

Questions on Cells

1. What are living things made from?

2. What are cells?

3. What are the specialised structures that make up the cell called?

4. What do plant and animal cells both have in common?

5. What does the cell membrane control?

6. Chemical reactions happen in the ...?

7. Where is the DNA stored and what does it do?

8. What stops plant cells being floppy (flaccid)?

9. Where is cell sap contained?

10. What is in the chloroplasts and what is it used for?

11. How are sperm cells specially adapted?

12. What do root hair cells have for absorbing water and nutrients?

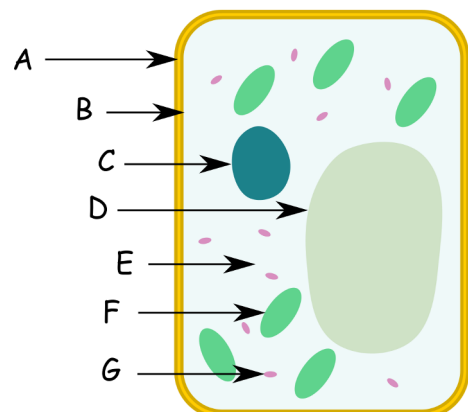
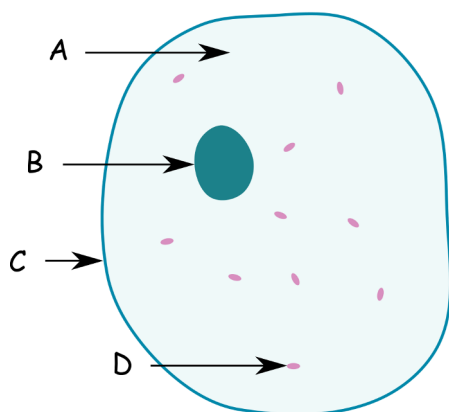
13. How is tissue formed?

14. When different types of tissue work together what is formed?

15. What is an organ system?

16. What happens if different organ systems combine?

Label and memorise the parts of a plant and animal cell below

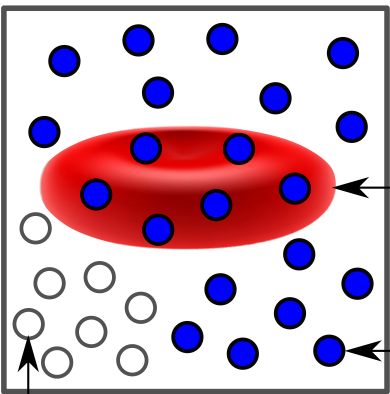


Questions on Diffusion

- | | |
|---|--|
| <p>1. What do we call the process of 'smells spreading out'?</p> <hr/> | <p>9. What does the large surface area of root hair cells allow?</p> <hr/> |
| <p>2. How can we think of diffusion?</p> <hr/> | <p>10. 'Normally' how does the concentration of water and nutrients in soil compare to the root hair cell?</p> <hr/> |
| <p>3. From where to where do the particles diffuse?</p> <hr/> | <p>11. Where does the oxygen in the air we breathe end up?</p> <hr/> |
| <p>4. When would the particles of orange squash stop diffusing?</p> <hr/> | <p>12. Why does carbon dioxide build up in our blood?</p> <hr/> |
| <p>5. In what sort of substances does diffusion happen?</p> <hr/> | <p>13. What is respiration?</p> <hr/> |
| <p>6. In what sort of motion do the particles move?</p> <hr/> | <p>14. What happens to the carbon dioxide that has built up in the blood?</p> <hr/> |
| <p>7. What is digestion?</p> <hr/> | |
| <p>8. What happens to the high concentration of food particles in our small intestines?</p> <hr/> | |

Glucose with a higher concentration in the blood can diffuse into a red blood cell with a lower concentration. Complete the diagram to show what things look like after diffusion. It looks just like the squash and chips opposite. Any colour is fine.

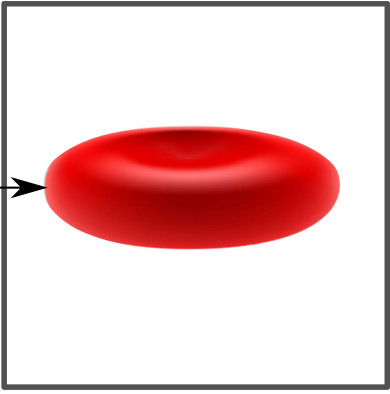
BEFORE



glucose

water

AFTER



red blood cell

Where have some of the glucose molecules ended up?!

Questions on the Skeleton and Muscles

1. How many bones does a human skeleton have?

2. Why are bones made mostly from calcium?

3. What is an endoskeleton?

4. What sort of skeleton do insects have?

5. What is chitin?

6. What are the four main jobs of the human skeleton?

7. What is the purpose of the skull?

8. What do bone joints do?

9. What sort of joint does your shoulder have?

10. Why are ball and socket joints really useful?

11. What is made inside of bones?

12. What do red blood cells carry?

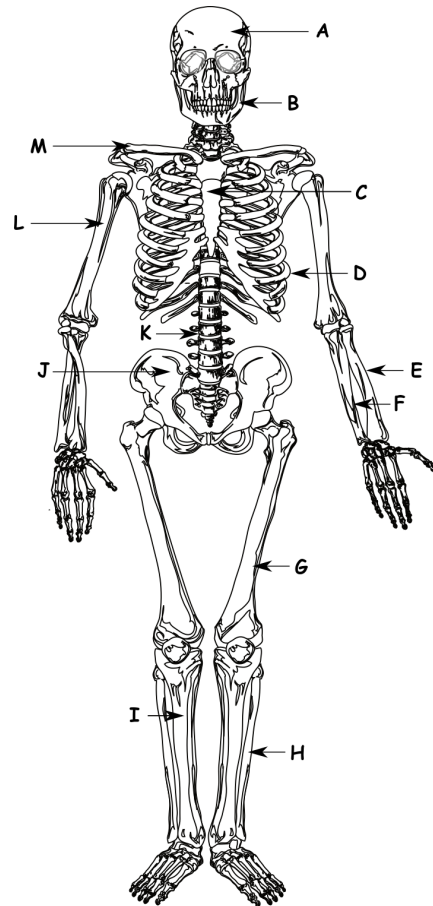
13. What holds the muscles to the bones?

14. What do ligaments do?

15. What happens to your triceps when your biceps contract?

16. What do we call muscles that work in pairs contracting and relaxing?

Label and memorise the bones shown below



- | | |
|----------|----------|
| A. _____ | H. _____ |
| B. _____ | I. _____ |
| C. _____ | J. _____ |
| D. _____ | K. _____ |
| E. _____ | L. _____ |
| F. _____ | M. _____ |
| G. _____ | |

Questions on the Healthy Human Diet

1. What is a healthy diet all about?

2. Complete the sentence; There isn't a.....
food that contains everything we need.

3. What do carbohydrates do?

4. What is the main role of lipids?

5. What helps you grow and repair tissue?

6. Give two examples of minerals needed by the
body?

7. In what quantities are vitamins needed?

8. What is fibre and what does it do?

9. Where do starchy foods mainly come from?

10. What are pulses and what food group are they a
good source of?

11. What kind of vegetables are a good source of
iron?

12. What causes scurvy?

13. What are the symptoms of scurvy?

14. What is night blindness?

15. What does lack of calcium and vitamin D cause?

Match the vitamins and minerals below to what they help keep healthy.

VITAMIN C	healthy bones
IRON	healthy vision
VITAMIN D	healthy blood
CALCIUM	healthy bones
VITAMIN A	healthy skin

Write down which food groups you think you would get too much of and which too little of if you ate the following:

- i. Only fruit and vegetables
- ii. Only dairy foods
- iii. Only meat, fish, eggs and beans

Questions on Food Fuel

1. What is a fuel?

2. Through what process do humans slowly burn their food?

3. What happens if humans consume more energy than they use in daily activities?

4. What is energy measured in?

5. What does Kilo mean?

6. How many joules are in 5kJ?

7. What does the value of 8400kJ tell us?

8. In which years does a child need more energy and why?

9. What does the nutritional information on food labels usually tell us?

10. How is this information often given?

11. What does %RI tell us?

12. If an adult just ate biscuits, which food group would they be eating too much of?

13. What wouldn't they get enough of?

14. What do we mean by a balanced diet?

Use a calculator to complete the %RI columns for **100g** of the Multigrain cereal and the Cheese and onion sandwich below. The **reference intakes** are;

energy 8400kJ; protein 50g; fat 70g; carbohydrate 260g; fibre 30g; Sodium (salt) 6g.

Example (boiled potatoes opposite page):

%RI energy = $340 \div 8400 = 0.04$ (x by 100 to get 4%)

%RI protein = $1.9 \div 50 = 0.038$ (x by 100 to get 3.8%)

%RI carbohydrates = $20 \div 260 = 0.077$ (x by 100 to get 7.7%)

Nutritional information;	Multigrain cereal Per 100g	% RI Per 100g
Energy	1500 kJ	
Protein	9.3 g	
Fat	2.9 g	
of which are Saturated fats	0.6g	
Carbohydrates	69 g	
of which are sugars	17g	
Dietary fibre	12 g	
Sodium (salt)	0.5 g	

Nutritional information;	Cheese and onion sandwich brown bread Per 100g	% RI Per 100g
Energy	1200 kJ	
Protein	10 g	
Fat	16.5 g	
of which are Saturated fats	0.6g	
Carbohydrates	42g	
of which are sugars	2 g	
Dietary fibre	6 g	
Sodium (salt)	1.7 g	

Questions on the Human Digestive System

1. Why can we 'think' of digestion as starting on the plate?

2. What is the purpose of digestion?

3. Where does digestion really start?

4. Where does digestion end?

5. What does excretion mean?

6. What is saliva an example of?

7. Where does food go after entering the mouth and before reaching the stomach?

8. What helps it on its way and what is it similar to?

9. What does churned in the stomach mean?

10. How are the acidic conditions useful?

11. What does bile do and where does it come from?

12. What happens to the broken down food in the small intestines?

13. How could the food be described in the large intestine?

14. What is the only thing left to absorb in the large intestine?

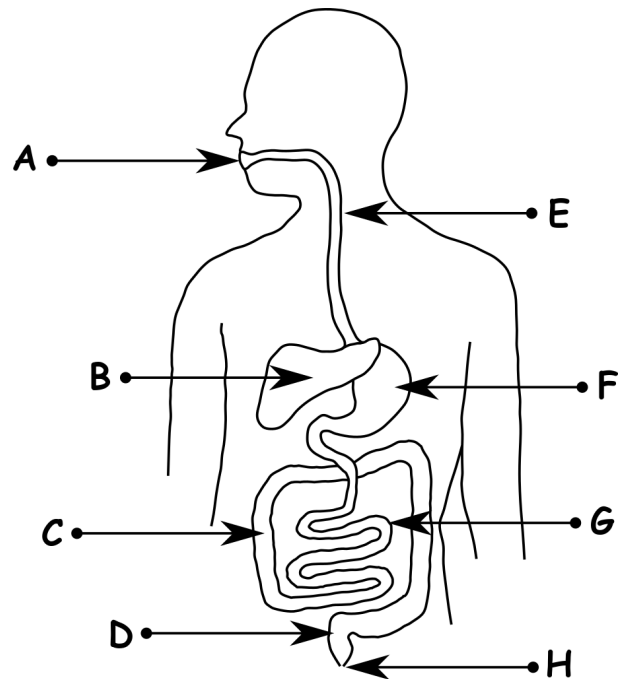
15. What is another word for waste faeces?

16. Why is it more solid at this stage?

17. What is the name for the part of the digestive system where faeces is stored?

18. Where are faeces finally excreted?

Name and memorise the organs of the human digestive system shown below



A. _____ E. _____

B. _____ F. _____

C. _____ G. _____

D. _____ H. _____

Questions on Enzymes and their Role in Digestion and Other Uses

1. What do enzymes do?

2. What do catalysts do to chemical reactions?

3. Why are enzymes called biological catalysts?

4. What produces the enzymes?

5. How many main types of enzyme are there in the human digestive system?

6. Which enzyme breaks down proteins?

7. What does lipase do?

8. What do enzymes act like in breaking down undigestible food molecules?

9. What is starch?

10. Which well known enzyme breaks down starch into simple sugars?

11. What does adding protease to washing powder help with?

12. Protease in baby foods breaks down protein, how is this helpful?

13. Why is invertase injected into chocolates?

14. What can enzymes in yeast do?

Match the words to their meanings below and memorise

Catalysts

enzymes that break down carbohydrates

Enzymes

enzyme for breaking down sugar (sucrose)

Carbohydrase

substances that speed up chemical reactions without being used up

Protease

enzymes that break down fats (lipids)

Lipase

enzymes that break down proteins

Invertase

biological catalysts

Questions on Plants and Energy Flow: Food Chains and Webs

1. What would happen to animal life with no plants?

2. Why are plants called producers?

3. What do herbivores eat?

4. What do animals called omnivores eat?

5. What is the name of an animal that eats only other animals?

6. What do plants use light for?

7. What happens to the energy in a food chain?

8. What do primary consumers eat?

9. What do food webs show?

10. What do we call the plants and animals found in a certain location?

11. What would happen if a hawk entered the ecosystem?

12. What might the foxes and wolves do if this happened?

13. What do we mean by conflict?

14. What might one of the animals do to avoid this conflict?

15. What are predators at the top of the food chain called? (WHAT? box)

16. Draw food chains for the following *jumbled up* producers and consumers.
 - a. *rabbit, grass, snake*
 - b. *mouse, seeds, hawk*
 - c. *aphids, leaf, ladybirds*
 - d. *hawk, caterpillar, robin, cabbage*

Match the words to their meanings below and memorise

Producers	animals that eat meat (other animals) only
Consumers	animals that eat plants only
Glucose	amount of living material
Biomass	a sugar
Herbivores	animals that eat plants and meat (other animals)
Carnivores	the animals
Omnivores	the plants

Questions on the Respiratory System: Breathing

- | | |
|--|--|
| <p>1. What does respire mean?
_____</p> <p>2. Why do we respire?

_____</p> <p>3. What does respiration do?
_____</p> <p>4. What is the waste gas from respiration?
_____</p> <p>5. How much oxygen is in the air we breathe in and how much in what we breathe out?

_____</p> <p>6. What does this tell us?

_____</p> <p>7. What is the diaphragm?

_____</p> <p>8. What does contract mean?
_____</p> <p>9. What happens to the space inside the lungs when we breathe in?
_____</p> | <p>10. What does this do to the air pressure inside the lungs?
_____</p> <p>11. What does this mean will happen?

_____</p> <p>12. In breathing out what does the increase in pressure in the lungs do?
_____</p> <p>13. What do we mean by gas exchange?

_____</p> <p>14. What are the tiny air sacs in the lungs called?
_____</p> <p>15. How many are there?
_____</p> <p>16. What are the alveoli touching?
_____</p> <p>17. Through what process is oxygen absorbed into the capillaries?
_____</p> <p>18. Why does carbon dioxide move the other way?

_____</p> |
|--|--|

Put the descriptions below in the correct order to describe breathing in and breathing out.

Breathing in

Diaphragm contracts, lung space increases, air pushed into lungs, air pressure inside lungs decreases, intercostal muscles contract

_____ → _____ → _____
→ _____ → _____

Breathing out

intercostal muscles relax, air pushed out of lungs, Diaphragm relaxes, air pressure inside lungs increases, lung space decreases

_____ → _____ → _____
→ _____ → _____

Questions on Aerobic and Anaerobic Respiration

1. What does aerobic mean?

2. Through what process do cells release energy?

3. What is respiration without oxygen called?

4. In what form does most of our energy come from?

5. Give three examples of life processes.

6. What are the products of aerobic respiration?

7. What does expelled mean?

8. Why is respiration sometimes called slow burning?

9. When might our bodies require anaerobic respiration?

10. What is the downside to anaerobic respiration?

11. What does this lead to?

12. What did Louis Pasteur discover?

13. What is yeast?

14. Why is aerobic respiration used in bread making?

15. What is another word for ethanol?

16. What are the products of fermentation?

Match the words to their meanings below and memorise

Aerobic	the release of energy in a cell
Anaerobic	single celled organism used in brewing and baking
Respiration	involving oxygen
Lactic acid	anaerobic respiration by yeast producing alcohol and carbon dioxide
Yeast	not involving oxygen
Fermentation	an acid produced during anaerobic respiration the causes muscle 'burn'

Questions on Exercise, Asthma and Smoking

1. What do we mean by exercise?

2. Why do humans exercise?

3. What diseases is exercise known to reduce the risk of?

4. What does exercise do for our energy levels?

5. How much exercise is recommended for 5 to 18 year olds?

6. How is more blood pumped to the muscles during exercise?

7. What is the long term effect of exercise on your muscles?

8. What do your tendons do?

9. What holds your bones together?

10. Why is an increase in bone density good?

11. What does the condition asthma affect?

12. What does chronic mean?

13. What are the symptoms of asthma?

14. What can happen to a person's airways who has asthma?

15. What should someone who is having an asthma attack do?

16. Why is smoking addictive?

17. What is tar exposure linked to?

18. What are cilia and what do they do?

19. What is the negative (bad) effect of carbon monoxide?

Match the words to their meanings below and memorise

Exercise

the addictive drug from smoking

Stress

a disease of the airways leading to breathlessness and wheezing

Nicotine

an activity that requires physical effort

Asthma

a state caused by demanding activities

Tar

a toxic gas from smoking that reduces the ability of the blood to carry oxygen

Carbon monoxide

a sticky brown substance from smoking and the main cause of throat and lung cancer

Questions on Reproduction in Humans: Women

1. What are gametes?

2. Where are a woman's gametes made?

3. What is made in the testes?

4. What is the name of the type of reproduction where sperm and egg meet?

5. What are hormones?

6. On what day is the egg released?

7. What does the menstrual cycle describe?

8. What happens when a woman's uterus lining breaks down?

9. What do we call this?

10. How long does a woman's period last?

11. What is the release of a mature egg called?

12. Where does the egg go after release from the ovaries?

13. How long does the egg stay alive?

14. What happens if the egg is not fertilised by a sperm?

15. What are the main hormones involved in a woman's menstrual cycle?

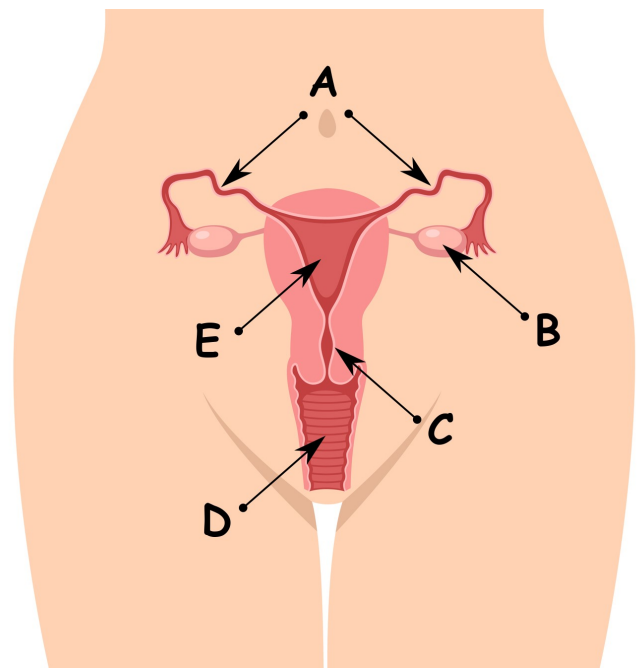
16. What does fertilisation mean?

17. How does the fertilised egg grow?

18. What does the placenta do?

19. What do we call the embryo after it starts to develop human features?

Label and memorise the parts of a woman's reproductive system below



- | | |
|----------|----------|
| A. _____ | D. _____ |
| B. _____ | E. _____ |
| C. _____ | |

Questions on Reproduction in Humans: Men

1. Which hormone controls the reproductive system in men?

2. Where is testosterone made?

3. What is the main job of the testes?

4. Where are a man's testes kept?

5. Why is it important that this is outside of the body?

6. To have a baby what must happen?

7. What happens to a woman's vagina before wanting sex?

8. What happens to a man's penis to get an erection?

9. What causes a man to ejaculate during sex?

10. Where is semen made?

11. What does the liquid part of semen contain?

12. What happens when an egg and sperm fuse?

13. What do we mean by gestation period?

14. How long is the gestation period for women?

15. What does the woman provide the baby with during pregnancy?

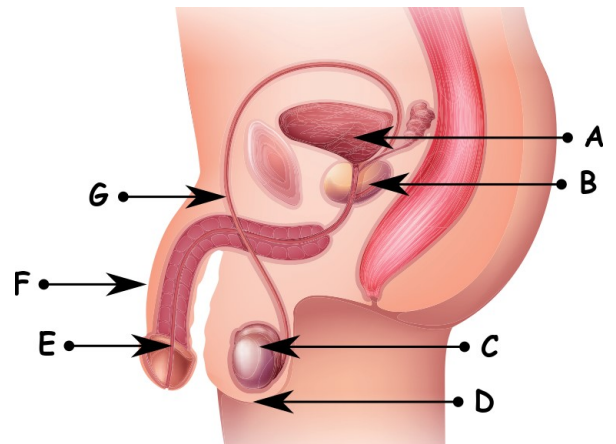
16. What does a woman need more of during pregnancy?

17. Why is folic acid important?

18. Why are alcohol and cigarette smoke harmful during pregnancy?

19. Why are some babies born addicted to drugs?

Label and memorise the parts of a man's reproductive system below



A. _____ E. _____

B. _____ F. _____

C. _____ G. _____

D. _____

Questions on Drugs and their Impact

1. What is a drug?

2. Why do people use recreational drugs?

3. What can happen with all drugs?

4. What is an obvious example of a good medicine?

5. What is an anaesthetic?

6. Give an example of a use for an anaesthetic.

7. What do antibiotics do?

8. What often happened to people after operations before antibiotics?

9. Why are many infections becoming resistant to antibiotics?

10. What kind of drug is alcohol?

11. What happens to your nerve activity after drinking alcohol?

12. What is a side effect of long term overuse of alcohol?

13. What's one of the reasons that getting drunk is dangerous?

14. Give an example of an illegal depressant.

15. Why can getting 'hooked' on heroin be bad?

16. What does a stimulant do?

17. What are the two legal stimulants mentioned?

18. What are some of the long term side effects of cocaine use?

Match the words to their meanings below and memorise

Medicines	drugs taken for enjoyment
Recreational drugs	slows down nerve activity
Anaesthetic	drugs that help us get better from illness
Antibiotics	speeds up nerve activity
Depressant	drugs that cause loss of sensation
Stimulant	drugs taken to treat bacterial infections

Questions on Reproduction in Plants

1. How do plants that produce a flower reproduce?

2. What is the male sex cell called?

3. What is the ovule?

4. What do we mean by pollination?

5. Pollination in the same plant is called what?

6. How is the nucleus of the pollen cell able to join with the ovule?

7. What does this produce?

8. What does the ovule become after fertilisation?

9. By what two methods does pollination usually happen?

10. Why do plants produce a sugary liquid called nectar?

11. What else do flowers produce to attract insects?

12. What are the four main methods of seed dispersal?

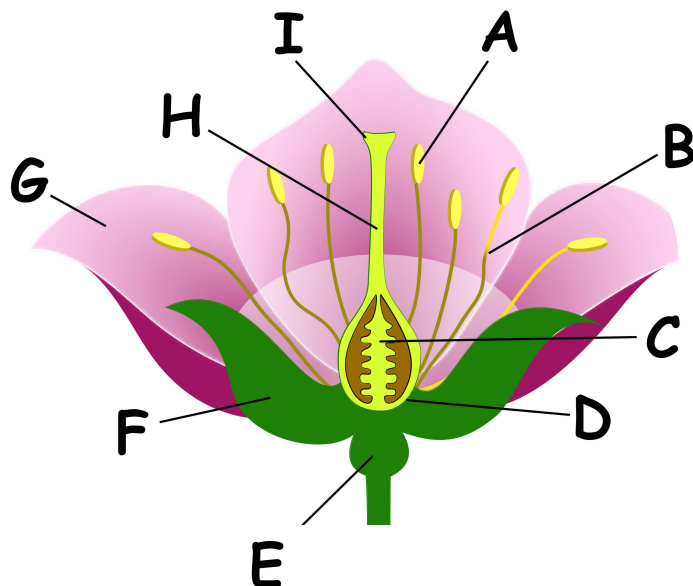
13. Why is it important that seeds are dispersed?

14. What is germination?

15. What is the embryo inside a seed's protective coating?

16. What percentage of plant life is actually in the oceans? (WHAT? box)

Label and memorise the parts of a flower below



Questions on Photosynthesis

1. What does the 'photo' in photosynthesis refer to?

2. What does photosynthesis mean?

3. What are the two reactants of photosynthesis?

4. What are the chemical formulae of water and carbon dioxide?

5. What is glucose as an example of?

6. How is glucose stored?

7. What does oxygen allow the body's cells to do?

8. What would happen without plants?

9. What does carbon dioxide contribute to?

10. What do plants do especially at night?

11. Why are leaves green?

12. What is chlorophyll able to do?

13. Which cells contain most of the chlorophyll?

14. What are stomata?

15. What happens to the stomata during the day time?

16. What is the name of the cells that control the opening and closing of stomata?

17. Why do the stomata close at night?

18. What else helps reduce water loss?

Match and memorise the meanings of the words and chemical formulae below

Chlorophyll	a gas produced by photosynthesis, chemical formula O_2
Stomata	a liquid absorbed through photosynthesis, chemical formula H_2O
Oxygen	a gas absorbed through photosynthesis, chemical formula CO_2
Carbon dioxide	a green pigment found in leaves for photosynthesis
Water	a sugar produced through photosynthesis, chemical formula $C_6H_{12}O_6$
Glucose	pores on the underside of a leaf to control gas exchange

Questions on Genetics and Inheritance

1. In biology what do we mean by inheritance?

2. What are our characteristics influenced by?

3. How many genes are there for each characteristic?

4. What do chromosomes look like?

5. Which chromosomes determine your sex?

6. Which sex chromosome do women carry?

7. Why is the population half male and half female?

8. Where is the gene found that determines the sex is male?

9. What percentage of our genes do we share with the chimpanzee?

10. What does evolved mean?

11. What can the same species do?

12. Are horses and donkeys the same species?

13. What happens if they breed?

14. What did Rosalind Franklin and Maurice Wilkins 'fire' at DNA?

15. What did the scattering of the X-rays form, enabling them to work out what the DNA molecule might look like?

16. From this work what did James Watson and Francis Crick come up with?

Match the words to their meanings below and memorise

Inheritance	a section of the chromosome made from DNA molecules, they decide a person's characteristics
Chromosomes	a weaker gene that only produces the characteristic if combined with another recessive gene
Genes	the passing of genetic characteristics from parent to offspring
DNA	a stronger gene that produces a characteristic
Dominant gene	a molecule that makes up chromosomes, has a double helix shape
Recessive gene	carry the genetic information

Questions on Adaptation

1. What do adaptations do?

2. What may happen if an organism is not well adapted to its environment?

3. How long do adaptations normally take?

4. What does the water proof outer layer of a cactus do?

5. What has happened to the leaves of a cactus?

6. What is the sweet liquid that plants produce called?

7. What tells a Venus fly trap to snap shut?

8. What happens to the insects that are trapped?

9. How does the specially adapted Caudal fin help a shark?

10. Why is a shark's streamlined shape so useful?

11. What is a shark's skeleton made from?

12. What colour is a polar bear's skin and how does this help?

13. What is the advantage of a polar bear's big feet?

14. Why is a polar bear's white coat useful?

15. How much water can a camel drink in one go?

16. Why is it an advantage for the camel to sweat little below 50°C?

Draw / invent an animal that is adapted to live in one of the habitats given below

- The sea
- A jungle
- A desert
- Antarctica (south pole)
- Cold mountain climate
- A forest

Questions on Evolution and Natural Selection

1. What does evolve mean?

2. What are the two causes of mutations in genes in the text?

3. What do these mutations lead to?

4. How does having traits adapted for the environment or finding food affect an animals chance of survival?

5. What happens to these traits in the population over time?

6. What two words do we use to describe this?

7. What do we call those that survive because they are better adapted?

8. What happens to species that are less well adapted to survive?

9. Who is credited with first presenting the ideas behind evolution?

10. Where did Charles Darwin famously study many species?

11. What is an insecticide?

12. What can some insects' bodies do to the insecticide chemicals?

13. What happens to the population of these insects?

14. What is another name for MRSA?

15. What have MRSA bacteria evolved to be resistant to?

16. What has made this worse?

Match the words to their meanings below and memorise

Mutate	single celled organisms
Evolve	the characteristic of an animal like for example thick fur
Traits	chemicals that kill insects
Insecticides	to change from what you were
Bacteria	animals with the best adaptations for survival
Survival of the fittest	to change over time

Questions on Biodiversity and Gene Banks

1. What does the desert food web show?

2. What does diverse mean?

3. What might happen if insecticide is used to kill the grasshoppers?

4. What is biodiversity essential for?

5. What does less biodiversity in an ecosystem mean for the species in it?

6. What can organisms do if there is a bad year in a diverse ecosystem?

7. What would be put in danger if we allowed the number of honey bees to decrease?

8. Why is this?

9. What can the introduction of non-native species do?

10. Why were Cane toads introduced to Australia?

11. Why did the number of some native predators decline (like lizards)?

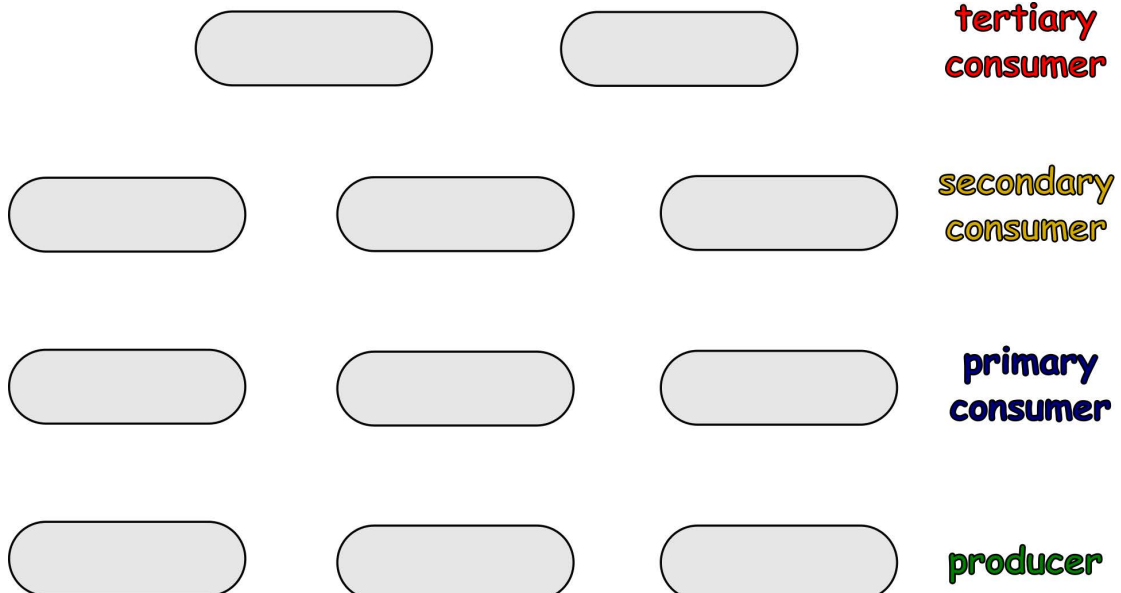
12. What has put pressure on other native animals?

13. Even with protected areas and captive breeding programmes what still happens?

14. What are gene banks a way of doing?

15. What can the genetic material be used for?

Use these three food chains: *leaves > rabbit > fox*, *corn > rat > snake*, *grass > vole > ferret*. And a wolf and eagle as the tertiary consumers, to fill the boxes below and draw arrows between who eats what.



Questions on Predator Prey and Populations

1. What is a predator?

2. What is a good example of a predator and a prey?

3. What happens to the population of mice as the cats eat them?

4. Why does this cause the cat population to decrease?

5. What causes the mice population to begin to rise again?

6. Why over time does this allow the cat population to increase again?

7. What do predator prey graphs show?

8. When are they simple to follow?

9. Apart from predators, what else can affect the number of prey?

10. Why don't hyenas want lions in their territory?

11. Why will animals of the same species also compete for territory?

12. Especially if scarce what else can be competed for?

13. What are the famous 'Darwin's finches' on the Galapagos islands?

14. Why does the population of birds with medium sized beaks struggle when there are more birds with medium sized beaks?

15. Why do populations of birds with shorter and longer beaks do better on the **same** island?

Many factors limit how big a population can become. Human population is heading towards 8 billion. It can't grow forever otherwise we wouldn't be able to grow enough food for everyone and have enough space for housing.

Below are some limiting factors that affect the size of a population.

NUTRIENTS IN THE SOIL

FOOD

PREY

DISEASE

WAR

PREDATORS

LIGHT TO GROW

SPACE

OXYGEN

WEATHER OR CLIMATE

Write about how you think these factors can affect the size of a population of **any** species, e.g. *not many nutrients in the soil means not many tomatoes on my tomato plant!*

Questions on Pyramids of Numbers and Toxins in Food Chains

1. What are toxins?

2. How many routes do they have into an organism?

3. What does ingested mean?

4. What are pesticides used for?

5. Which toxic metals can be passed up the food chain?

6. What do pyramids of numbers show us?

7. Each level in the food chain is drawn in to the size of the population?

8. Why do they often look like pyramids?

9. How many green fly could one bush feed?

10. Each trophic level tells us the size of the population but not what?

11. How can chemical fertiliser get into our water?

12. What is one of the ways that toxins can get into soils?

13. What happens to the toxin concentration as it is transferred higher up the food chain?

14. How high can the mercury levels reach in tuna and shark?

Draw a pyramid of numbers for the two food chains below

5,000 Clover leaves, 100 Snails, 10 Robins, 2 Buzzards (birds of prey)

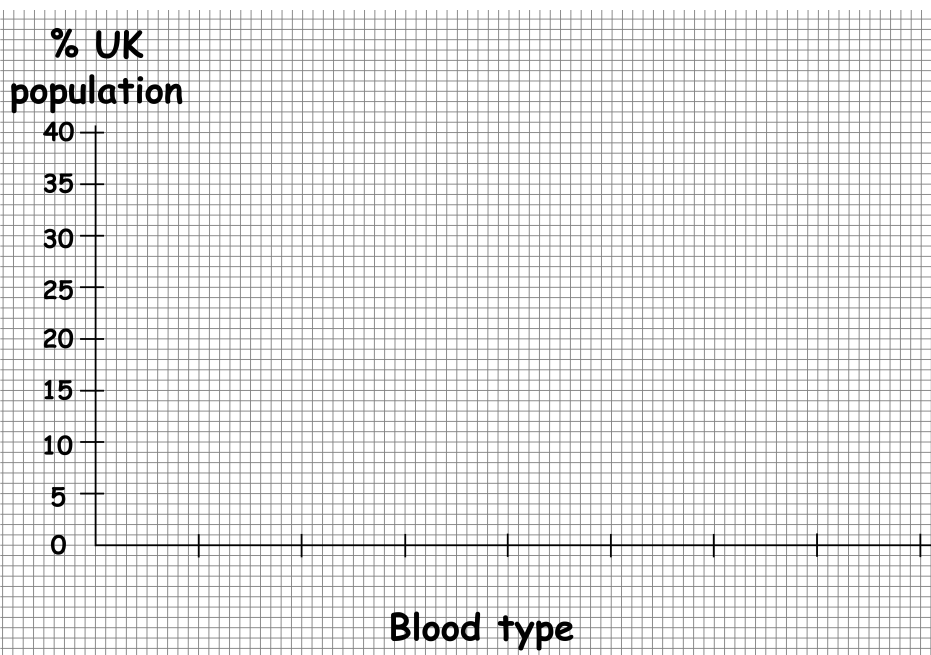
1 Oak tree, 1000 Caterpillars, 50 Pigeons, 2 Kitty hawks



Questions on Variation

- | | |
|---|---|
| <p>1. What clearly exists between species?</p> <hr/> | <p>9. How much of our genes come from mum and how much from dad?</p> <hr/> |
| <p>2. Why can all dogs breed with each other?</p> <hr/> | <p>10. What two factors affect our characteristics?</p> <hr/> |
| <p>3. What does discontinuous mean?</p> <hr/> <hr/> | <p>11. How can the environment change our skin colour?</p> <hr/> |
| <p>4. Name four human characteristics that are discontinuous.</p> <hr/> <hr/> | <p>12. What 'could' cause the child of tall parents to be small?</p> <hr/> |
| <p>5. What do continuous characteristics have?</p> <hr/> <hr/> | <p>13. What is thought to influence asthma?</p> <hr/> |
| <p>6. Name four human characteristics that are continuous.</p> <hr/> <hr/> | <p>14. What debate has been around for a long time?</p> <hr/> |
| <p>7. What does a histogram plot?</p> <hr/> <hr/> | <p>15. Why is it not true to say 'I'm not good at maths' or 'I'm not clever' because my parents aren't?</p> <hr/> <hr/> |
| <p>8. What sort of data is plotted on a bar chart?</p> <hr/> <hr/> | <p>16. What might genes mean for certain tasks for certain individuals?</p> <hr/> <hr/> |

Draw a bar chart of the percentage of people with each blood type in the UK.



Percentage of people in UK	Blood type
30	A+
8	A-
8	B+
2	B-
35	O+
13	O-
2	AB+
1	AB-

Questions on the Particulate Nature of Matter

1. What do we call minute pieces of matter?

2. Who is first thought to have presented the idea that substances are made from particles?

3. How small are these particles?

4. What do we now call these particles?

5. What does indivisible mean?

6. Existing as a solid, liquid or gas depends very much on what?

7. What does density tell us?

8. In solids, is the force of attraction strong, medium, or weak between particles?

9. What sort of shape and volume does this give to solids?

10. In a solid the particles can't move from their positions, but what do they do about the same position?

11. How strong is the force of attraction between particles in liquids?

12. In what way can the particles in a liquid move?

13. What sort of shape do liquids take?

14. Why can't liquids be compressed?

15. How far apart are the particles in a gas and what does this mean for the force of attraction between the particles?

16. Why are gases easily compressed?

Match the words to their meanings below and memorise

Indivisible	the gaseous (gas) form of water
Density	means with no particular pattern, the way particles in a gas move
Bond	means can't be divided or split
Water vapour	a force of attraction between particles
Volume	tells us how tightly packed particles are, high density substances have tightly packed particles, low density substances have loosely packed particles
Randomly	is the amount of space a substance occupies

Questions on Atoms, Elements, Compounds and Molecules

1. What did John Dalton develop?

2. What are atoms like?

3. How did John Dalton check his rules about atoms?

4. What are chemical reactions or changes due to?

5. What is a pure element made from?

6. Which element is a pure diamond made from?

7. When are compounds formed?

8. What is a chemical bond?

9. What is the chemical formula for water?

10. What is another name for alcohol?

11. What is a molecule?

12. Why is oxygen normally found as a molecule?

13. What do we draw to represent atoms on a piece of paper?

14. What does the number of each circle tell us?

15. What is the most common element in the universe?

16. What 'doesn't' helium form?

17. How is helium normally found?

Match the words to their meanings below and memorise

John Dalton

is a molecule made from two oxygen atoms and one carbon atom

Element

a substance formed from two or more different atoms

Compound

a scientist who developed the idea that matter is made from atoms

A Molecule

is a molecule made from two hydrogen atoms and one oxygen atom

Water

is two or more atoms bonded together, they can be the same or different atoms

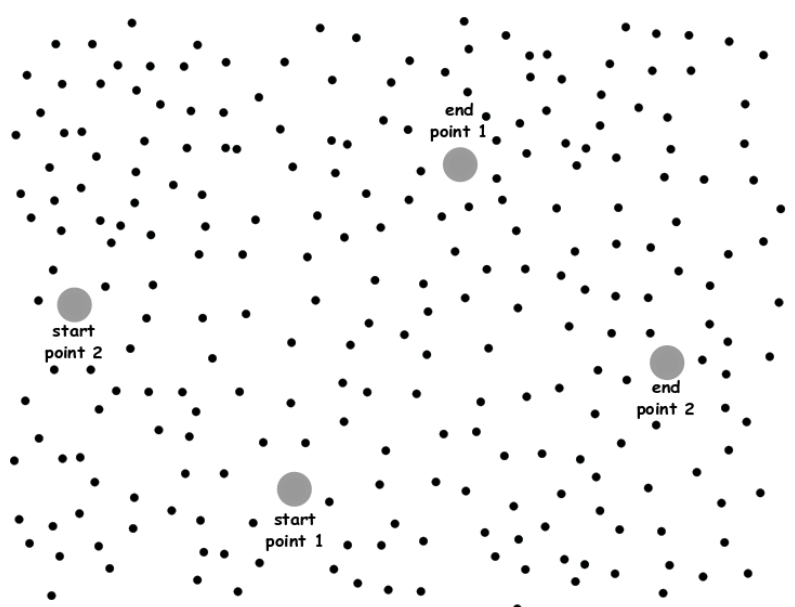
Carbon dioxide

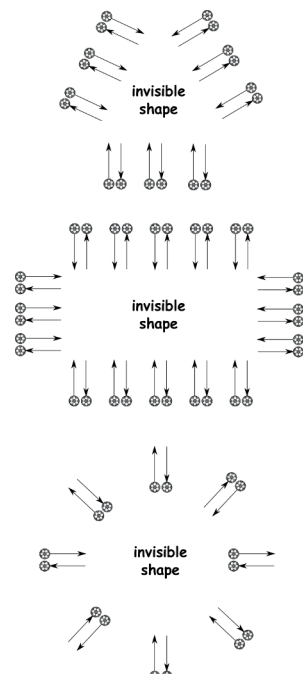
a substance made from only one type of atom

Questions on Evidence for Particles

- | | |
|---|---|
| <p>1. What did scientists think caused the difference between elements?</p> <hr/> <hr/> | <p>8. What causes the dust particles to move erratically?</p> <hr/> <hr/> |
| <p>2. Why don't you normally see a speck of dust in the air?</p> <hr/> <hr/> | <p>9. What is the name given to the particles moving erratically from their start point to end point?</p> <hr/> <hr/> |
| <p>3. When can you sometimes see dust particles moving around in the air?</p> <hr/> <hr/> | <p>10. How did Albert Einstein explain the motion?</p> <hr/> <hr/> |
| <p>4. In what direction do the particles seem to move?</p> <hr/> <hr/> | <p>11. What was most important about Einstein's explanation?</p> <hr/> <hr/> |
| <p>5. What was Robert Brown doing in 1827?</p> <hr/> <hr/> | <p>12. What is a simple way to know the rough size of an oil molecule?</p> <hr/> <hr/> |
| <p>6. What was Robert Brown unable to do?</p> <hr/> <hr/> | <p>13. What do we assume about how thick the layer of oil is?</p> <hr/> <hr/> |
| <p>7. How do we know air exists?</p> <hr/> <hr/> | <p>14. What do many other experiments do?</p> <hr/> <hr/> |

Sketch your own random walks below from start point to end point, they are different every time. Draw in what you think the invisible shapes are by how the balls are bouncing off





Questions on Chemical Symbols and Chemical Formula

- How many elements have been discovered so far?

- Often the chemical symbol is what version of the full name?

- Others come from what language?

- Who are some of the elements named after?

- What is the chemical formula for water?

- How many hydrogen and oxygen atoms does a water molecule have?

- Why is carbon monoxide dangerous?

- How many hydrogen and carbon atoms are there in methane?

- In what form is calcium carbonate commonly found?

- How many of each atom are there in baking powder?

- What is glucose?

- What are common compounds known by?

- What is a compound that normally ends in **-IDE** made from?

- If a compound's name ends with **-ATE**, what will one of the elements be?

Match and memorise the formulae to the compound names below, then write down how many of each atom there is next to the arrow.

Water	CuSO_4	→
Carbon dioxide	CaCO_3	→
Methane	H_2O	→
Calcium carbonate	$\text{C}_6\text{H}_{12}\text{O}_6$	→
Copper sulphate	CH_4	→
Glucose	CO_2	→

Questions on Chemical Reactions

1. What are the two chemicals that react together called?

2. What sort of substance is formed?

3. How many products are often formed?

4. How many ways can we tell if a chemical reaction has happened?

5. What is the name given to a solid that forms in a liquid?

6. What is a simple example of the products of a chemical reaction being a different colour?

7. Why wouldn't you feel anything if you put your hand above an unlit Bunsen burner?

8. What do hand warmers have inside them?

9. What does milk that has 'gone off' tell you?

10. Why do boiled eggs smell?

11. What do we call it when bubbles of gas are given off in a liquid?

12. How can you tell oxygen gas is produced by plants in a fish tank?

13. What chemical reaction is this due to?

14. Why does limewater go cloudy when carbon dioxide is bubbled through it?

15. What happens when water is added to Ouzo?

Match the words to their meanings below and memorise

Precipitate	the name given to bubbles formed in a liquid
Rusting	a chemical used to test for the presence of carbon dioxide gas
Hydrogen sulphide	a commonly used word for the chemical Calcium carbonate, CaCO_3
Effervescence	a solid formed in a solution (liquid)
Limewater	a smelly chemical given off from boiled eggs
Chalk	a chemical reaction between iron (or steel), air and water producing orange - red - brown <i>rust</i> (chemical name iron oxide)

Questions on Chemical Reactions: Atoms Rearranged

- How do we already know when a chemical reaction has taken place?

- We always start with reactants and 'go to' what?

- What does a chemical equation show us?

- What can happen when two substances react together?

- What are bonds?

- How do we know a chemical reaction has taken place instead of a physical change?

- What 'can't usually' happen to chemical reactions?

- What change happens if you put water in the freezer?

- What does sublimation mean?

- Is boiling an egg a chemical or physical change?

- What happens when you add water to sand and cement?

- What is in a cake mixture?

- How do you know a chemical reaction has taken place when you bake a cake?

- What is a familiar example of a reversible reaction? (WHAT? box).

Write next to the examples below whether you think they are chemical or physical changes

- Frying an egg _____ Milk going off _____
- Boiling water _____ Mixing sugar and salt _____
- Dropping a metal in acid _____ Burning toast _____
- Mixing sand with water _____ A lit sparkler _____
- Evaporating alcohol _____ Rotting wood _____
- Melting chocolate _____ Mixing oil and water _____
- A cloud making rain _____ Making popcorn _____
- Filtering dirty water _____ Rusting _____

Questions on Conservation of Mass and Balancing Equations

1. What does conservation of mass tell us?

2. How often is conservation of mass true?

3. Why can't we write $Mg + O$?

4. When one carbon atom reacts with one oxygen molecule, what is produced?

5. How do the number of atoms before and after always compare?

6. What is the product of reacting carbon dioxide with water?

7. When hydrogen reacts with oxygen, what molecule is produced?

8. What does putting numbers in front of the molecules show?

9. How many atoms are there in two molecules of hydrogen?

10. The number '2' in front of H_2 and the '2' in front of H_2O means how many atoms of hydrogen are on both sides of the equation?

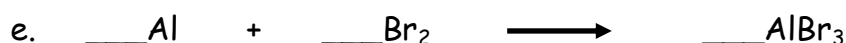
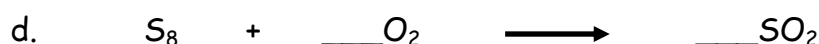
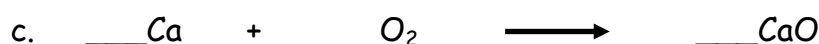
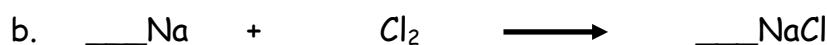
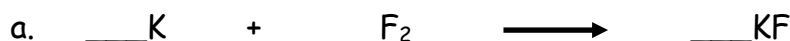
11. What does the reaction between nitrogen and hydrogen produce?

12. Why is the first equation for nitrogen plus hydrogen not balanced?

13. Once balanced how many hydrogen and nitrogen atoms are there on the left and right hand side of the equation?

14. When lead oxide reacts with carbon what are the products?

Balance the equations below, to help there is a space if a number is needed



Questions on Changes of State

1. When we talk of changing state, what do we mean?

2. To do this what must happen?

3. What do we mean by gaseous state?

4. How do we nearly always think of water?

5. What happens if we remove energy from the water molecules in the air?

6. If the water molecules are closer together, what happens to the force of attraction between them?

7. What change of state begins to happen?

8. If we continue to remove energy from the water molecules what happens to them?

9. What happens to the force of attraction eventually?

10. What state of matter is now formed?

11. What does line 'a' show on the graph?

12. What happened to the 'energy in' during line 'b' on the graph?

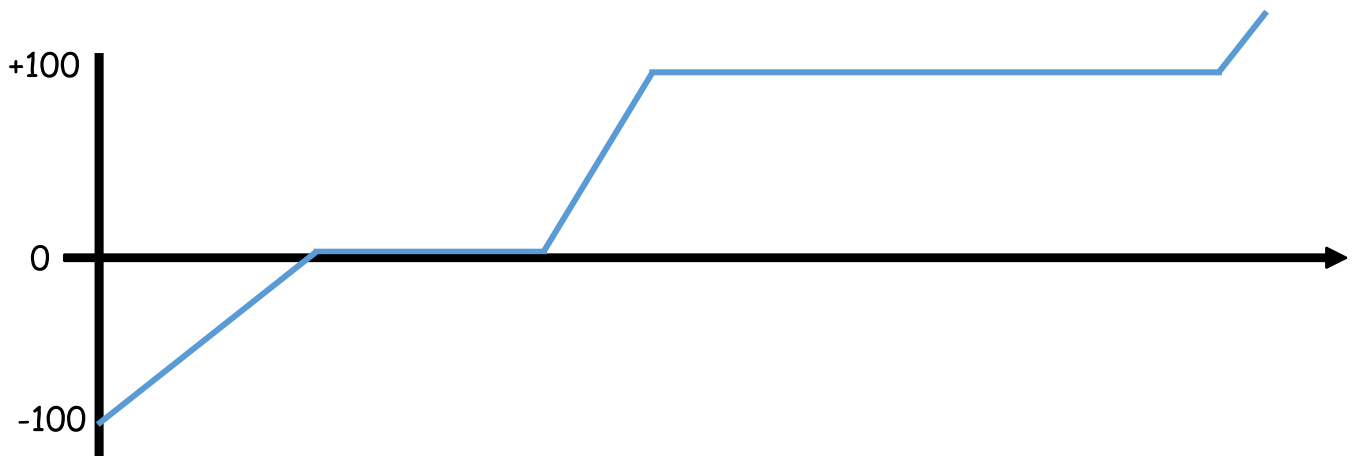
13. When line 'b' meets 'c', what has happened to all the ice?

14. What happens to the water at 100°C and what is another name for it?

15. At 'e' on the graph, what has happened to all the water?

16. Which have more internal energy, hot or cold substances?

Label the y-axis (vertical) and the x-axis (horizontal) and the five different parts of the graph for ice changing to gaseous water



Questions on Pure Substances, Mixtures and how to Separate them

1. What is a pure substance made from?

2. What are two examples of mixtures?

3. In a mixture the substance aren't what?

4. How could you separate a sand and water mixture?

5. What does immiscible mean?

6. What does filtering simply allow to happen?

7. What is the insoluble solid that doesn't pass through after filtering called?

8. What does magnetic separation simply mean?

9. What are the names of the three magnetic elements?

10. What does the word chromatography mean?

11. Chromatography is a method of what?

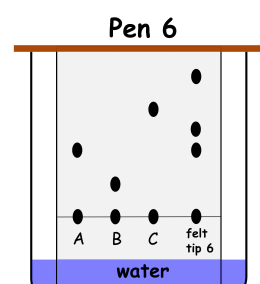
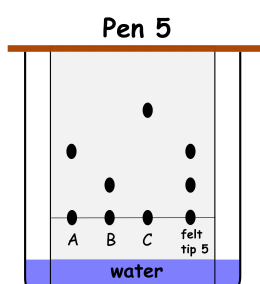
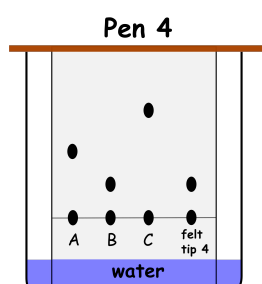
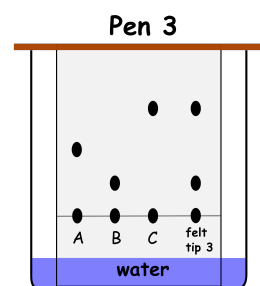
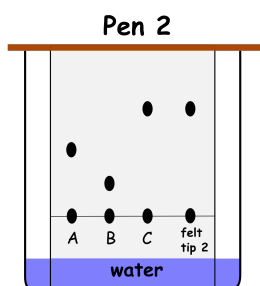
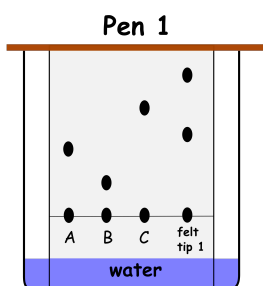
12. When performing chromatography what happens to some of the colours (chemicals)?

13. What happens to the others?

14. When the dissolved substances are separated what is produced?

15. How can we see if inks contain the same colours?

Six new felt tips need to be tested to make sure that they don't contain any of dyes, **A**, **B** or **C** that are banned. Compare the chromatograms and state whether felt tip pens 1 to 6 contain any of the banned dyes.



Questions on Pure Substances, Mixtures and how to Separate them; Continued

1. What happens to the molecules when we evaporate a liquid like water?

2. At what temperature can evaporation take place?

3. When water molecules break away at the surface what do they take with them?

4. What does this do to the liquid left behind?

5. When you sweat and the water evaporates, what is left behind?

6. What can be seen left behind when a puddle evaporates?

7. If you let the water evaporate from a sugary drink what are you left with?

8. What can make this effect faster?

9. Why is it better to evaporate just below the boiling point?

10. Simple distillation is a way of doing what?

11. What does it involve?

12. What are we able to obtain by distilling sea water?

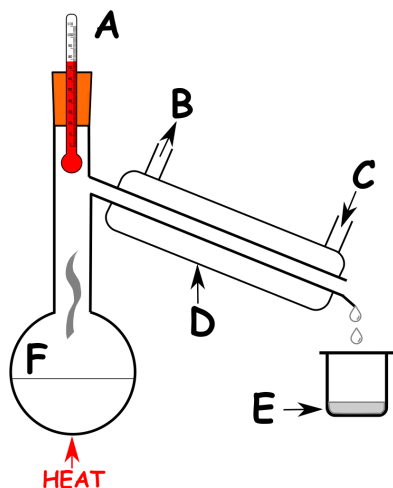
13. What is this process called?

14. We can use distillation to separate a mixture of liquids because they have different what?

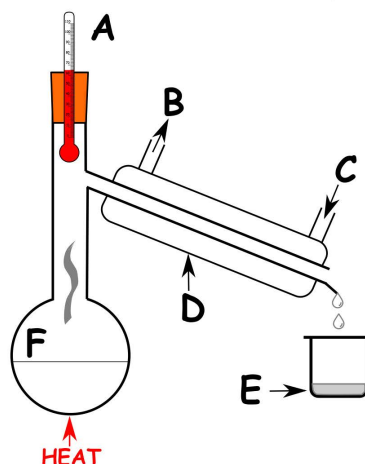
15. You can separate a mixture of alcohol and water by boiling off the alcohol at what temperature?

Label the diagrams below

Label A-F below using the following.
Water/salt mixture, condenser, cold water in,
thermometer reads 100C, warm water out, pure water



Label A-F below using the following.
Acetone and water mixture, condenser,
cold water in, thermometer reads 65C,
warm water out, pure acetone



Questions on Dissolving

1. What does dissolving mean?

2. What 'appears' to happen to the solid that is dissolved?

3. What happens to the sugar molecules, once they are surrounded by the water molecules?

4. What is the substance you are dissolving called?

5. What name is often given to water?

6. What is another common solvent?

7. What does solubility tell you?

8. What do people mean when they say you are saturated because of the rain?

9. Why do some substances dissolve and others don't, is simply down to what?

10. What will happen if the force of attraction between the water molecules and sugar molecules is stronger than the attractive force between the sugar molecules?

11. What else will dissolve in liquids?

12. Which gas is dissolved in fizzy drinks?

13. What can affect how quickly substances dissolve?

14. Why do fish sometimes come to the surface to 'gasp' for air? (WHAT? box)

15. What has no effect on nail polish?

16. What solvent is nail polish remover and what else can it dissolve?

Match and memorise the meanings of the words below

Solute	what is produced when a solute dissolves in a solvent e.g. salty water
Solvent	not able to be dissolved, e.g. chalk, sand, glass
Solution	the substance being dissolved
Soluble	when no more solute can be dissolved by the solvent
Insoluble	the liquid you are dissolving into
Saturated	able to be dissolved, e.g. sugar, salt, metal in acid

Questions on Combustion

1. What is another name for combustion?

2. What are the three requirements for combustion?

3. Where does the oxygen normally come from?

4. What happens if you remove one of the requirements for combustion?

5. What are hydrocarbons commonly used as?

6. What are the products of burning methane, CH_4 ?

7. When does complete combustion happen?

8. What are hydrocarbons made from?

9. As well as methane what other common fuels are used for heating and cooking?

10. Why do the windows 'steam up' when a gas oven is on for a long time?

11. In the combustion experiment what happens to the limewater and the chemical in the 'U' tube?

12. What is incomplete combustion also called?

13. When does incomplete combustion happen?

14. What are the three products of incomplete combustion?

Write out the word equation for complete combustion and incomplete combustion below;

Complete combustion

Incomplete combustion

Using the 'balanced' symbol equations opposite, write the number of carbon, hydrogen and oxygen atoms underneath the left hand side and right hand side of **both** equations. Remember $4 CH_4$ means $4 \times C$, 4 carbon atoms (4 C) and $4 \times H_4$, 16 hydrogen atoms (16 H). They should be the same on both sides!

Questions on Thermal Decomposition

- | | |
|--|--|
| <p>1. What does thermal decomposition use heat to do?</p> <p>_____</p> <p>_____</p> | <p>9. How do we know a gas is given off when copper carbonate, CuCO_3 is heated?</p> <p>_____</p> <p>_____</p> |
| <p>2. What do we usually use to heat the solid in a laboratory?</p> <p>_____</p> | <p>10. How do we know that this gas is carbon dioxide, CO_2?</p> <p>_____</p> <p>_____</p> |
| <p>3. What is another name for calcium carbonate, CaCO_3?</p> <p>_____</p> <p>_____</p> | <p>11. Where do carbonates come from?</p> <p>_____</p> <p>_____</p> |
| <p>4. What happens if you add water to calcium carbonate, CaCO_3 before it is heated?</p> <p>_____</p> | <p>12. What does zinc carbonate, ZnCO_3 decompose to?</p> <p>_____</p> <p>_____</p> |
| <p>5. What is another name for calcium oxide, CaO?</p> <p>_____</p> | <p>13. Where does zinc oxide, ZnO, have lots of uses?</p> <p>_____</p> <p>_____</p> |
| <p>6. Where are huge amounts of calcium oxide, CaO made every year?</p> <p>_____</p> | <p>14. What products can it be found in?</p> <p>_____</p> <p>_____</p> |
| <p>7. What is formed after calcium carbonate, CaCO_3 is heated?</p> <p>_____</p> <p>_____</p> | |
| <p>8. What does copper carbonate, CuCO_3 turn into after heating?</p> <p>_____</p> <p>_____</p> | |

Complete the word equations for the thermal decomposition of the carbonates below

Calcium Carbonate $\xrightarrow{\text{(heat)}}$ **Calcium** _____ **+ Carbon dioxide**

Copper Carbonate $\xrightarrow{\text{(heat)}}$ _____ **oxide** + _____ **dioxide**

Zinc Carbonate $\xrightarrow{\text{(heat)}}$ **Zinc** _____ + _____

Magnesium Carbonate $\xrightarrow{\text{(heat)}}$ _____ _____ **+ Carbon dioxide**

Sodium Carbonate $\xrightarrow{\text{(heat)}}$ _____ _____ + _____

Questions on Oxidation Reactions

1. What would happen to us without oxidation reactions?

2. What is steel mainly made from?

3. Why does an apple soon turn brown once bitten?

4. What is oxidation?

5. What is the product of oxidation called?

6. What is produced when copper is heated to high temperatures in air?

7. What kind of reaction is combustion?

8. What is produced when hydrocarbons are burned?

9. What is coal mainly made from?

10. What is the product of burning carbon?

11. During respiration what is glucose oxidised to give?

12. What is respiration the same as?

13. Because of this, what is respiration also called?

14. What temperatures does respiration happen at?

Complete the word equations below for oxidation below

Zinc + Oxygen \longrightarrow _____

Beryllium + _____ \longrightarrow Beryllium oxide

_____ + Oxygen \longrightarrow Calcium oxide

_____ + Oxygen \longrightarrow Iron oxide

Aluminium + _____ \longrightarrow Aluminium oxide

Nickel + Oxygen \longrightarrow _____

_____ + Oxygen \longrightarrow Sulphur dioxide

Silicon + Oxygen \longrightarrow _____ dioxide

Questions on Displacement Reactions and the Reactivity Series

1. What is the dictionary definition of displacement?

2. Why are you able to grab back your favourite toy from your little brother or sister?

3. In chemistry how do we describe the stronger chemical?

4. Why is 'Z' able to steal 'X' from 'Y'?

5. What do we say that 'Z' has done to 'Y'?

6. What are the names of the four salts in the classic displacement experiment?

7. What are the salts reacted with?

8. What will a more reactive metal do to the sulphate part of the salt?

9. What is left behind?

10. Which is the most reactive metal of the four in the experiment?

11. How can we see that a chemical reaction has taken place?

12. Why does adding magnesium to magnesium sulphate produce no reaction?

13. Which displacement reaction gets hot enough to weld metal together? (What? box)

14. What are some explosions examples of? (What box)

In the empty spaces of the jumbled table below, write either, **no reaction** or **yes** followed by the **name of the metal displaced**. Try using the **reactivity series** rather than the table opposite.

Salt solution	Iron metal	Magnesium metal	Copper metal	Zinc metal
<i>Magnesium sulphate</i>				
<i>Zinc sulphate</i>				
<i>Iron sulphate</i>				
<i>Copper sulphate</i>				
Number of Reactions				

Questions on Acids, Alkalis, Neutralisation and the pH Scale

1. How can acids and alkalis be thought of?

2. If we mix the right amount of acid and alkali what can happen?

3. What do we call this?

4. What are the two most commonly used acids in schools?

5. When is it true that acids are dangerous?

6. Why is the hydrochloric acid, HCl, in our stomachs essential?

7. What might have something to do with the pain we experience from bee stings?

8. What is the most commonly used alkali in schools?

9. How does sodium hydroxide in soap help clean our skin?

10. How do indigestion tablets help calm your stomach?

11. What might have something to do with the pain we experience from wasp stings?

12. What do we use indicators for in chemistry?

13. What is the pH scale and what does it tell us?

14. What do we often use to know the pH of a solution?

15. What colour is neutral on the pH scale?

16. Why can't litmus indicator tell us the pH?

Complete the jumbled pH table below using the examples given on the page opposite

pH	Example	Acid or alkali?
4		
8		
10		
6		
11		
5		
1		
12		
2		
9		
3		
14		
7		
13		

Questions on Reacting Acids and Alkalis and Acids and Metals

1. What happens when you react an acid with an alkali?

2. What does an acid plus an alkali produce?

3. What is produced when an acid reacts with a metal?

4. When hydrochloric acid, HCl, is reacted with sodium hydroxide, NaOH, what is the name of the salt produced and what is its formula? (text box)

5. When sulphuric acid, H₂SO₄, is reacted with sodium hydroxide, NaOH, what is the name of the salt produced and what is its formula? (text box)

6. What is the name of the salt produced when using hydrochloric acid, HCl?

7. What is the name of the salt produced using sulphuric acid, H₂SO₄?

8. Which fertiliser is made by reacting sulphuric acid, H₂SO₄ with ammonia?

9. If magnesium metal is added to hydrochloric acid, HCl, what will you see?

10. What is the test for hydrogen gas?

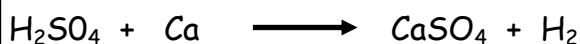
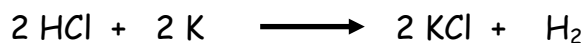
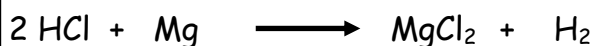
11. How quickly a reaction takes place between an acid and metal depends upon what?

12. When sulphuric acid, H₂SO₄ is reacted with zinc metal, what is the name and formula of the salt produced?

13. When hydrochloric acid, HCl, reacts with potassium metal, what is the name and formula of the salt produced?

In the examples below, underline the salt produced in each case and choose from the following to write the name of the salt underneath its chemical formula. Use the periodic table (pg90) to help and choose from:

Calcium sulphate, Magnesium chloride, Calcium chloride, Magnesium sulphate, Potassium chloride, Calcium sulphate, Sodium sulphate and Calcium chloride



Questions on Exothermic and Endothermic Chemical Reactions

1. What happens whenever a chemical reaction takes place?

2. When the reactants release heat (get warm or hot), what is this reaction called?

3. What will you see, if you measure the temperature before and after an exothermic reaction?

4. When the reactants absorbs heat (get colder), what is this reaction called?

5. What will you see if you measure the temperature before and after an endothermic reaction?

6. What happens to chemical bonds during a chemical reaction?

7. What happens when chemical bonds are formed?

8. What happens when chemical bonds are broken?

9. What happens to the 'decrease in heat energy' during an endothermic reaction?

10. What do energy level diagrams show?

11. Why is dissolving some salts in water endothermic?

12. What is an 'obvious' exothermic reaction?

13. What is neutralisation and is it exothermic or endothermic?

14. What is the chemical reaction of releasing energy from our food called?

Complete the third column of the table by writing whether the chemical reaction is endothermic or exothermic.

Starting temperature of reactants (C)	Final temperature of products (C)	Endothermic / exothermic ?
20	30	
25	6	
-10	15	
22	65	
16	5	
18	-6	

Questions on The Periodic Table of Elements

- | | |
|--|--|
| <p>1. When scientists began discovering lots of new elements what did they put them in order of?</p> <hr/> | <p>8. What is the name of the three particles that the atom is made from?</p> <hr/> |
| <p>2. Who had great success with this method?</p> <hr/> | <p>9. What does the number at the top of each 'square' tell you and what is it called?</p> <hr/> |
| <p>3. How did he arrange the rows?</p> <hr/> | <p>10. Why do the charges of an atom cancel out?</p> <hr/> |
| <p>4. What did Dimitri Mendeleev leave in his table, for elements he predicted should exist?</p> <hr/> | <p>11. What does this mean that the atom is?</p> <hr/> |
| <p>5. Each element in the periodic table is made from a different what?</p> <hr/> | <p>12. How are the electrons arranged in an atom?</p> <hr/> |
| <p>6. Complete the sentence ; the atom is the smallest.....</p> <hr/> | <p>13. What decides how one element reacts with another element?</p> <hr/> |
| <p>7. How many particles are atoms made from and where aren't they normally found?</p> <hr/> | <p>14. What is the atomic number of chlorine?</p> <hr/> |

Use the periodic table to complete the number of protons, number of electrons and number of neutrons for each element. First one is done for you.

Element	Number of protons	Number of	Number of
Boron - 11	5	5	11 - 5 = 6
Carbon - 12			
Magnesium - 24			
Fluorine - 19			
Potassium - 39			
Lithium - 7			
Iron - 56			
Gallium - 70			

Questions on Properties of Metals and Non-Metals

- | | |
|--|---|
| <p>1. What separates the metals from the non-metals on the periodic table?</p> <hr/> <hr/> <hr/> <hr/> | <p>8. What is the property of being able to pull metal into wires called?</p> <hr/> |
| <p>2. What are metals good at?</p> <hr/> | <p>9. Which metal is particularly ductile?</p> <hr/> |
| <p>3. What does this mean?</p> <hr/> <hr/> <hr/> | <p>10. What does being malleable mean?</p> <hr/> <hr/> <hr/> |
| <p>4. What does sonorous mean?</p> <hr/> <hr/> <hr/> | <p>11. What is a mixture of metals called?</p> <hr/> |
| <p>5. What do we mean by being dense?</p> <hr/> <hr/> <hr/> | <p>12. Why might you mix a strong, heavy metal, with a light, weak one?</p> <hr/> <hr/> <hr/> |
| <p>6. What are the names of the three magnetic metals?</p> <hr/> <hr/> <hr/> | <p>13. Non-metals are bad at conducting electricity and heat which means they are good at what?</p> <hr/> |
| <p>7. Why is much of the metal 'around us' magnetic?</p> <hr/> <hr/> | <p>14. In what form do non-metals often exist at room temperature?</p> <hr/> <p>15. Why are non-metals dull?</p> <hr/> <hr/> <hr/> |

Write the following properties in the metals or non-metals column

malleable, good conductors, not sonorous, bad conductors, strong, high melting points, ductile, not strong, not ductile, not malleable, sonorous, low melting points

Metals	Non-metals

Questions on Properties of G1, G2, G7 and G8

1. What are the Group 1 (G1) elements called?

2. What is one of the ways to investigate their reactivity?

3. What do the alkali metals produce when they react with water?

4. What happens to the reactivity as you move down Group 1?

5. Why does rubidium sink when dropped into water?

6. Why do Group 1 elements react in a similar way?

7. What are Group 2 (G2) elements called?

8. What do they produce when reacted with water?

9. What happens to their melting point as you move down the group?

10. Why do Group 2 elements react in a similar way?

11. What are the Group 7 elements called?

12. What state of matter are fluorine, chlorine, bromine and iodine at room temperature (20°C)?

13. What happens to the reactivity as you move down Group 7?

14. Why do Group 7 elements behave in a similar way?

15. What are the Group 8 elements called?

16. Why are they very unreactive?

Match and memorise the meanings of the words below

Groups	(the alkali earth metals), have two electrons in their outer shell
Group 1	(the halogens), have seven electrons in their outer shell
Group 2	(the noble gases), have full or eight electrons in their outer shell
Group 7	(the alkali metals), have one electron in their outer shell
Group 8	these are the columns in the periodic table and tell you the number of electrons in the outer shell. Elements in the same group behave similarly

Questions on Metals and Non-metal Oxides

- When elements react with oxygen what do they form?

- If the compound formed has two oxygen atoms, what will the second part of its name be?

- What are the names of the three example monoxides?

- What kind of elements are carbon, sulphur and nitrogen?

- What will nearly all of their oxides do in water?

- Which two compounds released from burning fossil fuels are responsible for acid rain?

- What type of chemical are all metal oxides?

- What are the products of the reaction between an acid and a base?

- What is the difference between alkalis and bases?

- What other compounds are bases?

- If a carbonate base reacts with an acid what gas is produced?

- What is the formula for calcium carbonate?

- What is calcium carbonate often used in and why?

Use the difference between an alkali and a base to put the following in the correct column

Sodium oxide (soluble in water), Iron oxide (insoluble in water), Copper oxide (insoluble in water), Potassium oxide (soluble in water), Lithium oxide (soluble in water), Tin oxide (insoluble in water).

Alkali	Base

Questions on Using Carbon to Obtain Metals from Ores

1. What are ores?

2. How are useful metals extracted from ores?

3. What does electrolysis do?

4. What are elements higher up in the reactivity series able to do?

5. What is magnesium metal able to do to copper sulphate?

6. What does the reactivity series mean we can do?

7. Where is carbon in the reactivity series?

8. Why is carbon cheap?

9. What can carbon be used for?

10. Which metals are extracted using carbon?

11. How is carbon used to extract the metal from its ore?

12. What is the name of an iron ore?

13. How is iron obtained from iron oxide?

14. How is lead obtained from lead oxide?

15. Give two uses of lead.

Find the ores in the word search below (italics)

Acanthite (silver), Bauxite (aluminium), Chalcocite (copper), Chromite (chromium), Cinnabar (mercury), Cobaltite (cobalt), Galena (lead), Hematite (iron), Malachite (copper), Scheelite (tungsten), Sperrylite (platinum), Sphalerite (zinc), Pentlandite (nickel), Rutile (titanium)

A	B	C	D	C	I	N	N	A	B	A	R	E	F
G	H	I	J	K	L	M	M	N	N	O	P	Q	R
S	C	T	S	P	H	A	L	E	R	I	T	E	U
V	H	W	X	Y	Z	L	L	G	X	M	K	D	S
Y	A	G	Z	S	M	A	A	P	A	X	W	X	P
M	L	S	G	C	G	C	P	E	G	J	A	E	E
P	C	D	V	H	C	H	T	N	L	O	T	T	R
O	O	U	R	E	N	I	C	T	M	I	I	M	R
B	C	M	V	E	T	T	P	L	T	H	B	T	Y
C	I	Y	B	L	D	E	V	A	T	K	R	A	L
J	T	P	A	I	L	J	M	N	V	T	E	N	I
P	E	B	U	T	R	E	A	D	T	L	Q	H	T
S	O	K	X	E	H	C	R	I	I	E	V	M	E
C	Y	K	I	J	A	W	Z	T	W	R	N	N	G
C	M	I	T	L	L	K	U	E	F	Z	I	H	S
I	Z	X	E	C	H	R	O	M	I	T	E	J	T

Questions on Polymers (Plastics), Ceramics and Composites

1. What are polymers or plastics?

2. How are they made?

3. What are the molecules that link together to make a polymer called?

4. What is polythene made from?

5. Why can PVC be used to make shoes and clothes?

6. What does composite mean?

7. What do you make if you mix sand, cement, stones and water?

8. Why is carbon fibre used in making bikes and cars?

9. What does MDF stand for?

10. What is MDF widely used for?

11. What do we think of when we see the word ceramic?

12. What useful properties do ceramics have?

13. What are ceramics used to make?

14. Why are our houses 'made from' ceramics?

15. What property makes ceramics useful on electricity pylons?

Write the names of the materials below into the correct column

NYLON, CHIPBOARD, HOUSE BRICK, BATHROOM SINK, PLAYDOUGH, PTFE, FALSE TEETH, POLYSTYRENE, REINFORCED GLASS, TILES, FIBRE-GLASS, RUBBER, PAPIER-MACHE, A SAUCER, SILK

Polymer	Composite	Ceramic

Questions on Composition and Structure of the Earth

1. What is the earth?

2. What is a mineral?

3. How many distinct layers is the earth made from?

4. What are the names of the layers?

5. Which of the layers is the thickest?

6. About how thick is the earth? (Its radius)

7. What happens to the density of the layers as you head towards the centre?

8. What are the inner and outer core made mainly from?

9. Where does most of our knowledge of the earth's interior come from?

10. Imagine broken pieces of plate sitting on treacle, what happens to the plates if the treacle is heated?

11. What is this theory called?

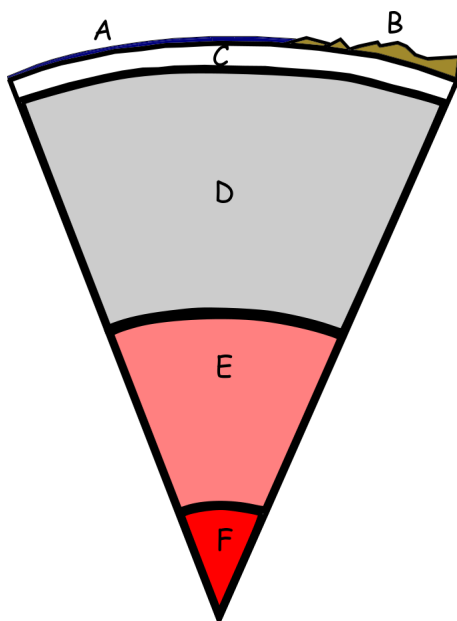
12. Scientists have evidence that the earth was what, millions of years ago? What is its name?

13. What happened to this continent?

14. What can be caused by land masses colliding?

15. What are the two easily understood pieces of evidence for plate tectonic theory?

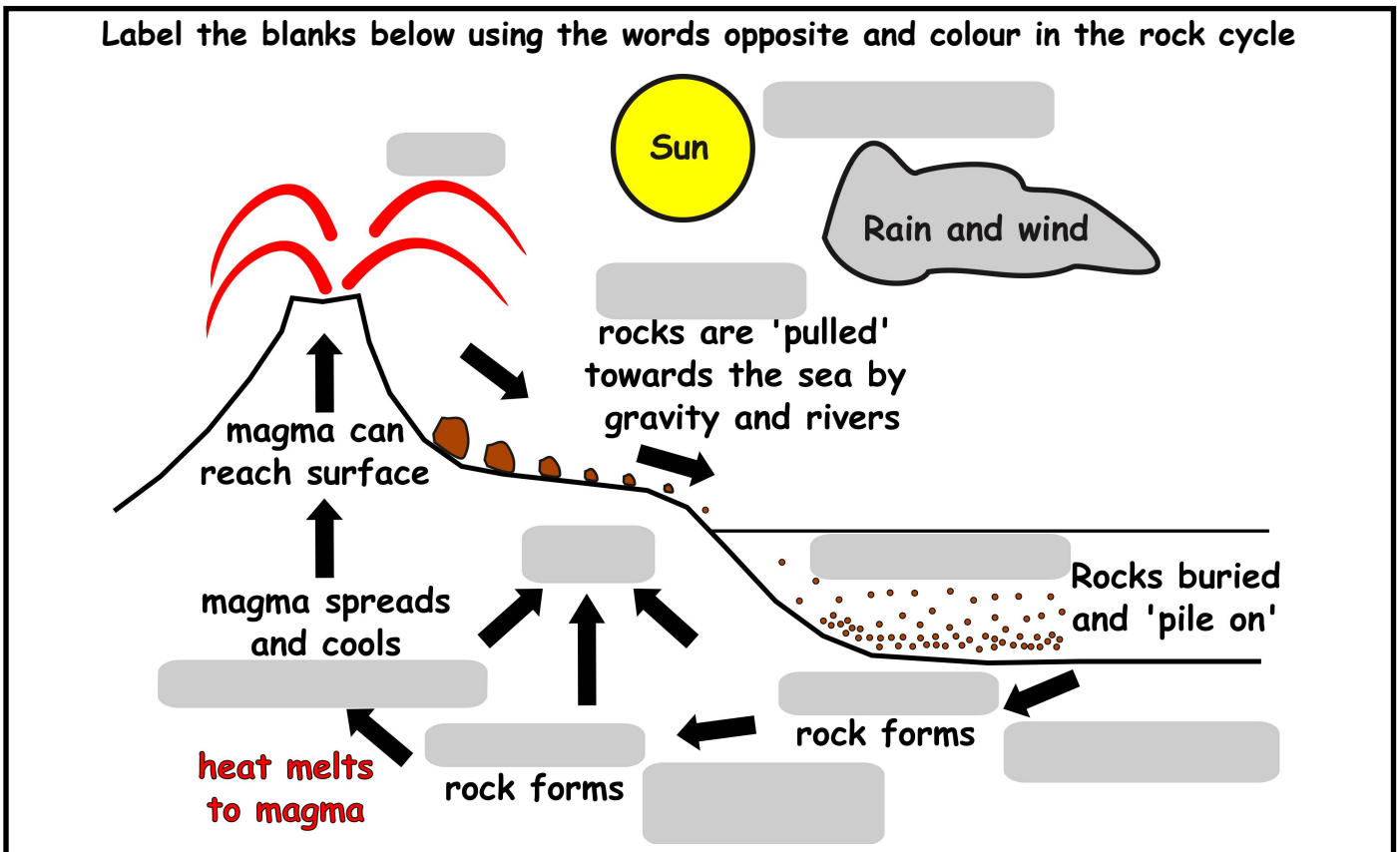
Label the earth and write in the name of the layer from its thickness in the table



Layer	Thickness (miles)
	4
	1400
	25
	760
	1800

Questions on the Rock Cycle

- | | |
|--|--|
| <p>1. How many different types of rock are there?</p> <p>_____</p> <p>_____</p> | <p>9. How do rocks get transported to the oceans?</p> <p>_____</p> <p>_____</p> |
| <p>2. What does the rock cycle describe?</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>10. How is sedimentary rock formed? Give an example of sedimentary rock?</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| <p>3. What makes the rock cycle happen?</p> <p>_____</p> <p>_____</p> | <p>11. What does heat and pressure do to sedimentary rock?</p> <p>_____</p> <p>_____</p> |
| <p>4. What is liquid rock under the ground called?</p> <p>_____</p> | <p>12. What does metamorphosis mean?</p> <p>_____</p> <p>_____</p> |
| <p>5. What do we call liquid rock above the ground?</p> <p>_____</p> | <p>13. How is igneous rock formed?</p> <p>_____</p> <p>_____</p> |
| <p>6. Why is extrusive rock made from smaller crystals?</p> <p>_____</p> | <p>14. What is the name of the igneous rock we use to clean our skin?</p> <p>_____</p> <p>_____</p> |
| <p>7. When magma cools slowly, what happens to the size of the crystals formed and what is this rock called?</p> <p>_____</p> <p>_____</p> | |
| <p>8. What does weathered mean?</p> <p>_____</p> <p>_____</p> | |



Questions on Earth's Limited Resources

- | | |
|--|--|
| <p>1. What sort of life forms are all living things on earth?</p> <hr/> <hr/> <hr/> | <p>8. Which two metals are used in batteries to power anything from a tablet to an electric car?</p> <hr/> <hr/> <hr/> |
| <p>2. What does the carbon cycle show?</p> <hr/> <hr/> <hr/> | <p>9. Where does most of the world's cobalt and lithium come from?</p> <hr/> <hr/> <hr/> |
| <p>3. How long does it take the fossil fuels to form?</p> <hr/> <hr/> <hr/> | <p>10. What isn't there enough of in many parts of the world?</p> <hr/> <hr/> <hr/> |
| <p>4. As well as contributing to climate change, what else is wrong with the way we use earth's resources?</p> <hr/> <hr/> <hr/> | <p>11. How can wells become polluted?</p> <hr/> <hr/> <hr/> |
| <p>5. What is the raw material for plastics?</p> <hr/> <hr/> <hr/> | <p>12. What happens if more water is consumed than replaced by rainfall?</p> <hr/> <hr/> <hr/> |
| <p>6. What else can oil be used for?</p> <hr/> <hr/> <hr/> | <p>13. What is another word for drinkable water?</p> <hr/> <hr/> <hr/> |
| <p>7. Where is too much plastic ending up?</p> <hr/> <hr/> <hr/> | <p>14. What can put our supply of water at risk?</p> <hr/> <hr/> <hr/> |

Find the words below in the word search opposite

*CARBONCYCLE CARBONDIOXIDE
 PHOTOSYNTHESIS
 FOSSILFUELS POPULATION
 DEFORESTATION RESOURCES
 PLASTIC BIODEGRADABLE
 LITHIUM COBALT POTABLE*

D E F O R E S T A T I O N E
 A B C D E F G H L I J K L C
 L M N O P O T A B L E B P A
 P Q R S T U B M V W A C H R
 X Y R E S O U R C E S A O B
 Z P T A C I L E D L B R T O
 K O C Y H N V A E J B B O N
 Z P L T F T R U W U A O S D
 V U I R M G F V A A T N Y I
 W L G V E L X R S K T C N O
 W A C D I B H I T S E Y T X
 J T O S P N V O E S R C H I
 G I S F K F S H F G I L E D
 B O V A C D N Y U A E E S E
 F N F K W U Q P L A S T I C
 H J A F V L N A H C Q G S Y

Questions on The Earth's Atmosphere and Climate Change

1. What is our atmosphere?

2. What are the two main gases in earth's atmosphere and what are their percentages?

3. How much has the population risen since the year 1800?

4. Where does a lot of energy even electricity come from?

5. What is a greenhouse gas good at?

6. What would happen to the heat without our carbon dioxide blanket?

7. Where does a lot of methane in the atmosphere come from?

8. Why has the amount of methane in the atmosphere increased?

9. What has the extra heat done to land and sea water?

10. What does this cause in some parts of the world?

11. What does it do in other parts of the world?

12. What's happening to the frequency of extreme weather?

13. What sort of vehicle could we switch to that would help?

14. Generating electricity through which methods would also help?

Complete the gap filling exercise on global warming. Choose from the words below.

warmer, Water, carbon dioxide, fossil fuels, animal, rotting, light, greenhouse, methane, re-emitted, heat energy, gases, surface, back, extra

The two main _____ gases are _____ and _____. Carbon dioxide comes mainly from burning _____. Methane comes mainly from _____ farming and _____ vegetation. _____ in the atmosphere also helps trap heat that would escape into space. The _____ energy from the sun is absorbed by earth's _____ heating it. This energy is _____ back towards space. Instead of escaping, this _____ is absorbed by greenhouse _____ which re-emit some of the heat _____ towards earth. The _____ greenhouse gases from human activity mean that the earth is getting _____ too fast.

Questions on Reaction Rates and Catalysts

1. What do we mean, when we talk about rates?

2. Measuring how quickly which product is formed, can measure the rate of a reaction?

3. What could be the unit of how quickly this product is formed?

4. How else can a reaction rate be measured?

5. What does collision theory tell us?

6. What does more collisions per second mean?

7. How must particles hit each other for a reaction to happen (a successful collision)?

8. What does increasing the concentration mean?

9. If the particles move faster, what must have increased?

10. What's another way of saying increasing the surface area?

11. What does this do to the likelihood of a collision?

12. What are catalysts?

13. Why can you use catalysts again and again?

14. What do catalysts do to the energy that particles must hit each other with for a reaction to occur?

15. What is an enzyme?

Match the words to their meanings below and memorise

Concentration

particles have less energy and move slower, collisions are less frequent (often)

High temperature

smaller area to hit and collisions are less likely

Low temperature

the amount of particles in a given volume

Low surface area

chemicals that speed up reactions without being used up

High surface area

particles have more energy and move faster, collisions are more frequent (often)

Catalysts

bigger area to hit and collisions are more likely

Questions on Cost of Electricity and Power Ratings

- | | |
|--|---|
| <p>1. What does the amount of energy an electrical appliance uses depend upon?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> | <p>9. Why don't we use the joule?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> |
| <p>2. Power ratings are normally found as what on an electrical appliance?</p> <hr style="border: 0.5px solid black;"/> | <p>10. How many kWh would the kettle shown opposite use, if it was switched on for 1 hour?</p> <hr style="border: 0.5px solid black;"/> |
| <p>3. What voltage is mains electricity supply in the UK?</p> <hr style="border: 0.5px solid black;"/> | <p>11. How much does one kWh cost on the electricity bill shown?</p> <hr style="border: 0.5px solid black;"/> |
| <p>4. What is the unit of power?</p> <hr style="border: 0.5px solid black;"/> | <p>12. Where are the readings taken from for an electricity bill?</p> <hr style="border: 0.5px solid black;"/> |
| <p>5. How many watts are there in 1kW?</p> <hr style="border: 0.5px solid black;"/> | <p>13. How much is the average household electricity bill? (WHAT? box).</p> <hr style="border: 0.5px solid black;"/> |
| <p>6. How do you convert watts into kilowatts?</p> <hr style="border: 0.5px solid black;"/> | <p>14. What are two of the energy hungry appliances in the house?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> |
| <p>7. How do we calculate how much energy is consumed by an appliance?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> | |
| <p>8. What is the unusual unit of energy that we use when calculating the energy used by an electrical appliance?</p> <hr style="border: 0.5px solid black;"/> | |

Complete the energy column by calculating how much energy in kWh each appliance uses

Appliance	Energy (kWh)	Power (kW)	Time (hours)
Kettle		2.0	1.5
Shower		9.0	0.5
Iron		5.0	2.0
Xbox 1		0.11	10.0
Toaster		1.8	0.5
Sandwich maker		1.0	0.25
Washing machine		4.0	1.5
Vacuum cleaner		0.9	1.0
Tumble dryer		2.2	0.5

Convert the following times into hours and write them as a decimal and as a mixed fraction.

- | | | | | |
|---------------|---------------|----------------|---------------|----------------|
| A. 30 minutes | B. 80 minutes | C. 600 minutes | D. 10 minutes | E. 120 minutes |
| F. 90 minutes | G. 15 minutes | H. 200 minutes | I. 20 minutes | J. 160 minutes |

Questions on Energy Stores

- How many different ways can energy be stored?

- What type of energy do batteries store?

- What are we doing when we recharge a battery?

- How does an object gain GPE?

- What increases the GPE an object has?

- Apart from being stretched how else can objects store elastic potential?

- What is nuclear energy released from?

- What happens to a nucleus during fission and fusion?

- How can you have stored magnetic energy?

- What do positive and negative charges do to each other?

- How do we transfer electric potential energy?

- What is another word for heat?

- When does an object store kinetic energy?

- How can the kinetic energy of an object be increased?

Match the words to their meanings below and memorise

Chemical potential energy	the energy an object has when stretched or squashed.
Gravitational potential energy	energy stored due to the attraction or repulsion of charges.
Elastic potential energy	the energy stored in chemical bonds.
Nuclear energy	energy of motion.
Magnetic potential energy	another word for heat, due to the vibration or motion of the particles of a substance.
Electric potential energy	the energy an object has by being raised above the ground.
Thermal energy	energy stored due to the attraction or repulsion of magnets.
Kinetic energy	energy stored by the nucleus of an atom

Questions on Energy Transfers

- | | |
|--|---|
| <p>1. When is energy most useful?</p> <hr/> <hr/> | <p>8. What happens to the GPE as the ball falls?</p> <hr/> |
| <p>2. What's involved in bringing about energy transfers?</p> <hr/> | <p>9. How is the chemical energy store of your food converted to elastic potential?</p> <hr/> <hr/> |
| <p>3. What does emission mean?</p> <hr/> <hr/> | <p>10. What does contract mean?</p> <hr/> |
| <p>4. What type of energy does a battery store?</p> <hr/> | <p>11. What type of energy increases when the elastic band is let go?</p> <hr/> |
| <p>5. What happens to this energy when you switch on your torch?</p> <hr/> <hr/> | <p>12. What type of energy decreases when the elastic band is let go?</p> <hr/> |
| <p>6. What eventually happens to the light energy emitted by your torch?</p> <hr/> | <p>13. What happens to the energy store of an object if you increase its height?</p> <hr/> |
| <p>7. Why does the ball store GPE?</p> <hr/> <hr/> <hr/> | <p>14. In increasing the height of an object what are chemical reactions able to do to muscles?</p> <hr/> <hr/> <hr/> |

Complete the table by matching the examples given below to the energy flows

A catapult being released; A car speeding up; A falling yoyo;
 A solar cell powered by sunlight; A wind turbine; A rising yoyo; A car at constant speed;
 A tumble dryer; A kettle boiling water; A catapult being pulled back

Examples	Energy flows
	Chemical potential to heat (explosion in engine) to kinetic energy
	Electric potential forces an electric current to flow producing heat
	GPE to kinetic
	Kinetic to GPE
	Elastic potential to Kinetic energy
	Kinetic energy to Electric potential
	Chemical potential to elastic potential
	Nuclear energy to light energy to Electric potential
	Electric potential forces an electric current to flow producing heat and kinetic energy
	Chemical potential to heat energy

Questions on Energy Transfers (Continued)

1. Through what process is light emitted by the sun?

2. What does the light energy force a plant to do?

3. What energy store increases for a bicycle speeding up?

4. What energy store decreases for a bicycle speeding up or moving a constant speed?

5. What happens to the tyres and moving parts when pedalling a bike?

6. What do you have to do to the air when riding a bicycle?

7. When you pedal a bicycle at constant speed why isn't your kinetic energy increasing?

8. What sort of energy does a bullet store?

9. How is the bullet forced from the gun?

10. What does this do to the thermal energy?

11. What's another name for the voice box?

12. What do we call the vibration produced by the voice box?

13. What eventually happens to the energy of the vibrations of a sound wave?

14. How much energy reaches the earth from the sun in one hour? (WHAT? box)

Solve the clues below to do with energy

1. What is the name of the process by which plants grow called?

P_____

2. A chemical that is burned to provide heat energy is called a? F ____

3. If the kinetic energy of an object is increasing it must be? A _____

4. Objects have to push air out of the way when they move this is called?

A ____ R _____

5. Another word for heat energy? T _____ E _____

6. A changing magnetic field can force a speaker to vibrate producing? S _____

7. A falling bouncy ball is squashed when it hits the ground, this converts its kinetic energy to? E _____ P _____

8. The electric potential of a battery decreases through the flow of an?

E _____ C _____

9. We do this to our houses to reduce heat loss? I _____

10. There is plenty of this energy left in our sun? N _____ E _____

Questions on Conservation of Energy

- | | |
|---|--|
| <p>1. What can't happen to energy?</p> <p>_____</p> <p>_____</p> | <p>9. What happens to the 10J of GPE when the bowling ball is dropped?</p> <p>_____</p> <p>_____</p> |
| <p>2. Complete the sentence about conservation of energy, "All this means is...".</p> <p>_____</p> <p>_____</p> | <p>10. If you increase the length of an average elastic band by 10cm how much energy does it store?</p> <p>_____</p> <p>_____</p> |
| <p>3. What is another way of thinking of this?</p> <p>_____</p> <p>_____</p> | <p>11. What does dissipation mean?</p> <p>_____</p> <p>_____</p> |
| <p>4. If 100J of energy flows into a bulb, how much energy must flow out?</p> <p>_____</p> <p>_____</p> | <p>12. Roughly how much energy does an 'AA' battery store?</p> <p>_____</p> <p>_____</p> |
| <p>5. How often is this true?</p> <p>_____</p> <p>_____</p> | <p>13. Why is this energy really useful?</p> <p>_____</p> <p>_____</p> |
| <p>6. What does this enable us to do?</p> <p>_____</p> <p>_____</p> | <p>14. If I put the battery into a handheld fan and turn it on what will most of the energy be transferred into?</p> <p>_____</p> <p>_____</p> |
| <p>7. What could we calculate about a space craft?</p> <p>_____</p> <p>_____</p> | <p>15. What causes the heat emitted by the fan?</p> <p>_____</p> <p>_____</p> |
| <p>8. What does 1kg weigh?</p> <p>_____</p> <p>_____</p> | |

Write down possible or not possible next to the energy changes in the table using conservation of energy

Energy changes	Possible / Not possible ?
A light bulb, 100J of electric current flow changes into 30J heat and 71J of light	
Stretching an elastic band, 0.25J of chemical energy changes into 0.25J of elastic potential	
Lifting a ball, 10J of chemical energy changes into 8J of GPE for the ball	
A falling bouncy ball, 2J of GPE changes to 1.9J of KE and 0.1J of heat	
A bouncy ball hitting the ground, 1.9J of KE changes into 1.9J of elastic potential	
A growing plant, 1000J of light energy changes into 800J of chemical and 100J of heat	
Mixing hot and cold drinks, hot drink loses 20,000J, cold drink gains 18,000J	
Pushing two repelling magnets together, 0.05J of chemical energy changes to 0.05J magnetic potential energy	

Questions on Work and Energy

- | | |
|--|---|
| <p>1. What does doing housework or homework require?
_____</p> | <p>9. When you push your pen along the paper, what are you doing work against?
_____</p> |
| <p>2. What is the work done equal to?
_____</p> | <p>10. When you lift your clothes off the floor what are you doing work against?
_____</p> |
| <p>3. What do we need to know to calculate work?

_____</p> | <p>11. What happens to some of the work you do (energy) when starting to push a chair?
_____</p> |
| <p>4. Why does this make sense?

_____</p> | <p>12. Once the chair is moving at a steady speed what happens to the work done on the chair?
_____</p> |
| <p>5. If you lift two apples weighing 1 N each a height of 1 metre how much work is done?

_____</p> | <p>13. When pushing the chair on 'zero friction ice' what happens to the work you do (energy transferred)?
_____</p> |
| <p>6. What is the unit of work and hence energy?
_____</p> | <p>14. If there is no friction or air resistance what can't the kinetic energy transfer into?
_____</p> |
| <p>7. If when doing your homework you move your pen 4m, how much work have you done?
_____</p> | <p>15. What happens if you push the chair for a greater distance?
_____</p> |
| <p>8. Often when you do work you are working against a force, what does that force try to do?

_____</p> | <p>16. What does power tell us? (WHAT? box)

_____</p> |

Solve the jumbled words to do with work and energy

Letters	Description	Answer
OUELJ	The unit of work	
ANSRTERFRED	When work is done, energy is always	
TREME	The unit of distance when calculating work	
CTIIORFN	What we often do work against	
ARGTIVY	Doing work against this increase GPE	
EHTA	Work against friction always transfers some energy to..	
IKETICN	If there is no friction or air resistance the work we do in pushing an object is equal to the energy gained	
TWENNO	The unit of force	

Questions on Fuels and Energy Resources

- | | |
|--|---|
| <p>1. How is most of the world's energy still generated?</p> <p>_____</p> <p>_____</p> | <p>11. What are the blades of a wind turbine connected to?</p> <p>_____</p> |
| <p>2. What are the fossil fuels?</p> <p>_____</p> <p>_____</p> | <p>12. How does geothermal power work?</p> <p>_____</p> <p>_____</p> |
| <p>3. What were they formed from and how?</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>13. What does the up and down motion of a wave do to the air to produce electricity?</p> <p>_____</p> <p>_____</p> |
| <p>4. What does non-renewable mean?</p> <p>_____</p> | <p>14. After trapping water behind a dam how does hydroelectric power generate electricity?</p> <p>_____</p> <p>_____</p> |
| <p>5. Why does the kinetic energy of the steam decrease?</p> <p>_____</p> <p>_____</p> | <p>15. Why does burning fossil fuels contribute to global warming?</p> <p>_____</p> |
| <p>6. What does the generator produce?</p> <p>_____</p> | <p>16. What is the problem with wave, solar and wind energy?</p> <p>_____</p> <p>_____</p> |
| <p>7. How does the energy from the generator flow to our homes?</p> <p>_____</p> | <p>17. What is an advantage of renewables?</p> <p>_____</p> <p>_____</p> |
| <p>8. What can't we do to nuclear fuel?</p> <p>_____</p> | <p>18. What is one of the problems with nuclear power?</p> <p>_____</p> <p>_____</p> |
| <p>9. Why is nuclear fuel also non-renewable?</p> <p>_____</p> <p>_____</p> | |
| <p>10. What does a solar panel do?</p> <p>_____</p> <p>_____</p> | |

Solve the jumbled words below to do with energy resources

Letters	Description	Answer
ONBNAEWLEERNO	Energy resource that will run out	
CLUREAN EACRIONST	Nuclear power releases its energy through these	
HIANC	Country that generates most electricity from hydroelectric	
CIAD INRA	Burning fossil fuels contributes to	
IBNEUTR	Spins very fast like a jet engine and connected to a generator	
OTARRENEG	Transfers kinetic energy into electric potential	
IKETICN	Type of energy wind has	
BLOLAG IRAMGNW	Burning fossil fuels also contributes to	
BNAEWLEERO	Energy resource that won't run out	

Questions on Simple Machines

1. What does a machine do to a job?

2. What happens to the energy put into a machine?

3. What is the simple name for an inclined plane?

4. Why was a ramp used to get the mower into the car?

5. Although a ramp requires a smaller force what is greater when you use a ramp?

6. What would happen to the force needed to push the mower up the ramp if it was 2.4m long? (three times as far rather than twice)

7. What would the work done still be in this case?

8. What two words could be used to describe a lever?

9. What did ancient civilisations use levers for?

10. What are you most likely to use a lever for nowadays?

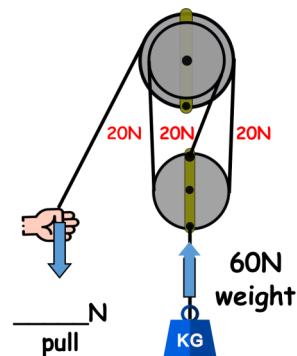
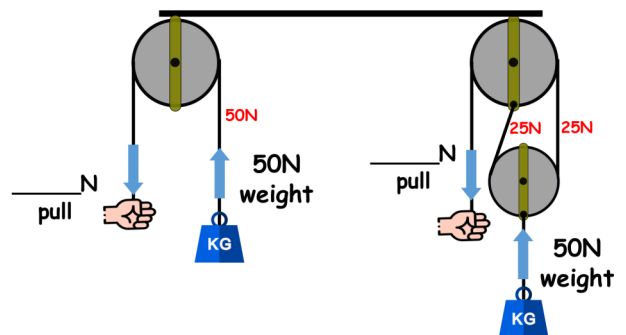
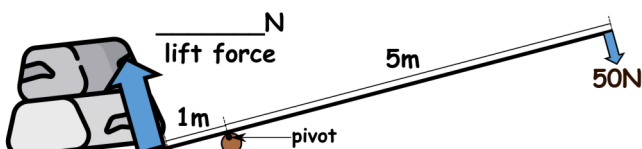
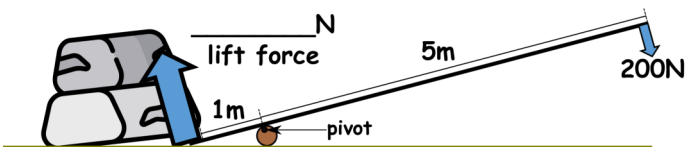
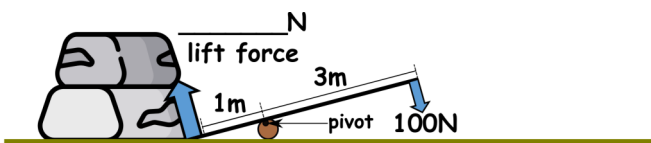
11. What fact do levers rely on to work?

12. What is the turning effect of a force called?

13. What is mechanical advantage?

14. Is there any mechanical advantage with the pulley on the left?

Write down what the lift force is for the force magnifiers below and the pull force for the pulleys, use the examples opposite to help



Questions on The States of Matter

- When thinking about solids, liquids and gases what is very familiar?

- What shape is a water molecule?

- What do we draw to represent the atoms or molecules?

- What are the forces of attraction (bonds) like in a solid?

- What do the particles vibrate 'about' in a solid?

- What happens to the particles when you heat a solid and what does this mean for the space they need?

- How do the forces of attraction in a liquid compare to a solid?

- What's the spacing of the particles like in a liquid?

- What's the spacing of the particles like in a gas?

- What normally happens to density as you move from the liquid state to the solid state?

- Why is this?

- What does anomaly mean?

- What happens as water changes from liquid to solid?

- Why does ice float on water?

- What can happen to power lines in the summer?

- How do thermometers work?

- What do bridges have to allow for expansion and what do they look like?

Match and memorise the meanings of the words below

Melting	changing from a liquid to a solid
Vapourising	reduction in size of a material usually when cooled
Condensing	increase in size of a material usually when heated
Freezing	changing from a solid to a liquid
Sublimation	changing from a gas to a solid without the liquid stage, opposite to sublimation
Deposition	changing from a solid straight to a gas without the liquid stage opposite to deposition
Expansion	changing from a gas to a liquid
Contraction	changing from a liquid to a gas

Questions on Heat Energy and Temperature

- | | |
|--|--|
| <p>1. What has heat energy?</p> <hr/> | <p>9. Why is degrees Celsius convenient?</p> <hr/> |
| <p>2. Why does heat energy exist?</p> <hr/> | <p>10. By looking at the liquid in a thermometer, how do we know how hot it is?</p> <hr/> |
| <p>3. What does temperature tell us about the particles?</p> <hr/> <hr/> | <p>11. Many methods use the principle of measuring What?</p> <hr/> <hr/> |
| <p>4. Which way does heat energy always flow?</p> <hr/> <hr/> | <p>12. How do most of these devices give a read out?</p> <hr/> |
| <p>5. What happens to the water if you climb into an ice cold bath?</p> <hr/> <hr/> | <p>13. Why are probes sometimes used for measuring the temperature of cooked food?</p> <hr/> <hr/> |
| <p>6. What happens if you climb into a hot bath?</p> <hr/> <hr/> | <p>14. What is internal energy due to?</p> <hr/> <hr/> |
| <p>7. If we know the temperature of a gas what can we actually work out?</p> <hr/> <hr/> | <p>15. We can just think of internal energy as what?</p> <hr/> <hr/> |
| <p>8. What do we measure temperature in usually?</p> <hr/> <hr/> | <p>16. Why can we melt more ice cubes with a warm bath of water than a hot cup of tea?</p> <hr/> <hr/> <hr/> |

Write the temperature values next to the examples in the table below, choose from: 0°C, 37°C, 100°C, 4°C, 30,000°C, 20°C, -15°C, 6000°C, 40°C.

Examples	Temperature (°C)
Human body temperature	
Average freezer temperature	
Boiling point of water	
Average fridge temperature	
Average room temperature	
Temperature of lightning	
A hot bath	
Surface of the sun	
Freezing point of water	

Questions on Heat Transfer

1. Which way will heat energy always flow?

2. Where does conduction happen best?

3. How does a metal often feel to touch?

4. Why is this?

5. Why wouldn't a wooden climbing frame feel cold?

6. In the human chain what happens to the person next to the tickled person and why?

7. If one end of a solid is heated what is passed on down the chain?

8. What do all objects emit?

9. What is heat radiation?

10. What sort of objects emit more heat radiation?

11. When thinking about heat radiation **only**, why do we get hot near to a fire?

12. What states of matter does convection happen in?

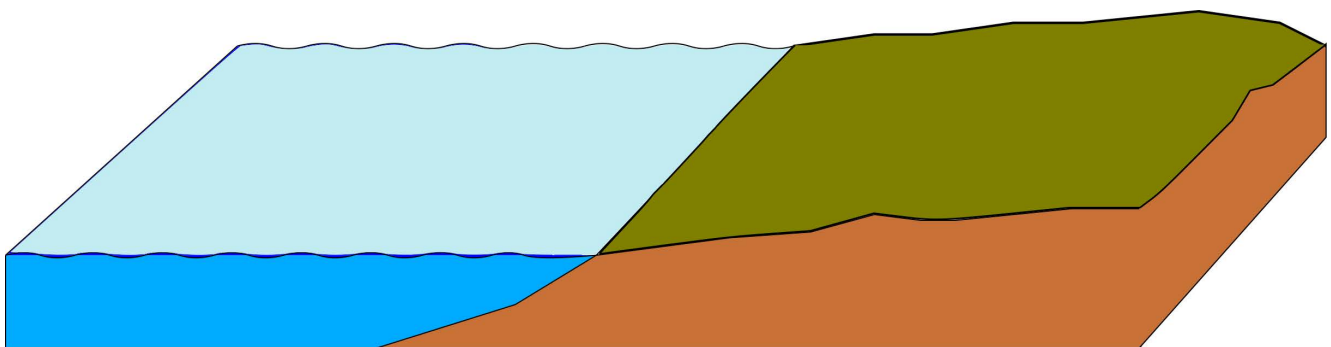
13. What happens to the density of air when it is heated?

14. What does this cause the warm air to do?

15. What is wind an example of?

16. Why are radiators badly named?

Label the diagram of the onshore breeze
and add your own arrows to show the movement of the air



Questions on Insulators and Insulation

1. What is an insulator?

2. Which materials are good conductors of heat?

3. What are the bottom of frying pans often made from and why?

4. Why are the handles often made from wood or plastic?

5. What are some of the best coats insulated with and why?

6. Why do we want to slow down the loss of heat from our homes?

7. What are three effective methods of insulating the home?

8. In what similar way do they work?

9. How are convection currents prevented from circulating?

10. What are the modern insulating panels used in cavity walls made from?

11. What does the reflective foil do?

12. Why is this layer useful in hot countries during summer?

13. Why is argon often used in double glazing rather than air?

14. What is the purpose of insulating a fridge?

15. Why do spacecraft have insulating panels on the outside? (WHAT? box)

Solve the clues on insulators and insulation

1. The gas often used in double glazing? A _ _ _ _
2. What cavity wall and loft insulation rely on to insulate? T _ _ _ _ _ A _ _
3. The diagram of double glazing doesn't have a ? C _ _ _ _ _ W _ _ _
4. Best conductor listed in the table? C _ _ _ _ _
5. Fridges are insulated to stop _____ entering? H _ _ _
6. Brilliantly insulating bird feathers? D _ _ _
7. Trapped air stops _____ _____ circulating?
C _ _ _ _ _ C _ _ _ _ _
8. Found on insulation panels to reflect heat radiation? R _ _ _ _ _ F _ _ _

Questions on Speed

1. What is speed an example of?

2. What does speed tell us?

3. What is the 'scientific' unit for speed?

4. Which unit are we more used to?

5. Why does the word average appear in the equation?

6. When running 100m when do athletes normally reach their top speed?

7. What does the steepness (gradient) on a distance time graph tell us?

8. What's happening on the flat section of the graph?

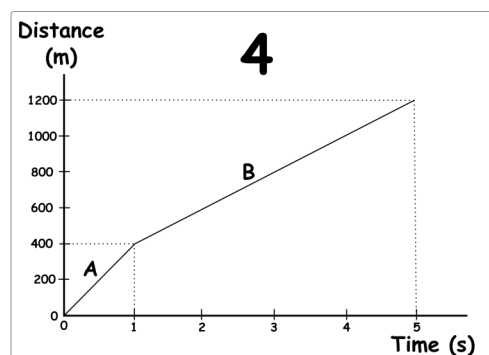
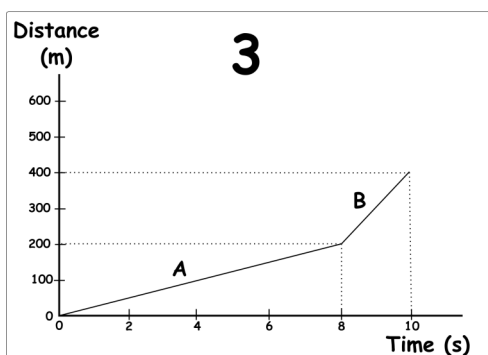
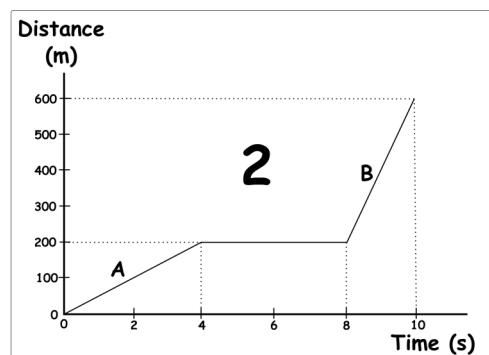
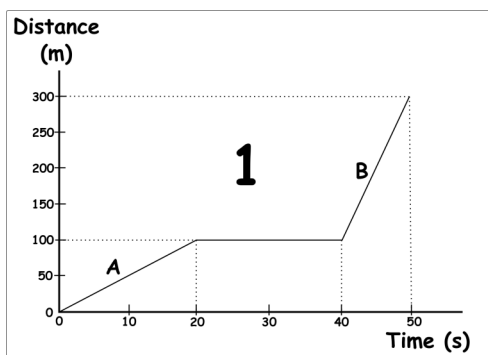
9. How is the gradient (steepness) of the line found?

10. If you move 200m in 10 seconds how fast are you moving?

11. Between 20 to 25 seconds, how far does the object move?

12. What do speed cameras do and how do they do it?

Calculate the speed for sections A and B on the graphs below



Questions on Relative Speed and more Distance time Graphs

1. If we plot our distance from a starting point, what can we then do?

2. How long does it take the man to walk 100m?

3. How long did he stop for before running back to the start?

4. What was his walking speed if he walked 100m in 30 seconds?

5. What was his running speed if he ran 100m in 15 seconds?

6. How don't most objects move?

7. What usually happens?

8. What does the steepness (gradient) of a distance time graph tell us?

9. If a line is getting steeper what must an object be doing?

10. How does a line show slowing down?

11. What isn't a silly question?

12. When all the cars on a motorway are moving at the same speed what does the car next to you appear to be doing?

13. Is the car in question 12 'really' moving?

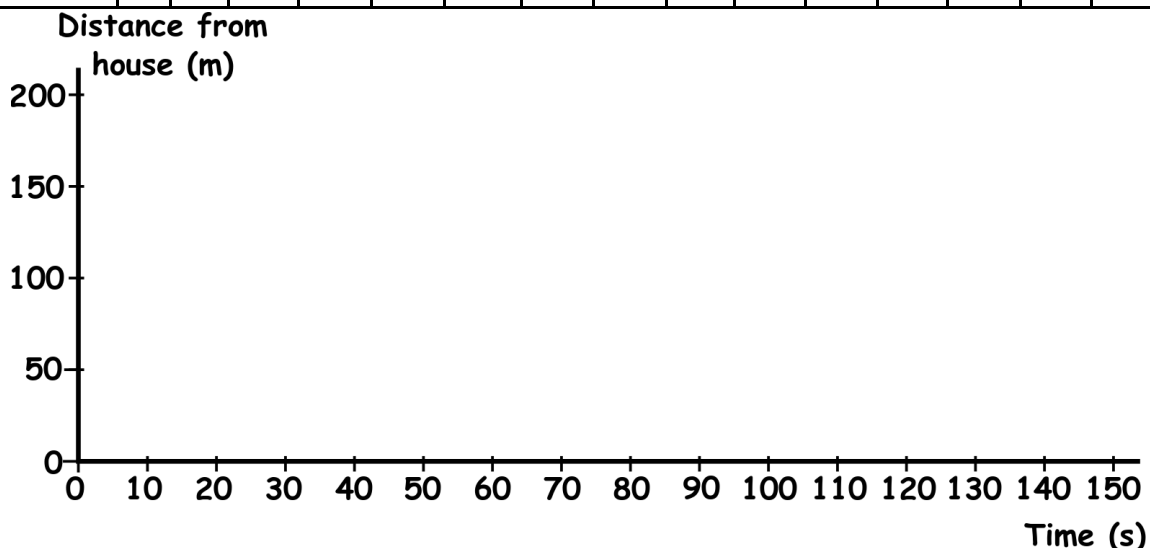
14. How do we normally think of our speed?

15. In **B** why are the red car and black car approaching each other at 40 m/s?

16. Compared to the ground, how fast is the black car always moving?

The table below shows the distance and time data for a boy running to the corner shop to buy an ice cream and walking home as he eats it. Plot the graph and label the lines with, *running to the shop*, *buying an ice cream* and *walking home*.

Distance from the house (m)	0	50	100	150	200	200	200	200	175	150	125	100	75	50	25	0
Time (s)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150



Questions on Contact Forces

1. What is the size of a force measured in?

2. How are forces shown in diagrams?

3. What do we mean by contact forces?

4. What does a wall do if you push against it?

5. What do we call this force?

6. What is upthrust?

7. How must the upthrust compare to an object's weight for it to float?

8. Why does a helium balloon rise upwards?

9. Try to move an object along the ground and which way does friction always act?

10. Give two examples of friction being useful?

11. Why is a rusty bicycle chain difficult to pedal?

12. What can reduce friction?

13. What is another name for air resistance?

14. What does air resistance increase with?

15. How can air resistance be reduced?

16. How is tension created?

Match and memorise the meanings of the words below

Reaction force	a force that tries to stop an object moving through air
Upthrust	using oil or grease to reduce friction between surfaces
Friction	a force created when an object is pulled, suspended by a rope, cable or string
Air resistance (drag)	a force that tries to stop an object moving over a surface
Tension	the force pushing back on an object
Lubrication	upward force on an object placed in a fluid

Questions on Non-contact Forces

1. What is action at a distance a way of describing?

2. How are these forces more simply described?

3. What non-contact force do we feel all the time and what else does it do?

4. What does mass tell us and what's it measured in?

5. What does everything with mass do?

6. Why don't you feel the attraction of the person next to you?

7. Can gravity repel?

8. What size is the gravitational field strength on earth?

9. What is weight?

10. An object that feels the force of a magnetic field is said to be?

11. Permanent magnets always have a magnetic field, what else produces a magnetic field?

12. What are the three magnetic metals?

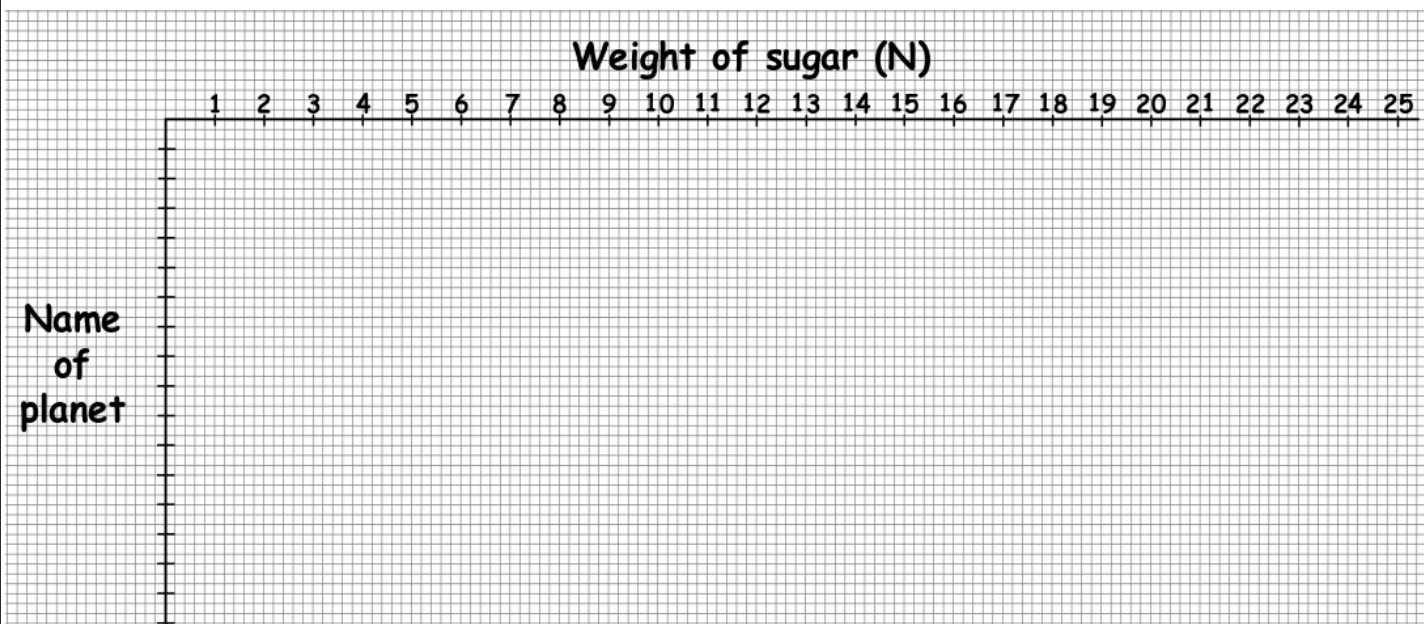
13. What do charges have around them?

14. Why can a charged ruler bend a stream of water?

Draw a bar chart for the weight of a 1kg bag of sugar on the eight planets using the data below

Planet	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
Strength of gravity (N/kg)	3.7	8.9	10.0	3.7	25	10.5	9.0	11.7
Mass of sugar (kg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Weight of sugar (N)	3.7	8.9	10.0	3.7	25	10.5	9.0	11.7

Weight of sugar (N)



Questions on Balanced Forces

1. What do the arrows in the diagrams show us?

2. When an object has balanced forces acting on it what does this mean about the up and down and left and right forces?

3. What does this mean for the overall force on the object?

4. If forces are in the opposite direction what do we do with them?

5. If forces are in the same direction what do we do with them?

6. Why is the force to the left 5000N on the car?

7. What happens if the forces on an object are balanced?

8. Whose first law is this?

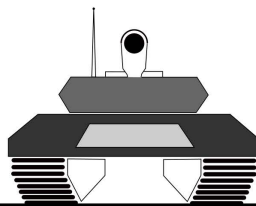
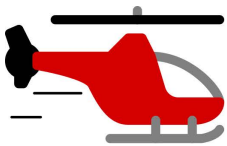
9. What happens to skydivers not long after opening their parachute?

10. Why is this?

11. Which forces are balanced for an aeroplane at constant speed?

12. What do helium balloons experience upthrust from?

Draw arrows to show the balanced forces on the objects below. A helicopter, a jet ski and a bike **all at constant speed**. **All the rest are stationary**. Labels needed will be: AIR RESISTANCE; LIFT; WEIGHT; WATER RESISTANCE; THRUST FROM ENGINE; PEDALLING FORCE; FRICTION; REACTION FORCE; UPTHrust



Questions on Unbalanced Forces

1. What happens to the motion of an object if the forces are balanced?

2. What happens if the forces are unbalanced?

3. What is the name of the overall force acting on an object?

4. What are the two main things that an object with a resultant force will do?

5. What does accelerate mean?

6. Which are the unbalanced forces in the diagram of the car?

7. Why can't the car accelerate forever?

8. When the driver of the drag car takes their foot off the accelerator, what disappears?

9. What produces the resultant force on the drag car?

10. Which direction does the resultant force act?

11. What does this do to the drag car?

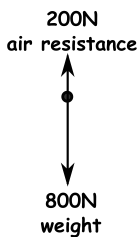
12. What does Newton's 3rd law tell us?

13. Why do we only think about four forces when the ball is being kicked?

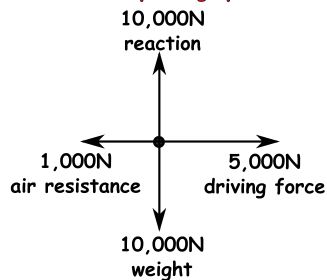
14. Complete the sentence. After the ball has been kicked and rolls along the ground, the **R**_____ force from **F**_____, **S**_____ it down to a stop.
15. What does the dropped ball do to the earth?

Calculate the resultant force from the diagrams below by taking away the up and down and left and right forces. Say which direction the resultant force is.

Sky diver just leapt



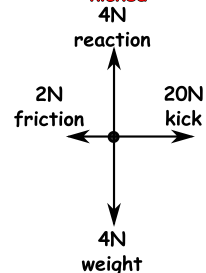
Car speeding up



Drone ascending



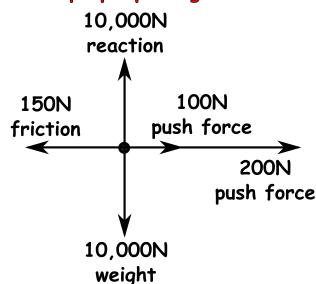
Football being kicked



Tennis ball hit upwards



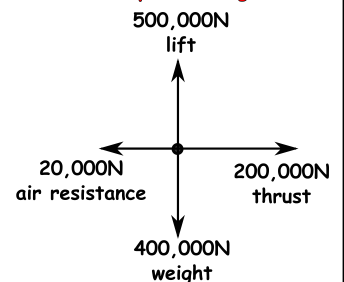
Two people pushing a car



A bouncy ball just dropped



Aeroplane taking off



Questions on Moments

1. What do you have to do if you want to open the door by pushing near to the hinges?

2. Pushing on the handle requires a smaller force but greater what?

3. What is the turning effect of a force called?

4. How do you calculate the moment of a force?

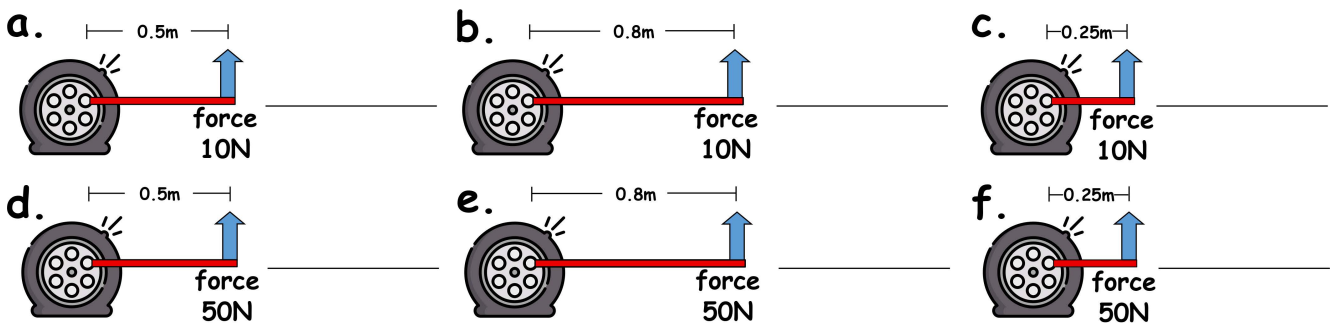
5. Why wouldn't a shorter wheel brace undo tight wheel nuts?

6. Why do nail scissors have a long handle?

7. What is the scientific name for balanced moments?

8. What does it mean?

Write down what the moment of the force is (force x distance from pivot) for the wheel braces below, remember the units, Nm, newton metres



Write out what the clockwise and anticlockwise moments are for seesaws A-F and say if they are balanced or unbalanced

- | | |
|--------------------------|-----------------------------|
| A. anticlockwise = _____ | <i>balanced/unbalanced?</i> |
| clockwise = _____ | _____ |
| B. anticlockwise = _____ | <i>balanced/unbalanced?</i> |
| clockwise = _____ | _____ |
| C. anticlockwise = _____ | <i>balanced/unbalanced?</i> |
| clockwise = _____ | _____ |
| D. anticlockwise = _____ | <i>balanced/unbalanced?</i> |
| clockwise = _____ | _____ |
| E. anticlockwise = _____ | <i>balanced/unbalanced?</i> |
| clockwise = _____ | _____ |
| F. anticlockwise = _____ | <i>balanced/unbalanced?</i> |
| clockwise = _____ | _____ |

Questions on Hooke's Law

1. What happens the more you stretch an elastic band?

2. When you double or treble one quantity and the related quantity doubles or trebles, what is this called? (like force and extension)

3. If you plot a graph of this sort of relationship what does it look like?

4. What is another name for a spring balance?

5. Inside a force meter, what is it that stretches?

6. If you pick up an object with a force meter, what will the size of the force tell you?

7. If you pull objects along with a force meter, what can you investigate?

8. What do we call it when an object goes back to its original length when the force is removed?

9. What will most objects do?

10. Give two examples of where we see elastic behaviour?

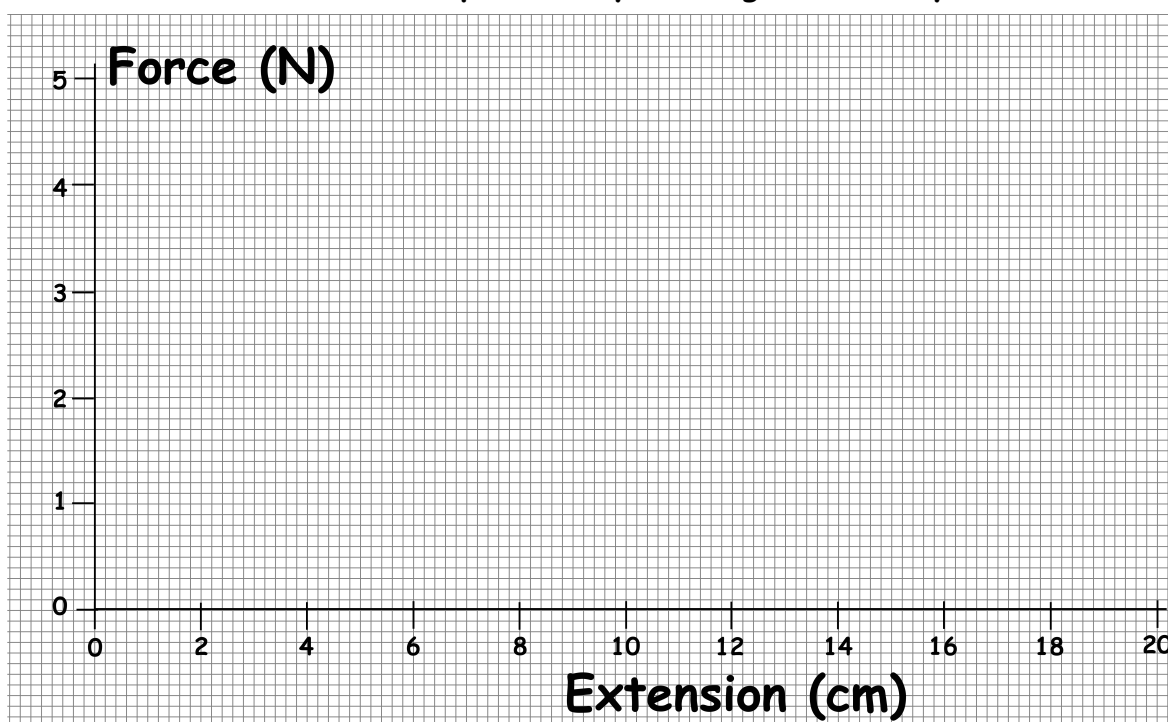
11. What do we mean by the elastic limit?

12. If an object stays permanently stretched after the force is removed what do we call this?

13. Why is the graph for spring 'a' steeper?

14. What does stiffness mean?

Plot the results opposite on the graph below, draw a straight line and predict what extension 2.5 N and 4.5 N will produce by drawing across to your line and down.



Questions on Gas Pressure

1. What happens if you push air from your lungs into your mouth space?

2. What happens to the pressure inside your mouth?

3. Why does the air rush out when you open your mouth?

4. When does the air stop rushing out?

5. Where does the force come from for gas pressure?

6. In what way do the gas particles move around inside a container?

7. How is pressure defined?

8. Which direction does gas pressure act?

9. How many ways are there to increase the pressure of a gas?

10. What makes them easy to understand?

11. What happens when you pump up a tyre?

12. What does this do to how often the collisions occur?

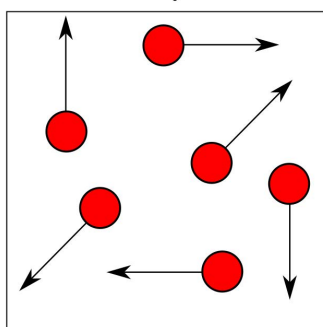
13. What does heating the gas up do to the particles?

14. What's another way of saying reduce the space for the particles?

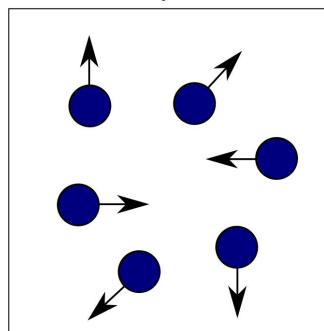
Label the boxes below with the words *low* and *high*, then write the statements in italics under the correct box

Particles move fast; particles collide with the walls less often; particles move slow; particles collide with the walls more often; particles exert less force; particles exert more force

--- temperature
--- pressure



--- temperature
--- pressure



Questions on Atmospheric Pressure

1. Why can it be confusing to talk about atmospheric pressure?

2. Why is atmospheric pressure similar to being in bed?

3. How high are the layers of air above us?

4. What is the weight of air that is pushing down on 1m^2 ?

5. What is this weight about the same as?

6. Why don't we normally feel the huge atmospheric pressure of $100,000\text{ N/m}^2$?

7. What happens to the number of air particles as you go higher up?

8. Why do high altitude climbers wear breathing apparatus?

9. If the air pressure at sea level is $100,000\text{ N/m}^2$, what is it up Mount Everest?

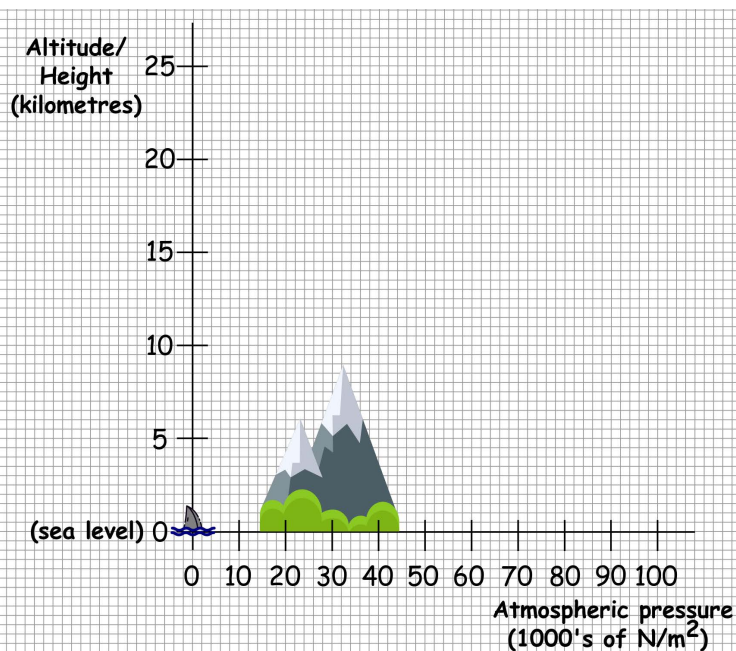
10. When do we see the effects of the large forces involved in atmospheric pressure?

11. When the collapsing can fills with steam, why doesn't the pressure rise?

12. What happens to the steam that was pushing outwards when the lid is replaced and can cooled?

13. Why does the can get crushed?

14. By pumping the air out of the hemispheres and closing the tap, what does this mean for the 'push balance'?



Plot the points from the table below and draw a smooth curve to show how atmospheric pressure changes with height

Atmospheric pressure (1000s of N/m^2)	Height / altitude (kilometres)
100	0 (sea level)
50	5
30	10
16	15
9	20
5	25

Questions on Pressure in Water

1. What force makes a float rise to the surface?

2. What will any object in a fluid experience?

3. What happens if the upthrust is less than an object's weight?

4. What can be used to show that the pressure of water increases with depth?

5. Why is this?

6. This increased pressure leads to a greater?

7. How is this shown with the pressure can?

8. What causes upthrust?

9. What happens to the forces on the sides of objects?

10. What will a submerged object do to the water?

11. In diagram **A** what is the water trying to do to the space taken up by the cube?

12. How much water would the ice cube displace if it was pushed under water?

13. What did Archimedes notice?

14. Even if an object sinks, it still feels lighter because of upthrust, what do we call this?

15. Why is ice unusual?

16. Why do huge ships float?

Complete the table to say whether the example will float (yes/no) and whether it will displace its own weight in water

Example	Density (g/cm ³)	Floats (yes/no?)	Displaces its own weight in water (yes/no?)
Beeswax	0.96		
Aluminium	2.7		
Baking powder	0.72		
Brick	2.0		
Coal	1.5		
Potassium	0.86		
Steel	7.82		
Butter	0.86		
Pencil Rubber	1.1		
Sand	1.6		

Questions on Pressure on Solid Surfaces

1. What is produced when two solid surfaces come into contact?

2. What two factors affect the size of this pressure?

3. What is the usual unit of pressure?

4. Why use cm^2 rather than m^2 to begin with?

5. How many times bigger is the pressure under stiletto heels compared to trainers?

6. What do stiletto heels often leave in the floor?

7. Why are they terrible for walking in mud?

8. When do knives cut well?

9. Why is this?

10. What does the small area tip enable a drawing pin to do?

11. Why does the weight of a tank need to be spread over a wide area?

12. What is one of the adaptations of a polar bear?

13. What does this stop them doing?

14. What do humans do to stop this happening?

15. What would happen if we tried to sit on one nail?

16. Why are we able to sit on a bed of nails?

Example	Force (Newtons)	Area (cm^2)	Pressure (N/cm^2)
Knife edge	5	0.02	
Tank tracks	300,000	25,000	
Drawing pin tip	10	0.005	
Polar Bear's paws	5000	800	
Under a car tyre	2500	100	
Razor blade	5	0.001	
A punch	400	30	
Pressure of a human bite	500	8	

Example	Force (Newtons)	Area (cm^2)	Pressure (N/cm^2)
Knife edge (blunt)		0.06	133.33
Tank tracks		25,000	10
Drawing pin tip (blunt)		0.01	2000
Polar Bear's paws (cub)		100	6.25
Under a truck tyre		250	30
Razor blade (blunt)		0.008	3000
A punch		25	15
Pressure of a human bite		6	50

Calculate the pressure in the table opposite (divide force by area)

$$P = \frac{F}{A}$$

Calculate the force in the table opposite (multiply pressure by area)

$$F = P \times A$$

Questions on Waves and their Properties

1. When we wave our hands what do we do?

2. What are the waves on the surface of water called?

3. When we say waves have common properties what do we mean?

4. What's the name for the up and down or back and forth motion that makes a wave?

5. As well as transferring energy, reflecting and refracting what else can waves do?

6. What are the names of the two types of wave motion?

7. Which type of wave is light and sound?

8. What is the top of a wave called?

9. What is the wavelength?

10. What do we call the distance from the centre line (rest position) to the peak?

11. What does this tell us about the wave?

12. What does the frequency tell us and what is its unit?

13. How do the particles move compared to the direction of travel for transverse waves?

14. What causes the air particles to produce a higher pressure in a sound wave?

15. What's an important difference between longitudinal and transverse waves?

16. What can cause interference on a TV or radio?

Match the words to their meanings below and memorise

Peak	waves where the vibrations are at right angles to wave travel, e.g. light
Trough	distance from centre line to peak or trough
Amplitude	waves adding or cancelling when they meet
Wavelength	waves where the vibrations are parallel to wave travel, e.g. sound
Frequency	top of the wave
Transverse waves	number of wavelengths that pass per second
Longitudinal waves	distance from peak to peak
Interference	bottom of the wave

Questions on Sound

1. How is sound made?

2. What changes the sound we hear?

3. How can we describe sounds?

4. What is another word for loudness?

5. What do loud sounds carry a lot of?

6. What can loud sounds do to our ear drums?

7. What is the unit for the loudness of sound?

8. What do we mean by high pitched sound?

9. What do we mean by frequency and what is the unit?

10. How can sound travel from place to place?

11. What do we mean by 'the medium' when talking about sound?

12. What substances does sound travel fastest in and why?

13. What happens to the sound of a vibrating object in a bell jar with all the air pumped out?

14. Why can't the vibrations be passed on?

Match the words to their meanings below and memorise

Vibration	the number of vibrations per second
Amplitude	the substance sound travels through
Medium	the unit of frequency
Frequency	the to and fro or back and forth motion that produces sound
Hertz (Hz)	the unit for the loudness of sound
Decibels (dB)	the size of the vibration

Questions on Picturing Sound

1. The energy of a sound wave travels outwards in all directions, but what does not move from place to place?

2. What kind of wave is a sound wave?

3. How can we detect the vibration of a sound wave?

4. What do microphones convert sound waves into?

5. What do we use to display sound waves?

6. How can we tell a sound is loud by looking at the trace on an oscilloscope?

7. How can you tell by looking at a trace a sound is high pitched?

8. If the pitch is high what else must be high?

9. What does it mean when the peaks of a wave are more spread out?

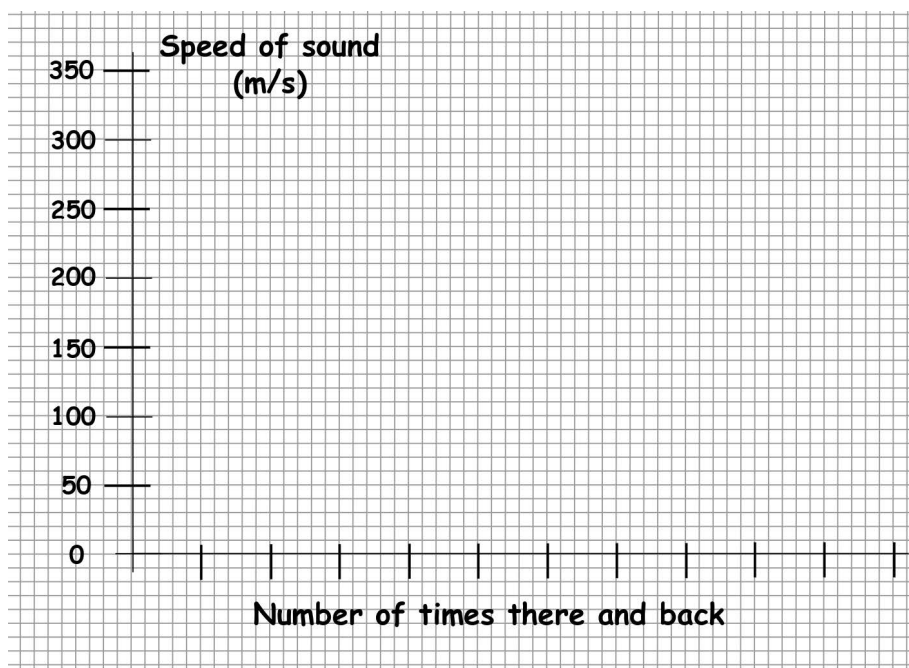
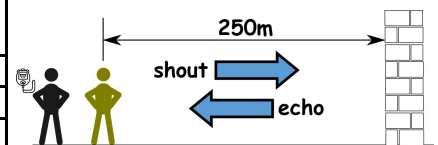
10. What do we call it when sound bounces off an object?

11. When you shout towards a building 340m away why do you hear your echo 2 seconds later?

12. Why would a person inside the building hear the sound too?

Two students stand 250m away from the gym wall. One student shouts and when he hears the echo shouts again. The other student times how long it takes the sound to go there and back between shouts for a different number of times. They then calculated the speed of sound. Plot six bars on the chart below for each speed value.

Number of times there and back	1	2	3	4	5	6
Distance (m)	500	1000	1500	2000	2500	3000
Time (seconds)	2.0	3.3	4.7	6.1	7.5	8.9
Speed (m/s)	250	300	320	330	330	340



Questions on Hearing and Using Sound

1. What are the two main ways to detect sound?

2. What do both methods do?

3. What does the pinna help direct the sound down?

4. What is the ear drum like?

5. What does the sound wave do to the ear drum?

6. What are the ossicles?

7. How do these bones amplify the vibration?

8. What does the cochlea contain?

9. How do the electrical impulses get to the brain?

10. What does range mean?

11. How does a moth's large hearing range help it?

12. What are frequencies above 20,000Hz called?

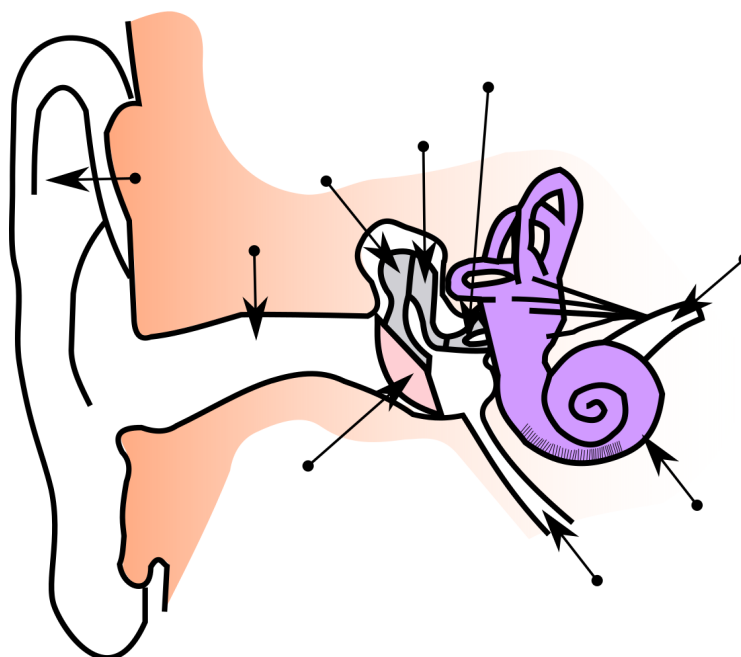
13. How do bats find their prey?

14. How does a bat know if the prey is close?

15. How is ultrasound used to build a picture of an unborn baby?

16. Why is ultrasound used by physiotherapists?

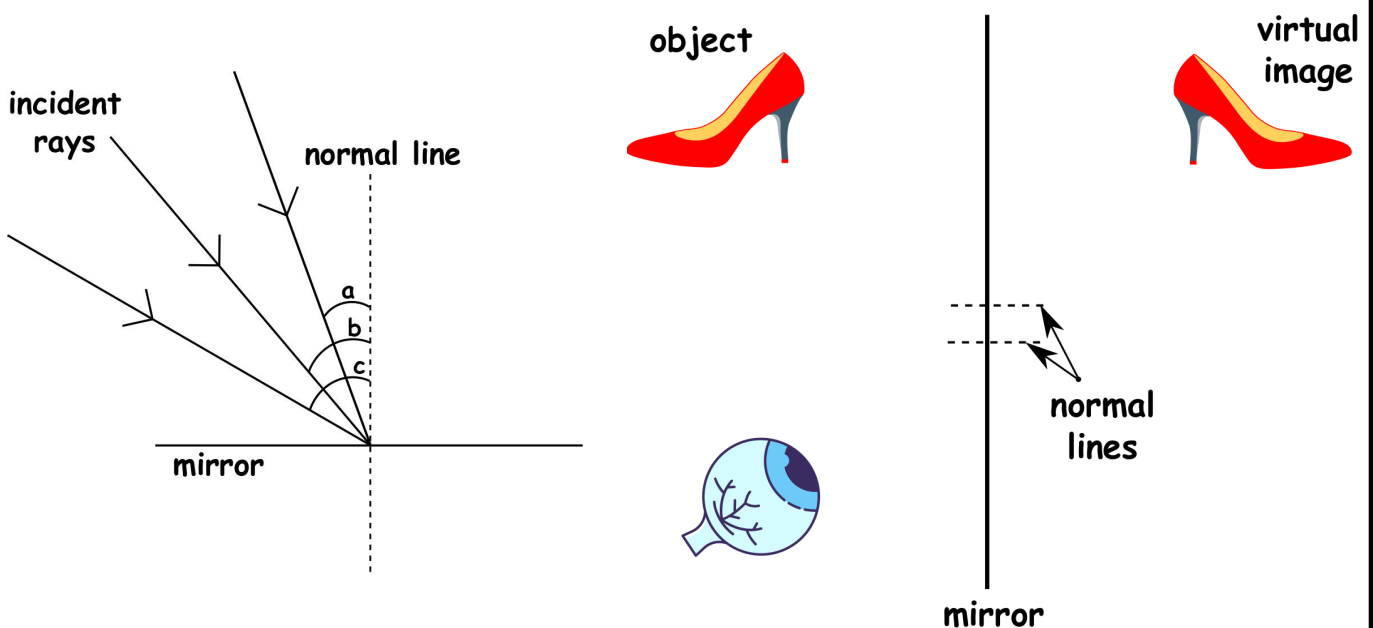
Label and memorise the diagram of the ear below



Questions on Light and Reflection

- | | |
|---|--|
| <p>1. How does light travel?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>9. What is the normal line?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>2. When we want to investigate how light is going to behave, what do we use?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>10. What sort of surface is the law of reflection true for?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>3. How far does light travel in one second?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>11. To see an object what must light do?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>4. What do we call a material that light passes through?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>12. When light is shone on the person's spot, in which direction will the reflected light travel?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>5. What can light do to translucent material?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>13. How many rays do we use to show the image produced?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>6. What does the law of reflection tell us?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>14. Why does the brain 'see' the spot behind the mirror?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>7. What do we use to show the law of reflection?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>15. How far behind the mirror does the image appear to be?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>8. Complete the following sentence describing the law of reflection;</p> <p>The angle of i _____ is e _____ t _____</p> <p>the angle of r _____.</p> | |

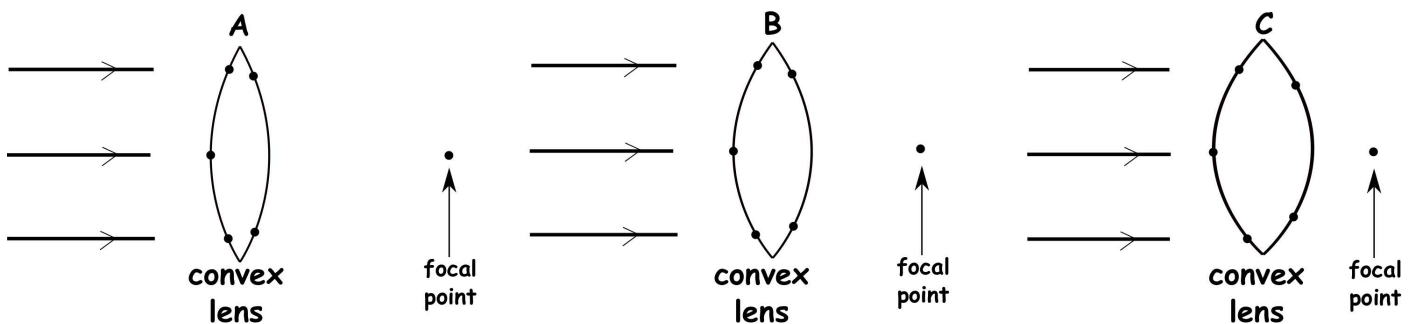
Using a protractor measure the angles a , b and c below and draw in the reflected rays. Complete the ray diagram (as shown opposite) to show how a virtual image of the stiletto heel is formed.



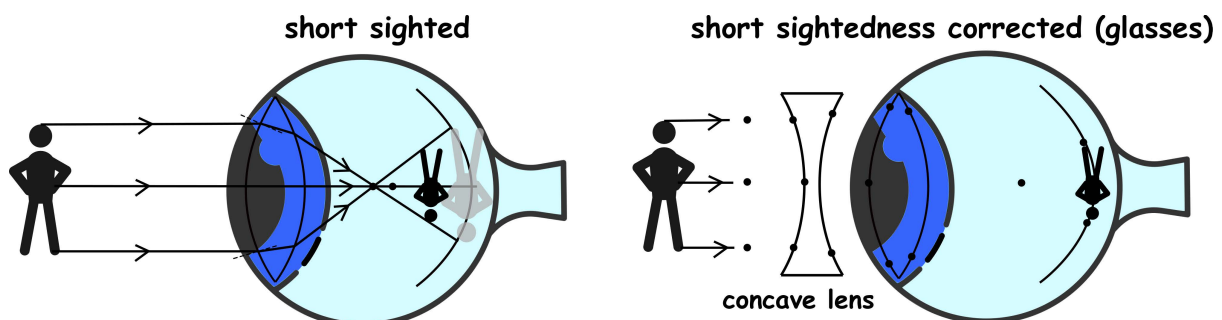
Questions on Refraction, Lenses and the Eye

- | | |
|--|--|
| <p>1. How do sound waves in air, water waves and waves on a string transfer energy?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>8. If light hits the glass block at an angle, what happens to its path?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>2. What doesn't light need to travel?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>9. What happens to light's path as it leaves the glass block?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>3. What is another word for the emptiness of space?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>10. What sort of lens does your eye have and what is it able to do?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>4. What happens when light hits earth's atmosphere?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>11. Where do parallel rays of light pass through after being refracted by the lens?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>5. What can the slowing down of light cause?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>12. What is myopia?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>6. What is this called?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>13. How can myopia be corrected?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>7. If light hits the glass block at a 0° angle (head on) what doesn't happen?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>14. What does a diverging lens do to light rays?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |

Complete the ray diagrams below by 'joining the dots'. A, B and C show how the focal point changes with lens thickness.



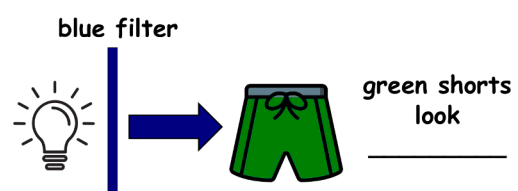
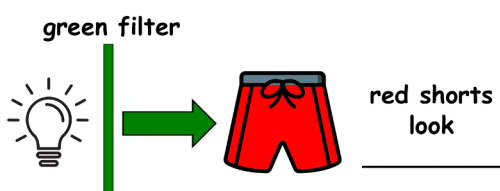
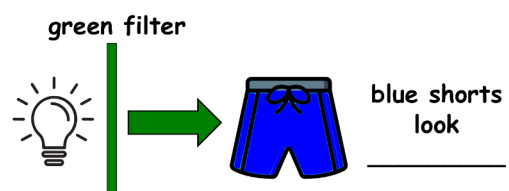
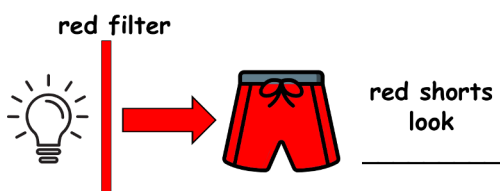
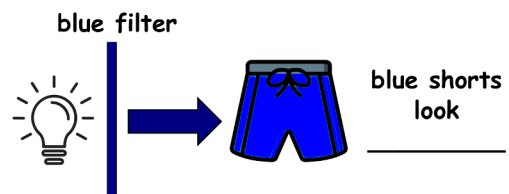
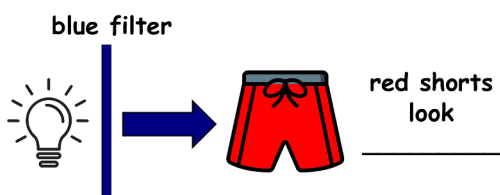
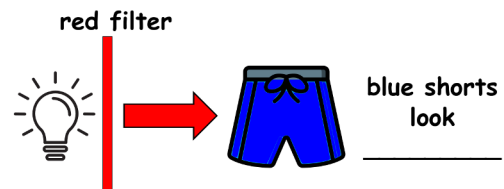
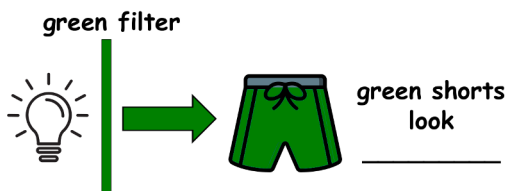
The right hand diagram shows how a concave lens can be used to correct short sightedness. Complete the path of the three rays showing how short sight can be corrected. Join the dots!



Questions on Dispersion and Colour

- | | |
|--|---|
| <p>1. What do rainbows show?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> | <p>7. Why does an object look a particular colour?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> |
| <p>2. What do we call light that contains all the colours of the visible spectrum?</p> <hr style="border: 0.5px solid black;"/> | <p>8. What does a red T-shirt do to all colours apart from red?</p> <hr style="border: 0.5px solid black;"/> |
| <p>3. What is a useful memory aid for the colours in the visible spectrum?</p> <hr style="border: 0.5px solid black;"/> | <p>9. Why do the socks look white?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> |
| <p>4. What did Sir Isaac Newton place in the path of a light ray entering his room?</p> <hr style="border: 0.5px solid black;"/> | <p>10. Why do objects look black?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> |
| <p>5. Using another prism what are you able to do to the spectrum produced?</p> <hr style="border: 0.5px solid black;"/> | <p>11. What colour light does a green filter allow through?</p> <hr style="border: 0.5px solid black;"/> |
| <p>6. Why does dispersion happen?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> | <p>12. Why do green shorts look black under blue light?</p> <hr style="border: 0.5px solid black;"/> <hr style="border: 0.5px solid black;"/> |

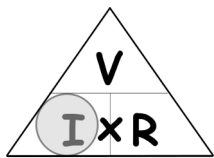
Write down what each of the coloured shorts will look like under the different coloured light.



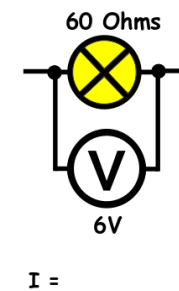
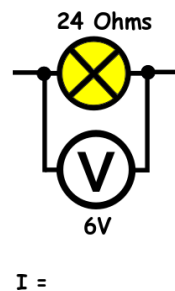
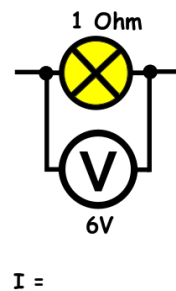
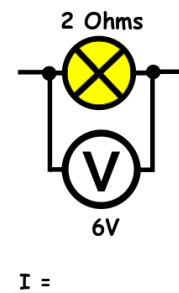
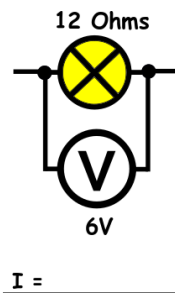
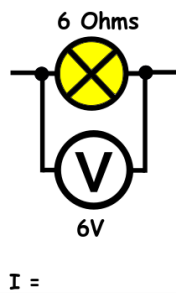
Questions on Electric Circuits

- | | |
|---|---|
| <p>1. What do electric circuits allow?</p> <hr/> <hr/> | <p>9. What is a current?</p> <hr/> |
| <p>2. Why is electricity so useful?</p> <hr/> <hr/> | <p>10. What does the size of a current tell us?</p> <hr/> <hr/> |
| <p>3. When can electricity increase a chemical energy store?</p> <hr/> | <p>11. What does the current carry?</p> <hr/> |
| <p>4. What do electrons need to get them moving?</p> <hr/> | <p>12. What is the unit of current and what is it measured with?</p> <hr/> |
| <p>5. What is the flow of electrons like?</p> <hr/> | <p>13. What does resistance tell us?</p> <hr/> <hr/> |
| <p>6. What's another name for voltage?</p> <hr/> | <p>14. What is its unit and what is the symbol for resistance?</p> <hr/> |
| <p>7. What does voltage tell us?</p> <hr/> <hr/> | <p>15. What component has a very high resistance?</p> <hr/> <hr/> |
| <p>8. What is the unit of voltage and what do we measure it with?</p> <hr/> <hr/> | <p>16. What does increasing the resistance do to the current?</p> <hr/> <hr/> |

Use current = voltage ÷ resistance to calculate the current in each case and write down what you notice.



$$I = \frac{V}{R}$$

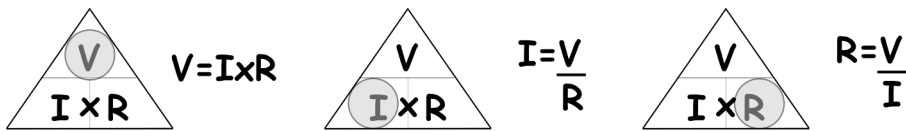


Now complete the sentence below.

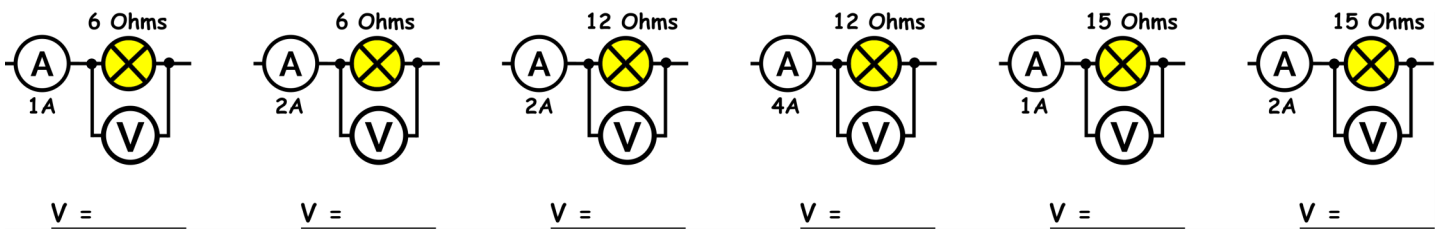
I notice that...

Questions on Series Circuits

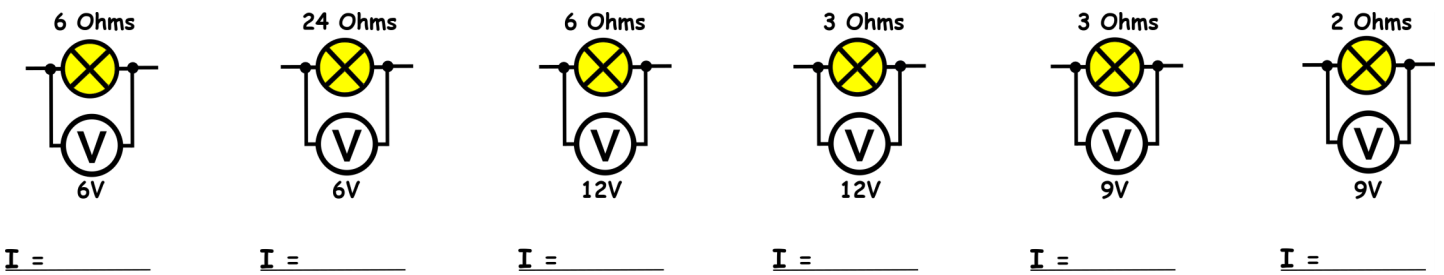
- | | |
|---|--|
| <p>1. What does series mean?
_____</p> <p>2. How many important facts are there to learn about series circuits?
_____</p> <p>3. What happens to the voltage in a series circuit?
_____</p> <p>4. Where can the ammeter be connected in a series circuit?
_____</p> <p>5. How are voltmeters always connected?
_____</p> | <p>6. Why does no current flow in circuit 1?
_____</p> <p>7. Why does the bulb in circuit 2 get 6V?
_____</p> <p>8. How much harder is it for the current to flow in circuit 3 than circuit 2?
_____</p> <p>9. Why do the bulbs in circuit 3 get 3V?
_____</p> <p>10. What is the total resistance of circuit 4?
_____</p> |
|---|--|



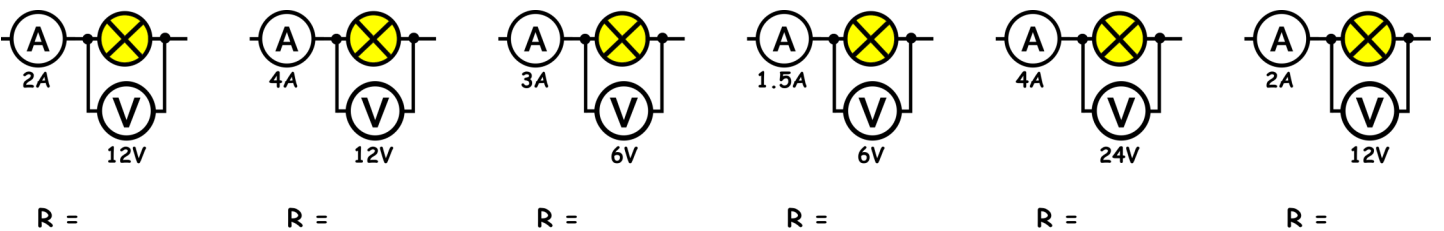
A. Calculate the voltage across the bulbs below.



B. Calculate the current through the bulbs below.



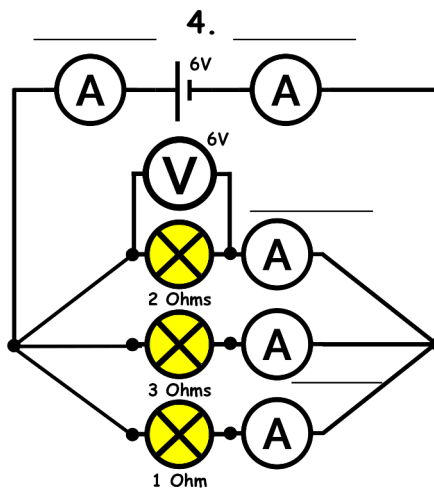
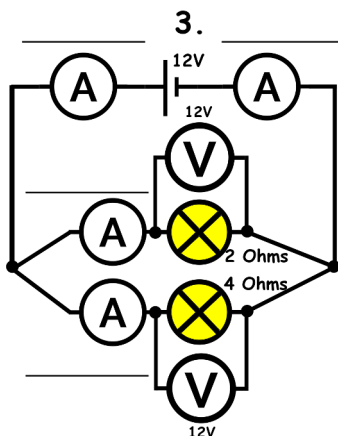
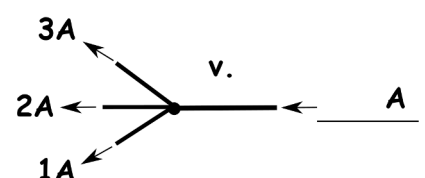
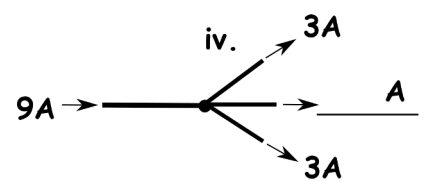
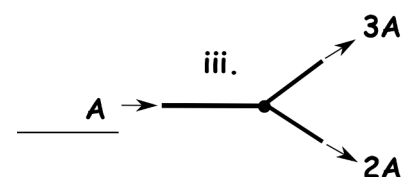
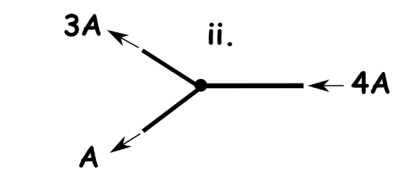
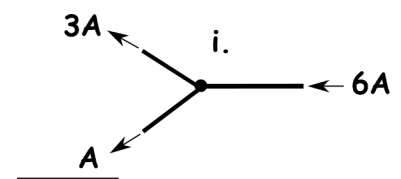
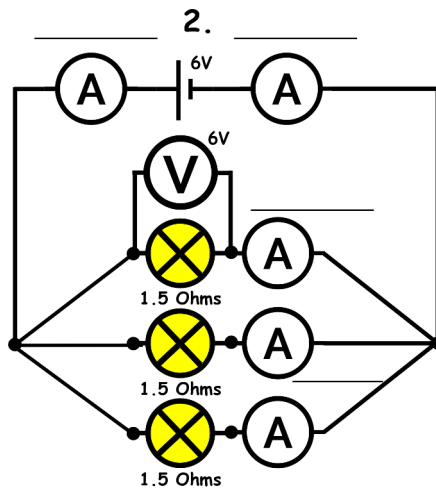
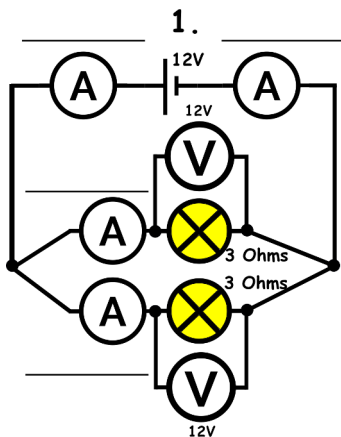
C. Calculate the resistance of the bulbs below.



Questions on Parallel Circuits

- | | |
|--|--|
| <p>1. What makes a parallel circuit different from a series circuit?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> | <p>6. How do we know what the voltage across each branch is in the example circuits?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> |
| <p>2. What does this mean the current can do?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> | <p>7. Why is the total current in circuit one 4A?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> |
| <p>3. What is this just like?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> | <p>8. Why is the current bigger in circuit 2 compared to circuit 1?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> |
| <p>4. What do more paths do to how easily the current flows?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> | <p>9. Why does the 1.5 ohm bulb have 4A of current flowing through it?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> |
| <p>5. The current splits at junctions, how do we know the total current?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> | <p>10. What does dividing voltage by total current tell us?</p> <hr style="border: 0; border-top: 1px solid black; margin-top: 10px;"/> |

Use $I = V/R$ to calculate the current along *each branch* and *total current* for circuits 1,2,3 and 4 below. Use the fact that the current into and out of a branch is the same to write down the missing currents in *i,ii,iii,iv* and *v*.



Questions on Electric Fields

- | | |
|---|--|
| <p>1. What do electric charges have around them?
_____</p> | <p>6. What is the diagram of a KG mass experiencing earth's gravitational field just like?
_____</p> |
| <p>2. What happens if a charge enters another electric field?
_____</p> | <p>7. What do oppositely charged particles do to each other?
_____</p> |
| <p>3. How can this happen?
_____</p> | <p>8. Which direction do electric field lines point for positive charges?
_____</p> |
| <p>4. What does the diagram show?
_____</p> | <p>9. What can strong electric fields do?
_____</p> |
| <p>5. The forces electric fields exert are?
_____</p> | <p>10. During storms what can cause the build up of charge in clouds?
_____</p> |
| <p>_____</p> | <p>11. What doesn't air normally do?
_____</p> |
| <p>_____</p> | <p>12. What is thunder?
_____</p> |

Choose from the words below to match to the statements.

Electric fields, attract, gravitational fields, repel, magnetic fields, air

Normally doesn't conduct _____

Opposite charges _____








Magnetic materials experience forces in _____

Like charges _____

Charges experience forces in _____

Masses experience forces in _____

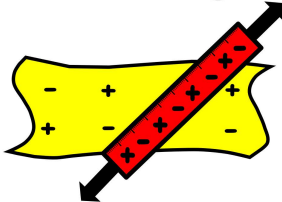
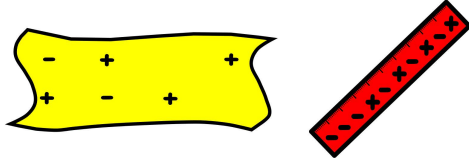
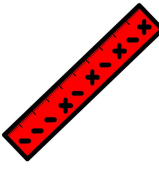
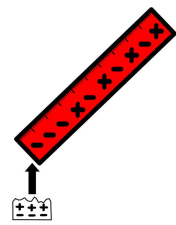
Underneath each of the adjacent charges write down whether they will attract or repel.

						
a _____	b _____	c _____	d _____	e _____	f _____	

Questions on Static Electricity

- | | |
|---|---|
| <p>1. When might you get a shock from static electricity?</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>2. What is the name of the negative charges that atoms have?</p> <p>_____</p> <p>_____</p> <p>3. What can these charges do?</p> <p>_____</p> <p>_____</p> <p>4. What can increase this effect?</p> <p>_____</p> <p>5. Why does an object become positive if it loses electrons?</p> <p>_____</p> <p>_____</p> <p>6. What happens to the cloth when it is rubbed with a ruler? (diagram)</p> <p>_____</p> <p>_____</p> <p>7. What happens to the charges in the paper when the positive ruler is brought near? (diagram)</p> <p>_____</p> <p>_____</p> | <p>8. What increases as the charge on an object increases?</p> <p>_____</p> <p>_____</p> <p>9. What happens if the voltage of the car becomes large enough?</p> <p>_____</p> <p>_____</p> <p>10. When we touch a car that is charged what do we create for the excess charge?</p> <p>_____</p> <p>_____</p> <p>11. What happens as this charge flows through us?</p> <p>_____</p> <p>_____</p> <p>12. What does a Van de Graaff Generator make possible?</p> <p>_____</p> <p>_____</p> <p>13. If you stand on an insulator and touch the dome what happens?</p> <p>_____</p> <p>_____</p> <p>14. Why do the strands of hair stand up and repel each other?</p> <p>_____</p> <p>_____</p> |
|---|---|

The red polyethene ruler below gains negative charge when rubbed with a cloth, complete the gaps to explain what is happening. Use the opposite page to help.

<p>Cloth and ruler together.</p> 	<p>Cloth _____ charge, ruler _____ charge.</p> 
<p>Ruler brought near paper, _____ charges move, nearest side of paper becomes more _____.</p> 	<p>_____ ruler attracts _____ side of paper.</p> 

Questions on Magnetic Fields

- | | |
|--|--|
| <p>1. It's lucky for us that earth has what?
_____</p> <p>2. What are the names of the three magnetic metals?

_____</p> <p>3. What is a nice way to observe the magnetic field around a bar magnet?

_____</p> <p>4. What do the magnetic field lines continue to do through the magnet?
_____</p> <p>5. What happens if you cut a magnet in half?

_____</p> <p>6. The magnetic field lines leave the north pole then what?

_____</p> | <p>7. State what like and opposite magnetic poles do to each other?

_____</p> <p>8. What happens when a north and south pole of a magnet come together?

_____</p> <p>9. An iron paper clip is not normally?
_____</p> <p>10. What does the paper clip become when picked up by a permanent magnet?

_____</p> <p>11. Where does earth's magnetic field come from?
_____</p> <p>12. What does the needle of a plotting compass do with the earth's magnetic field?

_____</p> |
|--|--|

Write **yes** or **no** next to the whether the following items can be picked up by a permanent magnet or not.

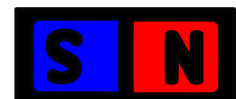
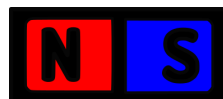
Item	Can pick up?
Paper clip	
Plastic ruler	
Permanent magnet	
Rubber	
Nickel coin	
Paper	
Iron nail	
Plotting compass	
Aluminium Can	
Chewing gum	
Piece of wood	
Cobalt cube	

Practise drawing the shape of the magnetic field around a single bar magnet and pairs that are repelling, use pencil in case of mistakes.

MAGNET ON ITS OWN



TWO MAGNETS REPELLING



Questions on Electromagnetism

1. What also produces a magnetic field?

2. What can we do with this magnetic field that can't be done with a permanent magnet?

3. What shape magnetic field does a straight wire produce?

4. What is the magnetic field *like* for a loop of wire carrying a current?

5. What does the magnetic field of a solenoid look like?

6. What does increasing the current do to the strength of the magnetic field?

7. If we add an iron core to the solenoid, what do we make?

8. Electromagnets can be made strong enough to do what?

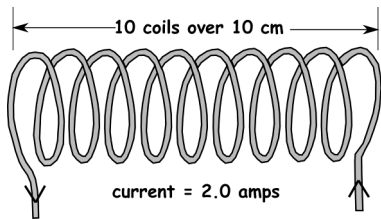
9. What safety device are they used in?

10. What do electric motors do?

11. What happens when a current flows through the coil of an electric motor?

12. When the poles line up what does the split in the ring do?

The solenoid below has a current of 2.0 amps and 10 coils of wire over 10cm. Complete the table to say whether the magnetic field will be stronger or weaker with the changes given below.



coils	current	Magnetic field stronger / weaker / same
10 coils over 10cm	3.0 amps	
20 coils over 20cm	2.0 amps	
5 coils over 10cm	2.0 amps	
10 coils over 10cm	0.5 amps	
40 coils over 10cm	2.0 amps	
20 coils over 10cm	2.5 amps	
6 coils over 10cm	1.0 amp	

Find the 'electromagnetism' words below in the word search.

ELECTROMAGNETISM CURRENT MAGNETIC FIELD
 SOLENOID ELECTROMAGNET WIRE
 CIRCUITBREAKER ELECTRICBELL SPEAKER
 MOTOR COMPASS FORCE
 NORTHPOLE SOUTHPOLE ELECTRICITY

```

A B C D E F G H I J K L M N O P Q R S T
U V W X Y Z O V D N C W U X Z J P N S A
J W D S X M I E I O O Z H X G Z V C H H
V F R V H C B F L U I D Y R S R F I K V
O C K N O Z D O X R A O E M F L F E E N
H K V L C S T N F K B K O F A Q L H T O
F K R C W O D N D O A K Y G V X M N N R
B A Z A D L A E L E C T R O M A G N E T
R A J P C E Z R R Q I J C F M G U M L H
B L G H H N N B W C S O U T H P O L E P
I G K M O O T B I S P Z P M H P C E C O
S R T H B I N R R M E X A D M P O L T L
G S B Z U D T P E S A S V M A J M T R E
Y C N C Y C Z C R U K Q Y W G B P B I U
H E R F E U V U P H E D M U N B A H C J
Q I Z L Z T O R U S R J Y O E U S E B N
C P E L E C T R O M A G N E T I S M E M
G G M R O F Q E G S L N Y Z I O W B L Q
E B F O I R C N U X K C I S C W R M L Z
R F I J B R Q T C N C S K H F O G Q U W
I H Q C O H A D P M P H L W I Y J F L W
S Q N F A Z B O D V Y K F R E T H M K O
W X J E F T P B V B G U A B L C J X E I
H I O N E E F E G X N E J O D U I N N O
  
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Questions on The Day, the Year and the Seasons

- | | |
|---|---|
| <p>1. What happened to the earth about 4.5 billion years ago?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>9. What do the torches show for winter in the northern hemisphere?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>2. What does earth's tilt cause?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>10. In the southern hemisphere when it is summer, what happens to the same amount of light?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>3. How long does it take the earth to spin round once?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>11. When is the sun's path more directly overhead?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>4. When 'our bit' of the earth is facing away from the sun is it daytime or night time?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>12. Looking from above the north pole which way does the earth rotate?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>5. What keeps the earth in its orbit?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>13. In which direction does the sun always rise and set?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>6. What shape is an ellipse?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <p>14. At the north pole in winter what can't you see during daytime?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>7. How long does it take the earth to orbit the sun?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |
| <p>8. During summer in the northern hemisphere, which way is earth tilted?</p> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> | <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> |

Match and memorise the meanings of the useful terms below

Equinox	the half of earth north of (above) the equator
Solstice	the half of earth south of (below) the equator
Equator	every fourth year in which an extra day is added to February because the earth takes 365 and 1/4 days to orbit the sun not 365
Northern hemisphere	spring 21st March and autumn 22nd September, when day and night are equal length (12hrs of day and 12hrs of night)
Southern hemisphere	summer solstice is the longest day , 21st June. winter solstice is the shortest day , 21st December
Leap year	an imaginary line drawn around the centre of earth half way between the north and south pole

Questions on Our Solar System, Galaxies and the Universe

1. What is at the centre of our solar system?

2. Why is the sun's gravity strong enough to keep the planets in their orbits?

3. What is the shape of the planets' orbits?

4. What is a satellite?

5. What happens to the amount of time needed to orbit the sun as you move further away?

6. Use the mnemonic to write out the order of the planets that starts closest to the sun.

7. What is the name of the galaxy we are in?

8. Where does our galaxy get its name from?

9. How many stars are there in the milky way?

10. What is a light year?

11. What is the name of our nearest major galaxy?

12. What is the universe?

Plot a bar chart below of orbit time in earth years for each planet. You will need eight bars at the correct height for the eight planets.

