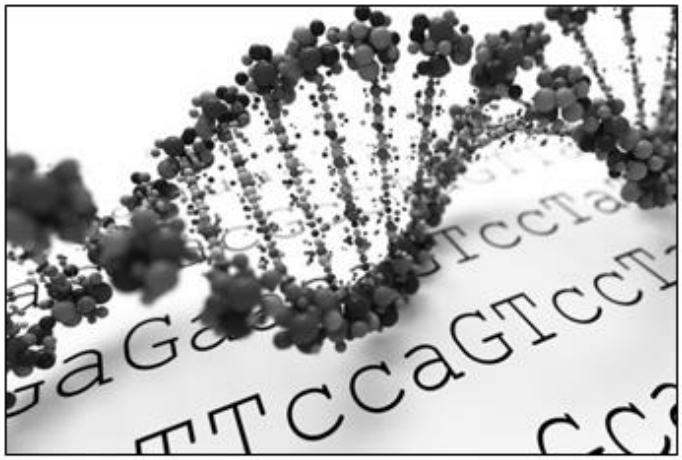
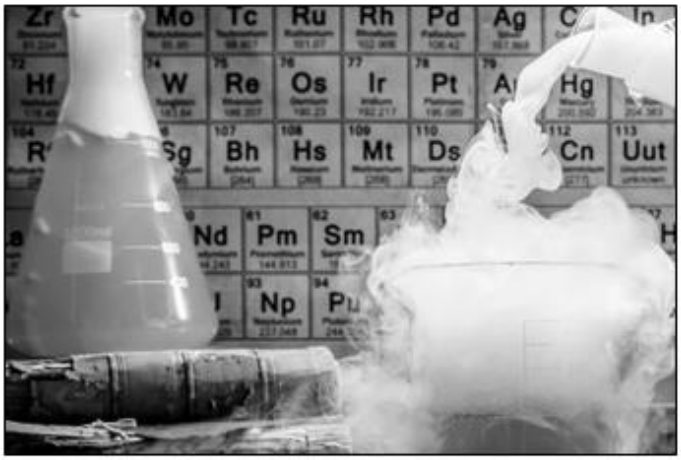
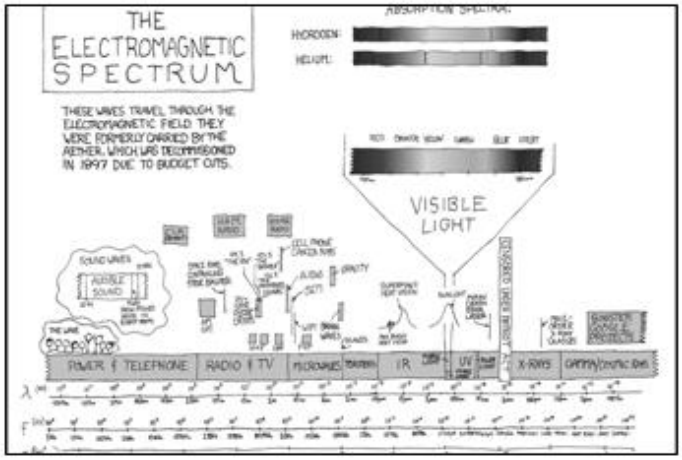
Name:
Science Class:
Teacher:

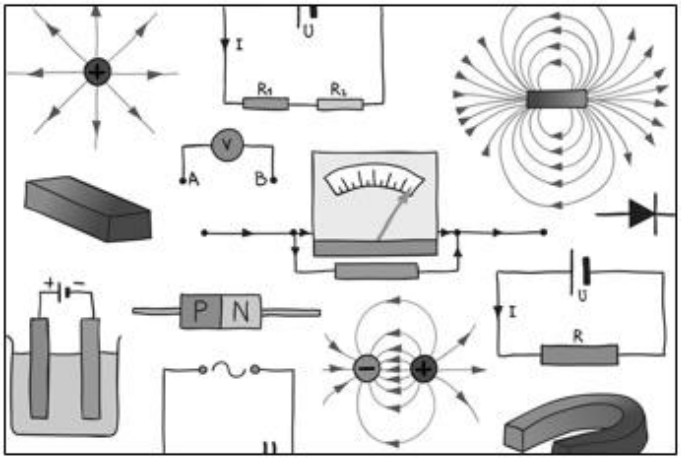
Aylsham High School Science Department

Year 7 Spring Term









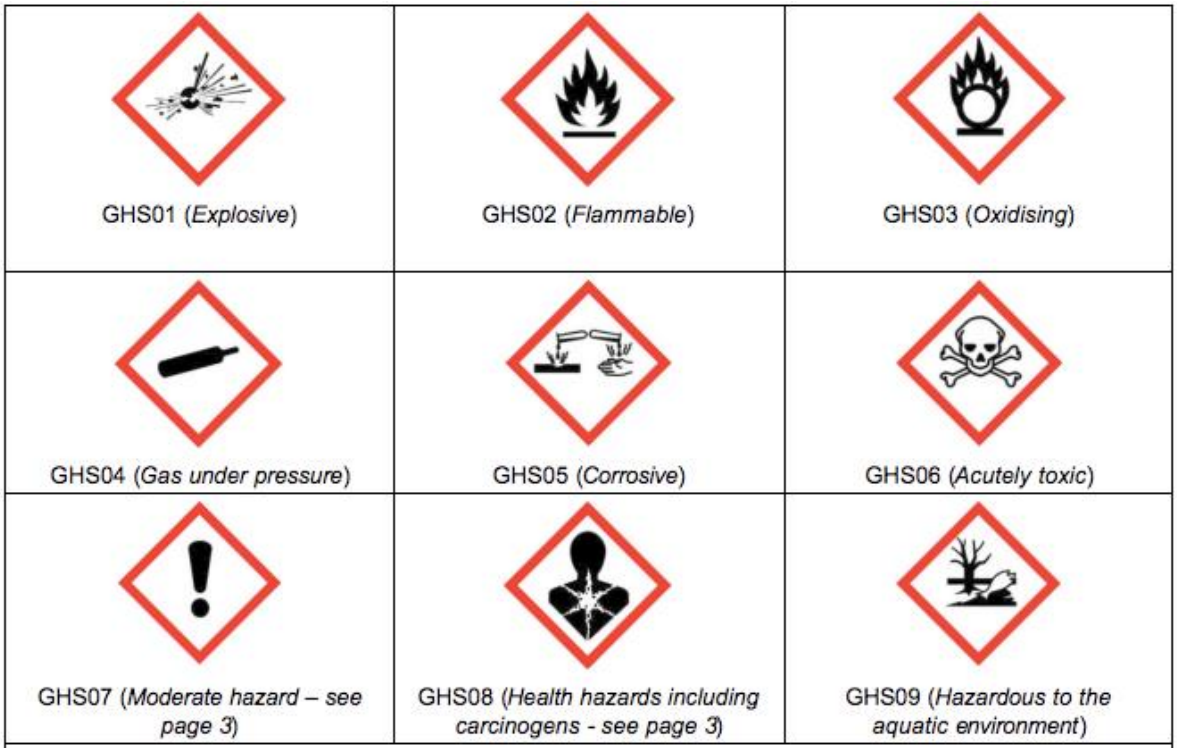
The Periodic Table of the Elements

Period	Groups																
	I	II										III	IV	V	VI	VII	0
1								1 H Hydrogen 1									4 He Helium 2
2	7 Li Lithium 3	9 Be Beryllium 4										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
3	23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
4	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
5	85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
6	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
7	Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

CLEAPSS - Laboratory Rules

The biggest danger in the lab is ***YOU!*** You are at risk when you don't understand the hazards, or you are careless, or both. The person most likely to suffer from your mistakes is ***YOU!*** Report any accident or breakage to your teacher.

1. Only enter a lab when told to do so by a teacher. Never rush about or throw things in the lab. Keep your bench and floor area clear, with bags and coats well out of the way.
2. Follow instructions precisely; check bottle labels carefully and keep tops on bottles except when pouring liquids from them; only touch or use equipment and materials when told to do so by a teacher; never remove anything from the lab without permission.
3. Wear eye protection when told to do so and keep it on from the very start until all practical work is finished and cleared away.
4. When using naked flames (e.g., Bunsen or spirit burners or candles), make sure that ties, hair, baggy clothing etc are tied back or tucked away.
5. Always stand up when working with hazardous substances or when heating things so you can quickly move out of the way if you need to.
6. Never taste anything or put anything in your mouth in the laboratory. If you get something in your mouth, spit it out at once and wash your mouth out with lots of water. Tell your teacher.
7. Always wash your hands carefully after handling chemicals, microbes or animal and plant material.
8. If you are burnt or a chemical splashes on your skin, wash the affected part at once with lots of water. Tell your teacher.
9. Never put waste solids in the sink. Put them in the bin unless your teacher instructs you otherwise.
10. Wipe up all small spills and report bigger ones to your teacher.



B3
Genetics

Year 7 Genetics Concept Core knowledge

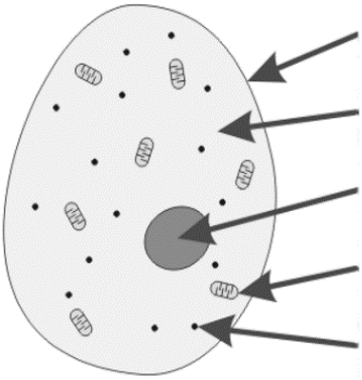
No.	Question	Answer
1	Write these down in size order (largest to smallest) nucleus, DNA, chromosome and cell.	cell, nucleus, chromosome and DNA.
2	What is DNA (deoxyribonucleic acid)?	DNA is a molecule found inside the nucleus of a cell.
3	What does DNA do?	It contains the instructions for a cell.
4	What are chromosomes?	Chromosomes are strands of DNA found in the nucleus.
5	What is a genome?	A complete set of chromosomes/ full set of DNA.
6	How many chromosomes are there in the nucleus of human body cells?	46 chromosomes (23 pairs of chromosomes).
7	What are gametes?	Sex cells (e.g. egg cells, sperm cells, pollen).
8	How many chromosomes are there in human gametes?	23 chromosomes (half the number of chromosomes found in the nucleus of body cells).
9	What causes the physical changes that take place at puberty?	Hormones
10	Why do these physical changes at puberty occur?	To prepare the body for reproduction/sex
11	Which gland produces oestrogen?	Ovaries
12	Which gland produces testosterone?	Testes
13	Which 'system' contains a collection of glands which produce hormones?	The endocrine system
14	Which gland is known as the 'master gland'?	The pituitary gland
15	What is the uterus (womb) and what does it do?	Muscular organ in a woman where the fetus/baby develops until it is ready to be born.
16	What do the testes do?	Produce sperm and testosterone
17	What is ovulation?	When an egg cell is released from an ovary
18	How often does a woman release an egg cell from her ovary?	Once a month/every 28 days.
19	When does ovulation usually happen?	Day 14
20	What is a period (menstruation)?	Shedding of the lining of the uterus that happens if an egg cell is not fertilised.
21	How often does a woman have a period (on average)?	Once per month/every 28 days
22	On what days of the menstrual cycle does menstruation occur?	Days 1-5
23	Describe what happens at fertilisation in humans.	Sperm reaches egg cell, head enters the egg cell, nuclei of sperm and egg cell fuse.
24	What is a zygote?	A fertilized egg cell produced after the nuclei of a sperm cell and an egg cell fuse.
25	When does the zygote become an embryo?	When the zygote is made up of 32 cells it is called an embryo
26	When do we say that a woman is pregnant?	After the embryo implants into the uterus
27	How long does pregnancy last in humans?	9 months, or 40 weeks.
28	How do food water and oxygen from the mother reach the growing baby?	Through the placenta.
29	Briefly describe birth.	Waters break (amniotic sac breaks), contractions (of uterus) start. Contractions push the baby out through the vagina.
30	What is contraception?	A method used to prevent pregnancy

Concept 1 The cell-recap

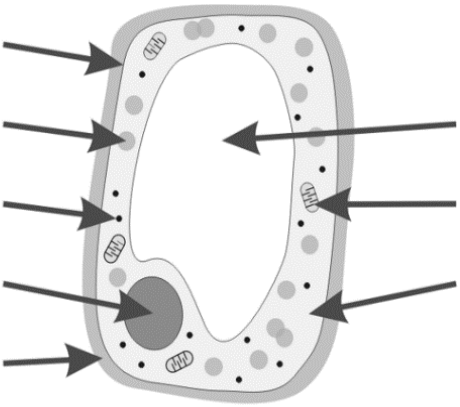
We are going to revise the cell

1. Label these cells

_____ Cell



_____ Cell



2.Complete the table

Key word	**Function**
	Smallest unit of living things
	Structure (organelle) that contains DNA and controls all the functions of the cell
	Jelly-like substance that contains everything that the cell needs to live. Chemical reactions happen here
	Structure (organelle) that carries out respiration to release energy for the cell
	A cell structure (organelle) that makes protein
	The outer part of the cell that controls what goes in and out of the cell
	Surrounds the cell membrane in plants for structure and protection
	Structure (organelle) in plant cells that contains green chlorophyll and converts light energy into chemical energy by making food.
	Structure (organelle) in plant cells filled with a fluid that contains sugar for the cell and gives the cell shape and rigidity

Concept 2: Genome

We are going to find out what we mean by genome, chromosome and DNA

5 quick questions	
1	
2	
3	
4	
5	

Look at the core knowledge at the beginning of the booklet and write down what is meant by genome

_____

Locating the genome: Part 1 Do you think the things in the pictures have a genome?

		
a human	a cat	a plant
		
a car	a dead tree	bacteria

Which statement do you agree with for **each** picture?

A It has a genome.

B It does **not** have a genome because it is not a living organism.

C It does **not** have a genome because it is not made of cells.

D It does **not** have a genome because it is not human.

Locating the genome: Part 2 Where in the human body are copies of the genome stored?

A Only in cells in the blood.

B In many different types of cells throughout the body.

C In cells on the outside of the body, such as skin and hair.

D Only in cells of the reproductive system.

Locating the genome: Part 3 Where in a plant are copies of the genome stored?

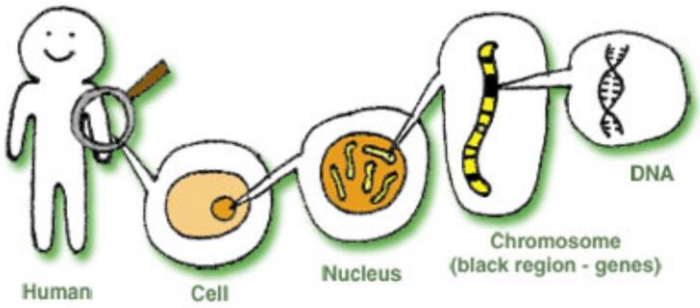
A Only in cells that make up reproductive structures, such as flowers and seeds.

B In cells on the outside of the plant, such as leaves.

C In many different types of cells throughout the plant.

D Only in cells of the roots and stem.

Cells, nucleus, chromosomes and DNA



Small or smaller? Human ova (egg cell) & sperm are two types of cell found in the human body. How big are they?

To do: A number of biological structures have been listed below. Put them into the right order of size. Place the **largest** item first and the smallest item last.

A	Human ovum (egg cell)
B	Cell nucleus
C	4-cell embryo
D	Hen's egg
E	Human sperm cell
F	Mitochondrion

Largest_____Smallest

Justify the order you have selected. What were your reasons for putting the structures in the order you did?

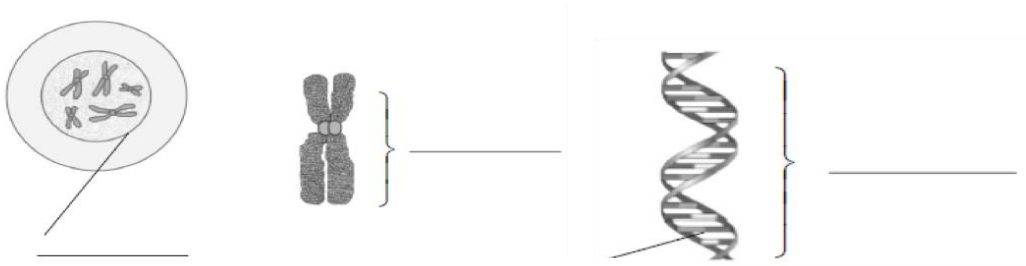
_____

DNA (**DNA** stands for **d**eoxyribo**n**ucleic **a**cid): Tick **one** box for each statement.

Statements		I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	The genome is made of DNA.				
2	DNA is alive.				
3	DNA is made of genetic information.				
4	All organisms contain DNA.				
5	DNA is made of cells.				
6	The shape of DNA is called a triple helix.				

Chromosomes are made up of a molecule of DNA and are found in the nucleus. Label this diagram.

Key words: N_cl_ _s Chr_m_s_m_ DN_



In humans there are 23 pairs of chromosomes 46 in total.

How many chromosomes: For life cycles to continue reproduction must take place. Mature adults produce gametes (sex cells). Sexual reproduction creates a new life.

Every body cell of a human has 46 chromosomes.

1. Choose numbers from the list below to answer the questions. Each number can be used once, more than once, or not at all.

   23 46 58 92

2. When humans grow, their body cells divide to make new body cells. How many chromosomes will be in each new body cell that is made?_____
3. Adult male humans make sperm cells for sexual reproduction. Sperm cells are gametes. How many chromosomes will be in each sperm cell?_____
4. Adult female humans make ova (egg cells) for sexual reproduction. Ova are gametes. How many chromosomes will be in each ovum (egg cell)?_____
5. When a sperm cell fertilises an ovum (egg cell) during sexual reproduction, an embryo is formed.
6. How many chromosomes will be in each cell of the embryo?_____

Check point

Cell division processes are used to produce body cells and gametes. The nucleus of a daffodil cell has 46 chromosomes.

1. State the number of chromosomes in each pollen grain (plant male gamete) from a daffodil_____
2. State the number of chromosomes in leaf cells (palisade cells) and root cells (root hair cells)_____

Concept 3: Puberty

We are going to learn about how humans change to prepare for reproduction

5 quick questions	
1	
2	
3	
4	
5	

True or False? Find the four true statements

1. Boys and girls start puberty at the same age.
2. You will get spots during puberty so it doesn't matter about washing.
3. All children suddenly shoot up in height during adolescence.
4. Puberty is caused by hormones.
5. Hormones are made in the ovaries in boys and the testes in girls.
6. Boys can have "wet dreams" during puberty where some sperm comes out of the penis.
7. It is all right to be moody – it's just the hormones.

1. Boys will all end up with deep voices.
2. Girls will need to wear a bra as their breasts will develop.
3. Both breasts are always the same size.
4. Periods can be painful.
5. You can't go swimming or horse riding if you're having a period.
6. Periods will be every 28 days.
7. Boys will become more muscular.
8. Girls and boys will grow extra hair.
9. Boys will need to shave daily.
10. Boys and girls will have periods.

When humans enter puberty, their bodies go through many changes.

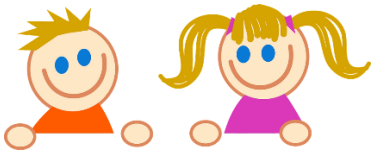
	Statements: Females	I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	One of the first signs of puberty in a human female is that the breasts begin to develop.				
2	During puberty a female's hips get narrower.				
3	The female's menstrual cycle begins.				
4	Females usually have their first period as soon as they start puberty.				
5	Egg cells are released for the first time.				
6	Females cannot reproduce until they have gone through puberty.				

	Statements: Males	I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	One of the first signs of puberty in human male is that the testicles start to get bigger.				
2	During puberty the size of the penis does not change.				
3	The male's menstrual cycle begins.				
4	Sperm cells are made for the first time.				
5	Puberty allows males to make sex cells.				
6	Males can reproduce at any age.				

Periods: When teenage girls go through puberty they start their periods. Look at the statements about periods in the table. Some are right and some are wrong. Tick **one** box for each statement.

	Statements	I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	A period always lasts 5 days.				
2	When a female is in a bad mood it is because she is having a period.				
3	The blood that is lost from the body during a period comes from the bladder.				
4	Females have periods because the lining of their uterus breaks down.				
5	The amount of blood lost during a period is on average about 6-7 teaspoons.				
6	The length of the menstrual cycle is always the same.				

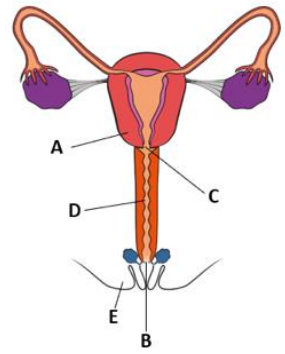
1. What happens in the body to make the sex organs active?_____
2. What do we call this stage in our lives?_____
3. Why is it important the boys and girls sex organs become active?_____

 **Changes that only happen in males**	 **Changes that happen in both males and females**	 **Changes that only happen in females**

Assessment Task: Between the ages of 10 and 15, boys and girls go through some changes, this is called puberty. Describe some of the changes experienced by teenage girls and boys going through puberty and explain why these changes happen.

For new life to be created reproduction must occur. In humans this is achieved by sexual reproduction.

Female reproductive system: The female reproductive system produces the ova (egg cells). The female reproductive system is made of many parts, each with its own function.



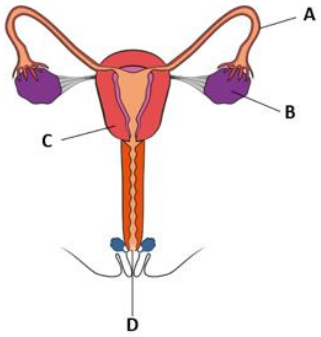
Part 1

1 Look at the diagram. Which letter, **A**, **B**, **C**, **D** or **E,** is the vagina? ☐

2 How would you explain your answer to question 1 (see slide)?

_____

_____



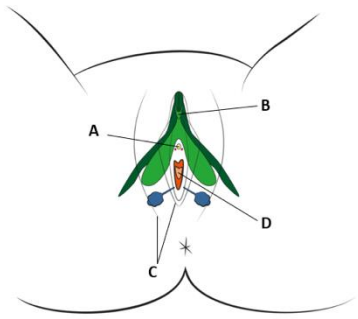
Part 2

1 Look at the diagram. Which letter, **A**, **B**, **C** or **D**, is the ovary? ☐

2 How would you explain your answer to question 1 (see slide)?

_____

_____



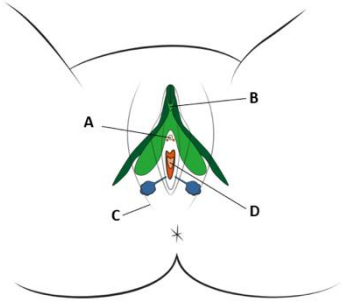
Part 3

Look at the diagram. Which letter, **A**, **B**, **C** or **D**, shows the labia?

1 How would you explain your answer to question 1 (see slide)? ☐

_____

_____



Part 4

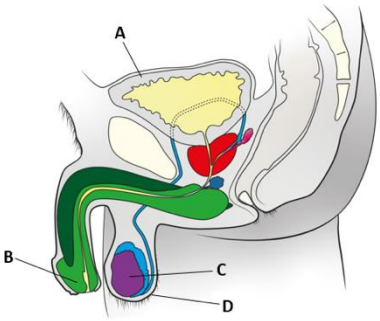
1 Look at the diagram. Which letter, **A**, **B**, **C** or **D**, is the clitoris? ☐

2 How would you explain your answer to question 1 (see slide)?

_____

_____

Male reproductive system: The male reproductive system produces the sperm. The male reproductive system is made of many parts, each with its own function.



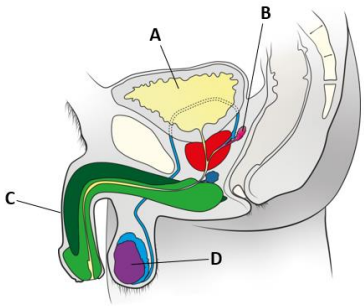
Part 1

1. Look at the diagram. Which letter, **A**, **B**, **C** or **D**, is the scrotum? ☐

2. How would you explain your answer to question 1 (see slide)?

_____

_____



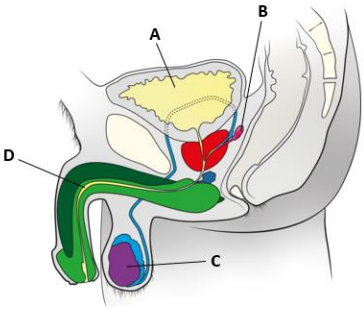
Part 2

1. Look at the diagram. Which letter, **A**, **B**, **C** or **D**, makes seminal fluid (a key component of semen)? ☐

2. How would you explain your answer to question 1 (see slide)?

_____

_____



Part 3

1. Look at the diagram. Which letter, **A**, **B**, **C** or **D**, is the structure that removes urine and semen from the body? ☐

2. How would you explain your answer to question 1 (see slide)?

_____

_____

Complete the table using the following key words

Ovaries, Testis, Scrotum, Vagina, Sperm duct, Uterus, Penis, Cervix, Fallopian tube

Structure	Function
	Sperm made here
	Carries sperm from testis to penis
	Holds testis outside the body to keep them at correct temperature
	Carries sperm out of the body
	Egg cells are made here
	Carries egg cell from ovary to uterus. Fertilisation takes place here
	Baby grows here
	Entry to uterus
	Receives sperm from penis

Sex hormones

1. Where is the male hormone produced?_____
2. Where is the female hormone produced?_____

Gametes are sex cells

3. What is the name of the gamete made by females and where is it produced?_____
4. What is the name of the gamete made by males and where is it produced?_____

Menstrual cycle and menstruation

5. The sentences in the box describe one of the changes that girls go through when they reach puberty. Complete the sentences in the box. You can only use the words **menstrual cycle** and **menstruation** to fill the gaps.

When adolescent girls go through puberty they start their periods. Each period lasts between 3-7 days.

Another word for a period is …… .

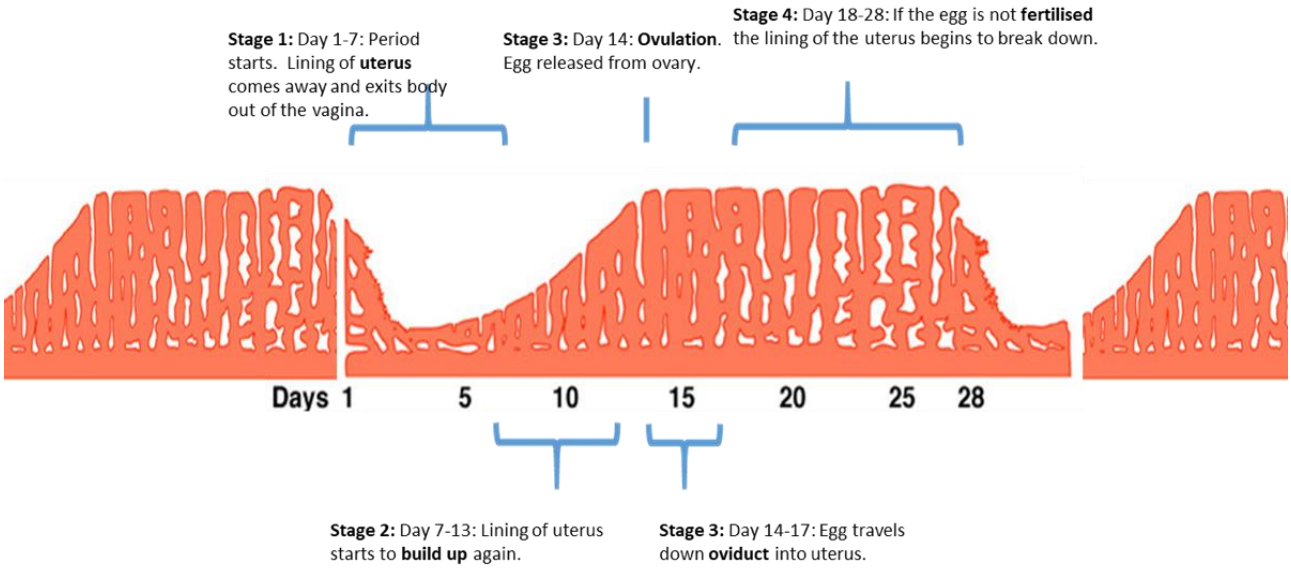
…… is when the lining of the uterus breaks down and blood leaves the body.

…….. is one part of the …… , which lasts around 28 days.

The …… lasts for around a month and is controlled by hormones, though the exact length is different for each female.

The menstrual cycle has 4 main stages

Stage 1-the lining of the uterus breaks down and bleeding starts
Stage 2- the lining of the uterus builds up. It is full of blood vessels ready for implantation
Stage 3-Egg cell (ovum) is released from one of the ovaries (this is the most likely time that a female may become pregnant
Stage 4-Lining of the uterus is maintained awaiting the arrival of a fertilized egg. If this does not happen the lining of the uterus breaks down and the cycle starts again.



1. Why do women have periods?_____

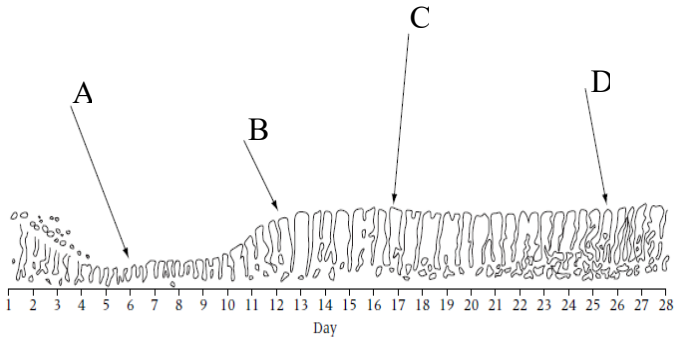
2. Where is the egg cell released from? _____

3. When an egg cell is released from the ovary it is known as? _____

4. Roughly at what point in the menstrual cycle does ovulation occur? _____

5. Match the numbers and letters

1. The lining gets thicker to prepare for a possible pregnancy
2. A fertilised egg is implanted into the uterus
3. The lining breaks down as no fertilized egg implants into the uterus lining
4. The lining stays thick as the fertilised egg has implanted



Exam style questions

1. This question is about the menstrual cycle. Choose words from the list to complete the sentences.

a daily the uterus the middle an ovary a weekly

the beginning a monthly the end the vagina

Menstruation is part of ..... cycle.

The cycle begins when the lining of ..... breaks away.

An ovum (egg cell) is released from ..... at about

..... of each cycle.

4 marks

2. **Diagram 1** shows the female reproductive system.

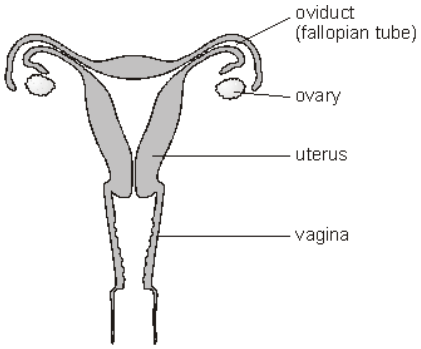


diagram 1

(a) **Diagram 2** is a graph showing how the thickness of the uterus changed over a 28-day cycle.

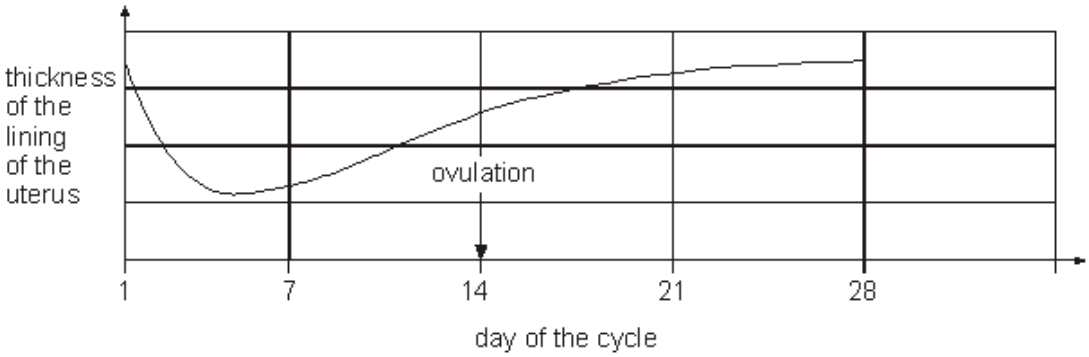


diagram 2

(i) Why did the thickness of the lining of the uterus decrease between day 1 and day 5 of this cycle?

.....

.....

1 mark

(ii) Suggest which day in this cycle an ovum (egg cell) is most likely to be fertilised.

day .....

What evidence is there for this in the graph?

.....

.....

1 mark

(iii) The graph shows that the lining of the uterus builds up again between day 5 and day 14.

Why is this necessary?

.....

.....

1 mark

(b) (i) Continue the line on the graph to show what would happen to the thickness of the lining of the uterus after 28 days if an ovum was fertilised.

1 mark

ii) Explain your answer.

.....

.....

1 mark

maximum 5 marks

Concept 4: Hormones

Today we are learning about how chemical messengers are used in the body

5 quick questions	
1	
2	
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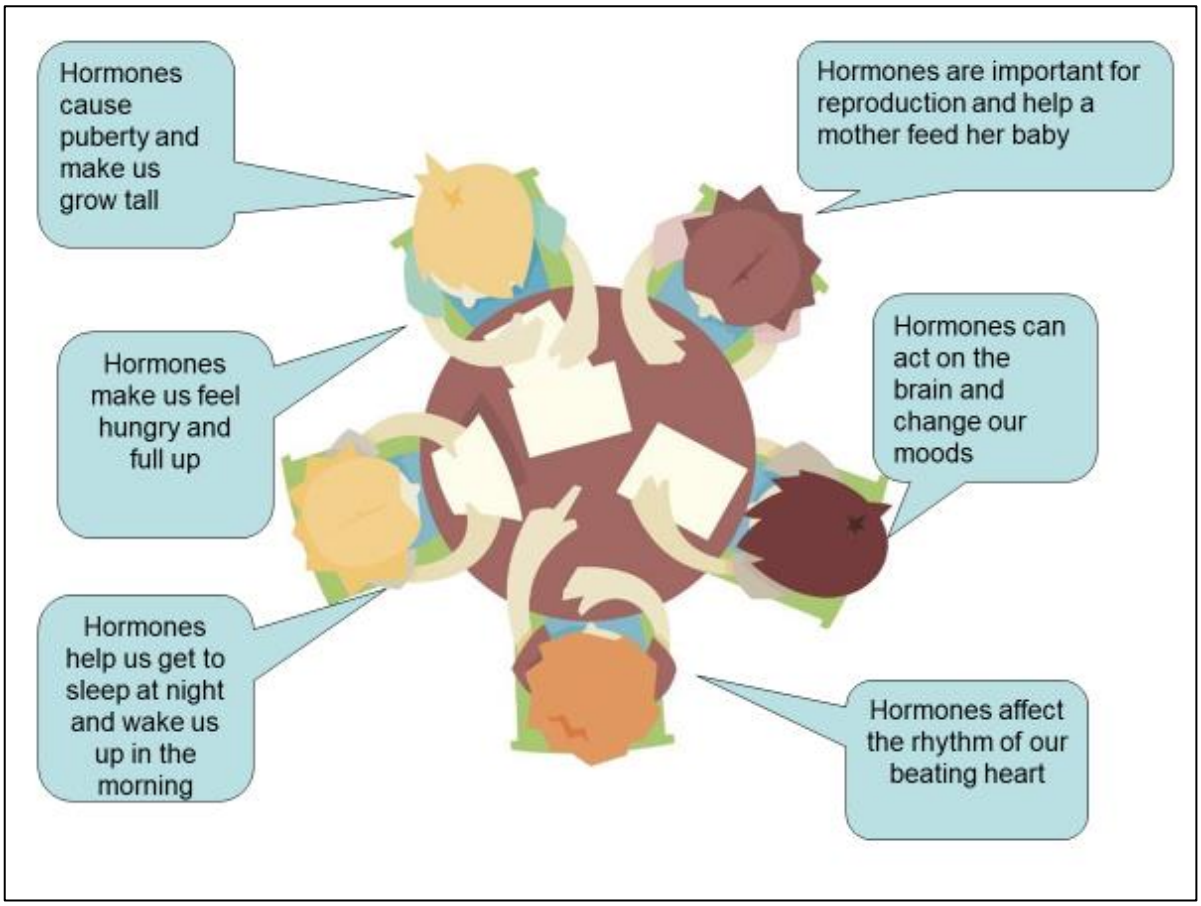
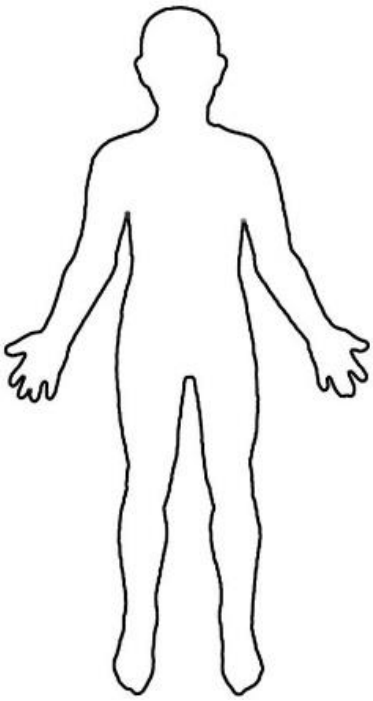
1. Which of these statements do you think is true and why?



2. Label the outline of the human body with the position of the major endocrine glands.



3. True or false?
    1. The adrenal glands are found in the head.
    2. Ovaries produce testosterone.
    3. The pituitary gland is the master gland that controls the other glands.
    4. The adrenal glands are small glands located on top of each kidney.
    5. The thyroid gland produces adrenaline.
    6. The pancreas produces insulin.
    7. The pancreas is found in the neck.
    8. The thyroid gland is found at the base of the neck.

4. Add the hormone that is released from each endocrine gland:

Endocrine gland	**Hormone**	**Function of the hormone**
Pituitary gland (master gland that controls the other glands)		
Thyroid gland		
Adrenal gland		
Pancreas	Insulin	
Ovaries		
Testes		

5. Multiple choice

1. What are hormones?
   - Chemicals secreted by glands
   - Chemicals secreted by target organs
   - Nerve impulses
2. What produces hormones?
   - Glands in the body
   - Nerves in the body
   - Blood
3. How are hormones transported around the body?
   - Blood
   - Glands
   - Nerves
4. Why do hormones take so long to act?
   - They are quite strong
   - They have to travel in the blood stream
   - They travel down neurons first
5. What system releases hormones?
   - Circulatory System
   - Nervous System
   - Endocrine System
6. Which gland is located at the base of the neck?
   - Thyroid gland
   - Adrenal glands
   - Pituitary gland
7. Which hormones are produced in the male and female reproductive organs?
   - Testosterone and oestrogen
   - Insulin and glucagon
   - Testosterone and insulin
8. Why do hormones last for such a long time?
   - They take a long time to reach the target organ
   - Once they are released, they stay forever
   - They have an effect until they are broken down

6. **Fill in the gap-can use key words more than once**

target, glands, master, hormones, testosterone, puberty, heart, adrenaline, oestrogen, chemical, adrenal gland, endocrine

The endocrine system is made up of _____that make and release _____in to the blood stream, which then transports the _____around the body. The hormones are like _____messages that can change the activity of a _____cell, tissue or organ e.g. adrenaline released from the _____acts on the target organ the _____to increase the _____rate. The _____keep working until it is broken down by the liver, so your heart rate stays high until the _____is destroyed.

The pituitary gland is the _____gland as it regulates the other _____ _____. The ovaries produce _____which controls ovulation and causes development of the female reproductive organs during_____. The testes produce _____which controls sperm production and causes the development of male reproductive organs in males.

7. Hormone bingo

Concept 5: Sexual reproduction

Today we are learning about how we reproduce

5 quick questions	
1	
2	
3	
4	
5	

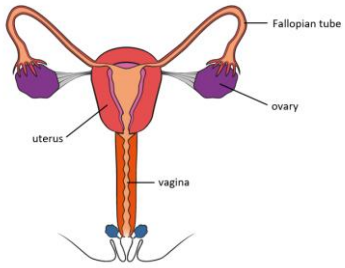
1. The statements in the tables below are all about conception and gamete. Look at the statements in the tables. Some are right and some are wrong. Tick **one** box for each statement.

Statements		I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	Fertilisation occurs when the sperm meets the ovum (egg cell).				
2	Two sperm can fertilise one ovum (egg cell).				
3	Conception occurs when the lining of the uterus is at its thickest.				
4	Identical twins can be different sexes.				
5	More than one ovum (egg cell) can be fertilised at a time.				
6	Fertilisation is when the DNA from the nuclei of the sperm and ovum (egg cell) fuse.				
7	Fertilisation and implantation are the same thing.				

Statements		I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	Animals can make gametes during all stages of their life cycle.				
2	Male and female animals make different types of gametes.				
3	Each gamete contains exactly the same genetic information as a body cell.				
4	When a male and female animal have sex, this is called fertilisation.				
5	Fertilisation is the start of a new life cycle.				

2. Where are sperm cells made and which tube do they travel through to leave the penis?

3. Draw an arrow on the diagram to show the pathway of sperm after they leave the vagina. Mark with a cross the place where fertilization happens.



4. Without looking at your diagram of the female reproductive organs, list all the female reproductive structures that the sperm swim though or pass before reaching the egg cell.

5. How does the sperm know where to go?

6. How many sperm combine with one egg cell?

7. Why don't more sperm enter the egg cell?

8. What do we call an egg cell that has been fertilised by a sperm (look at core knowledge question 22)?

9. Why is it important that sperm and egg cells have only half a set of genetic instructions?

10. Every body cell of a human has 46 chromosomes**.** Choose numbers from the list below to answer the questions. Each number can be used once, more than once, or not at all.

    23 46 58 92

    a) When humans grow, their body cells divide to make new body cells.

    How many chromosomes will be in each new body cell that is made? _____

    b) Adult male humans make sperm cells for sexual reproduction. Sperm cells are gametes.

    How many chromosomes will be in each sperm cell? _____

    c) Adult female humans make ova (egg cells) for sexual reproduction. Ova are gametes.

    How many chromosomes will be in each ovum (egg cell)? _____

    d) When a sperm cell fertilises an ovum (egg cell) during sexual reproduction, an embryo is formed.

    How many chromosomes will be in each cell of the embryo? _____

11. The table below show the number of chromosomes found in some different mammals. Fill in the table to show how many chromosomes are present in the different types of cells found in these mammals.

Mammal	Number of chromosomes in a body cell	Number of chromosomes in a female sex cell	Number of chromosomes in a male sex cell	Number of chromosomes in a fertilised egg cell
Human	46	23	23	46
Tiger	38			
Elephant	56			
Horse	64			
Chimpanzee	48			
Rabbit	44			

12. If you were given the name of a species, you had never heard of but were told how many chromosomes were in each of its body cells, how would you work out how many chromosomes were in its sex cells?

13. The process that creates sex cells is important. Explain why.

14. Exam style question

Cell division processes are used to produce body cells and gametes. The nucleus of a daffodil cell has 46 chromosomes.

State the number of chromosomes in each pollen grain (plant male gamete) from a daffodil.

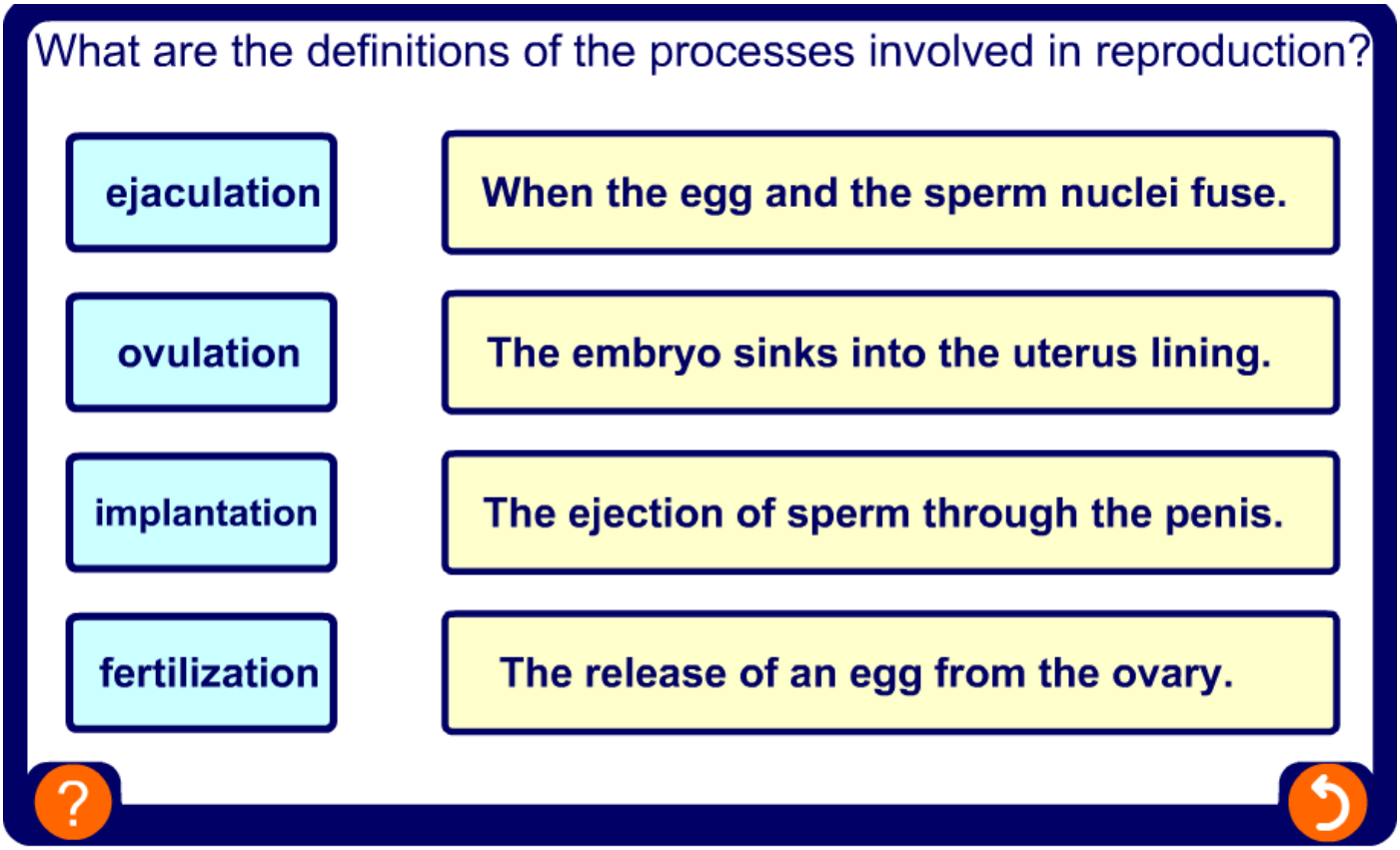
.....

State the number of chromosomes in leaf cells (palisade cells) and root cells (root hair cells)

.....

15. Fill in the gaps using the key words sperm, 46, fertilise, cervix, embryo, 2, sexual intercourse, lubricant, nuclei, fetus, fertilised, erect, 4, penis, blood, pregnant, uterus, vagina, egg cell, 32, vagina.

When a man and a woman have _____ _____the man's penis becomes _____ by filling up with _____. The woman's _____becomes receptive by swelling with blood and secreting _____. During intercourse the semen is released from the _____into the _____. _____cells then travel up through the _____, _____ and fallopian tubes until they meet an _____travelling down the fallopian tube. If they meet the sperm cell will _____the egg and this is known as a zygote. A zygote is a _____ egg cell produced after the _____ of a sperm cell and an egg cell fuse. The nucleus of a zygote contains ____ chromosomes. The zygote then splits in to ____ identical cells and then each of these two cells divide in to two more identical cells making a total of ____ identical cells. This process is known as cell division and after 4 days, when the zygote consists of _____ cells it is called an embryo. At this stage the _____ sinks into the uterus lining and embeds there; this is known as implantation and it is at this point that the woman is _____, and the embryo can receive oxygen and nutrients from the mother. After 8 weeks the embryo is known as a _____.



Concept 6: Pregnancy and Birth

Today we are learning about what happens during pregnancy and birth

5 quick questions	
1	
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Pregnancy:

1. Label diagram of fetus inside a pregnant woman from the side

amniotic fluid

umbilical cord

fetus

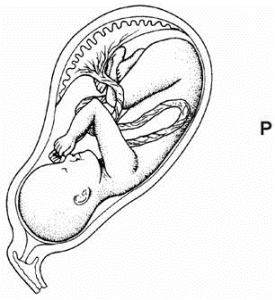
placenta

uterus

vagina

2. Exam style questions

a) The drawing below shows a baby just before it is born. Draw a line from the letter P to the placenta.



1 mark

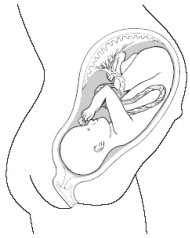
Give **two** functions of the placenta.

1. .....

2. .....

2 marks

b) The diagram shows a baby developing inside its mother.



(i) Which word means an unborn baby? _____ (1 mark)

(ii) Where does the unborn baby develop? _____(1 mark)

3. As a fetus grows and develops in the uterus it must be provided with substances it needs to stay alive and the materials needed for growth. Look at the statements in the table. Some are right and some are wrong.

Statements		I am **sure** this is right	I **think** this is right	I **think** this is wrong	I am **sure** this is wrong
1	The mother's blood takes nutrients to the developing fetus.				
2	The fetus breathes in amniotic fluid.				
3	Amniotic fluid contains the oxygen a fetus needs to survive.				
4	The baby produces urine which it releases into the amniotic fluid.				
5	To keep warm the fetus must move around.				

4. Arrange these words in the correct order to show how a fetus gets rid of waste from its cells.

Fetus's cells, mother's blood, umbilical cord, placenta

_____

5. Stick your statements in the correct place after class discussions

Placenta statements	Amniotic fluid statements

The effect of maternal lifestyle on the fetus

You know that the placenta passes oxygen and nutrients from the mother to the baby via the placenta. However other substances in the mother's blood can be passed on to the baby in the same way. So, if a mother smokes, drinks alcohol or takes drugs these substances end up in the blood of the fetus.

Complete these questions during our class discussions

1. Smoking
   a. What effect might it have on the fetus?

   b. How can the dangers be avoided?

2. Taking drugs
   a. What effect might it have on the fetus?

   b. How can the dangers be avoided?

3. Alcohol
   a. What effect might it have on the fetus?

   b. How can the dangers be avoided?

3. Diseases affecting the fetus
   a. Name three diseases if caught by the mother could be harmful to the fetus

   b. Why does the school tell staff if a pupil has caught chicken pox?

   c. Why are teenage girls vaccinated against German measles?

Title:

1. Un-jumble these words to help figure out the title. When you have un-jumbled, write a definition for each word.

   rouabl _____

   trantioconc _____

   wimifeid _____

   abby _____

   hups _____

   spitlaho _____

2. The statements describe stages of the life cycle of a human. What is the correct order for the statements?

A	The embryo develops.
B	Gametes (sperm and egg cells) can be formed.
C	Growth occurs and the human reaches maturity.
D	The fetus grows.
E	A sperm cell fertilises an egg cell.
F	Sexual reproduction occurs.
G	The baby is born.

3. When we say labour has started, what is happening in the mother's body?

4. What does the word pregnant mean?

5. What is the advantage of keeping the child in the mother's body during pregnancy?

6. How long does the baby grow in the womb before it is born?

7. Explain why the mother may need to eat more when pregnant?

8. Explain why the mother may need to go to the toilet more often?

9. Write the sentences about birth in the correct order (see slide)

10. Exam style question
The diagram shows an unborn baby.
Complete the sentences below by filling in the gaps.

In humans, normal pregnancy lasts for ..... months.

When the fetus is ready to be born, muscles in the uterus wall start

to ..... . 2 marks

After the baby is born, the ..... connecting

the fetus to the mother is cut. 1 mark

Concept 7: Contraception

Today we are finding out how pregnancy can be prevented

5 quick questions	
1	
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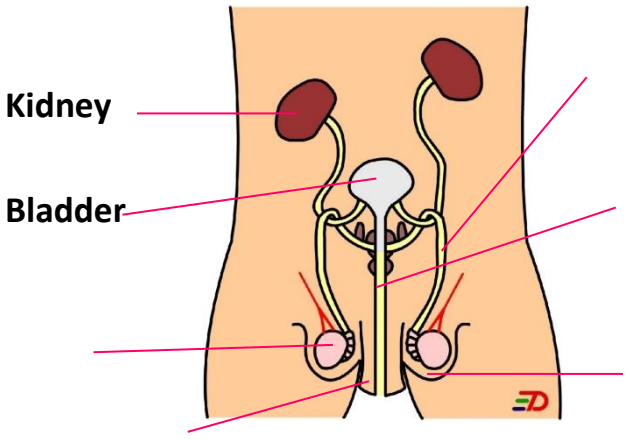
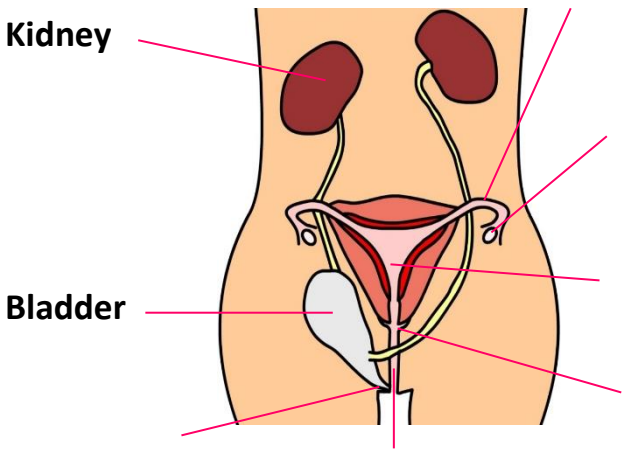
Review:

1. Label the diagram below using these key words 'Testis, Scrotum, Sperm duct, Penis, Urethra'



2. Label the diagram below using these key words 'Urethra, Ovaries, Fallopian tube, Uterus, Vagina, Cervix'



3. Fertilisation Recap:

- Sperm is released into the .....
- Sperm swims up through ....
- Sperm needs to meet the egg in the ....
- If the genetic material from the sperm and egg fuse, then ....
- When is a woman said to be pregnant?

Answer the questions for each of the contraceptive laminates

1. Barrier method of contraceptive

a) Name examples of a contraception that stops the sperm reaching the egg cell (barrier method).

b) The failure rate for men using a condom is 3-14%. Explain why a woman could get pregnant after intercourse when a man uses a condom.

c) Why do barrier methods of contraception also reduce the risk of spreading sexually transmitted infections?

2. Hormonal methods or contraceptives

a) Name examples of contraceptives that use hormones (oestrogen and progesterone) to stop ovulation by 'fooling' the body in to thinking it is pregnant.

b) Why might the birth control pill not work?

3. Anti-implantation methods

a) Name a examples of a contraception that prevents implantation of the embryo into the uterus lining

b) When would a woman take the morning after pill?

c) Explain why the morning after pill cannot be used as a regular contraceptive

4. Sterilization

a) Name an example of birth control that is irreversible.

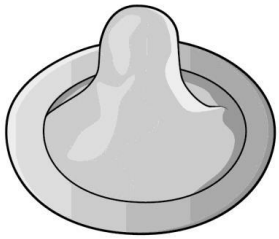
b) Name one advantage and one disadvantage of sterilization as a method of birth control

Advantage

Disadvantage

Exam Style questions

1. The male condom is a barrier method of contraception.



a State what is meant by contraception.

_____

b Give a reason why the male condom is described as a barrier method of contraception.

_____

c The table shows the percentage of pregnancies prevented when couples use some different contraceptive methods.

Contraceptive method	% of pregnancies prevented
male condom	98%
diaphragm or cap	92–96%
female condom	95%
contraceptive pill	>99%

Use the table to identify which contraceptive method is best at preventing pregnancy.

_____

2. The table shows the theoretical and actual effectiveness of a range of contraceptive methods. Effectiveness is measured as the percentage of couples using that method for a year, where the woman did not become pregnant.

Method	Actual effectiveness	Theoretical effectiveness
combined hormone pill	92%	99.7%
male condom	85%	98%
hormonal injection	97%	99.95%
diaphragm + spermicide	84%	94%

a Suggest reasons for any difference between the actual and the theoretical effectiveness for each method.

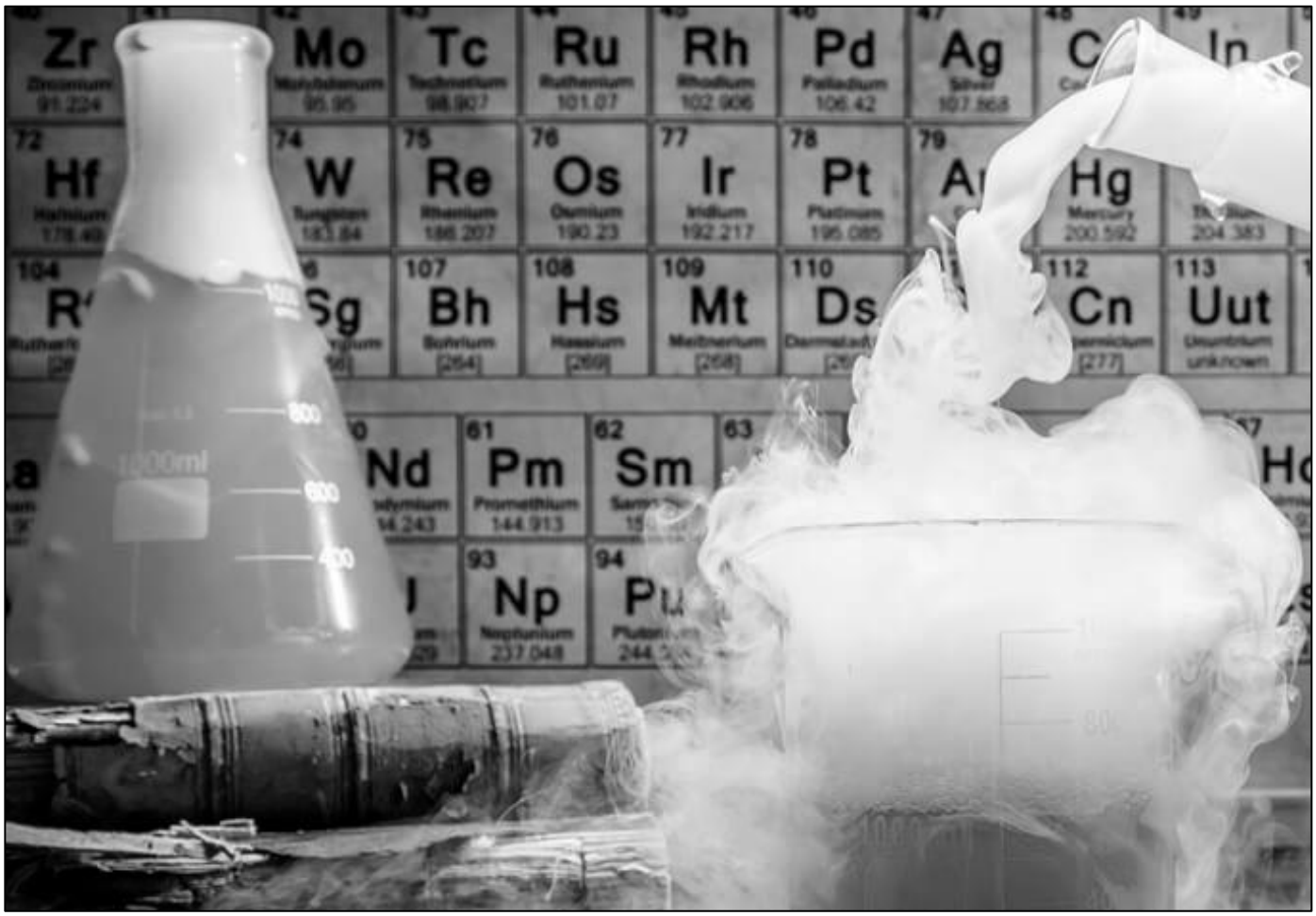
_____

b Comment on the difference in effectiveness between hormonal and physical barrier methods.

_____

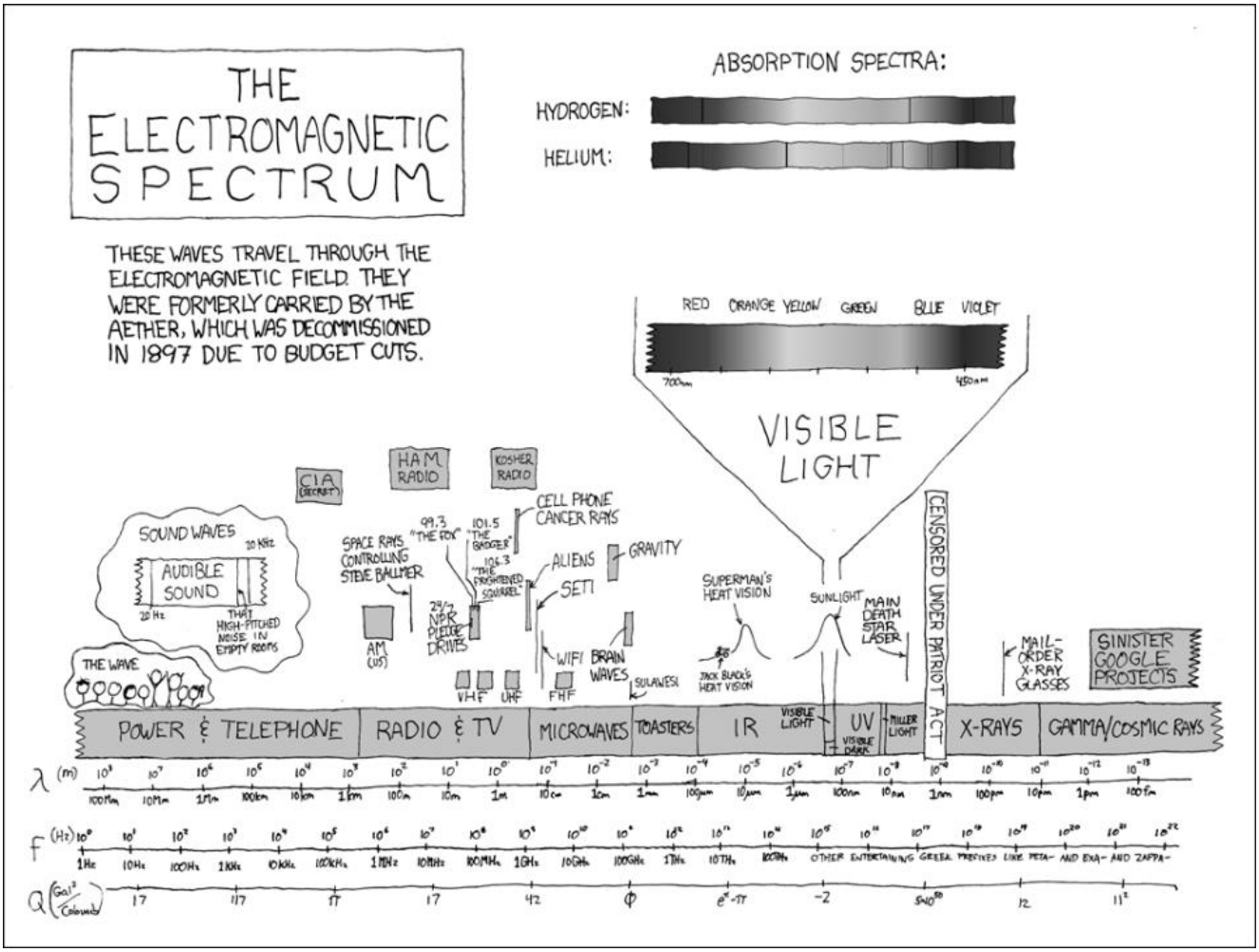
C3

Chemical Reactions



P3

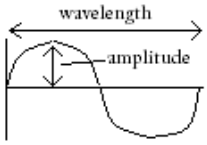
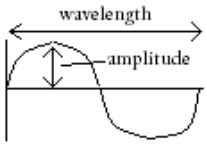
Waves



Knowledge and Understanding Checklist: 7P4-Waves

7P4-Waves	I understand this	I have learnt this
I can describe a wave as a transfer of energy but not of matter		
I can describe longitudinal waves and transverse waves		
I can give examples of longitudinal and transverse waves		
I can state that light can travel through all 3 states of matter (transparent/translucent solids) and a vacuum		
I can describe the meaning of the terms frequency, amplitude and wavelength and recall their units		
I can compare differences of simple transverse wave diagrams of frequency, amplitude and wavelength		
I can describe how sound transfers energy from an object producing vibrations		
I can describe how sound waves are transmitted (and affected by) in the three states of matter		
I can state the speed of light and sound		

Core knowledge questions for 7P4-Waves

	Question	Answer
1.	Define frequency and state its unit	The number of waves in 1 second and the unit is Hertz (Hz)
2.	Define amplitude and state its unit	 The distance from the centre of a wave to the top of the wave.
3.	Define wavelength and state its unit	 The length of 1 complete wave cycle. It is measured in meters (m).
4.	State an example of a longitudinal wave	Sound waves, primary seismic waves
5.	State examples of a transverse wave	• Radio waves, microwaves, infra-red radiation, visible light, ultra violet, x-rays, gamma rays (any part of the electromagnetic spectrum) • ocean waves • secondary seismic waves
6.	Describe a longitudinal wave	The direction of the vibration is parallel to the direction of the energy travel
7.	Describe a transverse wave	The direction of the vibration is perpendicular to the direction of the energy travel
8.	Describe how sound is produced	Vibrations cause sound waves
9.	Compare and explain how sound travels through solid, liquids and gases	Sound waves travel through solids faster because the particles are touching in solids, and so the energy is transferred on much quicker. Sound waves travel slowest in gases as particles are not touching, so passing on the energy takes longer.
10.	Describe how water waves can be reflected	A barrier in water causes waves to reflect
11.	Compare how sound waves interact with soft materials and shiny, hard materials	Soft materials absorb sound waves Hard, shiny materials reflect sound waves
12.	Define echo	An echo is a reflection of sound
13.	State the speed of light in a vacuum	300,000,000 m/s
14.	State the speed of sound in air	330 m/s
15.	Define transparent	A material that allows all light to pass through it
16.	Define translucent	A material which scatters and absorbs some light, as well as allowing some light to pass through
17.	Define opaque	A material that allows no light to pass through it
18.	Define vacuum	A space where there are no particles

0 How will our Y7 work help us with these ideas?	Recall core knowledge from the energy and particles topics in year 7 Check our understanding of important ideas around a) How particles behave in different states of matter b) Different types of energy

This is based on work you have completed in Y7 about energy and particles. See how many of these questions you can still remember the answers to based on your core knowledge.

1. List the nine forms of energy you learnt about in your energy topic

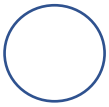
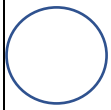
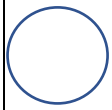
2. If something has energy, what does that mean?

3. How does electrical energy travel?

4. How does sound travel?

5. How does light travel?

6. Draw particle models of a solid, liquid and a gas, describing how the particles move in each state.

Solid	Liquid	Gas
		
Description	Description	Description

Concept 1: What is a wave?	Define a wave as a transfer of energy but not of matter State examples of longitudinal and transverse waves (just to know sound is longitudinal and light and water waves are transverse) Describe longitudinal and transverse waves

5 quick questions	
1	
2	
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1. List examples of waves, or energy traveling as a wave

Key Idea

What is a wave?

A wave moves _____ without moving _____.

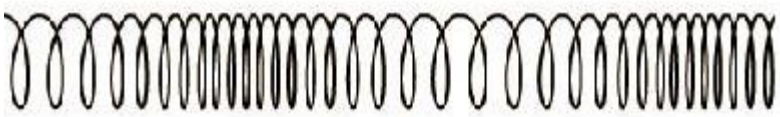
2. Can you see the wave of energy move around the stadium in the video? Can you see it pass from person to person, point to point? _____
3. Do the people move along with the wave? _____
4. Do the people return to their original locations? _____
5. Waves move energy without moving matter.
6. What is the matter in this model? _____
7. What is the energy being moved in this model? _____
8. How is a Mexican wave similar to the definition of a wave we have discussed?

Key Idea

Transverse Wave

Which direction is the wave travelling in? Show with an arrow labelled 'direction'

Which direction are the coils of the spring travelling in? Show with an arrow labelled 'matter'



Longitudinal Wave

Which direction is the wave travelling in? Show with an arrow labelled 'direction'

Which direction are the coils of the spring travelling in? Show with an arrow labelled 'matter'

Apply your knowledge of **transverse and longitudinal waves** to the following questions. Make corrections and additions when the answers are discussed in class

A longitudinal wave moves _____ in _____ direction as the direction of the wave.

A transverse wave moves _____ at _____ to the direction of the wave.

Comparison table between longitudinal and transverse waves

	Transverse	Longitudinal
Direction of the matter compared to the wave		
Does the wave carry energy?		
Does the wave permanently move matter/ particles?		

Key Idea

	Longitudinal	**Transverse**
Sound		
Light		
Water		

Concept 2 Materials and light	State that light can travel through all 3 states of matter (transparent/translucent solids) and a vacuum

5 quick questions	
1	
2	
3	
4	
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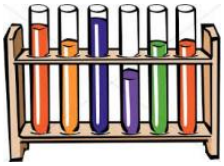
Light waves, which are an example of a transverse wave, can travel through solids, liquids gases and a vacuum.

Some materials (solids, liquids or gases) are **transparent**- that is, they let light through in an organised way, letting you see clearly through the object-e.g. a glass window. Some solids are **opaque**, this means that light does not travel through the object, it is either reflected or absorbed by it. Some materials can be described as **translucent**, where the material allows light to pass through, however the light is scattered so that the objects are not clear.

Draw diagrams to show how rays of light behave when they meet transparent, translucent and opaque objects



Practical task

Use a raybox to identify which state of matter each material is in and if it is transparent, translucent or opaque.

Material	Solid, Liquid or gas	Does light travel though it?	Is it transparent/translucent or opaque

1. What do you notice about materials that are:

   a transparent? _____

   b translucent? _____

   c opaque _____

Apply your knowledge of **transparent, translucent and opaque materials** to the following questions. Make corrections and additions when the answers are discussed in class

2. From the box below, select the object or objects that best fit the following descriptions.

mirror	unpainted wooden door	shop window
frosted glass window	painted wall	

   a. opaque _____

   b. transparent _____

   c. translucent _____

   d. the best reflector of light _____

   e. the best absorber of light _____

3. What is the difference in the way in which light travels through normal glass and through frosted glass? Draw diagrams to help explain your answer.

_____

_____

_____

4. a. What happens to light when it strikes the unpainted wooden door?

_____

_____

_____

   b. The door is rubbed down with sandpaper (to make it smoother) and then painted. Explain what happens to light when it strikes the door now.

_____

_____

_____

Concept 3 Describing waves	Define terms frequency, amplitude and wavelength and recall their units Compare differences of simple transverse wave diagrams of frequency, amplitude and wavelength

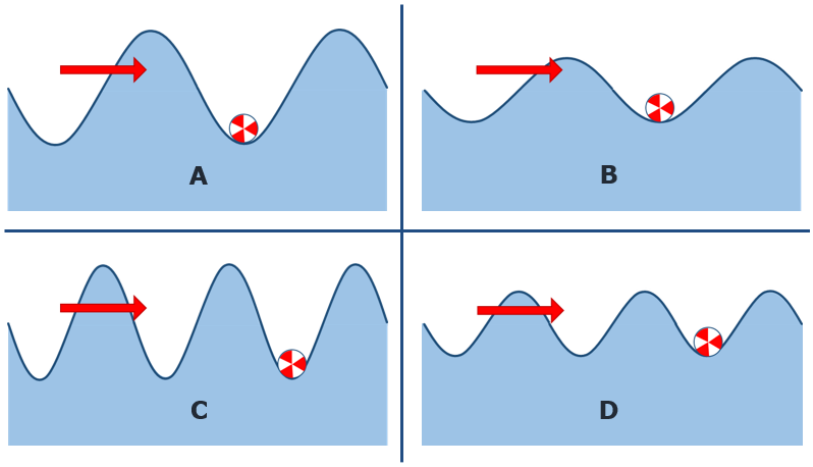
5 quick questions	
1	
2	
3	
4	
5	

Energy from a wave

As the wave moves forward, it makes the ball move up and down.

1. The wave transfers energy to the ball.

a. Which wave transfers energy to the ball most quickly? *Put a tick (✓) next to the best answer.*



b. What is the best reason for your last answer? *Put a tick (✓) in the box next to the best answer.*

A This wave contains most water. ☐

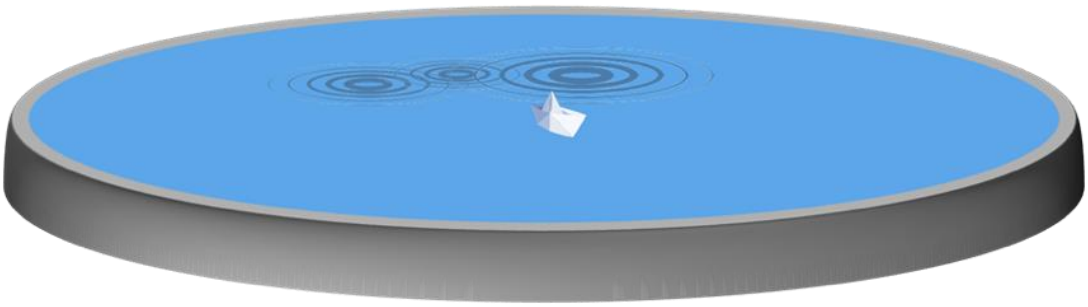
B This wave makes the ball move most quickly. ☐

C This wave contains most energy. ☐

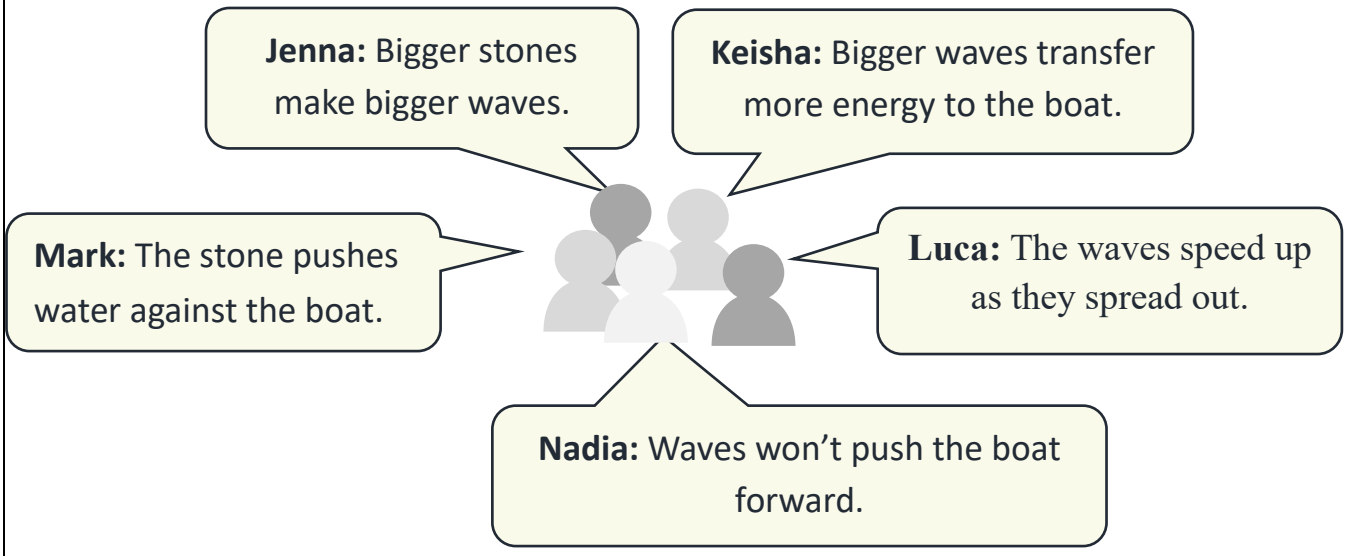
D This wave hits the ball with most force. ☐

Ripples on a pond

Some children have made a paper boat.
It has got stuck in the middle of a pond.



The children want to get their boat back.
They are discussing what will happen if they throw stones into the water.



2. Who is right about what happens?

- *Explain your answer*

3. Who is wrong about what happens?

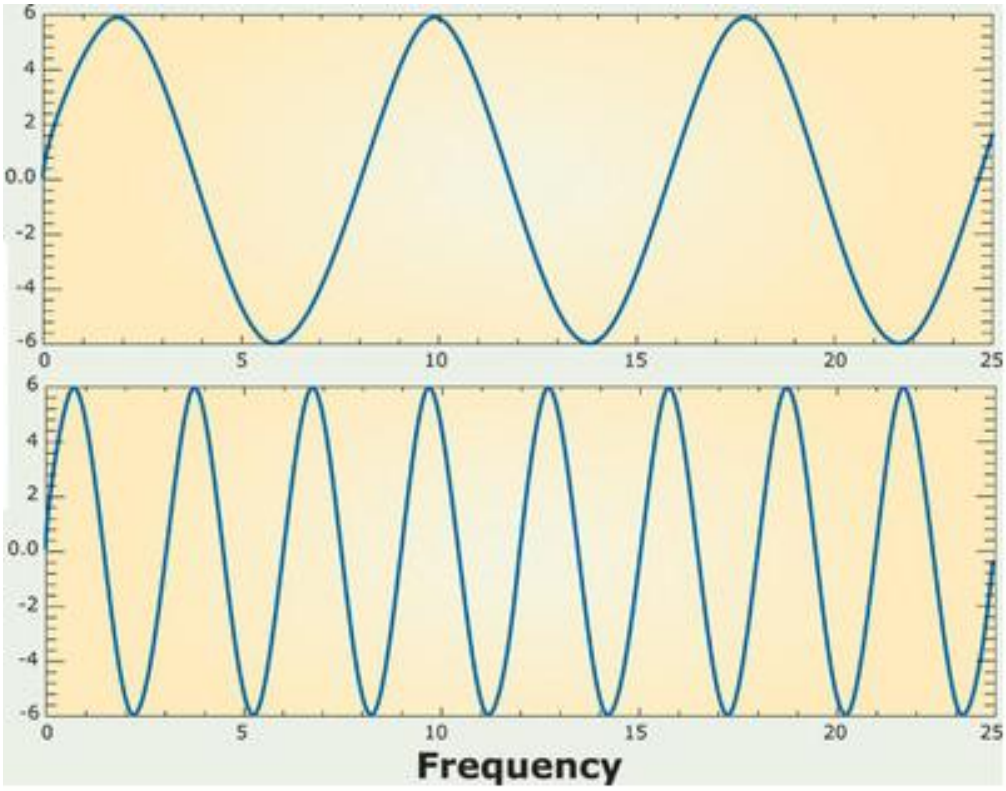
- *What would you say to help them understand?*

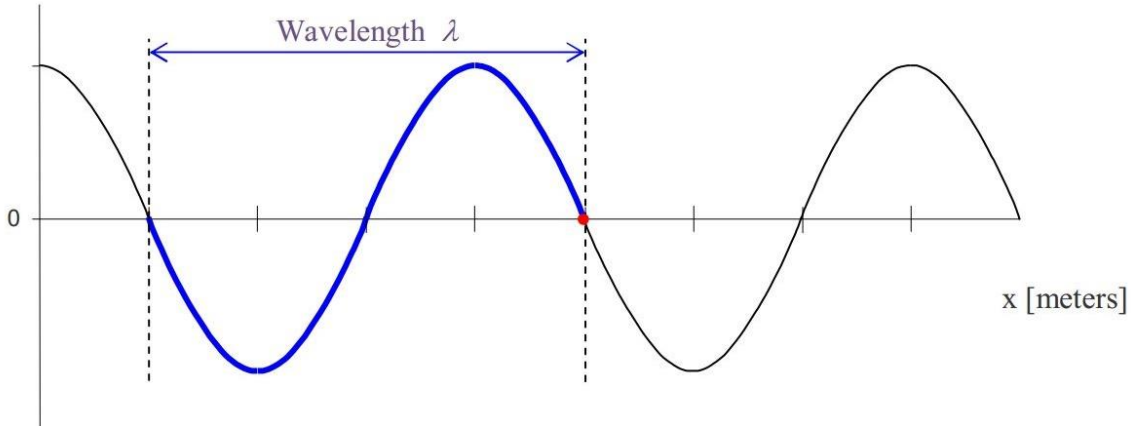
Ripples on water surfaces and waves on ropes are described as transverse waves. As a transverse wave travels across the surface of water or along a rope, water particles or bits of rope vibrate at right angles to the direction the wave travels in. As a wave travels this can be seen by observing a cork bobbing up and down on the surface of water, or a mark on a piece of rope moving from side to side.

The number of pulses produced each second (and hence the number passing any given point as the wave passes) is the **frequency** of a wave. The higher the frequency, the more quickly energy is transferred by the wave. Energy also transfers more quickly if each ripple or vibration is larger (has a bigger **amplitude**).

Neither frequency nor amplitude change the **speed** of a wave. Speed of a wave depends only on the medium through which the wave is travelling.

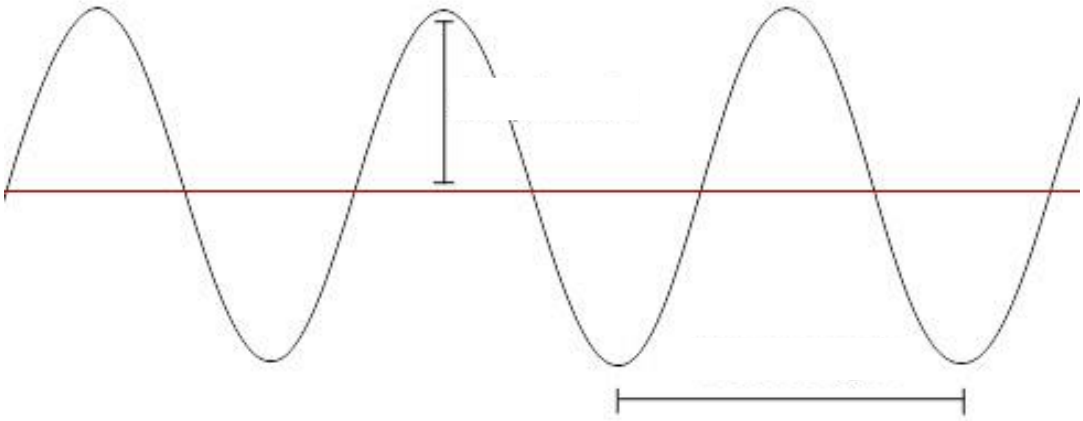
What is the difference between these two waves?





Parts of a wave

Key Idea

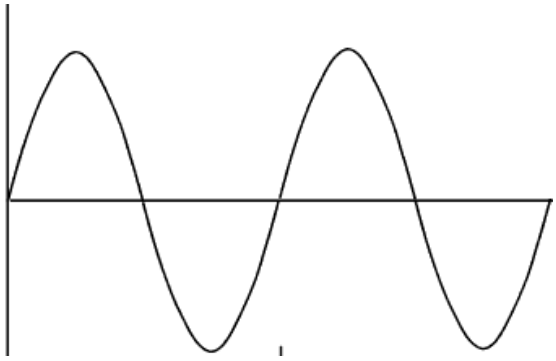


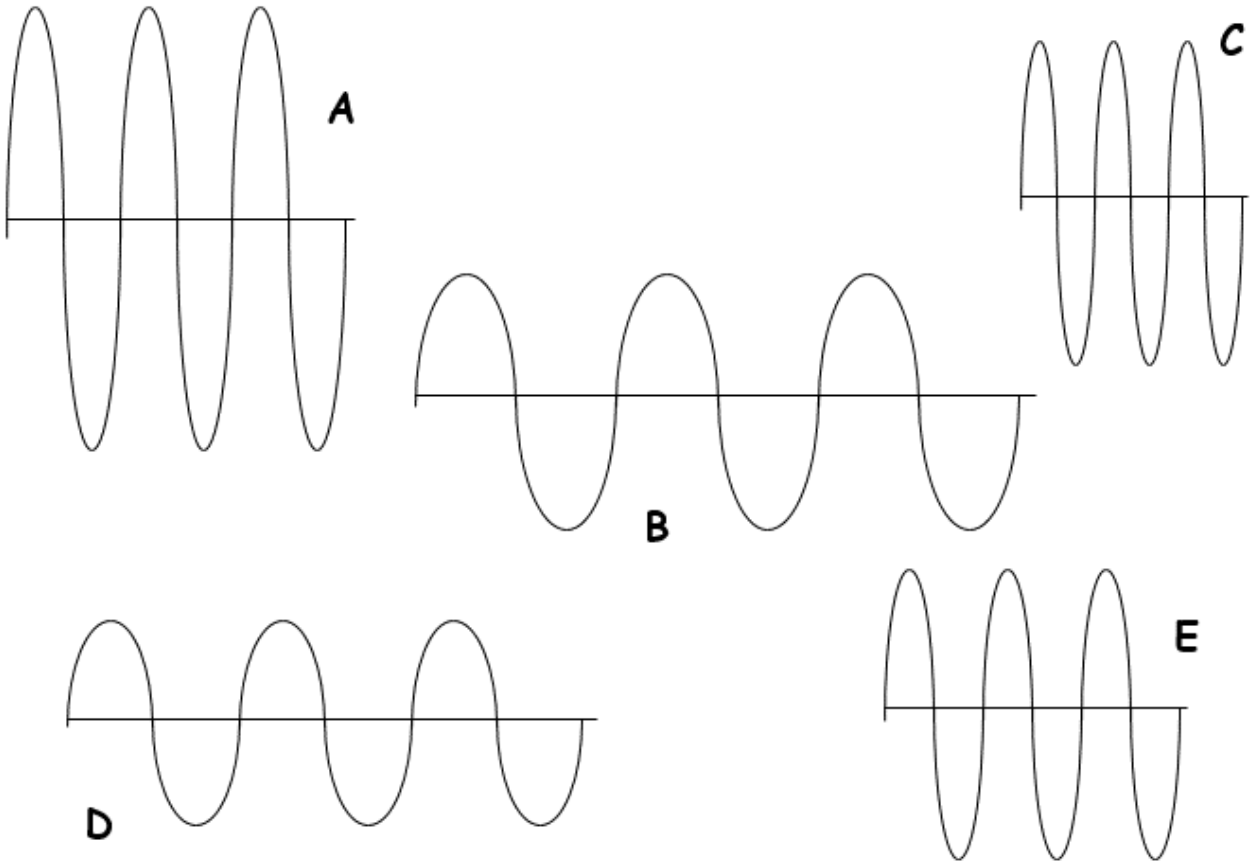
First two minutes only

1. Apply your knowledge of **describing waves** to the following questions. Make corrections and additions when the answers are discussed in class

Key word	**meaning**
Waves	The height of a wave above the zero line
Wavelength	They transfer energy from one place to another without the need for particles
Frequency	The number of waves per second
Amplitude	The distance from peak to peak/trough to trough on a wave

2. Label the crest, trough, amplitude and wavelength on this diagram of waves





Which of the above waves has: (**NB You might need a ruler!**)

The highest frequency?

The shortest wavelength?

The largest amplitude?

The longest wavelength?

The lowest pitch?

The loudest intensity?

The smallest amplitude?

Concept 4 Sound waves	Describe how sound transfers energy from an object producing vibrations Describe how sound waves reflect off of surfaces and these are known as echoes Describe, and explain, how sound waves reflect differently off of different materials

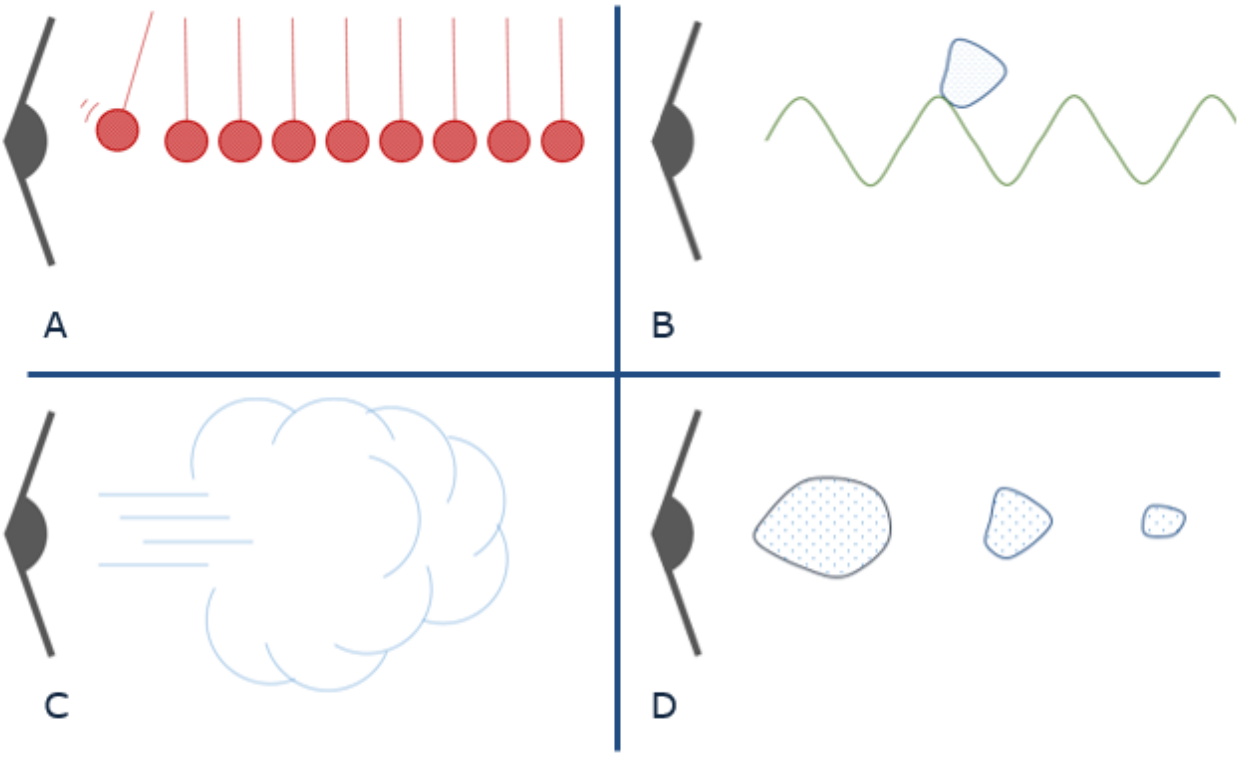
5 quick questions	
1	
2	
3	
4	
5	

Into the air

A loudspeaker vibrates and makes a sound.

We hear the sound because it moves through the air.

These pictures try to show how sound moves through the air. Which one is the best model for how sound moves?



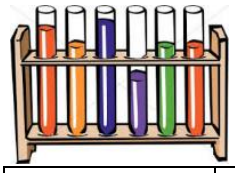
1. Which of the diagrams A – D is the best model for how sound moves?

2. What do the ping-pong balls represent?

3. What happens to the ping-pong balls when the loudspeaker vibrates?

3. How is this model similar to what happens when sound moves through the air?

4. How is this model different to what happens when sound moves through the air?



Practical task

Action	Observation	This proves
Striking tuning fork with rubber bung		
Placing vibrating tines near water or ping pong ball		

Material	Distance from sound (m) class results	Average distance (m)

The earmuffs that were the most successful were:

This is because:

Key Idea

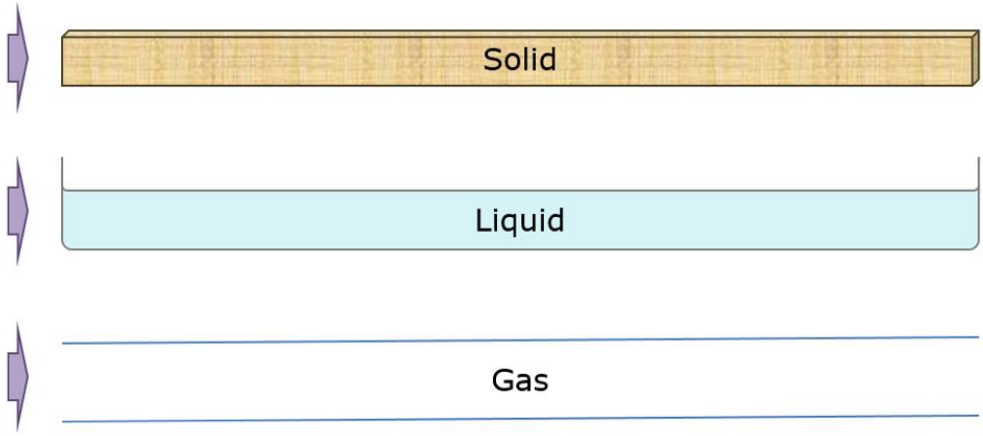
How sound waves reflect differently off different surfaces

Concept 5 Sound travelling through solids, liquids, gases and a vacuum	Describe how sound waves are transmitted (and affected by) in the three states of matter State the speed of light and sound

5 quick questions	
1	
2	
3	
4	
5	

Sound moves

When something vibrates it can make a sound. Sound can travel through solids, liquids and gases.



a. Does sound travel best in a solid, a liquid or a gas? Put a tick (✓) in the box next to the best answer.

A Solid ☐

B Liquid ☐

C Gas ☐

b. Why do you think sound travels best in this? Put a tick (✓) in the box next to the best answer.

A Space for sound to move between particles ☐

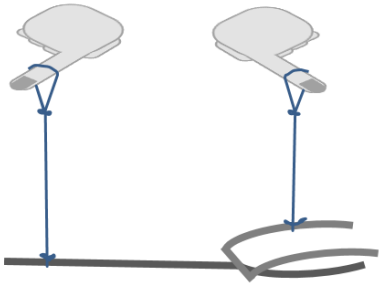
B Lots of particles to push the sound along ☐

C Many particles to vibrate and bump into each other ☐

D Particles are joined so it is easy to pass on vibrations ☐

String ears

The metal clamp makes a sound when it is tapped gently.



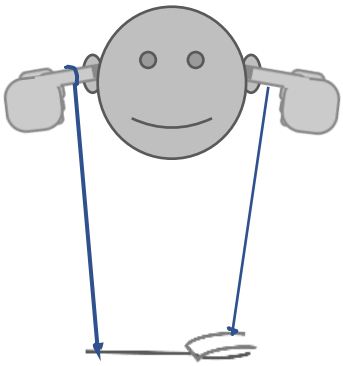
Predict

What do you think will happen to the sound if you put your fingers in your ears?

Explain

Explain why you think this will happen.

Now have a go



Observe

Describe how the sound changes.

Explain

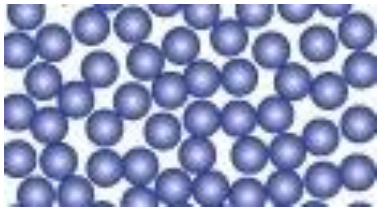
Were your prediction and explanation correct?

If not, can you explain what you observed?

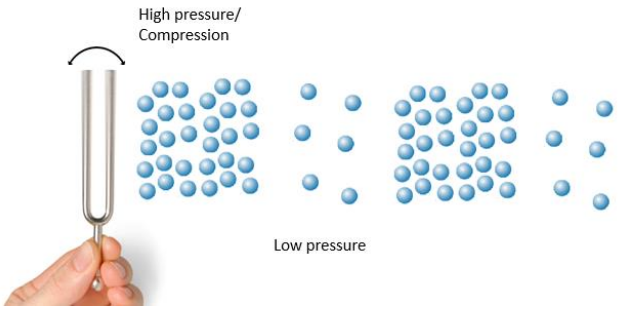
Key Idea

Sound travelling in solids

Sound travelling in liquids



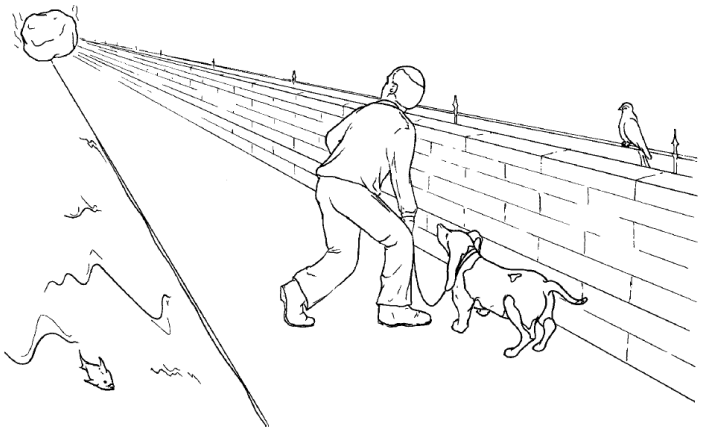
Sound travelling in gases



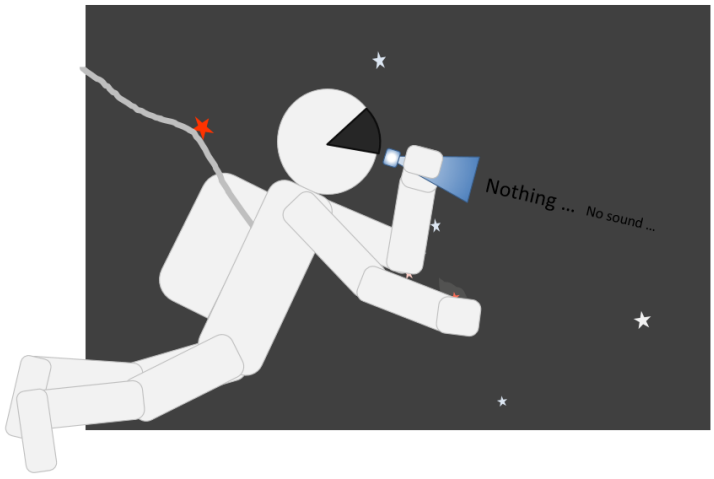
Apply your knowledge of **sound in solids, liquids and gasses** to the following questions. Make corrections and additions when the answers are discussed in class

A rock falls- striking a wall with a wire top, a path and the water at- strange this- the exact same time. Put the animals in order of who first detects the sound

Fish in the water
Man walking a dog
Dog leaning on the brick wall
Bird sitting on a metal wire



Sound cannot be heard through space



Why can't you hear a sound in space?

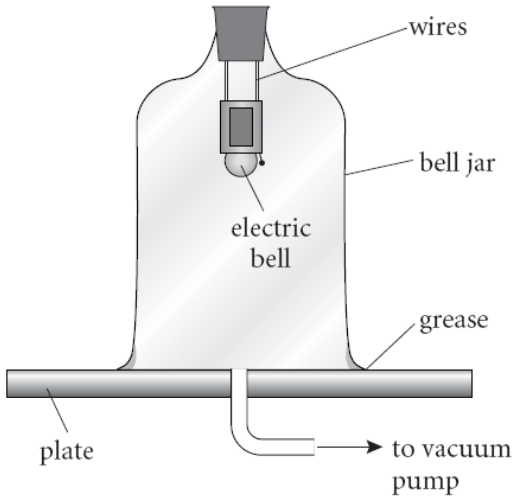
Put a tick (✓) in the box next to the best answer.

A No air particles to make each other vibrate ☐

B No air particles to push the sound along ☐

C No air particles to pass the sound along ☐

D No gaps in the space suit for sound to get in ☐



Questions

1 Why is it important that the jar is airtight?

2 How are small gaps around the jar sealed?

3 What is the space inside the empty jar called once the air is pumped out?

4 Could you hear the bell?

a before the air was pumped out?

b after the air had been pumped out?

c when the air was let back in?

5 How did you know the bell was still ringing if you couldn't hear it?

6 What did this experiment tell you about the way sound travels?

7 What did it tell you about the way light travels?

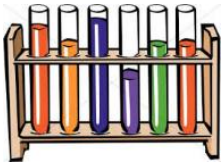
Key Idea

The Speeds of sound and light

1. Sound in air 330m/s
2. Light in a vacuum 300,000,000m/s.

Thunder is the sound that lightning makes as it passes through the air. Explain why you see the lightning flash before you hear the rumble of thunder.

Why do some people count the seconds between lightning and thunder?



Practical task- measuring the speed of sound in air

Attempt no.	Time (s)

Do- now Tasks

Task A

Observation		Explanation	
1	You see the lightning before you hear the thunder.	**A**	Light can travel through a vacuum.
2	The sound of the bell gets quieter as the air is pumped out.	**B**	Sound travels faster through metal than it does through air.
3	Starlight can reach us through empty space.	**C**	He was the first person (with Robert Hooke) to develop a good vacuum pump.
4	In films, cowboys sometimes put their ear to a railway track to see if a train is coming.	**D**	Light travels faster than sound.
5	It takes 5 seconds for us to hear the thunder from a mile (just over 1500 metres) away.	**E**	Sound needs air (or something) to travel through.
6	Robert Boyle was the first person to demonstrate that sound cannot travel through a vacuum.	**F**	Sound travels at over 300 metres per second.

Task B

The lightning flash and the thunder roll both happen at the same time in a thunderstorm, when the energy from the electrical discharge is released, but we always see the lightning first.

① Which travels faster - sound or light?

② Sound travels at about 340 metres per second. Light travels about one million times faster than sound, so we see things almost instantly. The time it takes to travel is almost too short to measure.

a How far will sound travel in 2 seconds?

b How far will sound travel in 10 seconds?

c If you hear the thunder 5 seconds after seeing the lightning, how far has the thunder sound travelled?

Task C

Some objects are light sources or sound sources.

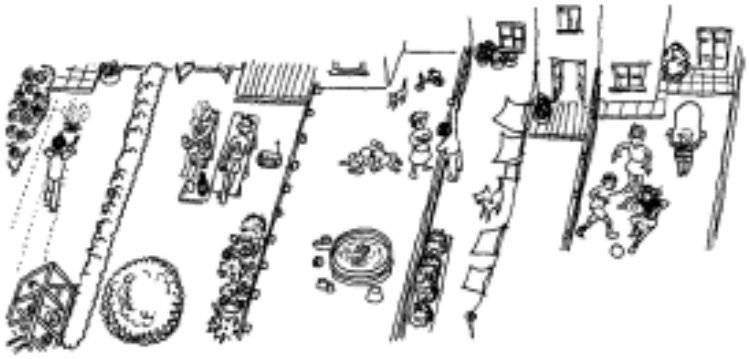
- In what direction do the sound and light move away from the source?

- Which travels faster, light or sound?
- Does sound always travel at the same speed?
- Does light always travel at the same speed?
- Can sound and light go through empty space?

Sound echoes.

- What causes an echo?
- Does light 'echo'?

Sound bends down towards the ground when the air near the ground is cooler than the air above.



- How do you make light bend?
- What is this bending called?

We hear sound.

- What affects the pitch of the sound?
- What pitches of sound can we hear?
- What affects the loudness of the sound?
- How do we hear sound?

We see light.

- What affects the colour of the light?
- What colours of light can we see?
- What affects the brightness of the light?
- How do we see light?

Task D

Match up the statements in the left-hand column with the correct explanation in the right-hand column:

1 Tuning forks make a sound.	**A** Because a child's voice is higher (it has a higher frequency).
2 You need a microphone to send a sound signal to a CRO.	**B** Because loud noises have more energy, so the waves have a bigger amplitude.
3 There are more waves on the screen when a child sings into the microphone than when a man does.	**C** Because the prongs vibrate.
4 The waves on the screen are taller for a louder noise.	**D** Because this makes the vibrating part of the string shorter, giving a higher note.
5 Guitar players place their fingers on the strings as they play.	**E** Because a microphone turns sound into electricity.

Task E

1 Use some of these words to fill the gaps.

a Sound is made when something ..... .

b Fast vibrations make a ..... pitched sound.

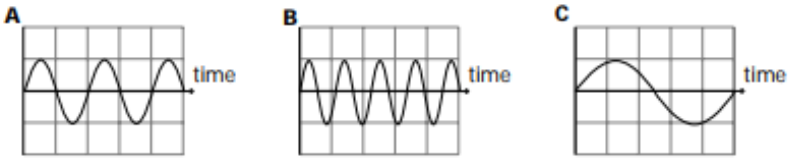
c ..... vibrations make a low pitched sound.

d Big vibrations make a ..... sound.

e ..... vibrations make a soft sound.

f A ..... shows the pattern of a sound on a screen.

2 Look at these three sounds.



Fill in the gaps in the sentences *and* then tick the correct answer.

a Wave ..... has the lowest pitch. This is because it has ...

... the most vibrations in the same time ☐

... the least vibrations in the same time. ☐

b Wave ..... has the highest pitch. This is because it has ...

... the most vibrations in the same time ☐

... the least vibrations in the same time. ☐

Pre-prepared core knowledge quiz no 1

Question	Answer
1. Define frequency and state its unit	
2. Define wavelength and state its unit	
3. State examples of a transverse wave	
4. Describe a longitudinal wave	
5. Describe a transverse wave	
6. Describe how sound is produced	

Pre-prepared core knowledge quiz no 2

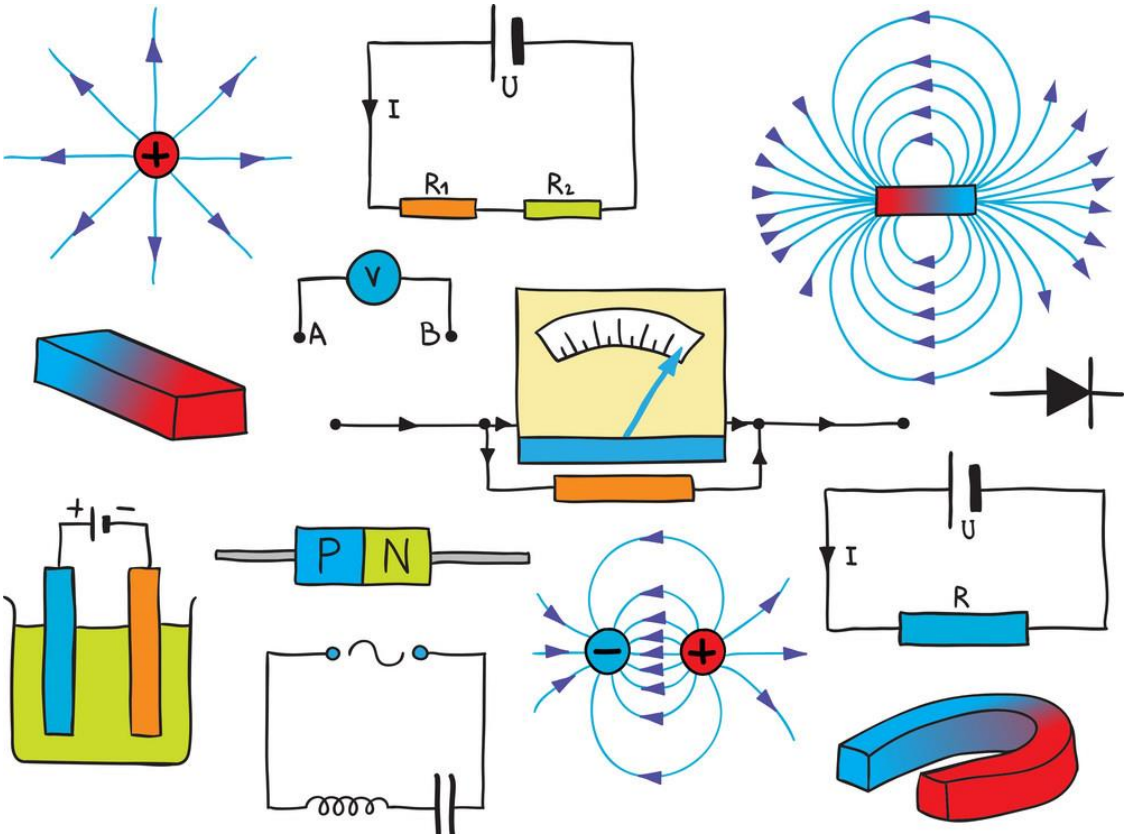
1. Compare and explain how sound travels through solid, liquids and gases	
2. Describe how water waves can be reflected	
3. Compare how sound waves interact with soft materials and shiny, hard materials	
4. Define echo	
5. State the speed of light in a vacuum	
6. State the speed of sound in air	

Pre prepared core knowledge quiz no 3

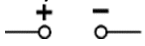
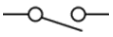
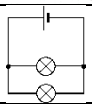
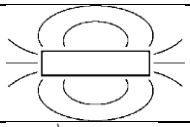
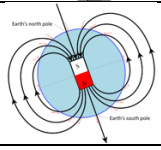
1. Define transparent	
2. Define translucent	
3. Define opaque	
4. Define vacuum	
5. Compare and explain how sound travels through solid, liquids and gases	
6. Describe how sound is produced	

P4

Electricity & Magnetism



7P4 Electricity & magnetism: Core Questions

	Question	Answer
1	Describe the structure of an atom	Electrons orbiting a nucleus
2	What subatomic particles are found in the nucleus?	Protons and neutrons
3	What is the charge and mass of the three subatomic particles?	Protons are positive with a mass of 1 Neutrons are neutral with a mass of 1 Electrons are negative with a mass of 0 or 1/1837
4	Describe the structure of metals	Positive ions surrounded by A sea of free electrons
5	How to like charges interact?	Repel
6	How do unlike charges interact?	Attract
7	Describe how static electricity is generated	Friction between 2 insulated materials causes electrons to transfer and build up.
8	Define current	Flow of electrons
9	Identify the following circuit symbols a)  b)  c)  d)  e)  f)  g)  h) 	a) Battery b) Power pack c) Switch d) Bulb e) Ammeter f) Voltmeter g) Resistor h) Variable resistor
10	What is the function of an ammeter?	Measure the current
11	What is the function of a voltmeter?	Measure the potential difference across a component
12	Draw a basic series circuit	
13	Draw a basic parallel circuit	
14	Describe how to place an ammeter in a circuit	In series (within the circuit)
15	What is the unit for current?	Amps (A)
16	Describe how to place a voltmeter in a circuit	Across a component/ parallel to a component
17	What is the unit for potential difference?	Volts (V)
18	Describe what happens to current in a series circuit	The current is the same everywhere
19	Describe what happens to current in a parallel circuit	Current splits and recombines at junctions
20	State three magnetic metals	Nickel, Iron and Cobalt (Stainless steel)
21	State how like poles interact	Repel
22	State how unlike poles interact	Attract
23	Describe what makes a material magnetic	Magnetic metals contain domains, which are groups of atoms that behave like tiny atoms
24	Draw a basic magnetic field around a bar magnet	
25	Draw a simple model of the Earth's magnetic field	
26	What are compasses used for?	Navigation

7P4 Electricity & magnetism: Keywords

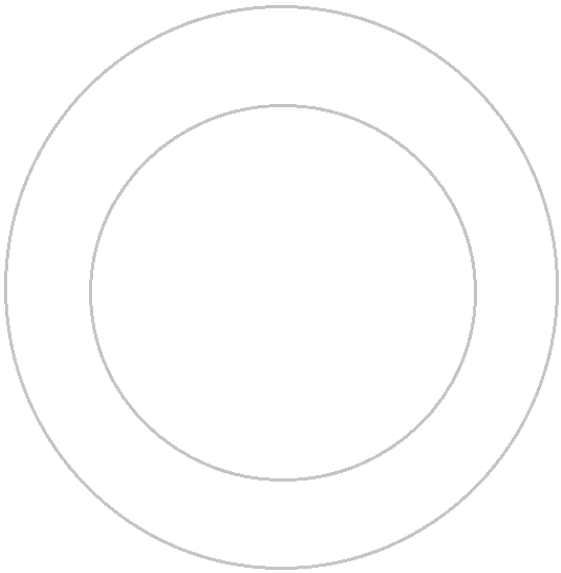
Keyword	Pronunciation	Definition
Ammeter		Measures how much electricity is flowing around a circuit
Atom	ah-tum	The smallest neutral part of an element that can take part in chemical reactions
Attract		Pull towards
bar magnet		A straight magnet, shaped like a small bar.
Battery		An object consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power.
cell	*sell*	It contains a store of chemical energy that can produce electricity (the scientific name for a battery).
Circuit	***sir**-kit*	A complete loop that electricity flows around.
Cobalt	CO-Bolt	A metal that is a magnetic material.
compass		A magnetised piece of metal that can swing around – it points north.
component	*com-**po**-nent*	Something in a circuit, like a bulb, switch or motor.
Conductor		Allows electricity to pass through
Current		Flow of electrons
Delocalised electron		An electron that is free to move and can carry an electrical current
Diode		A device which only allows electricity to flow in one direction
Electric field/electrostatic field		The space around an object with a charge of static electricity where it can affect other objects
Electrical conductivity		Allowing electricity to pass through
Electrical current		A flow of electrons around a circuit
Electron	Elek-tron	A tiny particle with a negative charge and very little mass
Element	El-le-ment	A simple substance made up of only one type of atom
Induce		To create. For example a wire in a magnetic field has a current induced in it
Induced magnet		A piece of magnetic material that becomes a magnet because it is in the magnetic field of another magnet
Insulator		A material that does not let electricity flow through it.
Iron		A metal that is a magnetic material.
iron filings	*f-**eye**-lings*	Tiny pieces of iron that are sometimes used to find the shape of a magnetic
Like		Same characteristics/charge
Magnet		An object that has its own magnetic field around it
Magnetic field		The area around a magnet where it can affect magnetic materials or induce a current
Magnetic materials		A material such as iron, cobalt, nickel or steel, that is attracted to a magnet
Magnetism		The force cause by magnets on magnetic material
mains (electricity)		Alternating current at 230 V provided to houses, shops etc.
Mass number		The total number of protons and neutrons in the nucleus of an atom.

Metallic bonding		the type of bonding found in metals. It is positively charged ions in a sea of negatively charged delocalised/free electrons.
Neutral (physics)		Something that has no overall charge
Neutron	new-tron	A subatomic particle with a neutral charge and a mass of 1
Nickel		A metal that is a magnetic material.
Non-contact force		A force that can affect something from a distance (e.g. magnetism, static electricity and gravity)
north magnetic pole		The place on the Earth where compasses point (it is not in the same place as
North pole		One end of a magnet. This ends points north if the magnet can move
Nucleus	***new****-clee-us*	The centre of an atom, contains protons and neutrons
Outermost electron		The electron that is furthest away from the nucleus.
Parallel		A circuit with two or more wires running next to each other.
Permanent magnet		A magnet that is always magnetic such as a bar magnet
Potential difference		Difference in electrical energy
Potential difference (p.d.)		The difference in energy carried after they have flowed through for voltage
power pack		A source of electricity with a low energy (low voltage).
Proton	Pro-ton	A subatomic particle with a positive charge and a mass of 1
rechargeable	*ree-****charge****-ab-el*	Cells that can have more energy stored in them after they have been used are said to be rechargeable.
Repel		Push away
Resistor		A component that makes it difficult for electricity to flow – resistors are used to control the size of the current in a circuit
Series		A circuit where there is only one loop of wire.
South pole		One end of a magnet
Static electricity		Electric charge tat builds up on insulating materials
Subatomic particle		A particle that is smaller than an atom, such as a proton, neutron or electron.
switch		Turns electricity on or off, by closing or opening a gap in a circuit.
Temporary magnet		A magnet that is not always magnetic, such as an induced magnet.
Unlike		Opposite in characteristics/charge
Variable Resistor		A resistor that can be adjusted to change the amount of resistance it has
Voltage		The difference in energy carried by electrons before and after they have flowed through a component. Another term for potential difference.
Voltmeter		Measures potential difference across a component

Lesson 1: The structure of the atom	Describe the structure of an atom including three subatomic particles, their charge and mass

5 quick questions	
1	
2	
3	
4	
5	

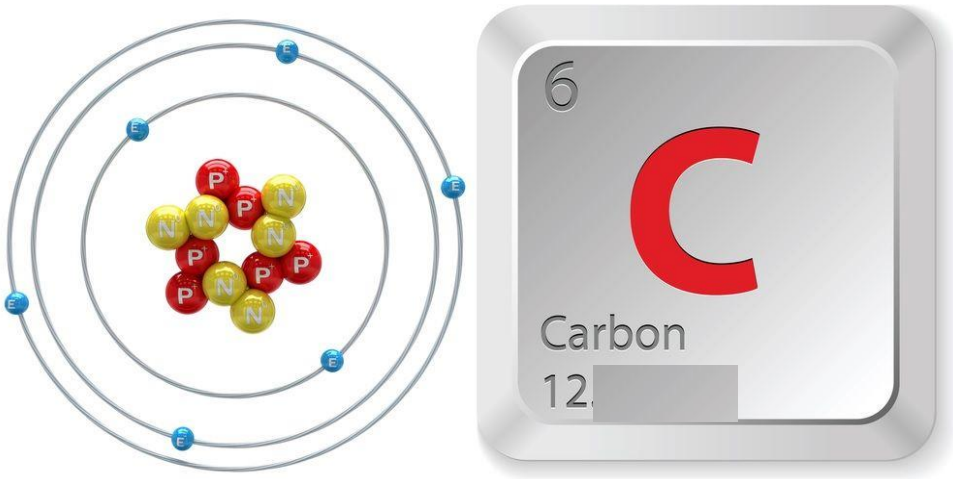
1. Draw the atom's structure:



2. An atom contains three type of sub-atomic particles. These have different charges and masses – complete the table to show their mass, charge and say where they are in the atom.

Sub-atomic particle	Charge	Mass	Position in atom
Protons			
Electrons			
Neutrons			

Let's look at an example of a carbon atom



3. What are the names given to these numbers and what do they represent?

   The number 6: .....

   .....

   The number 12: .....

   .....

4. How many particles does carbon have in its nucleus? .....
5. How many protons does it have? .....
6. How many neutrons? .....

So, carbon has 6 protons, 6+.

It has 6 electrons on its energy levels.

6 positives protons and 6 negative electrons.

There are the same number of each charge, this means they cancel each other out and create a balance- a neutral charge overall.

6 protons	6+
6 electrons	6-
overall	0

7. Name a particle which as a mass of 1 .....
8. Which particle has a negative charge? .....
9. Name a particle found in the nucleus .....
10. Which particle has a neutral charge? .....
11. State the particle whose mass is 0 .....
12. State the particle which has a positive charge .....

13. Where is all the mass found in an atom? .....

14. What charge does the nucleus have? .....

15. For each element shown, state how many subatomic particles they have.

24 **Mg** magnesium 12	16 **O** oxygen 8	4 **He** helium 2

Element	Number of Protons	Number of Electrons	Number of Neutrons
Magnesium			
Oxygen			
Helium			

15. Explain why atoms are neutrally charged overall.

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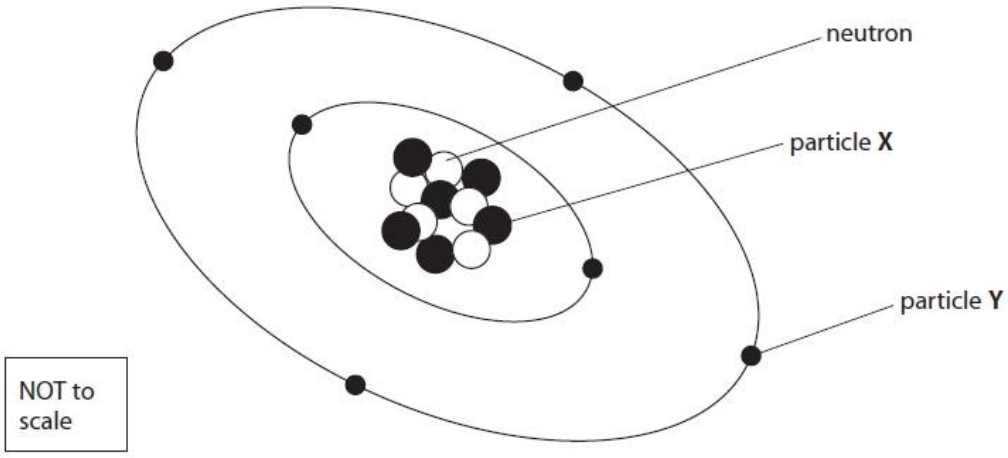
16. The diagram represents an atom of carbon.



(i) State the name of particle **X**. **(1)**

(ii) State the name of particle **Y**. **(1)**

17. An atom of an element **always** contains **(1)**

- ☒ **A** more protons than neutrons
- ☒ **B** equal numbers of protons and neutrons
- ☒ **C** more electrons than protons
- ☒ **D** equal numbers of protons and electrons

18. Atoms contain protons, neutrons and electrons. Complete the table to show the relative mass and relative charge of each particle and its position in an atom. **(3)**

	relative mass	relative charge	position in atom
proton		+1	
neutron	1		in nucleus
electron			

Checkpoint

Describe the structure of an atom including three subatomic particles, their charge, mass and location.

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Lesson 2: Investigating static electricity	• Describe how static electricity is generated (the rubbing of insulators to transfer electrons from one object to another, resulting in positive and negatively charged objects) • Describe how oppositely charged objects interact • Investigate how to generate static electricity and how like/unlike charged objects interact

5 quick questions

1	
2	
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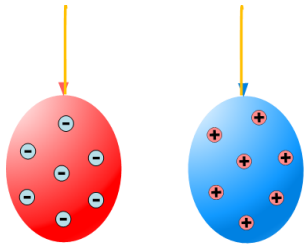
1)



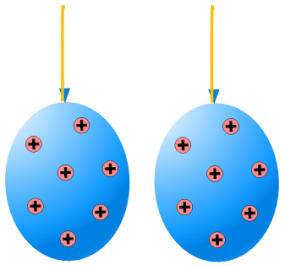
a) What happens to the balloons?

A They move together
B They push each other apart
C They stay still

b) How would you explain your answer?

A Opposite charges pull together
B Opposite charges don't push or pull each other
C Opposite charges push apart

2)



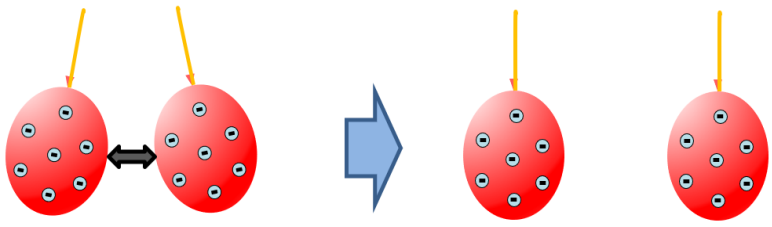
a) What happens to the balloons?

A They stay still
B They attract each other
C They repel each other

b) How would you explain your answer?

A Like charges attract
B Like charges repel
C Like charges don't attract or repel each other
D Positive charges attract
E Positive charges repel

3)



The same balloons are moved further apart

a) What happens to the balloons?

A They do not repel each other
B They repel each other with more force
C They repel each other with less force
D They repel each other with the same force

b) How would you explain your answer?

A The size of charge on the balloons is the same
B Electrostatic force only works close to a charge
C Electrostatic force gets smaller away from a charge
D Electrostatic force gets bigger away from a charge

Charged strips

You can charge a plastic strip by rubbing it with a cloth.
Rubbing an acrylic (Perspex) strip (clear plastic) gives it a positive charge
Rubbing a polythene strip (white plastic) gives it a negative charge

Apparatus and materials

- x2 polythene strips
- x2 acrylic (Perspex) strips
- clean, dry cloth
- watch glass

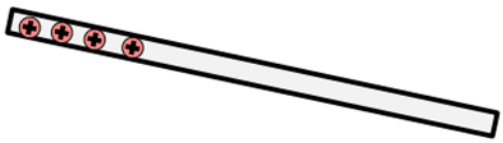
Procedure

Carry out each investigation in turn

1. Look at the diagram and predict what you think will happen.
2. Explain why you think this will happen.
3. Rub the first strip with a cloth to give it a charge.
4. Balance this strip on the watch glass.
5. Rub the second strip with a cloth to give it a charge.
6. Hold this strip close to the first one, but do not touch.
7. Write down what happens.
8. Explain what you see.

Test 1: Charged strips – opposite charges

Rubbing this polythene strip gives it a negative electric charge.
It is balanced on a watch glass.



Rubbing this Perspex strip gives it a positive electric charge.

1. What do you predict will happen when the Perspex strip is moved closer to the polythene strip?

.....

.....

.....

2. Explain why you think this will happen.

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3. Now try the experiment and describe what happens.

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4. Were your prediction and explanation correct? If not, can you explain what you observed?

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Test 2: Charged strips – like charges

This polythene strip has a negative electric charge.
It is balanced on a watch glass.

This polythene strip has a negative electric charge.

5. What do you predict will happen when the Perspex strip is moved closer to the polythene strip?

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6. Explain why you think this will happen.

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7. Now try the experiment and describe what happens.

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8. Were your prediction and explanation correct? If not, can you explain what you observed?

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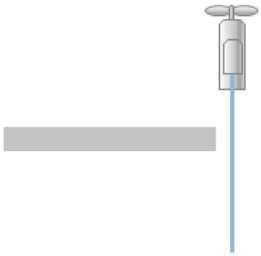
Test 3: odd one out

1) Polyethene rod and paper Charge the polyethene rod by rubbing with a cloth. Put it near to the paper. 	**2) Polyethene rod and can** Charge the polyethene rod by rubbing with a cloth. Put it near to the empty drinks can. 
3) Polyethene rod and water Charge the polyethene rod by rubbing with a cloth. Put it near to a thin stream of water. 	**4) Plastic strips** Hold the strips together at the top. Rub downwards with a cloth. 

1. Which is the odd one out?

   .....

   .....

2. Why did you choose this one?

   .....

   .....

3. What is an electrostatic force?

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Summary

1. Unlike charges .....

.....

2. Like charges .....

.....

3. What happens to the size of the electrostatic force as distance increases?

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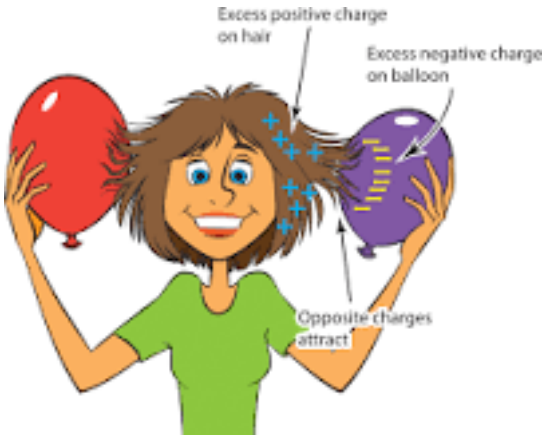
Test 3: Apply your learning to another investigation.

In this experiment, you will accomplish the seemingly impossible feat of separating salt from pepper after they have been mixed together.

Equipment

- Salt
- Pepper
- Plate
- Balloon (or another plastic object with large surface)
- Hair or a sweater made of natural wool



Rub the balloon on your hair or jumper to generate and bring it towards the salt and pepper.

Use your understanding to explain your observations when you bring a balloon towards some salt and pepper in a petri dish.

Useful keywords: negative positive charge friction attract repel

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Lesson 3: Static electricity	• Describe how static electricity is generated (the rubbing of insulators to transfer electrons from one object to another, resulting in positive and negatively charged objects) • Describe how oppositely charged objects interact

5 quick questions	
1	
2	
3	
4	
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1. What materials are good electrical conductors?

   .....

   .....

2. What materials are good electrical insulators?

   .....

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3. What does the term attract mean?

   .....

   .....

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4. What does the term repel mean?

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5. What is friction?

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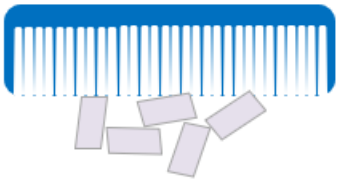
   .....

Complete this grid

A

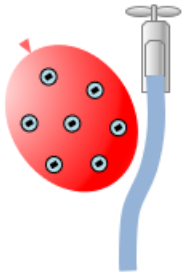


Tissue paper

B

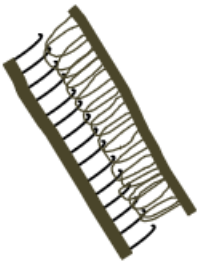
Sky diver

C



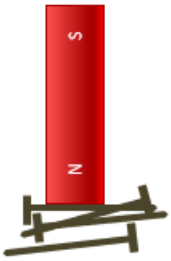
Bendy water

D



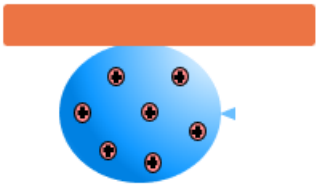
Velcro

E



Steel nails

F

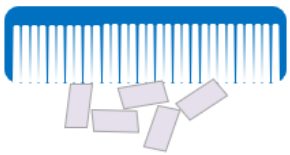


Sticky balloon

Examples	I am **sure** this is electrostatic	I think this might be electrostatic	I think this might **not** be electrostatic	I am **sure** this is **not** electrostatic
A Tissue paper				
B Sky diver				
C Bendy water				
D Velcro				
E Steel nails				
F Sticky balloon				

Can you explain your ideas here?

A



Tissue paper

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B

Sky diver

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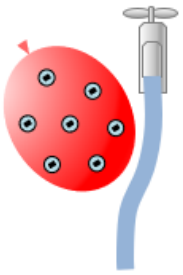
C



Bendy water

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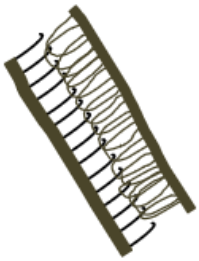
D



Velcro

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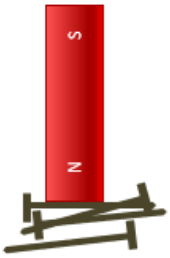
E



Steel nails

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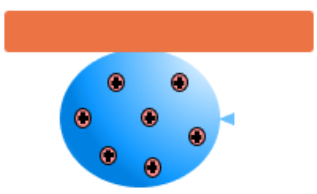
F



Sticky balloon

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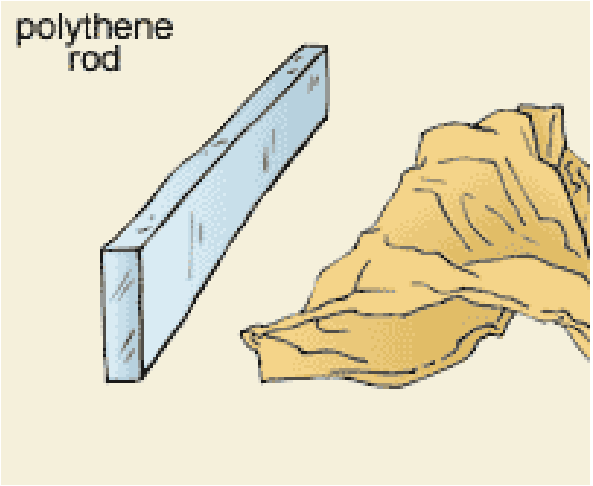
Generating static electricity



Summarise the generation of static electricity:

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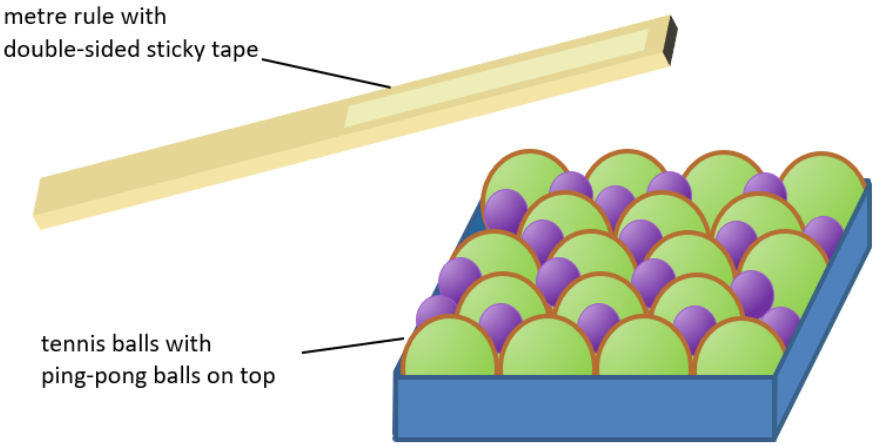
Modelling generating static electricity



In this model the _____ represents the cloth.

The _____ are the negatively charged electrons on the cloth.

The _____ are the atoms which become positively charged ions in the cloth.

When the ruler rubs on the "cloth" the negative charges _____

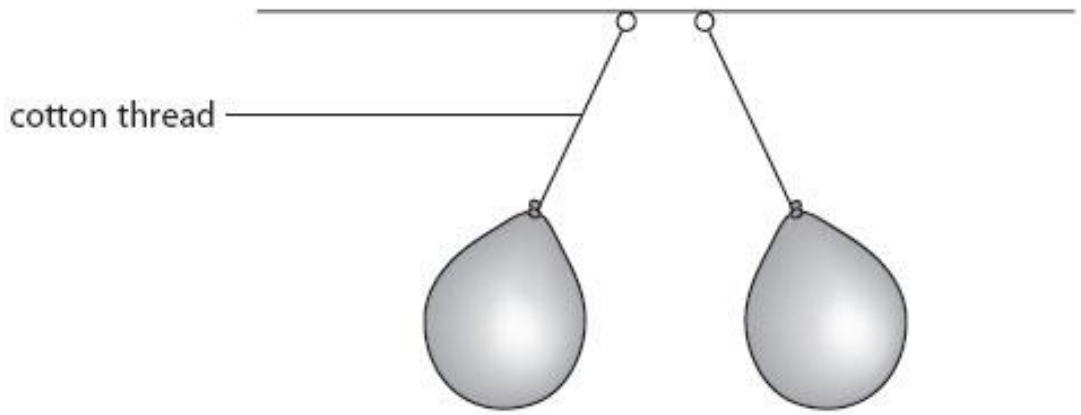
and the positive charged ions _____.

Now the ruler has a _____ charge and the cloth has a _____

charge.

Questions

1. A student charges two balloons and hangs them side by side.



a) Explain why the cotton threads are not vertical.

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The student rubs another balloon with a cloth. This balloon becomes negatively charged.

b) Explain why the balloon became negatively charged when it was rubbed with the cloth.

.....

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.....

The student then puts this charged balloon against a metal cabinet.

c) Describe what happens to the charge on the balloon where it touches the metal cabinet.

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The student charges another balloon and holds it against a wall. The charged balloon sticks to the wall when he lets go.

d) Suggest why the balloon is attracted to the wall.

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2. Plastic is an insulator. A student rubs a piece of plastic with a cloth. This gives the plastic a negative charge.

(i) Explain how the plastic is charged by the rubbing. (2)

.....

.....

.....

(ii) The cloth is also charged when it rubs against the plastic. Describe the charge on the cloth. (1)

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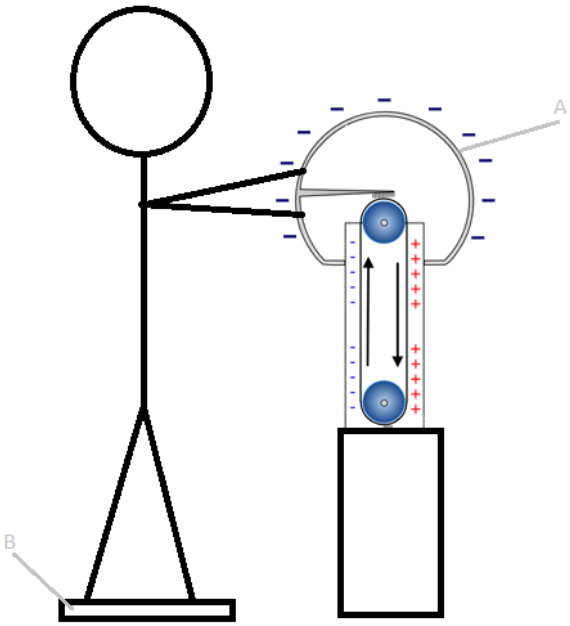
3. Use the diagram to explain how charge is build-up on a person when they use a van de Graff generator



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4. Lightning is an electrical discharge caused by imbalances between storm clouds and the ....., or inside the clouds. During a storm, the lower parts of the storm cloud become ..... charged. Objects on the ground, like ....., ..., and the Earth itself, become positively charged—creating an imbalance that nature seeks to repair by passing current between the two charges. Thunder the sound caused by the rapid expansion of the ..... around a lightning bolt.

Lesson 4: Current electricity	• Identify common electric circuit symbols including cell, battery, power supply/pack, switch, bulb, ammeter, voltmeter, resistors and variable resistors • Explain the function of the above mentioned components

5 quick questions	
1	
2	
3	
4	
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3. 4 pupils are asked how a torch work

Oliver: Electricity sparks out of the ends of batteries and that produces light in the bulbs.

Emma: Electrons are made by batteries and go to things likes bulbs to make them work, the light bulb uses up the electrons

Austin: The battery pushes electricity around through the light bulb inside the torch

Amelia: A torch needs a battery and a battery flows energy to the light bulb, where it all goes out as light

a) Which person's explanation is closest and why?

.....

b) Can you write a better explanation of how a torch works?

.....

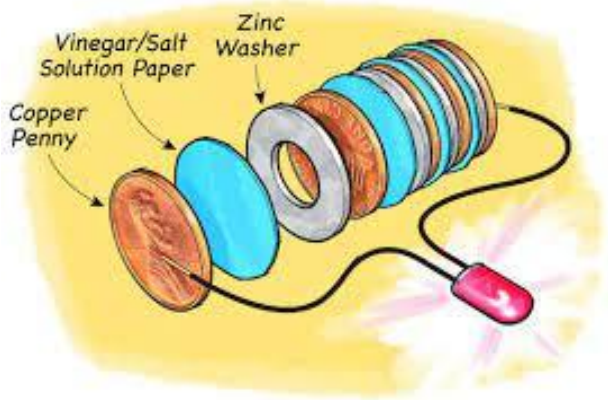
.....

.....

4. How can we use the energy in static electricity?

We've seen how static electricity is the result of an imbalance between ..... and ..... charges in an object. These charges can build up on the surface of an object until they find a way to be released or ..... When they are discharged, like when lightning strikes during a storm, we get a flow of ..... energy. If we could use this we can get the energy work for us. We just need a source of ..... and a ..... for them to move through.

5. The source of electrons: a cell or battery - make a penny battery

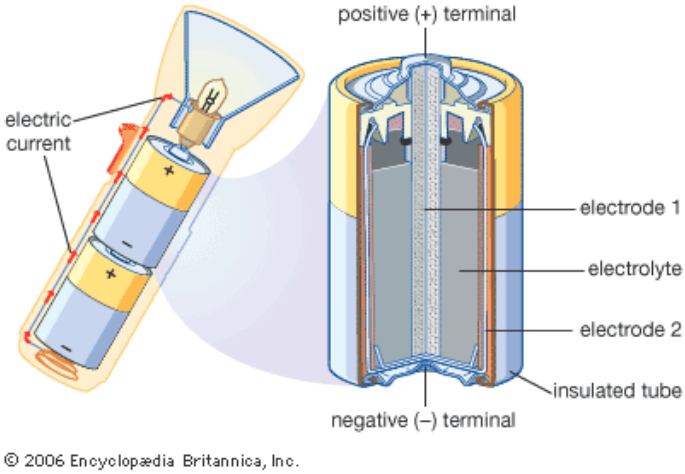


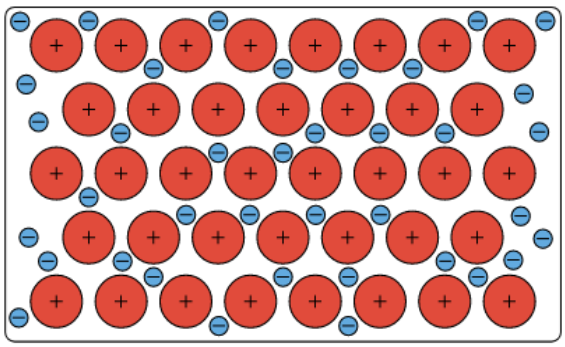
a) How many pennies did it take to light the LED? .....

b) What was the reading for potential difference (in volts) on the multimeter?

.....

Inside a cell or battery there are parts which do the same job as the vinegar, zinc and copper did in the penny battery. A chemical reaction between the two electrodes causes a build-up of electrons at the negative terminal. An electrical cell is an "electrical power supply". It converts stored chemical energy into electrical potential energy, allowing charged particles to flow. This is called a current.



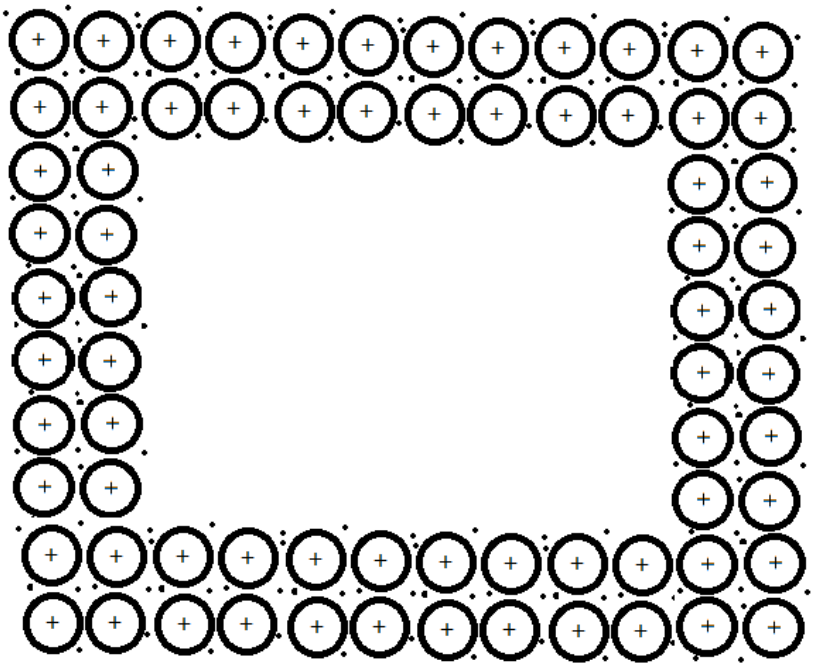


Free electrons

Metal ions

The diagram above shows the structure of metal wire. It has lots of free electrons in it. A battery provides the free electrons and when they are given a pathway to follow – the wires in a circuit between the positive and negative ends of the battery – they start to move.

A circuit would look something like this:



4. The rope model of an electric circuit. In this model, what is represented by …
   a) the rope?

      .....

   b) the person moving the rope?

      .....

   c) the moving rope?

      .....

   d) people holding the rope?

      .....

6. What is current? .....

   .....

7. Where do the electrons come from? .....

   .....

8. What makes electrons in the metal wires move? .....

   .....

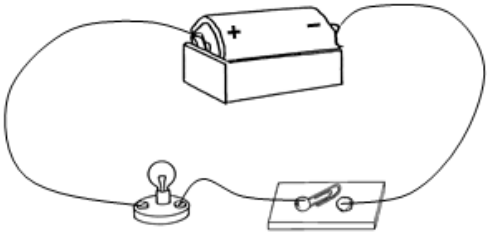
9. The particles that flow in the metal wire are (1)
   A atoms
   B electrons
   C protons
   D neutrons

10. An electric current is the rate of flow of (1)
    A atoms
    B charge

C voltage
D watts

11. A metal wire carries an electric current. The charge that flows in the wire is made up of (1)
    A electrons
    B protons
    C positive ions
    D negative ions

12. Your task is to sort out some statements about charge and current. These will explain what happens when there is a current in a circuit. Look at this circuit.



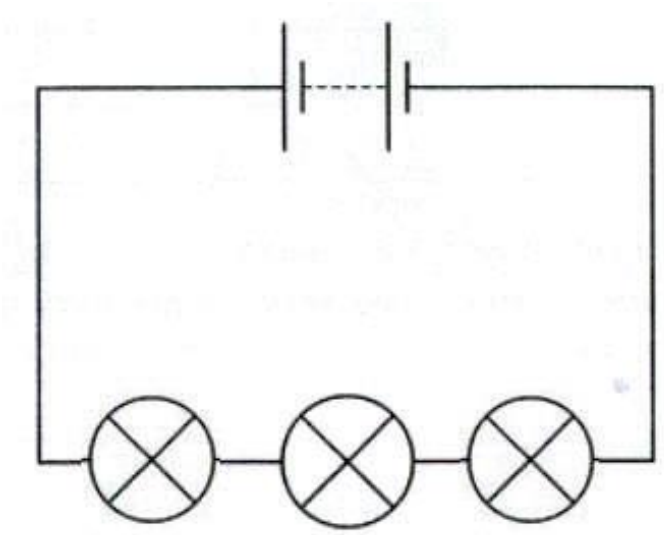
The bulb is connected to the battery using wires. The switch is turned on and an electric current flows round the circuit.

In each row pick one statement that you think is right. Start at number 1 and read through the statements that you chose.

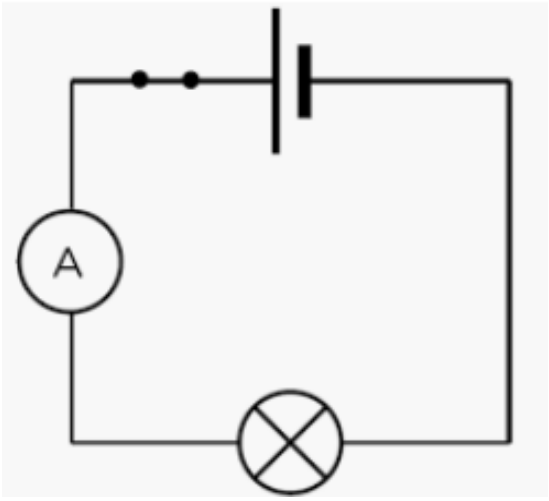
1)	There is a chemical reaction in the battery. This gives one end of the battery a small positive charge. The other end of the battery is given a small negative charge.		
2)	a) Before the switch is turned on there are charges in the battery. There are no charges in the wires or the bulb.	b) Before the switch is turned on there are charges in the battery. There are charges through all the wires and in the bulb too.	
3)	a) When the switch is turned on, the battery forces the charges in the wires and the bulb to move.	b) When the switch is turned on, charges flow out from both ends of the battery into the wires.	c) When the switch is turned on, charges flow out from one end of the battery into the wires.
4)	a) In the wires, charges are pushed from one end of the battery towards the bulb.	b) In the wires, charges are pushed from one end of the battery and pulled towards the other end	c) In the wires, charges are pushed from both ends of the battery towards the bulb.
5)	The flow of charge in the circuit is called an electric current.		

Lesson 5: Electrical components	• Identify common electric circuit symbols including cell, battery, power supply/pack, switch, bulb, ammeter, voltmeter, resistors and variable resistors • Explain the function of the above mentioned components

5 quick questions	
1	
2	
3	
4	
5	



CIRCUIT 1



CIRCUIT 2

7) What do these circuit diagrams have in common? .....

.....

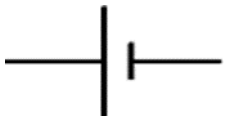
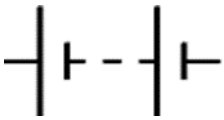
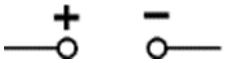
8) What is different? .....

.....

9) What is the difference between a cell, battery and power pack? .....

.....

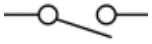
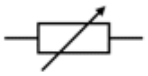
10) Each of the electrical components below has the same function in a circuit. What is each of them called?

a) ..... b) ..... c) .....

d) What is their function? .....

11) Name each of the components below and then chose one as an answer to questions

Component	Symbol	Component	Symbol	Component	Symbol
					
					
					

a) Which component can be used to vary the amount of resistance in a circuit? .....

b) Which component only allows electrons to flow in one direction? .....

c) Which component measure potential difference (voltage) across components? .....

d) Which component causes electrons to flow in the circuit? .....

e) Which component can open and close to start and stop the flow of electrons? .....

f) Which component provides some resistance which slows down electrons? .....

g) Which component measure current in a circuit? .....

h) Which component converts electrical energy into light? .....

i) Which component converts electrical energy into kinetic energy? .....

j) Which component only allows electrons to flow in one direction? .....

k) Which component measure potential difference across components? .....

l) Which component causes electrons to flow in the circuit? .....

m) Which component can open and close to start and stop the flow of electrons? .....

n) Which component provides some resistance which slows down electrons? .....

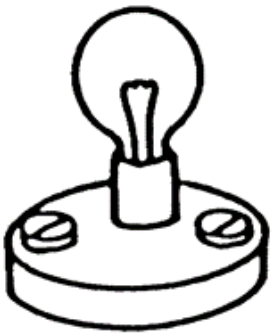
o) Which component measure current in a circuit? .....

p) Which component converts electrical energy into light? .....

q) Which component converts electrical energy into kinetic energy? .....

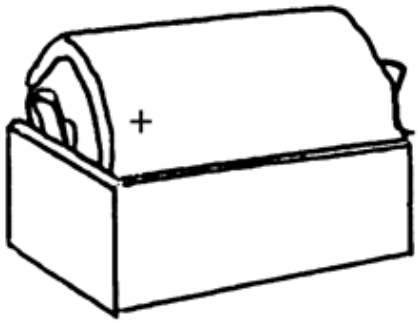
12) Which is the correct symbol for each component?

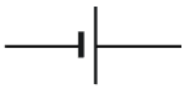
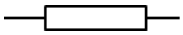
A light bulb



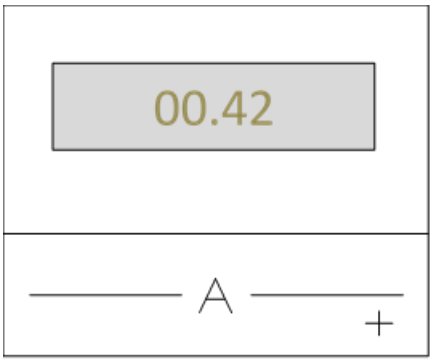
A	
B	
C	
D	

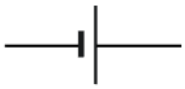
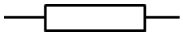
A battery



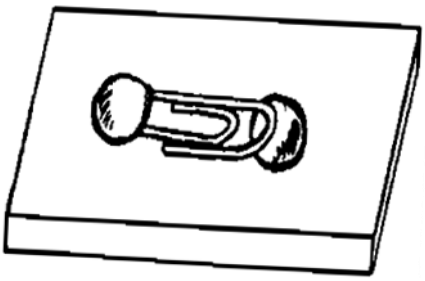
A	
B	
C	
D	

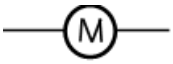
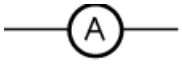
An ammeter



A	
B	
C	
D	

A switch



A	
B	
C	
D	

13) Draw common electric circuit symbols for each of the components:

a) A cell

b) A battery

c) A power supply/pack

d) A switch

e) A bulb

f) An ammeter

g) A voltmeter

h) A resistor

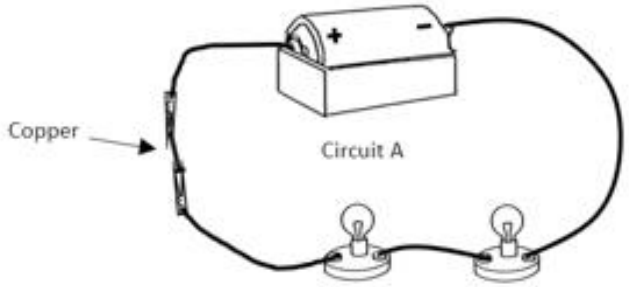
i) A variable resistor

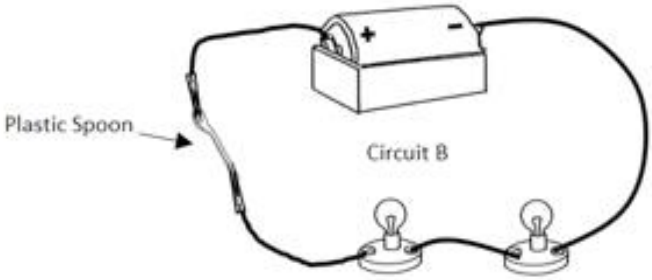
j) A motor

Lesson 6: Electric circuits	• Identify series and parallel circuits, describe series and parallel circuits • Describe how to place an ammeter in a circuit • State unit of current • Define current

5 quick questions	
1	
2	
3	
4	
5	

1. Tick any of these circuits you think will work, then explain your answer under each diagram.

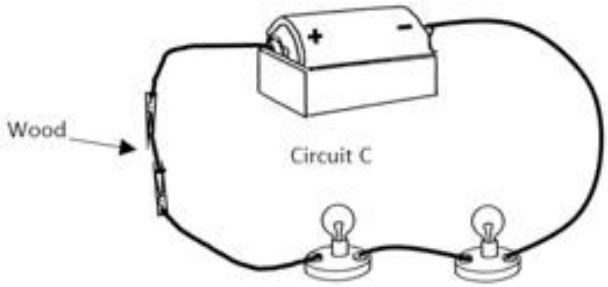


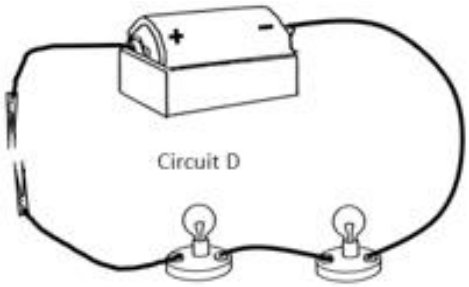


....

....

....



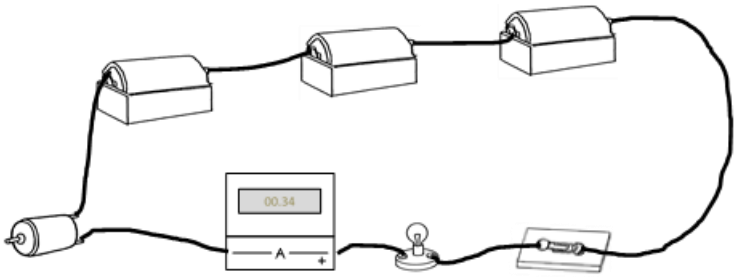


....

....

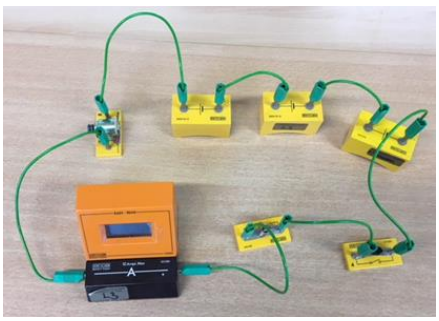
....

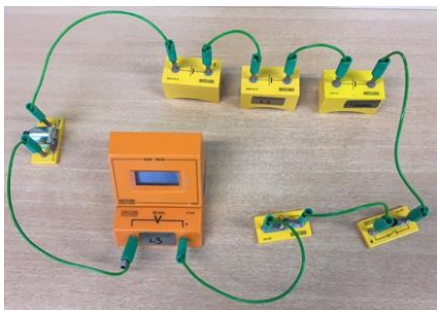
2. Look at the circuits below. Which photograph shows this circuit set up correctly?

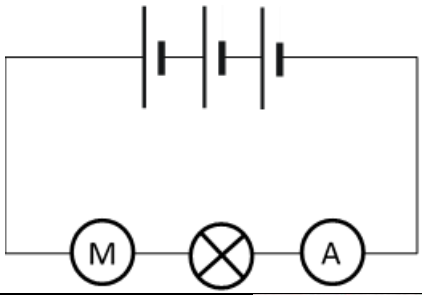


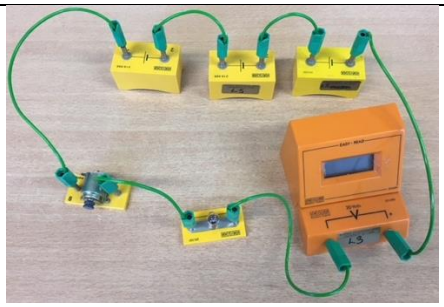
A 

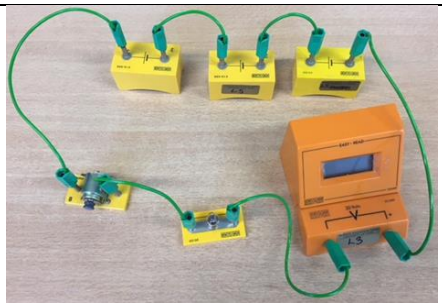
B 

C 

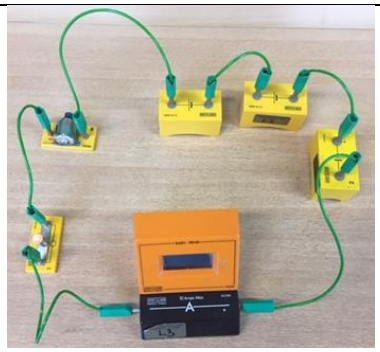
D 



A 

B 

C 

D 

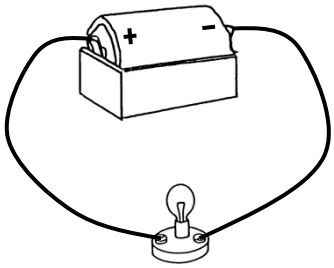
Making electrical circuits

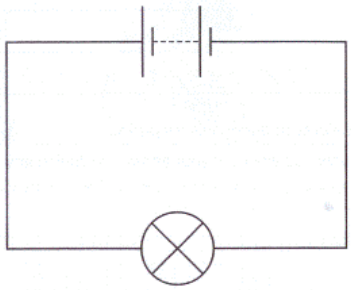
Apparatus and materials

x2 1.5 V battery in holder
x2 2.5 V bulb in holder
x4 connecting leads

1. Set up circuit A

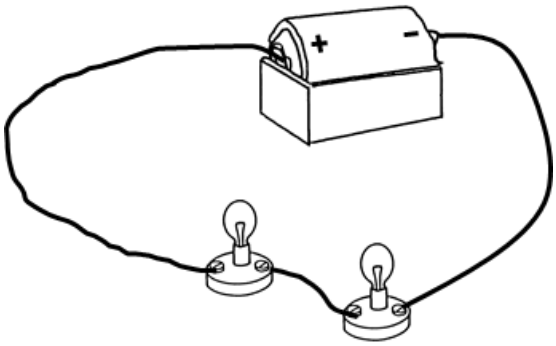
Circuit A

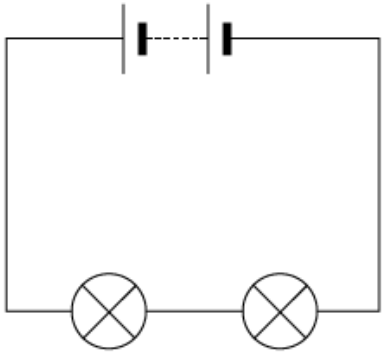




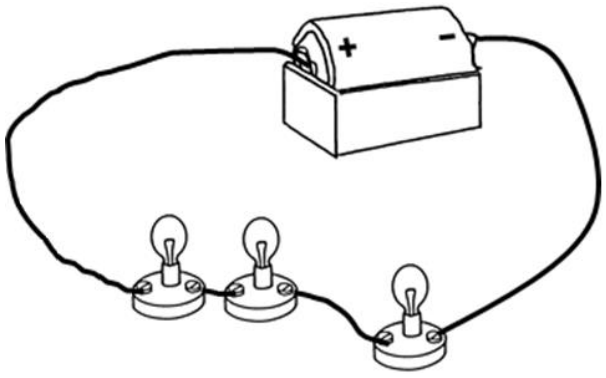
Once your teacher has checked that you have set it up safely, set up each of these circuits, one at a time, with a teacher checking them before you move onto the next.

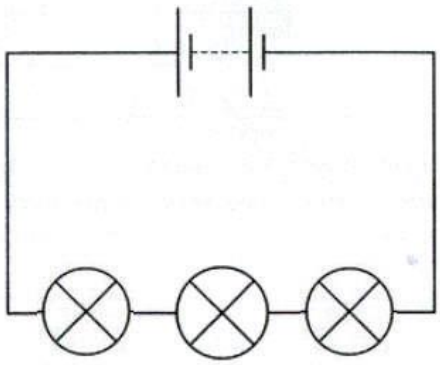
Circuit B





Circuit C





2. Describe the difference in brightness between the bulbs in circuits A, B and C.

.....

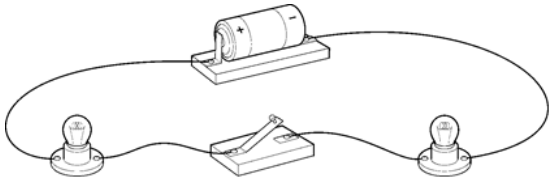
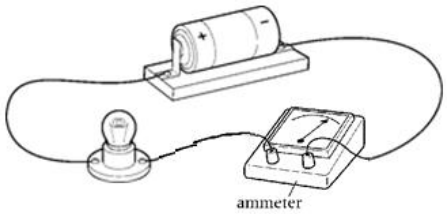
.....

.....

Drawing circuits - to draw a clear circuit diagram, you will need to follow each point on this checklist:

- ☐ I have used a sharp pencil.
- ☐ I have used a ruler for every straight line in a circuit symbol and the wires. (I even used a ruler for the cross inside each bulb symbol).
- ☐ All of my circuit symbols are correctly drawn.
- ☐ There are no gaps in my circuit. Every wire exactly touches each component. The corners of my circuit exactly touch too.

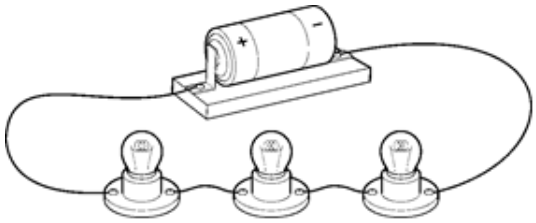
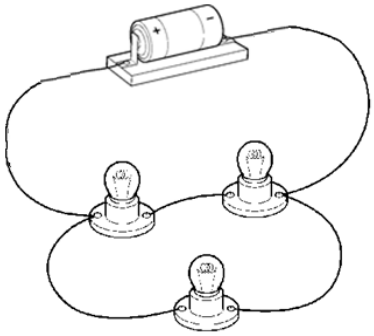
3. Use the checklist for drawing circuit diagrams to draw correct circuit diagrams for the sketches of circuits below:

Image	**Circuit diagram**
	
	

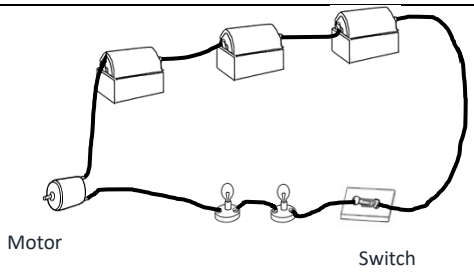
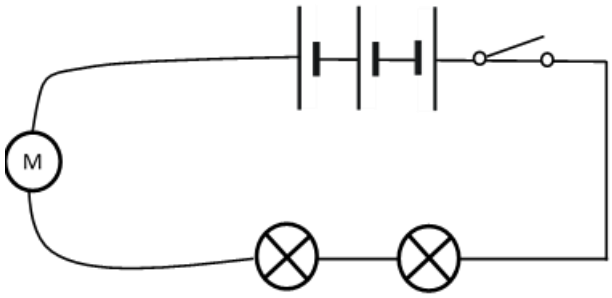
4. Describe the differences between series and parallel circuits and draw an example of each:

	Series Circuit	Parallel Circuit
Description		
Diagram		

5. Draw circuit diagrams for each of the sketched circuits below:

Series Circuit with 3 bulbs	Parallel Circuit with 3 bulbs
	

6.

	
Albert set up this circuit.	Then he drew a circuit diagram

Albert's friend Barry said he had made lots of mistakes, but Albert thought it was a good diagram.

This a list of what Barry said he had done wrong.

A. One of the batteries is the wrong way round

B. The wires to the motor are not drawn with a ruler

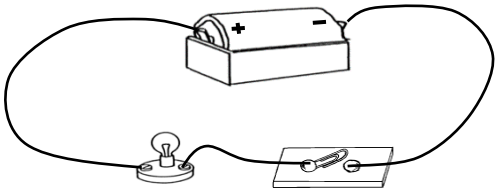
C. One of the circuit symbols is wrong

D. There are some little gaps in the circuit

E. The switch is in the wrong place

Circle the letter in front of the mistakes Albert made?

7. Look at this circuit below. Which of the circuit diagrams show how to connect the circuit?



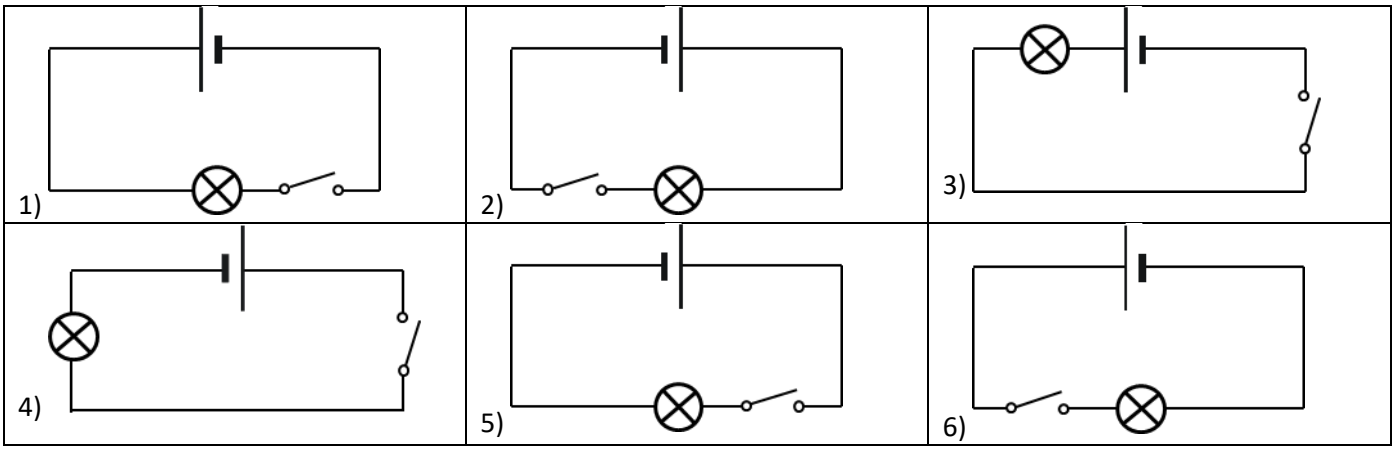
A Just circuit diagram 1

B Just circuit diagram 5

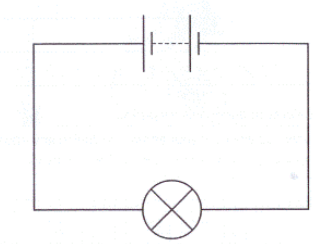
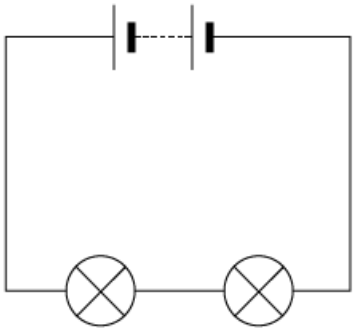
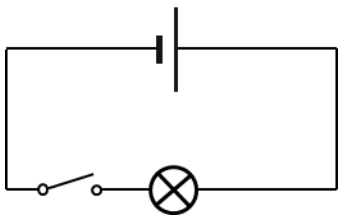
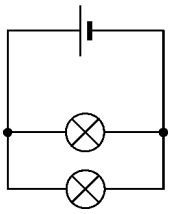
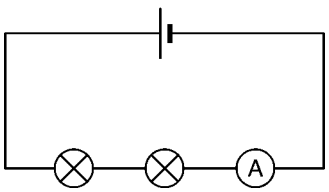
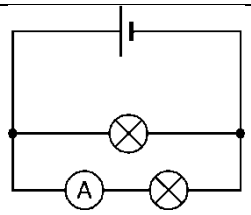
C Circuit diagrams 1 and 3

D Circuit diagrams 1, 2 and 3

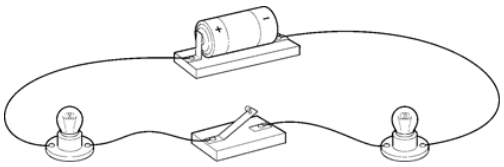
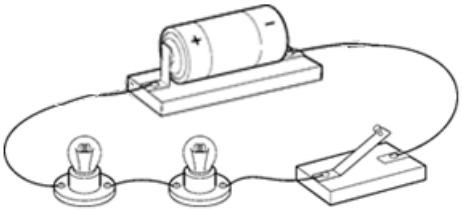
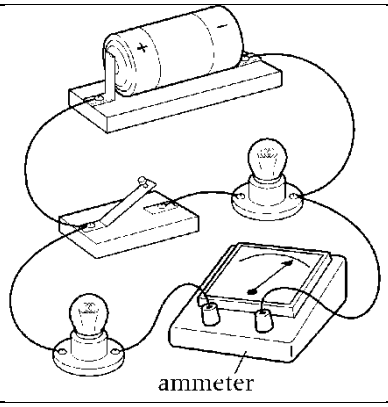
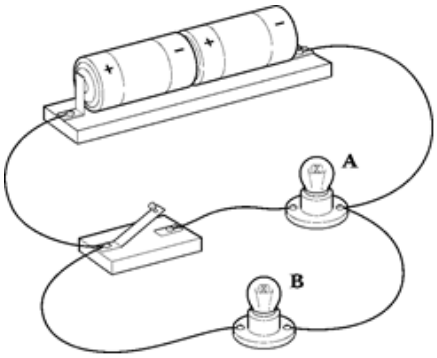
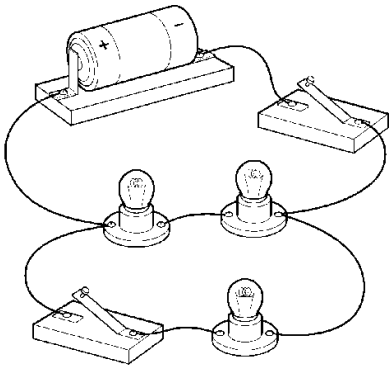
E Circuit diagrams 1, 3, 4 and 5



8. Set up each of the circuits below. Decide if it is a series or a parallel circuit and then get your teacher to check the box to say whether or not you have built it correctly.

Circuit diagram	Series or Parallel?	Set up ✓ or x	Circuit diagram	Series or Parallel?	Set up ✓ or x
					
					
					

9. Complete this table to demonstrate your circuit diagram drawing skills.

Image	Series or parallel?	Circuit diagram
		
		
		
		
		

Lesson 7: Current in series and parallel	• Investigate and describe what happens to current in a series and parallel circuit • Describe how to place and ammeter and voltmeter in a circuit

5 quick questions	
1	
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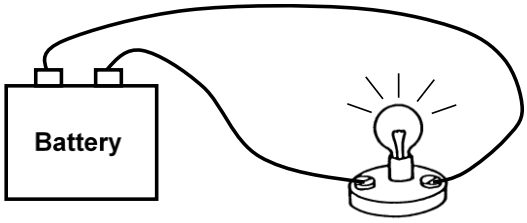
1. A bulb is connected to a battery. The bulb is lit.



Which of the following best describes the electric current in this circuit?

A. There is an electric current through one wire to the bulb. It is **all** used up in the bulb. So, there is **no current** in the other wire.
B. There is an electric current through one wire to the bulb. **Some** of it is used up in the bulb. So, there is a **smaller current** in the other wire.
C. There is an electric current through one wire to the bulb. It passes through the bulb and back to the battery. The current in the other wire is **the same size.**
D. There are two electric currents from the battery to the bulb. They meet at the bulb and this is what makes it light.

2. Define current .....

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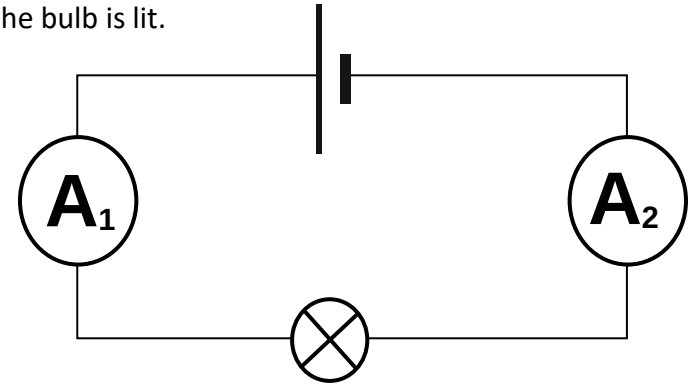
3. What component is used to measure current? .....

4. What is the unit of current? .....

5. In this circuit, the bulb is lit.



a) What can you say about the readings on the two ammeters?

A The reading on ammeter A1 is bigger.

B The reading on ammeter A2 is bigger.

C The readings on the two ammeters are the same.

b) How would you explain your answer?

A The current is the same all around the circuit.

B Some of the current is used up by the bulb.

C All of the current is used up by the bulb.

Circuit investigation

For each student/pair/group:

- x2 Ammeter
- x2 1.5V battery
- x3 1.5V bulbs
- x6 connecting wires

H&S

Wires should never be pushed into electrical sockets; the mains electricity is powerful enough to kill.
If sparks occur, turn off the power pack and inform a teacher.

Now make the circuit.

1. Make measurements to see if your prediction is right.

Ammeter 1 reading: ……

Ammeter 2 reading: ……

2. Do your results agree with your prediction? Explain your answer.

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3. What do you now think is the correct explanation for what you observed?

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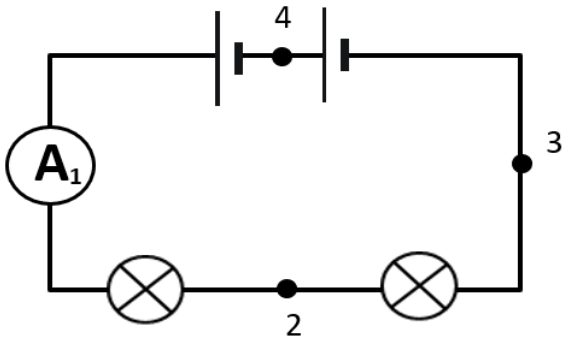
4. Now carry out a second investigation into series circuits.



5. Set up this circuit so both bulbs light.

6. What would you predict the current will be at points 2, 3 and 4?

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7. Explain why you think this will happen.

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8. Now measure the current at each point in the circuit.

Current at location 1: .....

Current at location 2: .....

Current at location 3: .....

Current at location 4: .....

9. Do your results agree with your prediction? Explain your answer.

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10. What do you now think is the correct explanation for what you observed?

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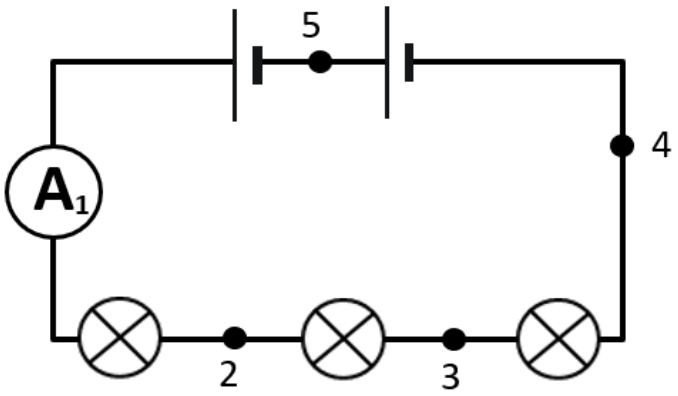
11. Now add another bulb and set up your circuit like this:



12. What would you **predict** the current will be at points 2, 3, 4 and 5?

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13. Explain why you think this will happen.

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14. Now measure the current at each point in the circuit.

Current at location 1: .....

Current at location 2: .....

Current at location 3: .....

Current at location 4: .....

Current at location 5: .....

15. Do your results agree with your prediction? Explain your answer.

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16. What do you now think is the correct explanation for what you observed?

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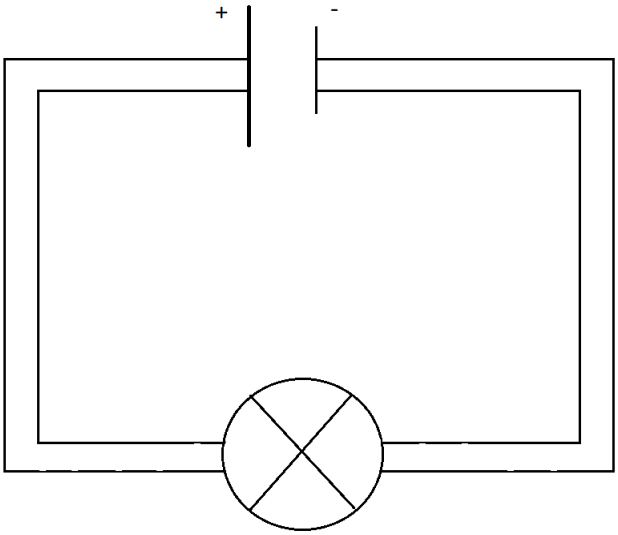
17. Explaining Current in Series Circuits



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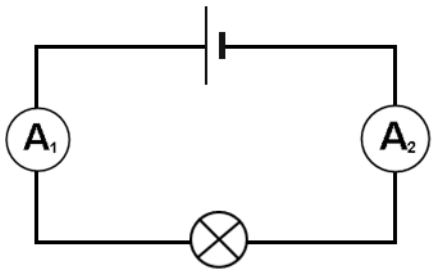
18. Look at this diagram



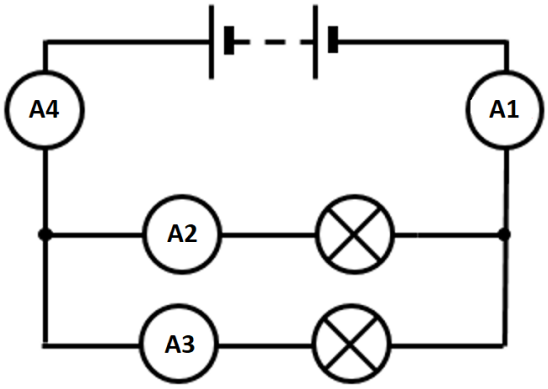
a) If the current at ammeter 1 is 5A then what will the other ammeter read? .....

b) If the current at ammeter 1 is 0.4A then what will the other ammeter read? .....

c) If the current at ammeter 1 is 1A then what will the other ammeter read? .....

CURRENT IN PARALLEL CIRCUITS

1. Label the junctions



2. Predict what happens to current in a parallel circuit.

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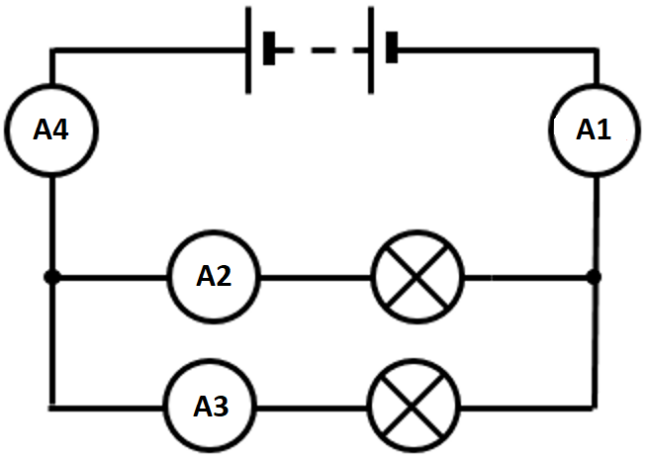
Investigating current in a parallel circuit

For each student/pair/group:

- ☐ 1 Ammeter
- ☐ x2 1.5V battery
- ☐ x2 1.5V bulbs
- ☐ x8 connecting wires

3. Set up the circuit as shown in the diagram



H&S

Wires should never be pushed into electrical sockets; the mains electricity is powerful enough to kill.
If sparks occur, turn off the power pack and inform a teacher.

4. What would you predict the current will be at ammeter 2, 3 and 4 in comparison to ammeter 1?

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5. Explain why you think this will happen.

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6. Now measure the current at each point in the circuit.

Ammeter 1: .....

Ammeter 2: .....

Ammeter 3: .....

Ammeter 4: .....

7. Do your results agree with your prediction? Explain your answer.

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8. What do you now think is the correct explanation for what you observed?

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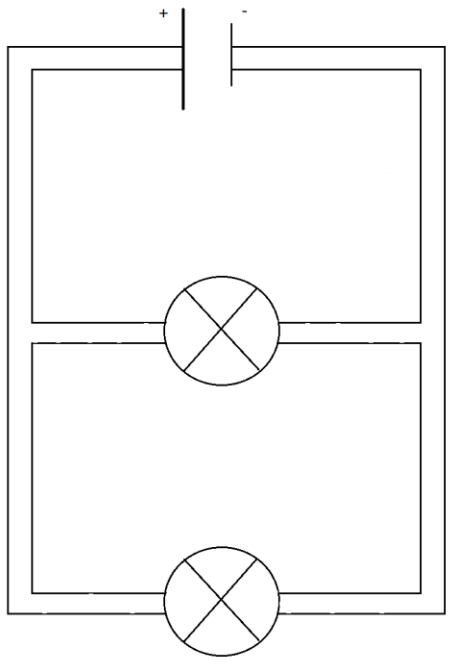
Explaining Current in Parallel Circuits



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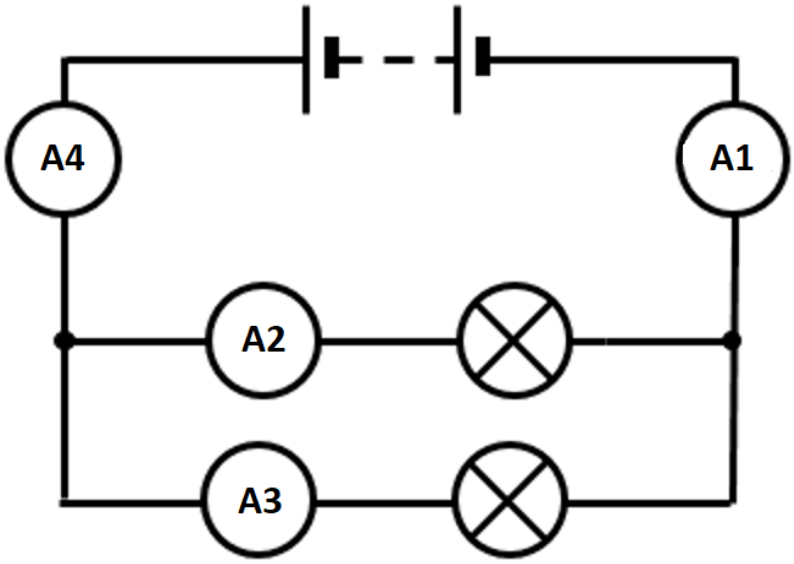
CURRENT IN PARALLEL CIRCUITS

Look at this diagram



1 a) If the current at ammeter 1 is 12A, what will the current at ammeter 2 be?

b) at ammeter 3?

c) At ammeter 4?

2 a) If the current at ammeter 1 is 0.8A, what will the current at ammeter 2 be?

b) at ammeter 3?

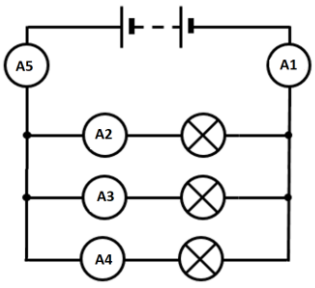
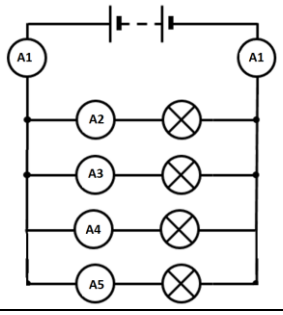
c) At ammeter 4?

3 a) If the current at ammeter 1 is 3A, what will the current at ammeter 2 be?

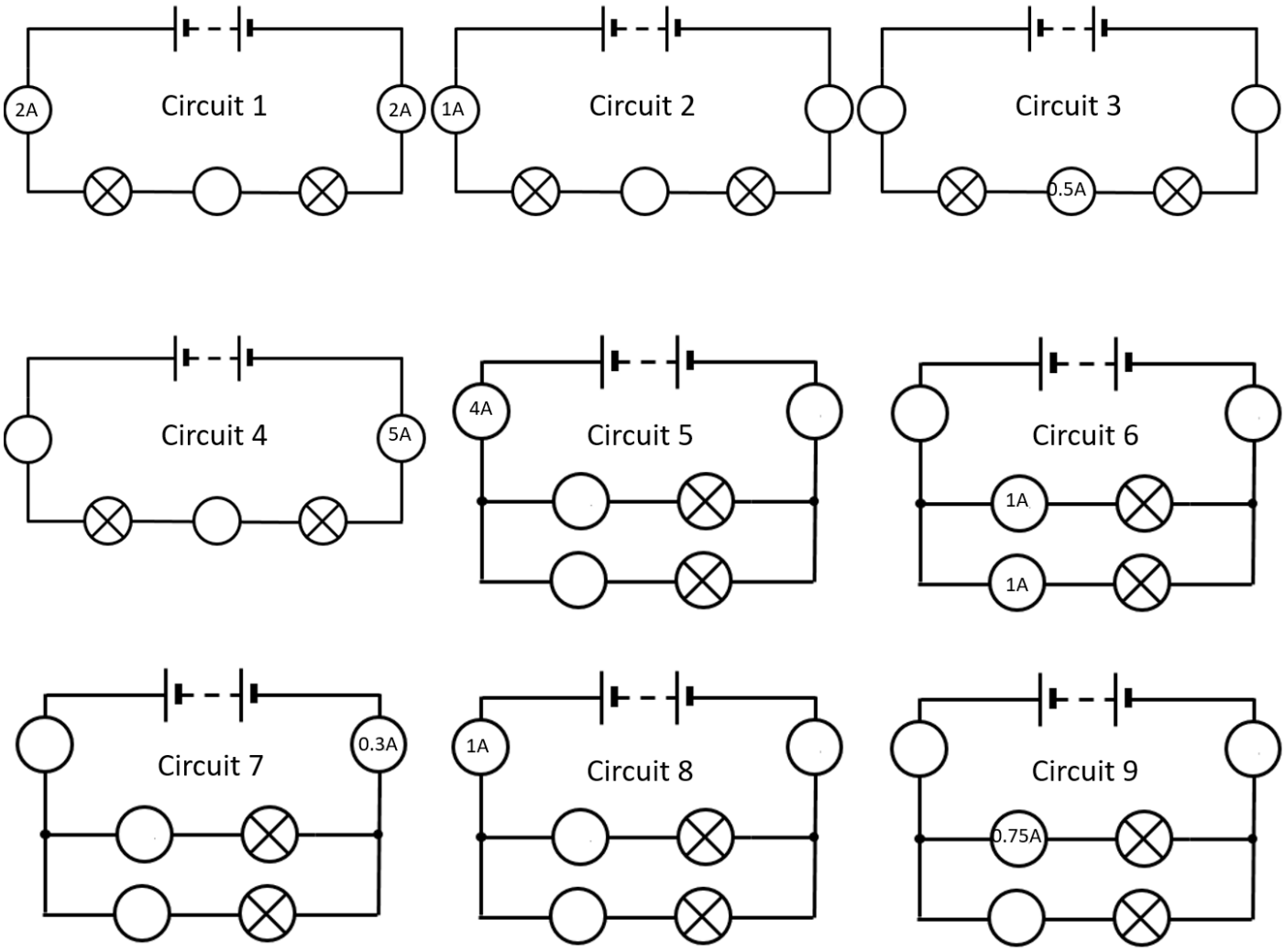
b) at ammeter 3?

c) At ammeter 4?

4) Apply your knowledge to these parallel circuits:

	
If ammeter 1 read 12A, suggest readings for all of the other ammeters.	If ammeter 1 read 12A, suggest readings for all of the other ammeters.

5) Suggest ammeter readings for each of these circuits:



✱ **Checkpoint**

Describe how to place an ammeter in a circuit

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✱ **Checkpoint**

State the unit of current

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✱ **Checkpoint**

Describe what happens to current in a series and parallel circuit

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Concept 8: Potential difference	• Describe what is meant by potential difference/voltage • State unit of potential difference • Describe how to place and ammeter and voltmeter in a circuit

5 quick questions

1	
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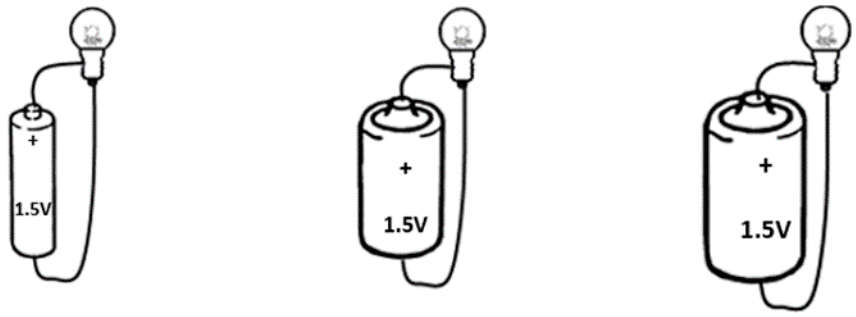
1. Some students are thinking about why there are different size batteries.

   All of these batteries are 1.5 Volt. Each one is connected to a bulb.
   And all the bulbs are exactly the same type.



type AA **type C** **type D**

Which statement/s do you agree with?

A All the bulbs will be the same brightness.

B The biggest battery has more chemicals in it, so it will last longer.

C The type AA battery has the most concentrated electricity, so it will have the brightest bulb.

D The bulb on the type D battery will be brightest because it is the biggest battery.

Voltage/Potential Difference

2. How is voltage/potential difference measured?

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3. What are the units for voltage/potential difference?

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4. How do you measure voltage/potential difference?

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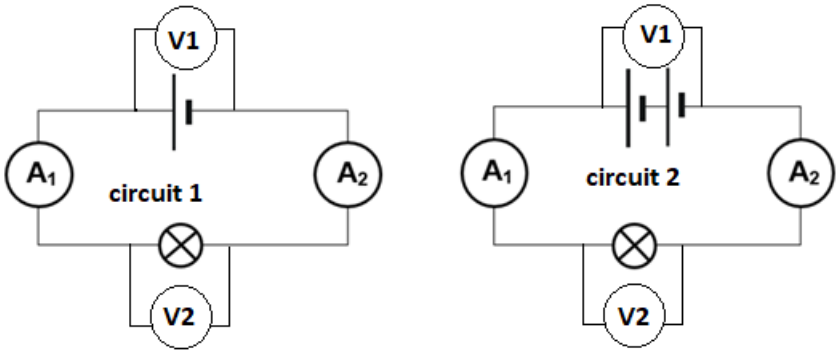
This practical activity is to find out what happens when you change the number of batteries in a circuit.



Apparatus and materials

- ☐ x2 1.5V batteries
- ☐ x1 2.5V bulb
- ☐ x2 ammeters
- ☐ 1 voltmeter
- ☐ x5 connecting wires

5. What do you think will happen when the second battery is added?

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6. What do you predict will happen to the readings on the ammeters?

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7. What do you predict will happen to the readings on the voltmeters?

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8. Explain why you think this will happen.

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9. Now make the circuits and see what happens.

10. Describe what happens.

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11. Were your prediction and explanation correct? If not, can you explain what you observed?

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12. What is potential difference?

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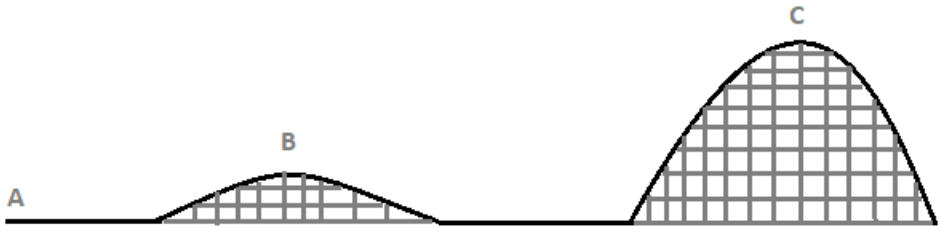

13. How do we measure potential difference in a circuit?

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14. What is the unit for potential difference?

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15. Explain what happens if we increase the voltage in the power supply in a circuit.

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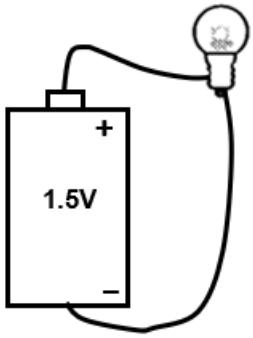
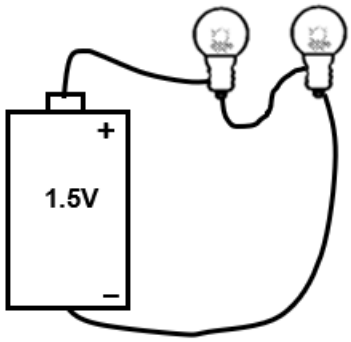
16. Fill in the gaps to describe what happens in these circuits. You should only use the words **current** and **voltage**.



Circuit with one bulb



Circuit with two bulbs

Circuit with one bulb

The battery has a …….. marked on it. This tells me how hard the battery can push

…….. around the circuit.

To make the bulb brighter I can use a battery with a bigger …….. . This will push

more …….. through the bulb.

Circuit with two bulbs

If I add another bulb, it will make the …….. smaller. This is because it is harder to

push …….. through two bulbs than one.

To make two bulbs as bright as one bulb was, I will need to use a bigger …….. .

Lesson 9: Magnetism	• Recall interaction between like and unlike magnetic poles • Recall three magnetic metals and that not all metals are magnetic

5 quick questions	
1	
2	
3	
4	
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Choose the correct answer:

1. The two ends of a magnet are called:

A north and east.
B east and west.
C south and north.
D south and west.

2. Which statement is not true about magnetic materials?

A They can be made into magnets.
B They are repelled by magnets.
C They are used in the magnets people put on fridge doors.
D They are attracted to magnets.

3. Which pair of materials are both magnetic materials?

A silver and gold
B iron and plastic
C copper and steel
D iron and steel

4. Which statement is not true?

A A north pole attracts a south pole.
B A south pole repels a south pole.
C A south pole repels a north pole.
D A north pole repels a north pole.

5. Two magnets which are pulling towards each other, are pulled slightly further away. What happens to the magnetic force?

A It gets weaker
B It gets stronger
C It stays the same
D The force no longer exists

Magnetic materials were discovered thousands of years ago when people found lodestone interacted with other lodestones and iron.
You have some lodestone, see how it interacts with the materials you have available.

Magnets are similar to lodestones, but magnets have 2 poles which enables them to interact differently.

6. Label this magnet.

7. Will these pairs of magnets attract or repel each other? Write 'attract' or 'repel' underneath each pair.

A) N S S N

_____

B) N S N S

_____

C) S N S N

_____

D) S N N S

_____

8. You are going to investigate which materials are magnetic and which are not.

Organise the materials into this results table.

Magnetic Materials	Non-magnetic materials

There are only _____ magnetic elements, _____, _____ and _____. _____ items will also behave magnetically as they contain _____.

Steel is an _____ (a mixture) of _____ and _____ atoms.

9. Why does steel also behave magnetically?

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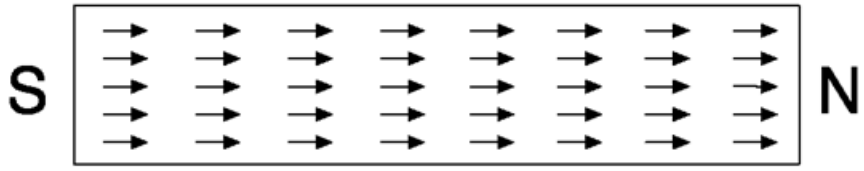
There are 91 metal elements that have been discovered on Earth so far, and only 3 of them are magnetic!
But why are these metals magnetic, and not the others?
Nickel, cobalt and iron's atoms work together to form domains.
Domains are like tiny little magnets themselves.



Let's investigate what makes a material magnetic by magnetising some steel nails.

Collect your materials, make sure you have the following:

- 2 steel nails
- 1 magnet
- 1 hammer

1) Take the 2 steel nails, bring them together. Are they attracted to each other? Why do you think this is?

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2) Take your magnet and stroke one steel nail only, in the same direction for a few minutes.

3) Now bring the second steel nail towards the one you stroked with a magnet. What happens? Why?

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4) Now hammer the magnetic nail for a few minutes.

5) Bring the second nail towards it again, what happens and can you try to explain why?

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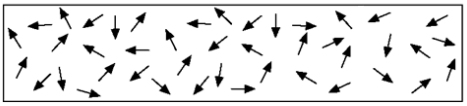
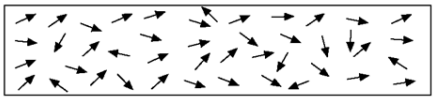
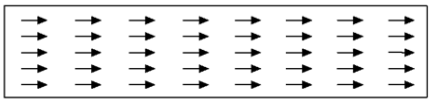
The Explanation

 unmagnetised iron	…… …… …… ……
S  N partly magnetized iron	…… …… …… ……
S  N fully magnetized iron	…… …… …… ……

6) Which materials can magnets be made from?

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7) What is special about the atoms in these materials?

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8) What is a domain?

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9) Why doesn't a normal piece of iron act like a magnet?

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6) Describe how to make a magnet and explain why this works.

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7) Use your notes to explain why the magnetised nail lost its magnetism once it was hit with a hammer.

Step 1) **THINK** In silence, by yourself. Think about they the nail lost its magnetism when it was hit by the hammer. Write down your ideas:

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Step 2) **PAIR** With your partner/s, read out your ideas and use this to come up with an improved answer. Use a whiteboard to create the draft improved answer and then write it up here:

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Step 3) **SHARE** your improved answer with the class. Take any additional needed notes here:

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❋ **<u>Checkpoint</u>**

1. Recall three magnetic metals and that not all metals are magnetic

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2. Recall interaction between like and unlike magnetic poles

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3. Explain what makes a material magnetic

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CORE KNOWLEDGE TESTS

TEST 1	DATE:	
1		
2		
3		
4		
5		**MARK / 5**

TEST 2	DATE:	
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5		**MARK / 5**

TEST 3	DATE:	
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5		**MARK / 5**

TEST 4	DATE:	
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TEST 5	DATE:	
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TEST 6	DATE:	
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5		**MARK / 5**

TEST 7	DATE:	
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5		**MARK / 5**

TEST 8	DATE:	
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5		**MARK / 5**

PAGES FOR YOUR NOTES