in plants)

Chloroplasts

Nucleus

Mitochondria

Cell wall

Vacuole

Cell membrane

Cytoplasm

Which organelle, usually found in plant cells, would you not expect to see in an onion skin cell (or a root hair cell)?

_____

Why?

_____

Write a method for preparing a microscope slide for observing onion cells. You should include a stain.

_____

_____

_____

_____

_____

_____

_____

What is a stain used for?

_____

_____

_____

Which stain is commonly used for animal cells?

_____

Which stain is commonly used for plant cells?

_____

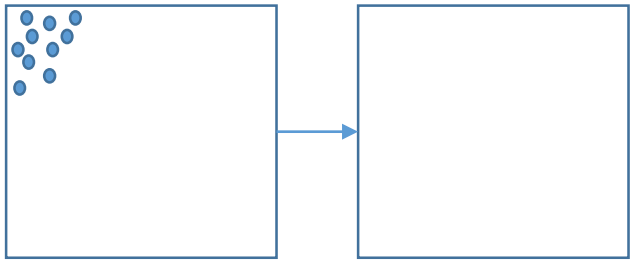
What is the definition for diffusion?

_____

_____

_____

Complete the diagram below to show diffusion taking place.



Explain why only fluids can diffuse.

_____

_____

Which substances would you expect to diffuse into a cell?

1. _____

2. _____

Which substances would you expect to diffuse out of a cell?

1. _____

2. _____

Write a definition for each of the words below and give an example:

Tissue

Example:

Organ

Example in animals:
Example in plants:

Organ system

Example in animals:
Example in plants:

Organism

Example:

Complete each word to give the seven characteristics of life:

M
R
S
G
R
E
N

Gas exchange system

Put these stages in order:

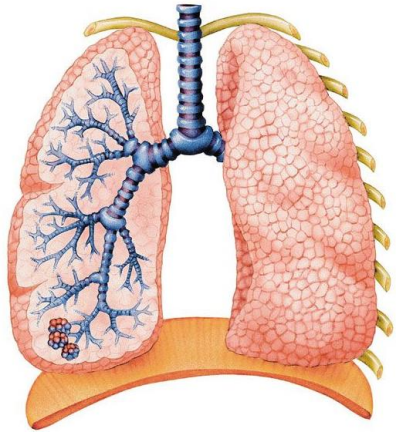
- [1] Air is inhaled through the mouth and nose and enters the lungs
- [ ] Oxygen is transported in the bloodstream to respiring cells
- [ ] Carbon dioxide diffuses out of respiring cells into the bloodstream
- [ ] Oxygen diffuses through the alveoli into the bloodstream
- [ ] Oxygen is used in aerobic respiration
- [ ] Carbon dioxide diffuses out of the bloodstream into the alveoli and is exhaled
- [ ] Oxygen diffuses out of the bloodstream into respiring cells
- [ ] Carbon dioxide is transported in the bloodstream to the lungs

What is the difference between breathing and respiration?

Breathing:

Respiration:

Label the diagram below using these words:
Alveoli, trachea, bronchioles, intercostal muscles, right bronchus, ribs, diaphragm



Complete the sentences by filling in the gaps:

When we breathe in, the diaphragm _____ and moves _____.

This _____ the pressure in the chest, causing air to be drawn into the lungs.

The intercostal muscles also _____, causing the ribs to move _____ and _____.

This is important, as the lungs need _____ space when they are inflated.

By what process do gases pass through the walls of the alveoli? _____

Oxygen moves from the _____ to the _____.

Carbon dioxide moves from the _____ to the _____.

What are three ways in which the lungs are adapted for efficient gas exchange?

1. _____

   _____

   _____

2. _____

   _____

   _____

3. _____

   _____

   _____

Write a method for measuring vital capacity.

_____

_____

_____

_____

_____

_____

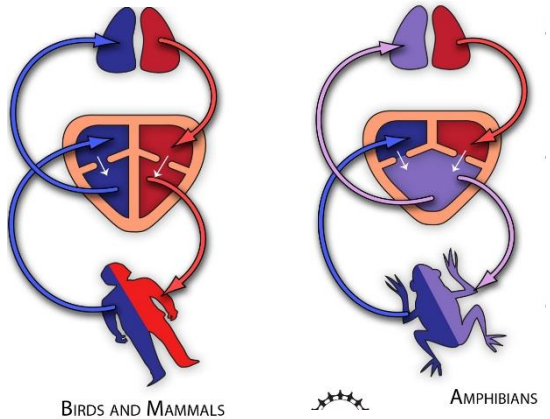
_____

From which type of tissue is the heart mostly made? _____

What is the name for the type of blood vessel which transports blood away from the heart? _____

What is the name for the type of blood vessel which transports blood towards the heart? _____

This is a simple diagram of the heart in mammals, and in amphibians:



What is the difference between the blood in the right side of the heart, and the left side of the heart in mammals?

_____

_____

_____

A frog's heart allows blood on the left and right side to mix. Why is this less efficient that a human heart?

_____

_____

_____

_____

Which three harmful chemicals can be found in cigarette smoke?

1.
Harmful because…

2.
Harmful because…

3.
Harmful because…

Underline the false statements **and** edit them to make the statement true.

During exercise…

…the heart rate increases

…more oxygen is required for anaerobic respiration

…breathing rate decreases

Following exercise…

…the heart rate returns to zero

…we continue to breathe heavily to repay an oxygen debt

Respiration

Write the word equation for aerobic respiration in animals.

Write the equation for anaerobic respiration in animals.

Explain why, after strenuous exercise, a person's heart rate remains high. You should include a chemical equation in your answer.

_____

_____

_____

_____

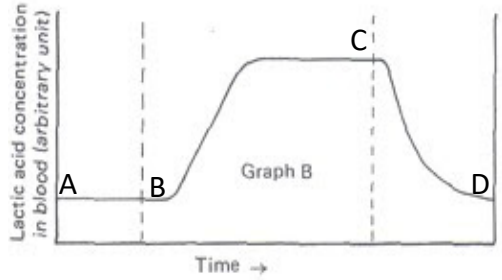
_____

In which organelle does aerobic respiration take place?

In which organelle does anaerobic respiration take place?

Which type of respiration releases more energy from glucose?

Explain the shape of the graph for this 100 m runner. Suggest what the athlete may be doing at each point.



_____

_____

_____

_____

_____

Complete the table below comparing aerobic and anaerobic respiration in animals.

Similarities	Differences

What is the chemical test for carbon dioxide?

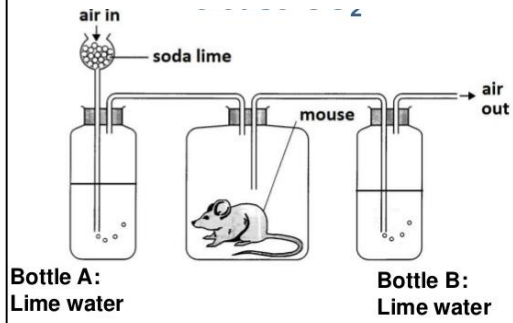
Test: _____

_____

Result: _____

_____

Explain what will happen to the limewater in Bottle A and Bottle B.



Bottle A: _____

_____

_____

Bottle B: _____

_____

_____

Write the word equation for anaerobic respiration in yeast (and other fungi).

What are two uses for yeast?

1.

2.

Explain why adding yeast to bread dough causes it to rise.

_____

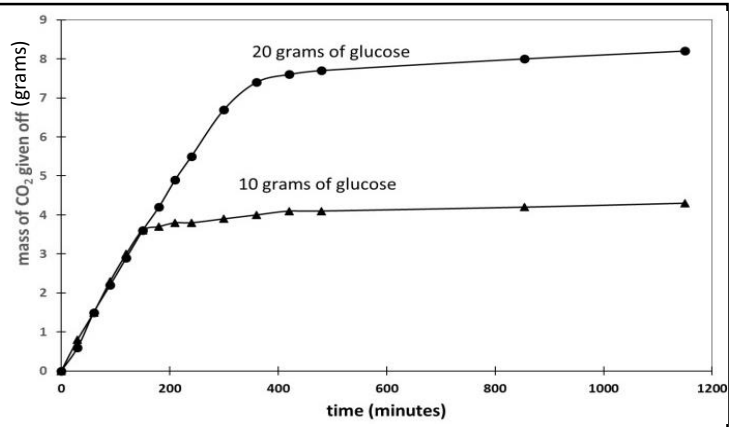
_____

_____

_____

A group of students investigated how the mass of glucose added to some yeast affected the mass of carbon dioxide which was given off.

Use the graph on the right to answer these questions:



Independent variable

_____

Dependent variable

_____

Control variables

_____

_____

_____

Describe the difference between the lines.
Why did both lines reach a maximum?

_____

_____

_____

_____

Write a method to investigate how temperature affects the rate of respiration in yeast.

Equipment:

- Gas syringe
- Stop clock
- Water baths
- Yeast
- Glucose solution
- Conical flask
- Balance
- Measuring cylinder

_____

_____

_____

_____

_____

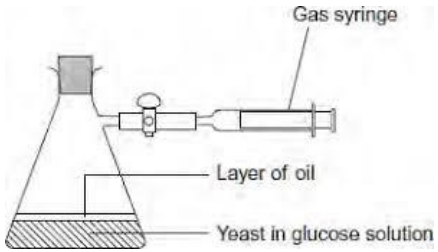
_____

_____

How could you improve the reliability of your investigation?

_____

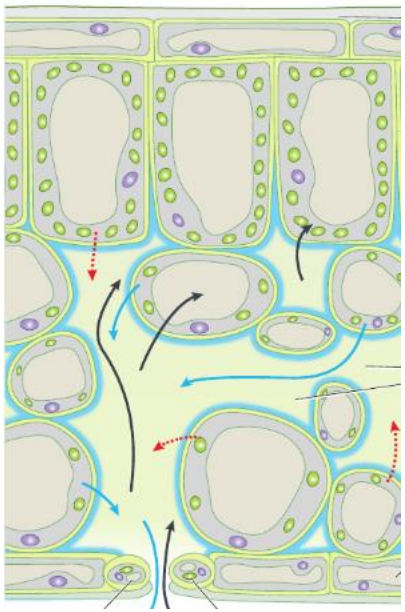
_____



Photosynthesis

Write the word equation for photosynthesis

Label the diagram of the leaf using the labels in the next question.



Describe the function of each part of the leaf:

Spongy mesophyll: _____

_____

Waxy cuticle: _____

_____

Palisade cells: _____

_____

Guard cells: _____

_____

Stomata: _____

_____

Upper/lower epidermis: _____

_____

Explain how the large surface area of leaves makes them well adapted to photosynthesising.

_____

_____

Explain why thin leaves allow more efficient photosynthesis.

_____

_____

In which organelle does photosynthesis take place?

_____

At what time of the day are stomata most likely to be open/closed? Why?

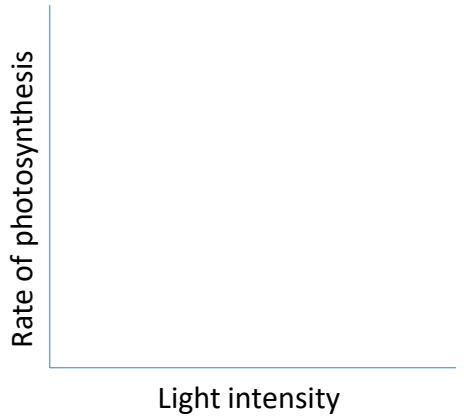
_____

_____

Which 3 factors are most likely to limit the rate of photosynthesis?

-
-
-

Sketch a graph to show the relationship between distance (from light source) and rate of photosynthesis



What is the name of the green pigment which absorbs light?

_____

Write a method to investigate how the rate of photosynthesis is affected by light intensity.

_____

_____

_____

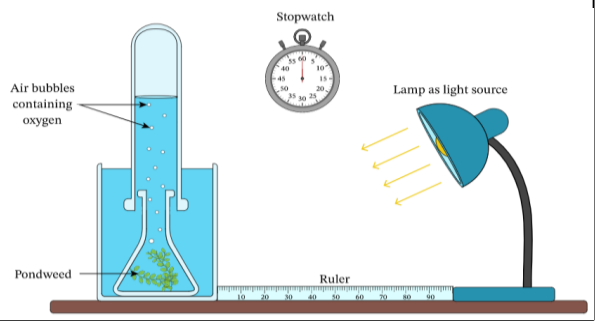
_____

_____

_____

_____

_____



What must be kept the same during the investigation?

- _____

- _____

- _____

How could the investigation be made more reliable?

_____

_____

What is a better method of measuring the amount of oxygen produced?

_____

Write a method to describe how a leaf can be tested for starch.

_____

_____

_____

_____

_____

_____

_____

This method is repeated using a leaf which has been wrapped in tin foil for 72 hours. What would you expect to see?

_____

_____

What is the role of the xylem in plants?

_____

What is the role of the phloem in plants?

_____

Why is photosynthesis important for life on Earth?

1. _____

_____

2. _____

_____

3. _____

_____

What are two mineral ions required by plants?

1. _____

Used for…

2. _____

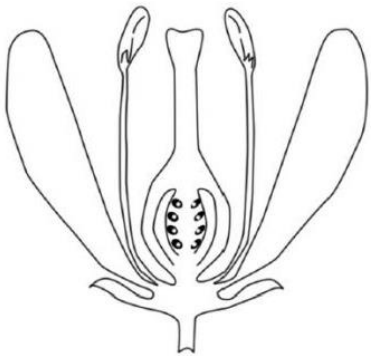
Used for…

Reproduction in plants

Put these stages for reproduction in plants in order:

- ☐ Fertilisation
- ☐ Germination
- ☐ Growth
- ☐ Pollination
- ☐ Dispersal

Label each part of the flower using the following words:
Sepal, anther, stigma, style, ovary, filament, petal, ovule



Which two parts make up the male part of the flower? _____

Which four parts make up the female part of the flower? _____

_____

What is the difference between pollination and fertilisation?

Pollination: _____

_____

_____

Fertilisation: _____

_____

_____

Suggest two methods of pollination:

1. _____
2. _____

Suggest two ways in which flowers pollinated by bees have adapted.

1. _____

_____

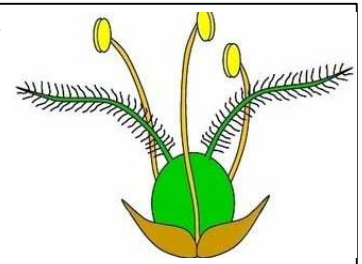
2. _____

_____

Why do wind pollinated flowers not grow in forests?

_____

Explain whether this flower is likely to be insect or wind pollinated.



_____

_____

_____

_____

_____

What is the name of the male gamete in plants? _____

Where is this produced? _____

What is the name of the female gamete in plants? _____

Where are these produced? _____

What must happen after pollination for fertilisation to occur?

_____

_____

_____

Why is seed dispersal important?

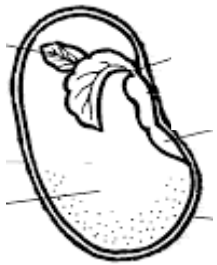
_____

_____

Suggest three methods of seed dispersal.

1. _____
2. _____
3. _____

Label each part of the germinating seed using the following labels:
Seed coat, embryo root, embryo shoot, food store



Which three things are required by germinating seeds?

1. _____
2. _____
3. _____

Seeds are stored inside fruit. Explain why they need a hard coat, and how this helps with seed dispersal.

_____

_____

_____

_____

_____

_____

Why do germinating seeds require a food store?

_____

_____

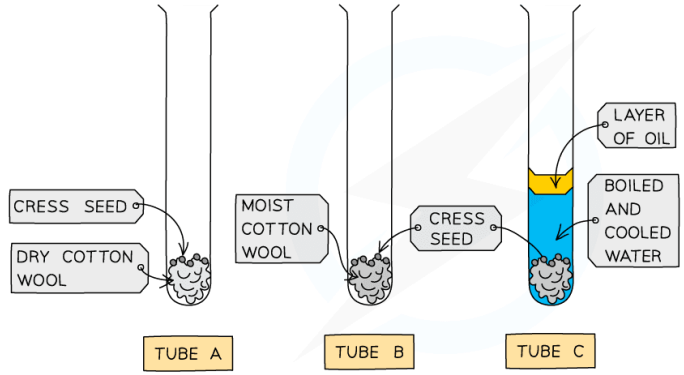
_____

What happens after the food store has been used up?

_____

_____

_____



Explain which of these seeds you would expect to germinate and which you would not expect to germinate.

_____

_____

_____

_____

_____

_____

_____

_____

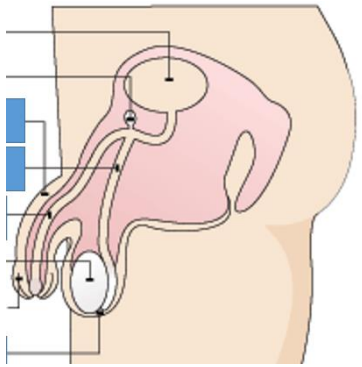
_____

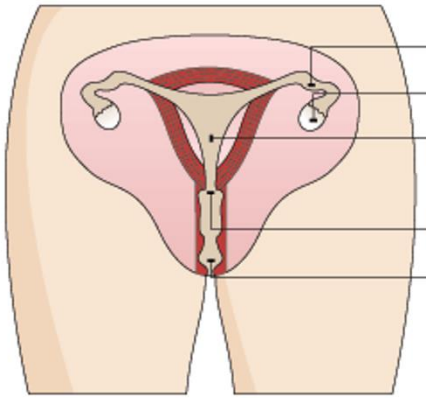
_____

_____

Reproduction in animals

Add labels to the diagrams below





What is the definition for the term ‘gamete’?

What is the male gamete in mammals?

What is the female gamete in mammals?

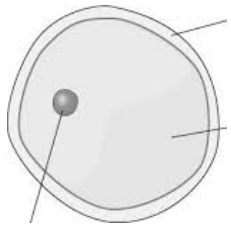
What is the definition for the term ‘fertilisation’?

What is the definition for the term ‘zygote’?

Which is bigger, a sperm cell or an egg cell?

What is special about the nucleus in gametes?

Write down three adaptations of sperm cells and egg cells.



1. _____

_____

2. _____

_____

3. _____

1. _____

_____

2. _____

3. _____

Put the stages of the menstrual cycle in order. Complete the final stage yourself.

1	The lining of the uterus breaks down
	The egg travels down the oviduct towards the uterus
	On day 14, the egg is released
	An egg starts to develop and mature inside one of the ovaries and the lining of the uterus starts to build up
5	If the egg is fertilised… _____ _____ _____ _____
5	If the egg is not fertilised… _____ _____ _____ _____

Approximately how long is the gestation period in humans? _____ weeks

Animal	Gestation period (days)
Dog	61
Hamster	20
Elephant	645
Cow	286
Lion	108

What can you infer from this data about the gestation period of different mammals?

_____

_____

_____

Which substances are transported from the mother to the fetus?

1. _____
2. _____
3. _____

Which substance is transported from the fetus to the mother?

_____

By what process does the transfer of substances between the mother and fetus take place?

_____

Suggest 2 chemicals which may be harmful to the development of the fetus.

1. _____
2. _____

Describe how one of these substances may reach the fetus. Use the diagram on the right to help you.

_____

_____

_____

_____

_____

_____

_____

Which of these changes happens during puberty in boys? Which happens in girls?
Put a 'B' for boys and 'G' for girls.

Ovaries start to develop and release eggs

Voice deepens

Hips widen

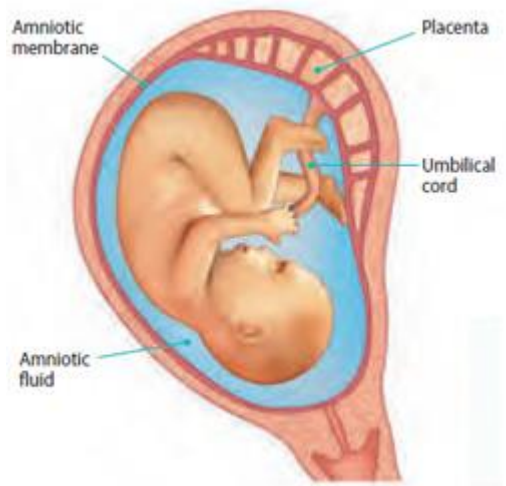
Breasts develop

Shoulders broaden

Hair starts to grow on body

Testes start to produce sperm

Sudden increase in height



Diet and nutrition

State the function of each nutrient (or food group) in the body:

Carbohydrates

Proteins

Fats (lipids)

Fibre

Water

Vitamin C (a vitamin)

Calcium (a mineral)

What are the two main types of carbohydrate?

1. _____

2. _____

Starter:
Carrot and coriander soup with buttered bread
Main:
Sausage and mashed potato with peas
Dessert:
Lemon meringue pie with ice-cream

In the menu above, which foods are a good source of:

Carbohydrate

Protein

Fat (lipids)

Fibre

Water

Vitamin C

Calcium

Why would a pregnant woman need to eat lots of protein?

_____

_____

_____

Why would a marathon runner eat pasta before a race and jelly-babies during the race?

_____

_____

_____

_____

Which disease is caused by a lack of vitamin C?

Which disease is caused by a lack of calcium?

Describe the food test for starch:

Test:

Result:

Describe the food test for glucose:

Test:

Result:

Write a method to determine which food stores the most energy.
Equipment:
- Various foods
- Tongs
- Bunsen burner
- Thermometer
- Test tube
- Measuring cylinder

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

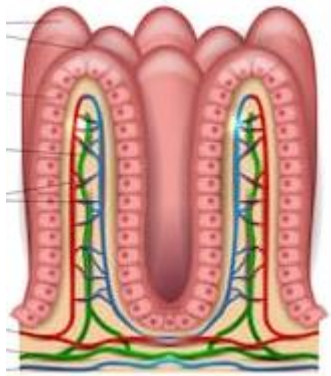
_____

_____

Match each organ with its function:

Mouth	Stores feces before it is egested
Small intestine	Contains acid which kills bacteria and helps to break down food. Made of muscle to mechanically break down food.
Stomach	Removes excess water from food
Esophagus	Transports food from the mouth to the stomach
Rectum	Nutrients pass through the villi into the bloodstream, by diffusion.
Large intestine	Egests food
Anus	Contains teeth which mechanically break down food. Contains enzymes which chemically break down food.

The wall of the small intestine is lined with 'finger-like' projections called villi. What are three adaptations of the villi which allow nutrients to diffusion quickly into the bloodstream?



1. _____

_____

2. _____

_____

3. _____

_____

What is the name of the enzyme found in the mouth which breaks down starch?

Health and the skeleton

What are the three roles of the skeleton?

-
-
-

Which words is used to describe…

- Two muscles working in opposing pairs?

_____

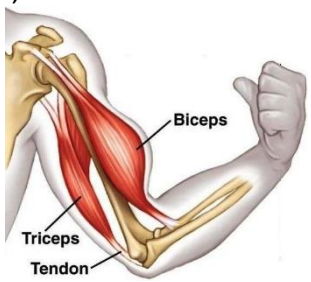
- The shortening of muscle fibres?

_____

- The lengthening of muscle fibres?

_____

Explain, using the diagram, how we bend and straighten our arm.



_____

_____

_____

_____

_____

_____

What are the four types of pathogen (disease causing organisms)?

-
-
-
-

Give two examples of diseases caused by viruses:

-
-

Give two examples of diseases caused by bacteria:

-
-

Why can antibiotics not be used to treat the flu?

_____

_____

_____

What is the function of white blood cells?

_____

_____

Use the graph at the bottom to explain why we cannot catch the same disease twice.

_____

_____

_____

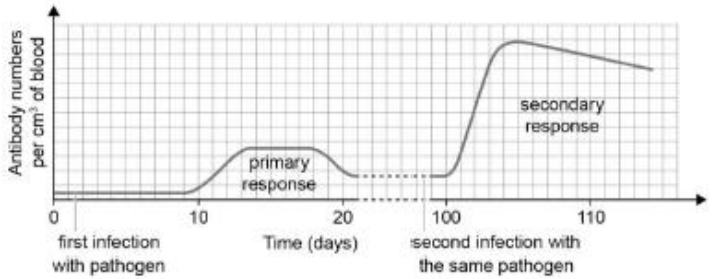
_____

_____

_____

_____

_____



What are three diseases which can be caused by smoking?

-
-
-

Which organs are most affected by drinking alcohol?

-
-

Which diseases can be caused by a lack of exercise and eating too much fat/sugar?

-
-

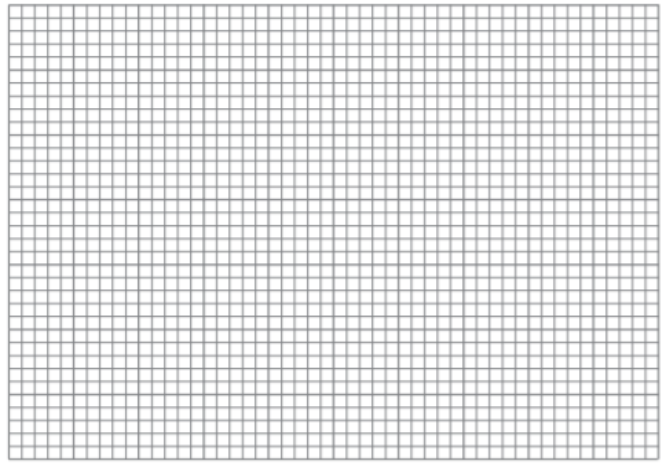
Number of cigarettes smoked per day	Number of bronchitis cases per 100,000 people
1-5	5
6-10	11
11-15	17
16-20	31
21-25	32

MRSA is a disease which is caused by a bacterium. It spreads quickly in hospitals when people are close to each other and when they touch infected surfaces.

Month	Number of MRSA cases reported
November 2015	65
December 2015	68
January 2016	73
February 2016	56
March 2016	48
April 2016	35
Total	

Calculate the total number of cases during this time period.

Plot a **bar** graph of the data on the left.



Describe the patterns shown in the data from November 2015 to April 2016.

_____

_____

_____

_____

_____

Suggest an explanation for the pattern shown in the data.

_____

_____

_____

_____

_____

What could be done to limit the spread of MRSA?

-
-
-

Relationships in an ecosystem

Suggest 3 resources that plants need to survive;

-
-
-

What is the definition for a…

Habitat

_____

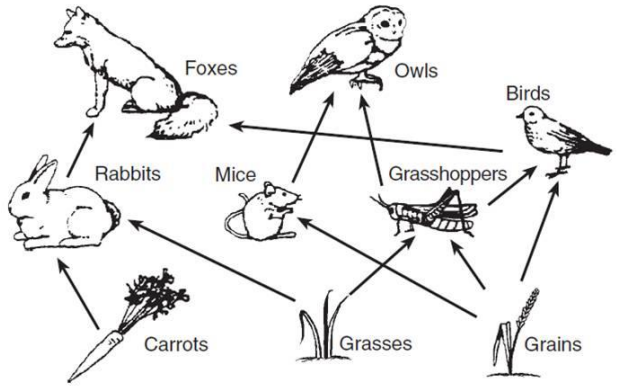
_____

Species

_____

_____

Draw a food chain which includes:
A hawk, a mouse, a snake, grains



(Not drawn to scale)

What is the impact on the food web of a disease killing all of the birds?

Where does all of the energy is a food chain ultimately come from?

Which of the organisms in the food web is a producer?

Which of the organisms in the food web is a predator?

Suggest 3 factors which may affect the population of tuna in the sea:

-
-
-

In a food chain, not all of the energy is transferred from organism to organism. What are some of the sources of energy loss?

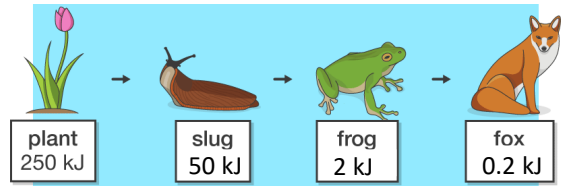
-
-
-
-

Calculate the percentage energy transfer at each stage in the food chain.

Plant → slug:

Slug → frog:

Frog → fox:



How might the introduction of wolves (carnivores) to an ecosystem also affect the population of some plant species?

_____

_____

_____

_____

_____

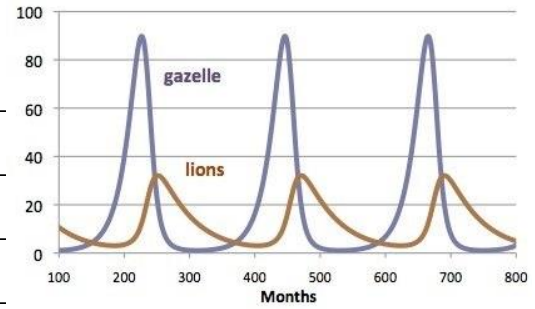
Explain the shape of the graph on the right.

_____

_____

_____

_____



What is conservation?

_____

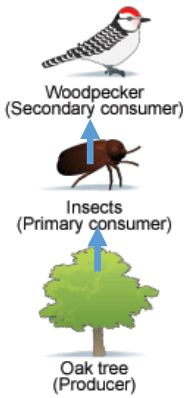
Suggest 2 conservation activities that humans could do to increase biodiversity

-
-

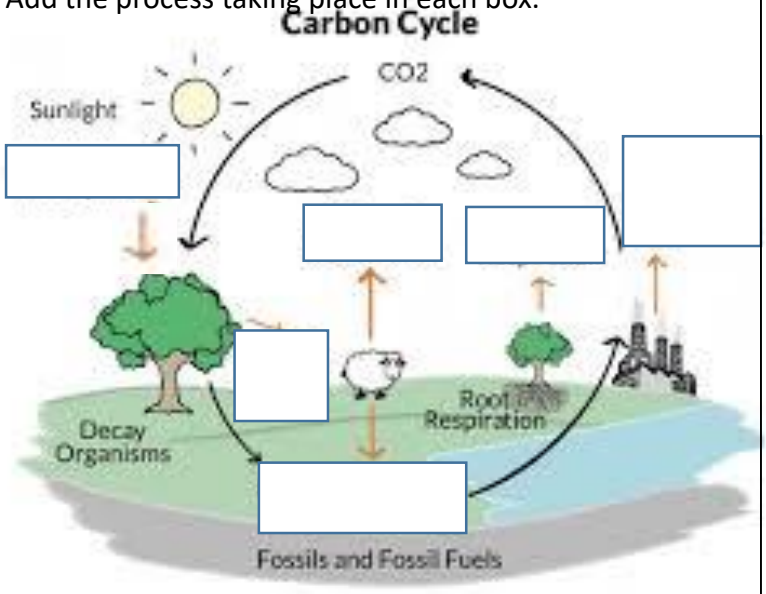
Maria collected the following data by randomly placing a 1 m^2 quadrat it a 50 m x 60 m field. Calculate an estimate for the total number of flowers in the field.

Trial number	Number of flowers
1	10
2	4
3	11
4	7
5	6
6	9

Draw a pyramid of numbers for this food chain:



Add the process taking place in each box.



Variation, classification and inheritance

What are the five kingdoms?

-
-
-
-
-

What is a vertebrate?

What is an invertebrate?

Add a tick to the appropriate boxes:

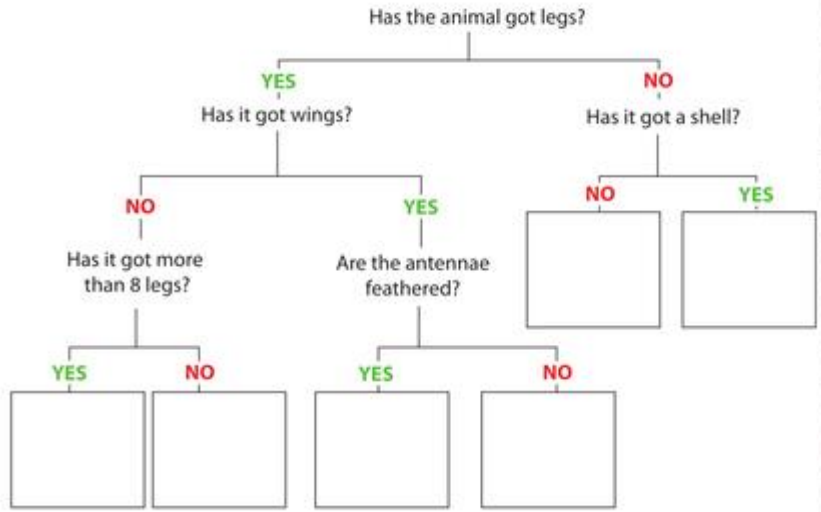
	Animal cells	Plant cells	Fungus cells
Multicellular			
Nucleus			
Chloroplasts			
Cell wall			
Cell membrane			
Cytoplasm			
Vacuole			
Mitochondria			

Match the description with the Class of animal

Mammals	• Cold blooded • Lay eggs with soft shells • Have scales and dry skin
Reptiles	• Cold blooded • Lays eggs in water • Has scales and wet skin
Amphibians	• Three main body parts • 6 legs • Arthropods
Birds	• Warm blooded • Gives birth to live young • Feeds its young milk
Fish	• Two main body parts • 8 legs • Arthropods
Insects	• Cold blooded • Lays eggs in water • Doesn't have scales
Spiders	• Warm blooded • Lays eggs with hard shells • Has feathers

Use the simple key on the right to sort out the organisms.

WILF: Use a key to identify an animal or plant



What is meant by the term ‘variation’?

_____

_____

Several different types of variation are listed below. Sort them into the correct columns in the table.

- Number of scars
- Height
- Eye colour
- Blood type
- Natural hair colour
- Whether you can roll your tongue
- Weight
- Hair length

Continuous	Discontinuous

During the industrial revolution, it was observed that the proportion of peppered moths which were black increased. Explain why this happened (hint: soot turns building black).

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

In what habitat do polar bears live?

How have polar bears adapted to their habitat?

-
-
-
-

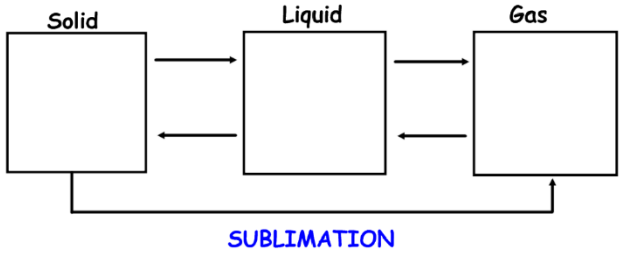
In what habitat do cacti live?

How have cacti adapted to their habitat?

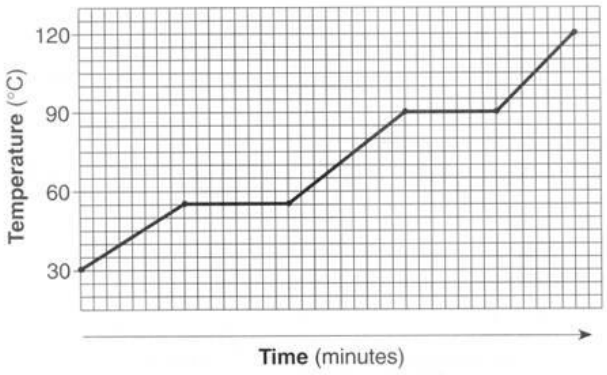
-
-
-
-

Particulate nature of matter

Draw particles diagrams for each state of matter and add the names of the changes of state.



On the graph, label where the substance is a solid, a liquid and a gas.



What is the melting point? _____

What is the boiling point? _____

What is happening during a change of state?

_____

_____

	Solid	Liquid	Gas
Arrangement			
Movement			
Intermolecular forces			

Explain why liquids and gases can flow, but solids cannot.

_____

_____

_____

_____

Explain why gases can be compressed, but solids and liquids cannot.

_____

_____

_____

_____

Substance	Melting point /^{o}C	Boiling point /^{o}C	State at 25^{o}C	State at -50^{o}C
Water	0	100		
Iron	1538	2862		
Mercury	-39	357		
Oxygen	-218	-183		
Bromine	-7	59		
Iodine	114	184		

Explain why ice floats in water.

_____

_____

_____

_____

_____

_____

Explain how a thermometer works.

_____

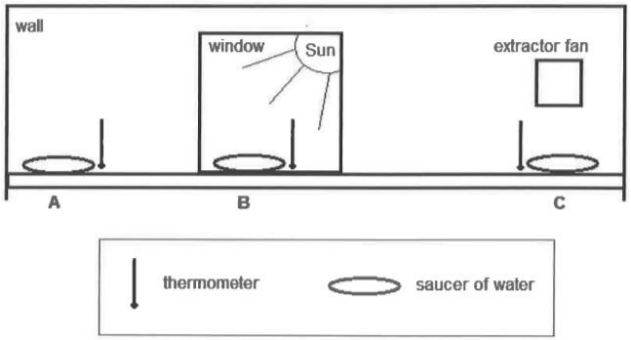
_____

_____

_____

_____

Some students are investigating how temperature and air flow affect the rate of evaporation. They set up their equipment as in the diagram.



What is the purpose of saucer A?

_____

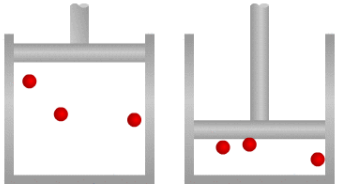
_____

What would be the best way to measure the quantity of water which has evaporated?

_____

Which of these gases is under higher pressure?

_____



A B

Explain what would happen to the gas pressure if the gas was heated up.

_____

_____

_____

_____

_____

Why did they use a saucer of water instead of a beaker?

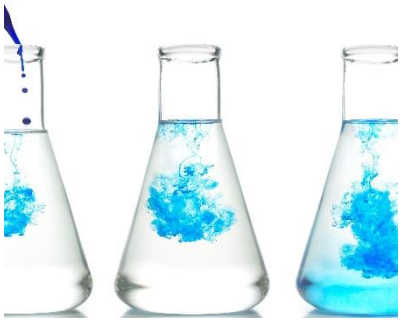
_____

_____

What are some control variables?

-
-
-

When food colouring is added to water, it spreads out.



What is this called? _____

What is the definition for this process?

_____

_____

_____

Explain what causes this process to take place.

_____

_____

_____

_____

Would this happen faster or slower if the particles in the food colouring had a larger mass?

_____

Atoms, element and compounds

What is the definition for:

Atom

_____

_____

Element

_____

_____

Compound

_____

_____

_____

Molecule

_____

_____

Mixture

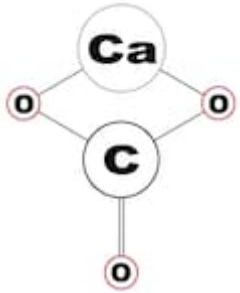
_____

_____

Add each of these substances to both tables below: O_2, H_2O, Co, CH_4, Ar, Br_2, CO_2, Ne, CO

Element	Compound

Atom	Molecule



Write the formula for this compound.

_____

How many atoms are in this compound?

_____

What is the name of this compound?

_____

Name the compound:

1. $CuSO_4$ –
2. FeO –
3. HCl –
4. CO_2 –
5. NaOH –
6. $Al(NO_3)_3$ –

Draw:

A mixture of elements

A pure compound

A mixture of elements and compounds

Complete the table with some of the physical properties of each substance.

Iron	Sulfur	Graphite

What is the definition for a physical change?

_____

_____

What is the definition for a chemical change?

_____

_____

What are some signs that a chemical reaction is taking place?

-
-
-
-

Put a tick in the correct box for each example

Description of change	Physical	Chemical
Cooking an egg		
Dissolving sugar in water		
Melting wax		
Respiration		
Lighting a match		
A towel drying		
Separating inks using chromatography		

Which three factors affect the rate at which a substance will dissolve?

-
-
-

In the graph below, what mass of sugar will dissolve in water at 64°C?

_____ g

Use the graph to answer these questions:

1. Describe the results in the graph

_____

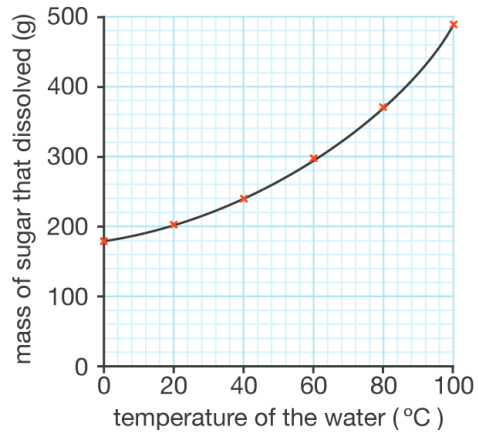
_____

_____

2. Explain the results in the graph.

_____

_____



Pure and impure substances

What is the definition for a pure substance?

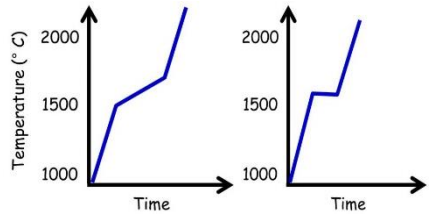
_____

_____

What is the definition for a mixture?

_____

_____



A B

Which of these graphs shows a mixture melting? _____

Explain your answer.

_____

_____

_____

Which of these would melt across a range of temperatures? iron, bronze, tin, steel

_____

Write 'pure' or 'mixture' in the second column.

Distilled water	
Coke	
Table salt	
Fruit salad	
Sea water	
Coffee	
Diamond	

5 grams of salt is added to 20 g of water. What mass of salt water is formed?

_____ g

100 g of ice is heated until it melts and finally boils. What mass of steam is formed?

_____ g

Which concept do both of these examples demonstrate?

_____

What happens to the volume of most substances when they are heated?

_____

Which substance does the opposite when it is melted? _____

Which of these substances is soluble in water?

Substance	Soluble in water?
Sand	
Sugar	
Instant coffee	
Flour	
Tea leaves	
Table salt	

What is the name used for the substance which dissolves?

_____

What is the name used for the substance into which the substance dissolves?

_____

Draw a diagram of a solution of salt and water. Use different coloured circles to represent the particles.

Which method of separation would you use to separate…

Mixture	Method of separation
The iron from a mixture of sand and iron	
The water in an ink solution	
The different coloured food dyes in skittles	
The flour in a mixture of flour and water	
The water in a mixture of salt and water	
The sugar in a mixture of sugar and water	
The raisins in a mixture of raisins and flour	

What is the name of this method of separation?

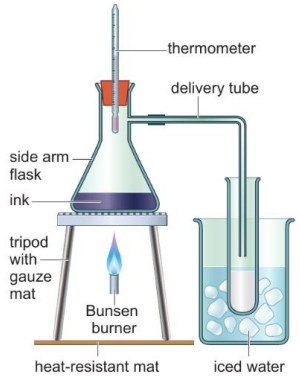
_____

Give an example of a mixture which could be separated using this method.

_____

Which two processes take place during this method of separation?

_____ followed by _____



How could this experimental setup be improved? Explain your answer.

_____

_____

_____

What is the name of this method of separation?

_____

Label the diagram using the words:
Filtrate, residue, suspension

Give an example of a mixture which could be separated using this method.

_____

Explain how this method of separation works.

_____

_____

_____

_____

_____

Explain why the gas exchange tube must be removed from the test tube **before** you stop heating.

_____

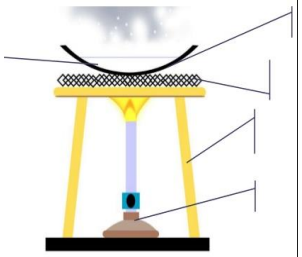
_____

_____

_____

_____

What is the name of this method of separation?



_____

Give an example of a mixture which could be separated using this method.

_____

Give two reasons that you should not continue heating salt solution until it is dry.

•

•

Air is a mixture of gases. Complete the table:

Gas	Abundance in air /%
	78
Oxygen	
Argon	
Other trace gases	0.04

Suggest how the gases in air could be separated:

_____

_____

_____

What is the name of this method of separation?

_____

Give an example of a mixture which could be separated Using this method.

_____

How many coloured dyes does ink 'X' contain?

_____

Use an arrow to point to the most soluble dye.

How do you know that this is the most soluble?

_____

Explain why the line is drawn in pencil.

_____

_____

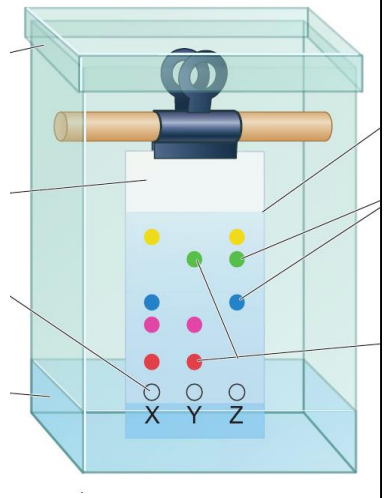
Explain why the dyes move up the paper?

_____

_____

Water is usually used as the solvent. Suggest two alternative solvents which could be used:

_____ or _____



Write a method (including a diagram for each stage), describing how to separate a mixture of:

Salt, sand, iron powder, high density wooden chips and low density wooden chips

Chemical reactions

What is the definition for a chemical change?

_____

_____

What is the definition for a physical change?

_____

_____

Complete the table below:

Description of change	Physical	Chemical
Ice melting		
Super-glue drying		
Separating sand and water by filtration		
Burning fuel in a car		
Fruit ripening		
Photosynthesis		
Tearing a piece of paper in half		

Magnesium metal is heated in a crucible. A white powder is formed.

Write a word equation for this reaction.

What is the name for this type of reaction?

_____

The mass of the crucible is measured before and after the reaction. What will have happened to the mass?

_____

Explain your answer.

_____

_____

_____

Complete these word equations:

Copper + oxygen → _____

Tin + _____ → tin oxide

_____ + oxygen → lithium oxide

Nitrogen + oxygen → _____

Oxygen is an example of a non-metal. Other non-metals can also react with metals.

Complete these word equations:

Iron + chlorine → _____

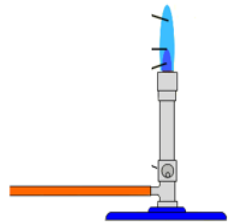
Gallium + sulfur → _____

Lead + _____ → lead bromide

Titanium + nitrogen → _____

What is the name for this piece of scientific equipment?

_____



Mark, with an 'x', the hottest part of the flame.

How would you change this from a roaring blue flame to a safety flame?

_____

_____

Why is a safety flame used when not heating?

•

•

Complete the general equation:

Hydrocarbon + oxygen → _____ + _____

What is the name for this type of reaction?

_____

Complete these word equations:

Methane + oxygen → _____ + _____

Petrol + oxygen → _____ + _____

Propane + oxygen → _____ + _____

If there is insufficient oxygen, different products are formed.

Complete the general equation for incomplete combustion:

Hydrocarbon + oxygen → _____ + _____ + _____

Two of these products can be harmful. Explain why.

Product: _____

Harmful because… _____

_____

Product: _____

Harmful because… _____

_____

What is the chemical test for water?

Test: _____

Positive result: _____

Or

Test: _____

Positive result: _____

What is the chemical test for oxygen?

Test: _____

Positive result: _____

What is the chemical test for carbon dioxide?

Test: _____

Positive result: _____

What is the chemical test for hydrogen?

Test: _____

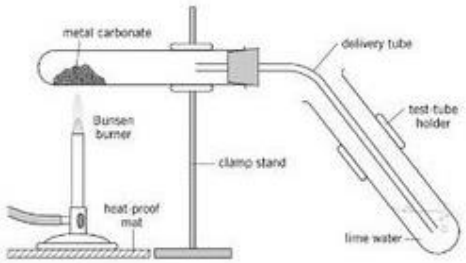
Positive result: _____

Complete the general equation:

Metal carbonate → _____ + _____

What is the name for this type of reaction?

_____



Complete these word equations:

Copper carbonate → _____ + _____

Calcium carbonate → _____ + _____

Lithium carbonate → _____ + _____

What colour is copper carbonate? _____

What colour is the solid product in the first equation? _____

Why must the gas exchange tube be removed from the liquid before the heating is stopped?

_____

What will happen to the mass of the solid in the test tube whilst it is being heated?

_____

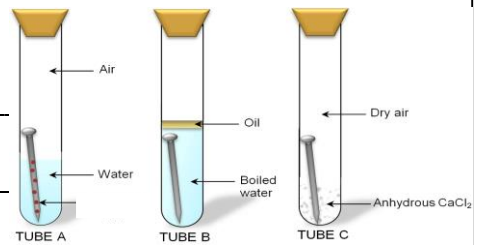
When potassium permanganate is heated, which gas is given off?

_____

Write a word equation for the rusting of iron:

_____ + _____ + _____ → _____

Explain what you would expect to happen to each of the iron nails in the experiment.



Tube A: _____

_____

Tube B: _____

Tube C: _____

Adding zinc to iron can prevent rusting. What is this method of protection called? _____

Explain why this prevents rusting.

_____

_____

Painting iron can also prevent rusting. Explain how this works.

_____

Explain which method is better. _____

_____

Complete the general equation:

(reactive) metal + water → _____ + _____

Complete the word equations:

Lithium + water → _____ + _____

Sodium + water → _____ + _____

Potassium + water → _____ + _____

Describe what will be **seen** during the reaction of potassium with water.

_____

Reactions with acids produce salts. You need to know about three acids:

Hydrochloric acid - formula: _____ - salt formed: metal _____

Sulfuric acid – formula: _____ - salt formed: metal _____

Nitric acid – formula: _____ - salt formed: metal _____

Complete the general equation:

metal + acid → _____ + _____

Complete the word equations:

Copper + sulfuric acid → _____ + _____

Iron + nitric acid → _____ + _____

Magnesium + hydrochloric acid → _____ + _____

Complete the general equation:

acid + base → _____ + _____

What is the name for this type of reaction?

_____

All of the reactions below are the reaction between an acid and a base.

Complete the general equations:

Acid + metal oxide → _____ + _____

Acid + metal hydroxide → _____ + _____

Acid + metal carbonate → _____ + _____ + _____

Complete the word equations:

Hydrochloric acid + copper oxide → _____ + _____

Nitric acid + magnesium hydroxide → _____ + _____

Sulfuric acid + tin carbonate → _____ + _____ + _____

Iron carbonate + nitric acid → _____ + _____ + _____

Lithium hydroxide + sulfuric acid →_____ + _____

Calcium oxide + hydrochloric acid → _____ + _____

If equal amounts of acid and base are reacted together, what will the pH of the solution be?

_____

This reaction often comes up in Common Entrance exams.

Complete the word equation:

Copper oxide + sulfuric acid → _____ + _____

Copper oxide is an example of a _____.

Copper oxide is insoluble.
Copper sulfate is soluble.

Excess (too much) copper oxide is added to the sulfuric acid. Explain why.

_____

_____

Which three substances are in the beaker now?

-
-
-

How can the excess copper oxide be removed?

_____

How can the dissolved copper sulfate be separated from the water?

_____

What colour will the copper sulfate crystals be?
_____

Air pollution

State three things which human do which causes carbon dioxide to be given out to the atmosphere.

-
-
-

It is important to have some carbon dioxide in the atmosphere, but too much carbon dioxide causes _____.

What negative effects does this have on the planet?

-

-

-

Explain why burning fossil fuels causes acid rain.

_____

_____

_____

What negative effects does acid rain have?

-
-

When metal oxides dissolve in water, they produce _____ solutions.
When non-metal oxides dissolve in water, they produce _____ solutions.

Fill in the boxes

Complete the table:

Substance	Approximate pH	Colour when Universal Indicator is added
Pure water		
Bicarbonate of soda		
Hydrochloric acid		
Orange juice		
Drain cleaner		

Which piece of equipment can be used to determine the pH more accurately?

_____

Give one other reason that this piece of equipment is better than Universal Indicator.

_____

What is a disadvantage of this piece of equipment?

_____

Red litmus paper turns _____ in acids and _____ in alkalis.

Blue litmus paper turns _____ in acids and _____ in alkalis.

Write a method describing how to make and test an indicator using red cabbage.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

What is a disadvantage of using red cabbage as an indicator?

_____

_____

Energy resources

What is the definition for a non-renewable energy resource?

_____

_____

Give four examples of non-renewable energy resources.

-
-
-
-

Describe how fossil fuels are formed.

_____

_____

_____

_____

How is electricity generated from fossil fuels?

_____

_____

_____

What is the definition for a renewable energy resources?

_____

_____

Write the name of the energy resources next to its definition.

Energy generated from the light of the sun

Energy generated from burning wood or other recently living things

Energy generated from the wind

Energy generated using water flowing downhill

Energy generated using hot rocks to heat up water

Energy generated using the tides to turn turbines

Energy generated using waves

What is the ultimate source of almost all energy on Earth?

_____

What is an advantage of using solar power instead of burning coal to generate electricity?

_____

_____

What is a disadvantage of using solar power instead of burning coal to generate electricity?

_____

_____

Describe the energy transfers in hydroelectric power.

_____

_____

_____

_____

Why are biofuels described as ‘carbon-neutral’?

_____

_____

_____

_____

Energy stores and transfers

What is the unit for energy?

_____

What is the law of conservation of energy?

_____

_____

Complete the tables:

Energy store	Examples
	Food, batteries, matches
Thermal	
Kinetic	
Elastic (strain)	
	Climbing a ladder
	Magnets attracting/repelling
	The sun

Energy pathway	Example
	Light, sound,
	Electric current
	A force moving through a distance
	Due to a temperature difference
	Due to a chemical reaction

What is the energy transfer in each of these examples?

A torch turning on:

(_____)

Useful energy transfer: _____ → _____

(_____)

Wasted energy transfer: _____ → _____

Explain why an LED torch is more efficient than a standard torch.

_____

An apple falling from a tree and then hitting the ground:

(_____) (_____)

_____ → _____ → _____

A Bunsen burner being lit:

(_____)

_____ → _____

Bungee jumping:

(_____) (_____)

_____ → _____ → _____

Some energy is always dissipated during an energy transfer (it is never 100% efficient). Explain what this means and where the energy goes.

_____

_____

Forces and motion

What is the equation which links speed, distance and time?

If a car travels 2000 m in 100 s, calculate the speed.

If an athlete runs at a speed of 5 m/s. How far will she run in one minute?

A train travels at a average speed of 30 m/s. How long will it take to travel 5 km?

Write a method for determining the speed of a car travelling along the road? Include the equipment that you would use.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Two cars are travelling in the same direction. Calculate the speed of car A relative to car B.

25 m/s  A

21 m/s  B

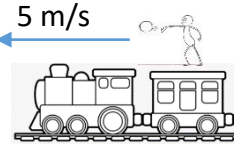
Two cars are travelling in opposite directions. Calculate the speed of car A relative to car B.

25 m/s  A

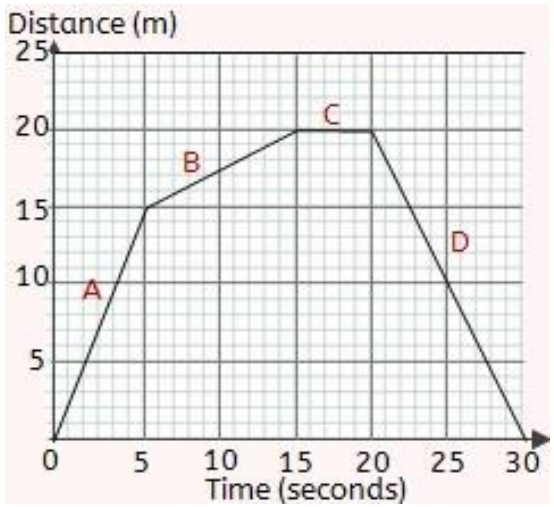
B  20 m/s

A boy stands on the roof of a moving train and throws a ball. Calculate the speed of the ball relative to the ground.

5 m/s



30 m/s



At which point in the graph is the object travelling the fastest? _____

Calculate the object's speed during section 'B' of the graph.

Describe the motion of the object throughout its journey.

_____

_____

Calculate the average speed of the object during the first 20 seconds of its journey.

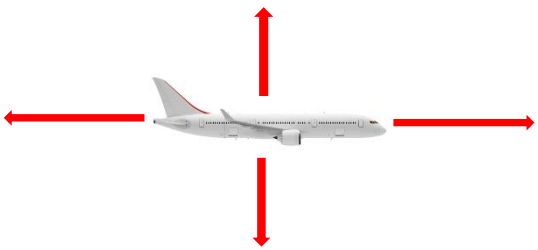
What is the unit for force?

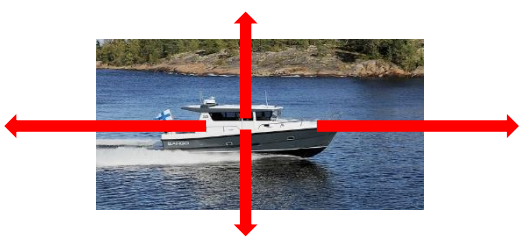
_____

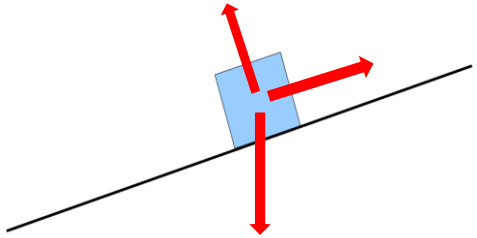
Which piece of equipment is used to measure the size of a force?

_____

Label the forces in each diagram:







If no result force acts upon an object…

_____

_____

_____

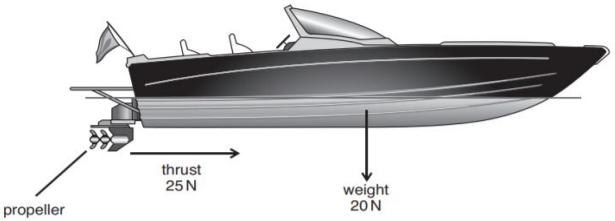
Complete the sentence:

A resultant force acting upon an object causes a change in the:

•

Or

•



If the boat is moving at a constant speed, what must be the size of the drag force?

_____ N

If the boat is floating, what must be the size of buoyancy?

_____ N

The engine is turned off whilst the boat is still moving forward. Draw a new diagram to show the forces acting on the boat now.

Explain what will happen to the motion of the boat.

_____

_____

_____

How can friction be reduced?

•

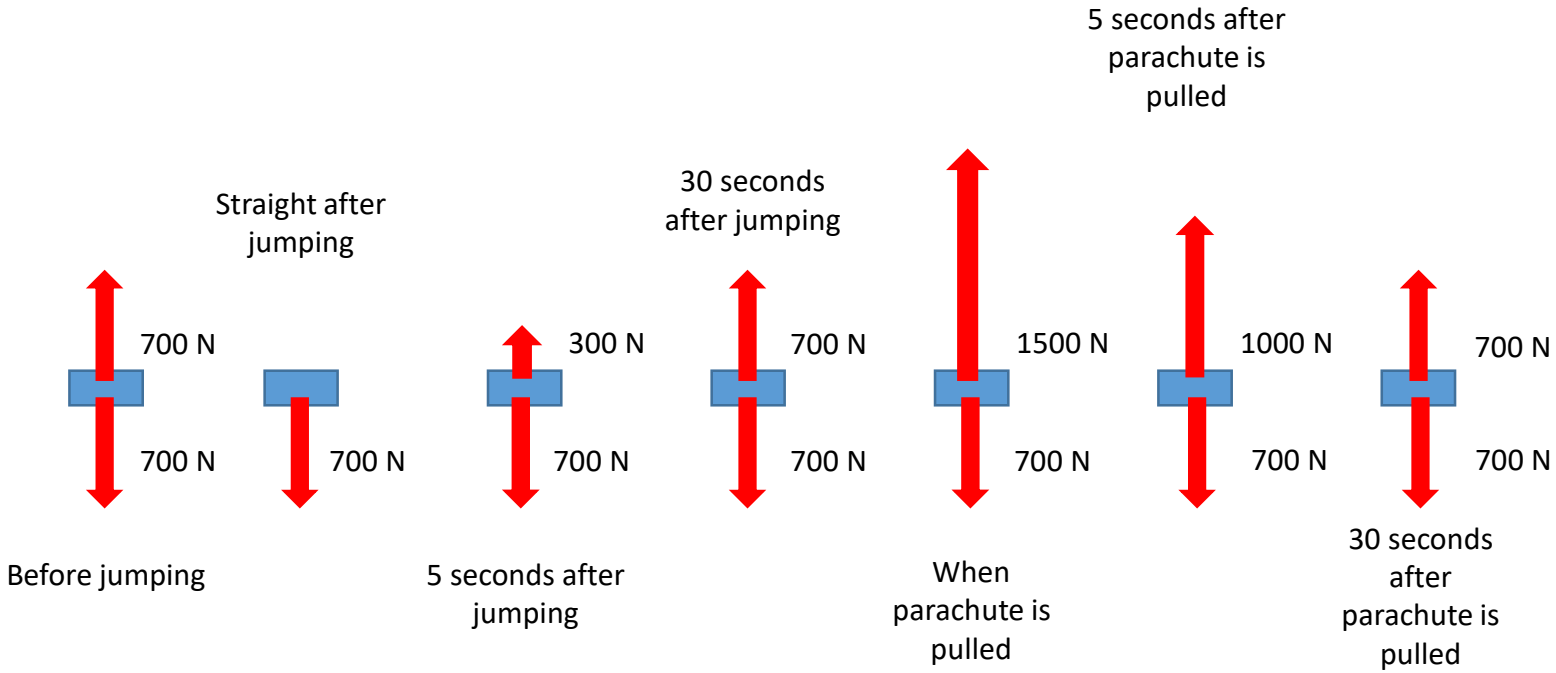
•

How can air/water resistance be decreased?

-
-
-

As speed increases, what happens to the size of the drag force?

_____



The diagrams above show the forces acting on a skydiver at different points in their jump.

For each diagram, explain the forces, and describe what will happen to the motion of the skydiver.

Before jumping: _____

Straight after jumping: _____

5 seconds after jumping: _____

30 seconds after jumping: _____

When parachute is pulled: _____

5 seconds after parachute is pulled: _____

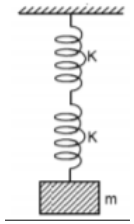
30 seconds after parachute is pulled: _____

Hooke's law describes how the extension of a spring changes when a force is applied.

For a single spring, if the force doubles, the extension will _____.

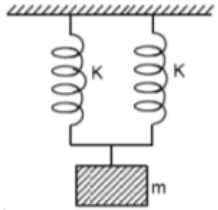
What is the name for this arrangement of springs?

_____



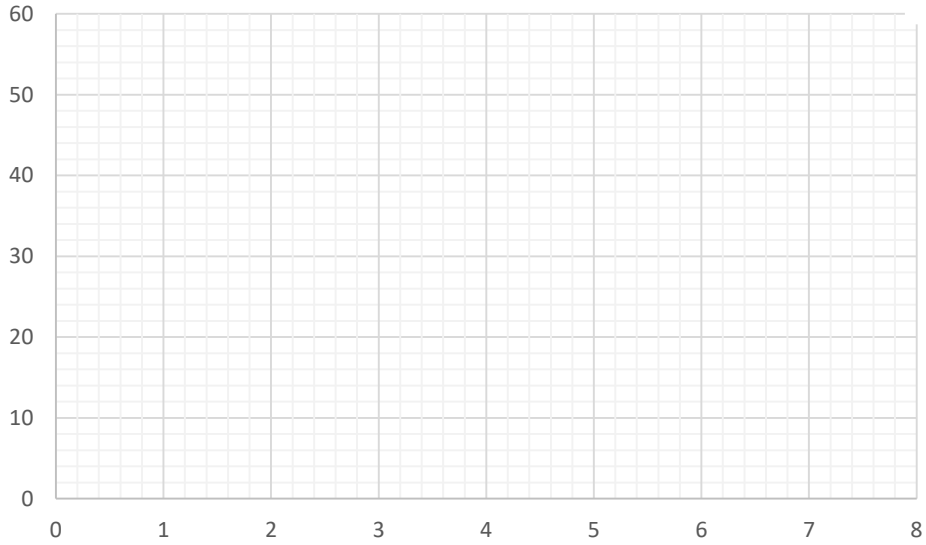
What is the name for this arrangement of springs?

_____



Complete the results table using your knowledge of springs:

Force (N)	Extension (cm)		
	Single spring	2 springs in series	2 springs in parallel
0	0	0	0
1	5		
2			
3			
4			
5			
6	30		
7	37		
8	49		



- Using the data in the table, add axis labels to the graph.
- Plot all 3 sets of data on the same graph (include a key)

Describe the results in the graph.

_____

_____

_____

_____

_____

_____

_____

_____

Use the graph to estimate the extension of the single spring when the force is 7.4 N.

Show your working on the graph.

_____ cm

Why does the data not obey Hooke's law when the force is too large?

_____

_____

_____

_____

Forces and pressure

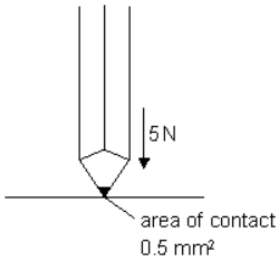
What is the equation which links pressure, force and area?

What are the units for force? _____

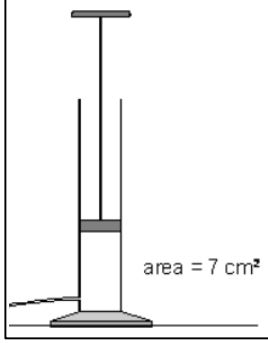
What are the units for area? _____

What are the units for pressure? _____

Calculate the pressure of the pencil on the table.



An arrow hits a target with a force of 200 N. The pressure of the arrow on the target is 125 N/mm^2 . Calculate the area of the arrow-head.



The pressure on the handle of the pump is 25 N/cm^2. Calculate the force being applied.

Explain why wearing a snowshoe prevents someone from sinking into the snow.

_____

_____

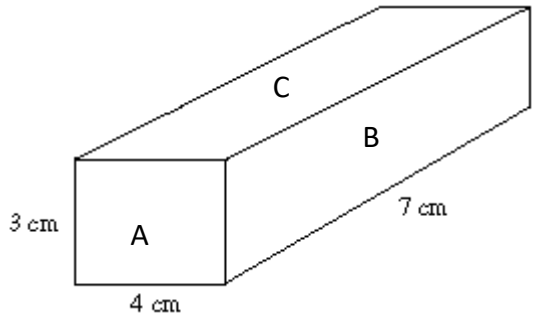
_____

Calculate the pressure of each side if it were touching the floor. The weight of the block is 120 N.

A:

B:

C:



Give an example of an object which is designed to exert a high pressure.

_____

Give an example of an object which is designed to exert a low pressure.

_____

Explain why standing on a single nail is painful, whilst standing on many nails is not painful.

_____

_____

_____

Density

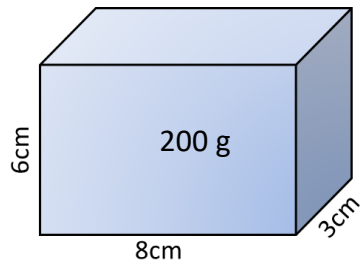
What is the equation which links density, volume and mass?

What are the units for mass? _____

What are the units for volume? _____

What are the units for density? _____

Calculate the density of the block.



A block of wood has a mass of 5 kg and a density of 1.6 g/cm^3. Calculate the volume. (Hint: check the units)

A beaker of an unknown liquid has a density of 0.8 g/cm^3 and a volume of 100 cm^3. What is the mass?

Complete the table to show whether the substance will float or sink in water.

Object	Density (g/cm^3)	Floats in water?
Water	1	
Iron bar	7.9	
Balloon filled with air	0.001	
Cork	0.24	
Cooking oil	0.91	
Concrete	2.4	

Describe a method for measuring the density of an irregularly shaped rock. Include the equipment that you will use.

_____

_____

_____

_____

_____

_____

_____

_____

Explain why ice floats in water.

_____

_____

_____

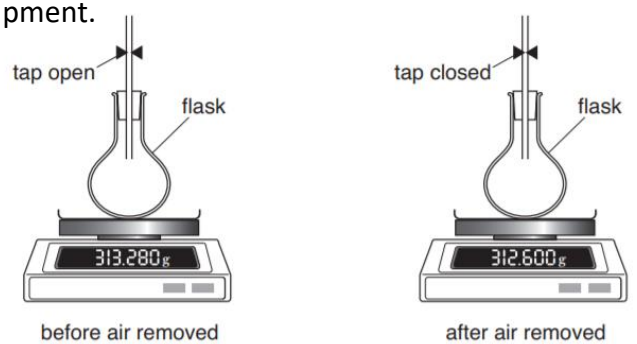
_____

_____

_____

_____

The density of air can be measured using this equipment.



What is the mass of air in the flask?

_____

How could you find the volume of air inside the flask?

_____

_____

Sound

How are sounds generated?

_____

_____

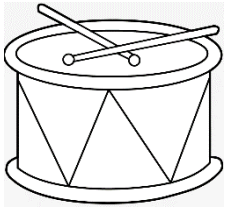
What is causing the sound in each case below?

_____

_____

_____

_____



_____

_____

_____

_____

_____

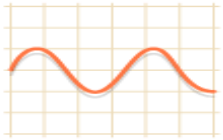
How does a sound wave change when the volume is increased?

_____

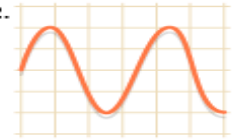
How does a sound wave change when the pitch is increased?

_____

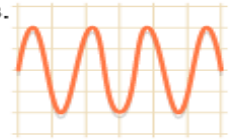
1.



2.



3.



Describe sounds 1, 2 and 3. Use key terms: high/low pitch, loud/quiet.

1 - _____

2 - _____

3 - _____

What is the effect of changing the following on a guitar?

- Shortening the string - _____
- Having a thicker string - _____
- Tightening the string - _____

What is the definition for the term 'frequency'?

_____

_____

What are the units for frequency?

_____

What is the approximate range of frequencies which can be heard by humans?

_____ to _____

What causes an echo?

_____

_____

_____

_____

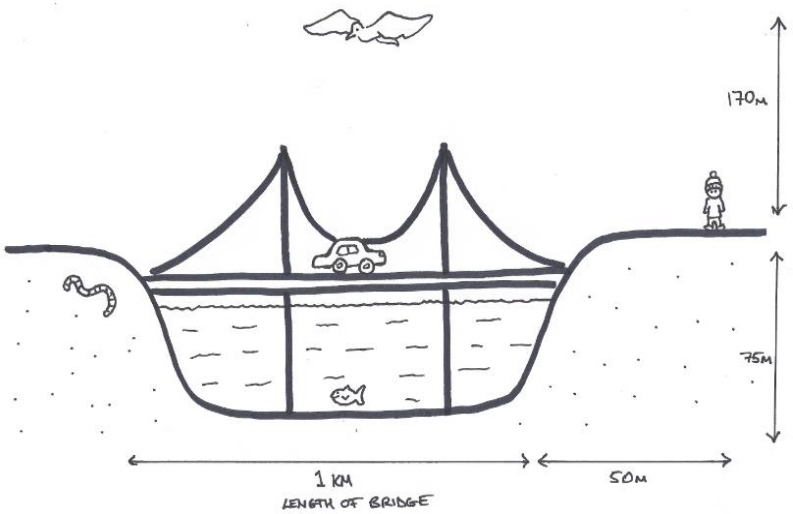
_____

Describe how the sound made by a mobile phone ringing is heard.

_____

_____

_____



The car beeps its horn.

Explain why this sound would be detected by the worm first.

_____

_____

Sounds travels at around 330 m/s in air. Calculate the time that it would take for the sound to reach the bird.

Explain why sound cannot travel through a vacuum.

_____

_____

Write a method, describing how the speed of sound in air could be measured. Include any equipment that you will need.

_____

_____

_____

_____

_____

_____

_____

Explain why lightening is seen before thunder is heard.

_____

_____

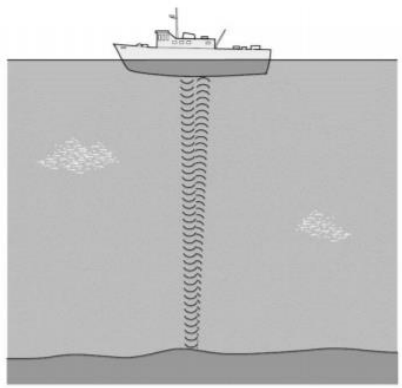
_____

Why is it a problem to hear very loud sounds?

_____

_____

Echolocation can be used to work out how far away an object is. A ship sends out a 'ping' and the echo is detected 2 seconds later. If the speed of sound in sea water is 1533 m/s, how far away is the bottom of the sea?



Light

Give examples of luminous objects:

Natural: _____

Artificial: _____

Give examples of non-luminous objects:

- _____
- _____

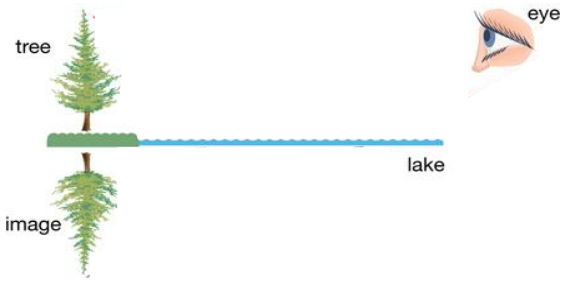
Explain how we are able to see non-luminous objects.

_____

_____

_____

Complete the diagram below to explain why the image of the tree appears beneath the water. You do not need to draw the sun.

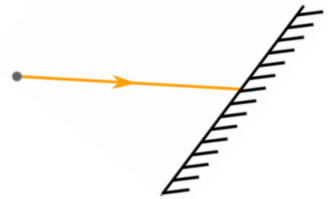


What is the law of reflection?

_____

_____

Draw a diagram to show this below. You should label any relevant angles.



Light rays should always be drawn using a _____ and should include _____ to show the direction. Light travels from the _____ to the _____.

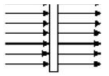
Explain why the image appears distorted when a stone is thrown into the lake. You may want to include a diagram.

_____

_____

Match the diagram with the key word.

Transparent 

Translucent 

Opaque 

Use these key words to define each type of object: transmit, absorb, reflect, scatter

Transparent: _____

_____

Examples: _____

Translucent: _____

_____

Examples: _____

Opaque: _____

_____

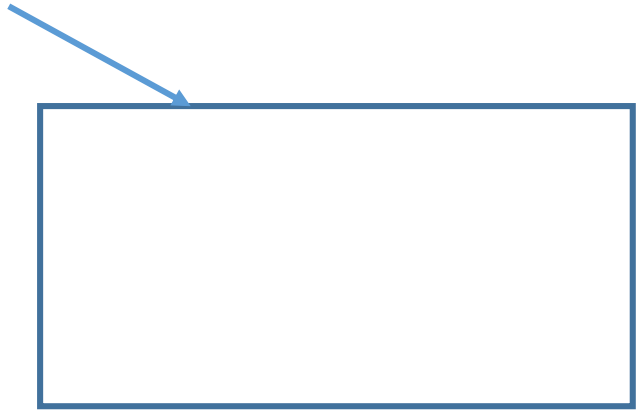
Examples: _____

Draw a diagram of a periscope. You should include an object and an eye.

At what angle should the mirrors be? _____

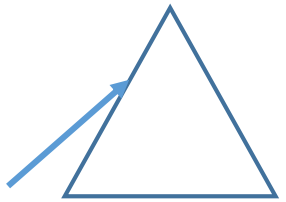
Label any relevant angles on your diagram.

Complete the diagram, showing what happens when the light enters and glass block **and** what happens when it leaves the glass block.



Label any relevant angles on your diagram.

Complete the diagram showing what happens to white light when it is shone through a glass prism.



What is this effect called?

_____

Explain what causes this effect.

_____

_____

_____

Light travels fastest in a _____.

When light enters a more dense medium, it _____

_____,

This causes the ray of light to _____

_____.

This is called _____.

Complete the diagram, showing what happens when light enters a pinhole camera.

To which human organ can this be compared?

_____

What would be the effect on the image of:
Moving the object further away?

_____

Making the pinhole larger?

_____

Electric circuits

Draw the circuit symbol for each component.

Lamp	Cell	Battery	Fixed resistor
Diode	SPST switch	LDR	Buzzer
Ammeter	Reed switch	Variable resistor	Fuse
Motor	LED		

Draw a series circuit containing 2 cells, 2 lamps and an SPST switch.

Draw a parallel circuit containing 2 cells, 2 lamps and an SPST switch in each branch.

In the two circuits that you have drawn, would you expect the bulbs in the series or parallel circuit to be brighter?

_____

What would be the effect of adding an extra cell to the circuit?

_____

Explain why this would happen.

_____

_____

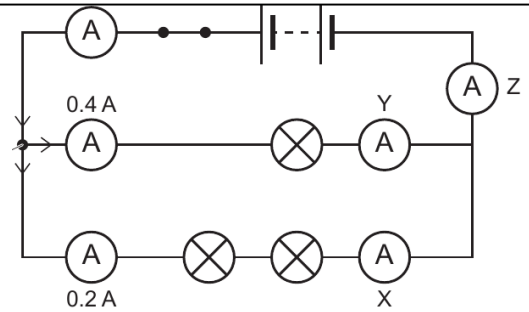
What would be the effect of adding an extra lamp to the series circuit?

_____

Explain why this would happen.

_____

_____



X =
Y =
Z =

Explain why the ammeter reading is smaller in the bottom part of the circuit.

_____

_____

_____

_____

_____

What is the purpose of a fuse?

_____

_____

_____

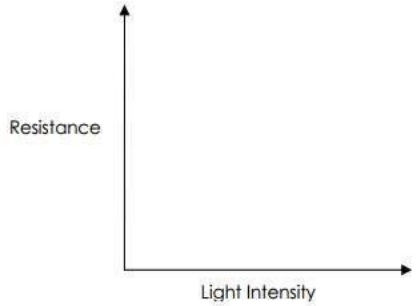
How does a fuse work?

_____

_____

_____

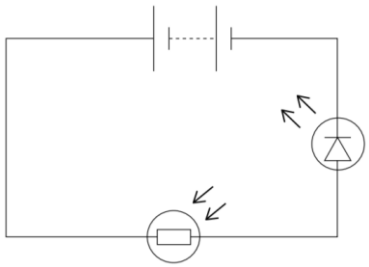
Add a line to the graph below to show the effect of light intensity on the resistance of an LDR.



Describe the relationship between light intensity and resistance in an LDR.

_____

_____



Explain what will happen to the brightness of the LED when the circuit is put into a dark cupboard..

_____

_____

_____

_____

_____

Why will an LED not turn on if it is placed the wrong way around in a circuit?

_____

_____

_____

_____

_____

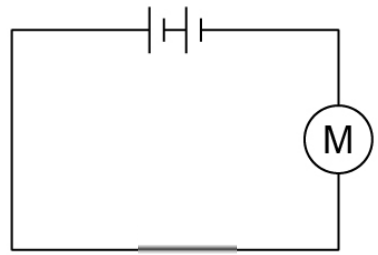
_____

Draw a circuit containing an LED which will turn on.

In an investigation using batteries, which component would it be best to use to change the current?

_____

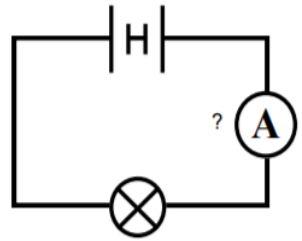
What is the energy transfer in the circuit below?



(_____)

_____ → _____

What is the current in the circuit below?



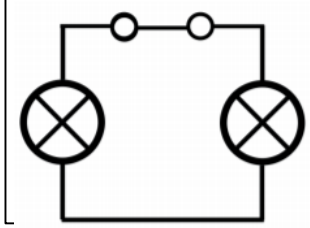
_____ A

Explain your answer

_____

_____

What is the mistake in this circuit?



_____

_____

_____

Describe how a pupil could investigate the effect of the material from which a wire is made on the resistance in a circuit.
You should include a diagram in your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

What is the independent variable?

_____

What is the dependent variable?

_____

What are some control variables?

•

•

•

•

Draw the results table that you would use to collect your data.

What sort of graph would you plot to display your data?

_____ because _____

_____

What happens to components (and wires) when the current is high?

_____

_____

Why should the circuit be switched off before the wire is changed?

_____

_____

What could be done to improve the reliability of the results?

_____

_____

_____

Does it matte where the ammeter is placed in the circuit? Explain your answer.

_____

_____

_____

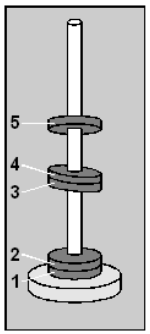
_____

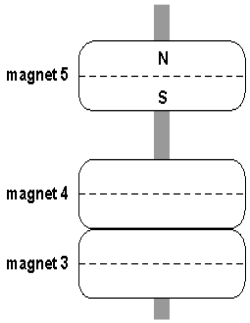
Magnetism and electromagnetism

Which 3 elements can be magnetised?

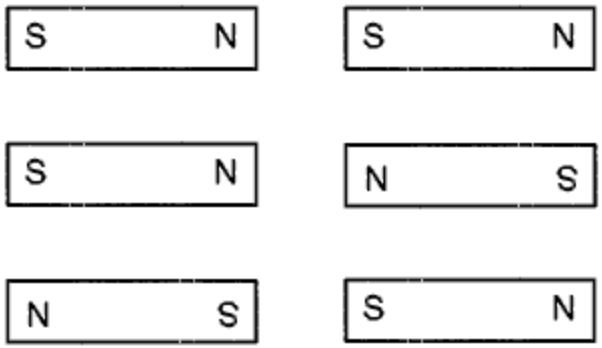
-
-
-

Complete the diagram on the right to show where the north and south poles on magnets 3 and 4 are.

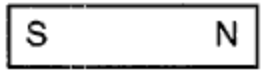




Describe what will happen to the magnets in these situations:



Draw the shape of the magnetic field around this bar magnet. Don't forget the direction!



Write a method describing how the shape of the magnetic field around a bar magnet can be determined. You may include a diagram.

If you have a known magnet, what is the only true test for another magnet?

For a bar magnet, where is the magnetic field strongest?

How is this shown with the magnetic field lines?

Why does a compass point north on Earth?

Describe how to make an electromagnet.

_____

_____

_____

_____

_____

_____

_____

_____

Which three factors will affect the strength of an electromagnet?

-
-
-

Which component can be used to change the current in a circuit?

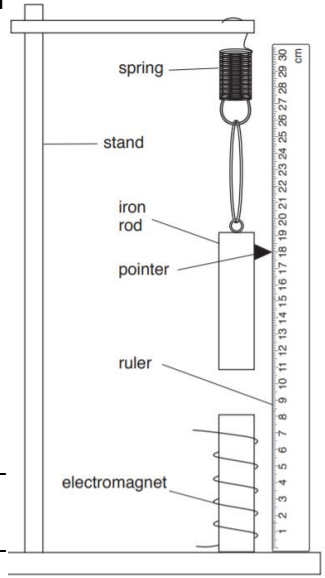
_____

The equipment on the right is set up and the electromagnet is switched on.

What would you expect to happen when the electromagnet is switched on?

_____

_____



Explain what would happen if the rod was made of copper instead?

_____

_____

_____

Would changing the direction of the current affect the investigation? Explain your answer.

_____

_____

_____

Explain how electromagnetic door holders (such as that shown in the picture) work. You should include an explanation of how the door can be closed automatically.

_____

_____

_____

_____

_____

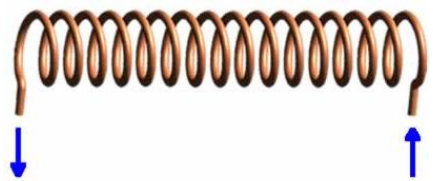
_____

_____

_____

_____

Draw the shape of the magnetic field in an electromagnet.



Space

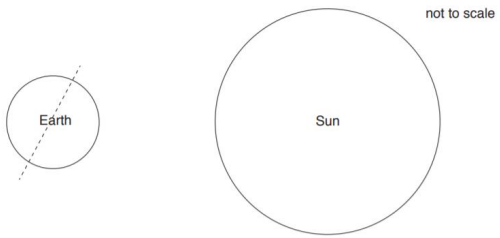
Approximately what shape are the Earth, Sun and Moon?

_____

Put these in order of size (smallest first).

- ☐ Sun
- ☐ Solar system
- ☐ Moon
- ☐ Milky Way
- ☐ Jupiter
- ☐ Universe

On the diagram, shade where it night.



Explain what causes day and night.

_____

_____

Give two examples of non-luminous objects in space.

-
-

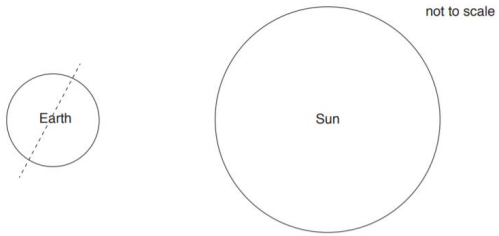
Give an example of a luminous object in space.

Explain how we are able to see one of the non-luminous objects on Earth.

_____

_____

What season is it in the UK in the diagram?



Explain your answer.

_____

_____

_____

Put an 'x' on the Earth to show somewhere on Earth that it is a winter's day.

How long does it take for the Earth to orbit the Sun?

_____

How long does it take for the Moon to orbit the Earth?

_____

How long does it take for the Earth to rotate on its axis?

_____

If the Earth's rotation on its axis were to speed up, what would change on Earth?

_____

_____

If the Earth were to be more tilted on its axis, what would change on Earth?

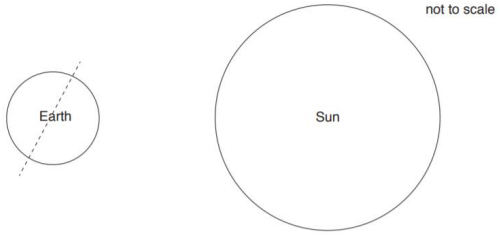
_____

_____

If the Earth was further from the Sun, what would change on Earth?

_____

Draw the position of the Moon when a full moon is seen on Earth.



What is the unit used for measuring distances in space?

_____

What is the definition for this unit?

_____

_____

What is a galaxy?

_____

_____

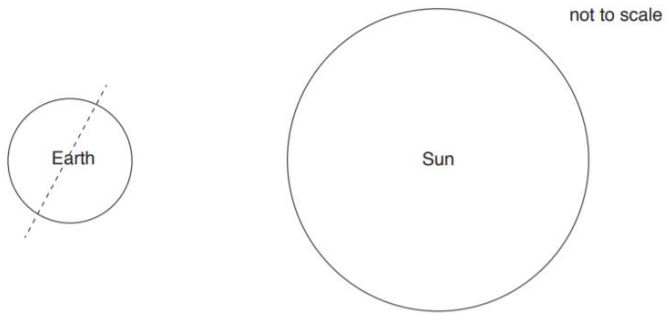
What is the equation which links weight, gravitational field strength and mass?

What are the units for mass? _____

What are the units for weight? _____

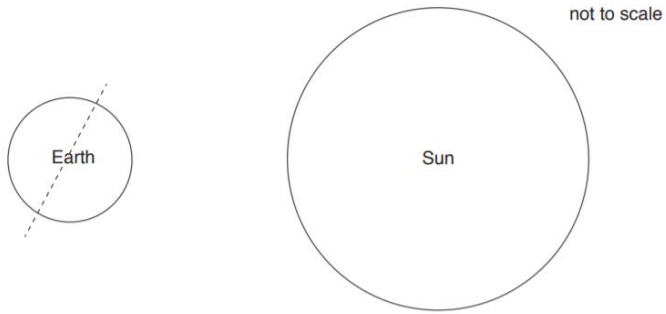
What are the units for gravitational field strength? _____

Draw the position of the Moon during a solar eclipse.



Add rays of light to show this eclipse and mark, with an 'x', where a total solar eclipse would be seen on Earth.

Draw the position of the Moon during a total lunar eclipse. Add rays of light to show this eclipse.



Explain why Jupiter's gravitational field strength is much larger than Earth's.

_____

_____

Jupiter is further from the Sun than the Earth. Would you expect a year on Jupiter to be longer or shorter than a year on Earth?

_____ because...

_____

_____

_____

_____

The gravitational field strength on Earth is approximately 10 N/kg.

A piece of wood has a mass of 4 kg. Calculate its weight on Earth.

_____

The same piece of wood weighs 4.8 N on the Moon. What is the gravitational field strength on the Moon?

_____

On Venus, a hamster weighs 0.176 N. The gravitational field strength on Jupiter is 8.8 N/kg. What is the mass of the hamster in grams?

_____ g