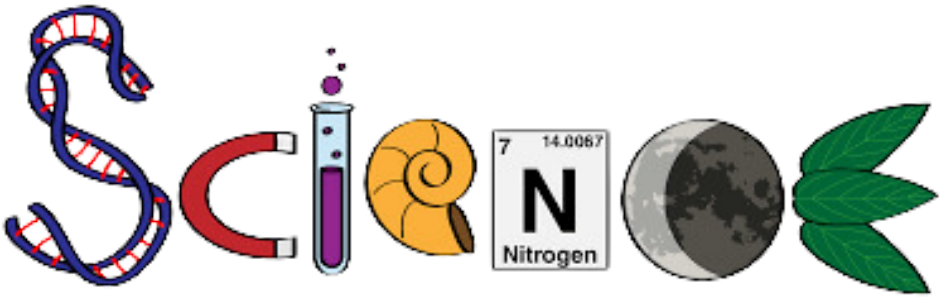
Meopham School



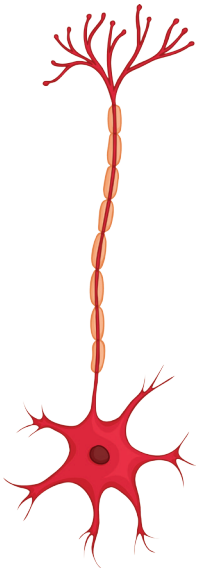
HOMEWORK BOOKLET

Year 9 Term 2

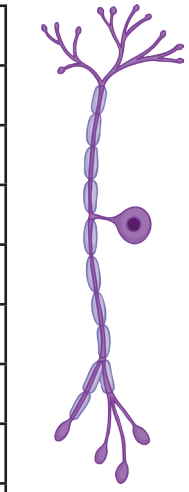
Coordination & Radioactivity

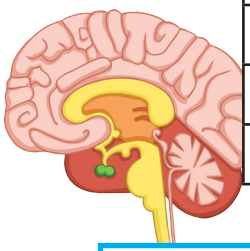
Nervous Response

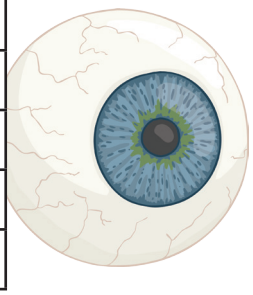
Homework 1



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

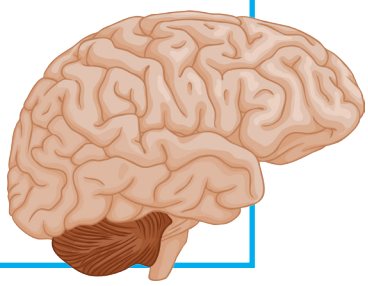






Find the following words in the word search below:

coordination	reflex arc	stimulus
CNS	receptor	synapse
effector	relay neurone	
motor neurone	sensory neurone	



Questions

1. What is a synapse? _____

2. State the parts of the CNS. _____

3. What is the main function of a reflex reaction? _____

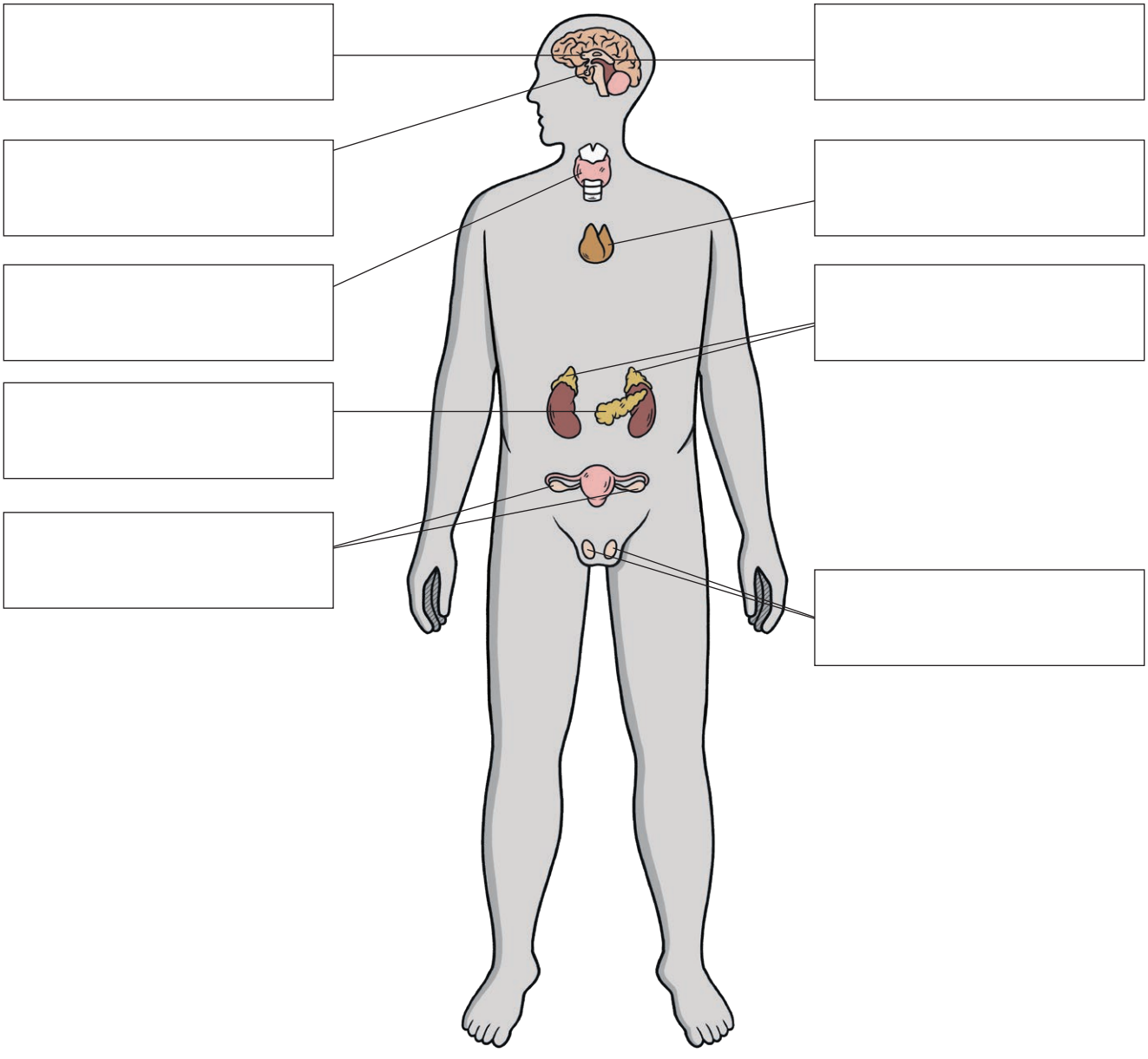
4. Name the three types of neurone in a reflex arc. _____

5. Describe the pathway taken in a reflex action. _____

_____

Homework 2

Labelling the Endocrine System **Activity**



Word Bank

Pancreas

Hypothalamus

Testes

Ovaries

Thymus

Pituitary Gland

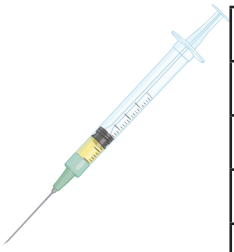
Adrenal Glands

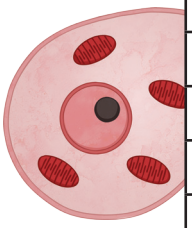
Pineal Gland

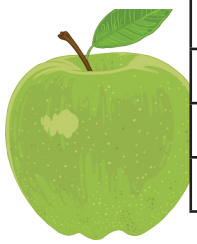
Thyroid and Parathyroid Glands

Homework 2

Hormonal Response







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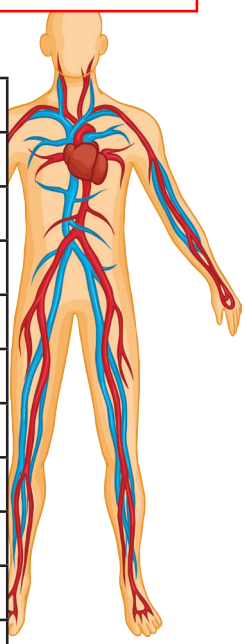
G	N	O	E	L	N	C	L	E	I	T	N	E	L	A	M	O	U
E	B	E	J	I	R	I	N	E	G	L	U	C	A	G	O	N	A
N	J	R	J	N	M	C	M	Q	P	R	J	S	E	F	M	E	L
A	H	O	M	E	O	S	T	A	S	I	S	E	N	M	A	H	O



Find the following words in the grid:

adrenaline	homeostasis	insulin	oestrogen	testosterone
endocrine system	hormones	glucagon	pituitary gland	

Tasks

1. For each of the hormones above, state the gland that produces it.

Hormone	Gland

2. Define the term homeostasis. _____

_____

3. Why is the pituitary gland often referred to as the master gland? _____

_____

4. What are the main differences between nervous and hormonal response?

Hormones	Nerves

Homework 3

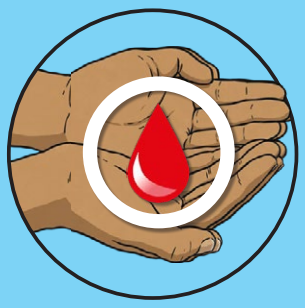
Type 1 Diabetes

What is it?

Type 1 diabetes is a condition in which a person's body struggles to regulate its blood glucose (sugar) levels.

What causes it?

For people with type 1 diabetes, the body's immune system attacks and destroys the cells that produce the hormone **insulin**. Insulin is responsible for controlling blood glucose levels.



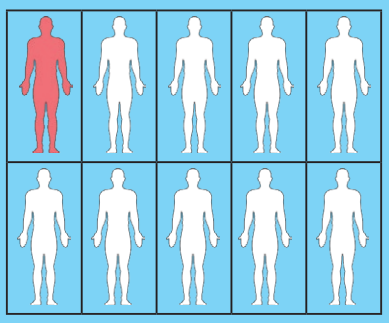
How is it treated?

Type 1 diabetes is treated by providing the body with insulin through injections or an insulin pump. The body's blood sugar levels need to be continuously monitored, either through finger prick testing or the use of a continuous glucose monitor (CGM).

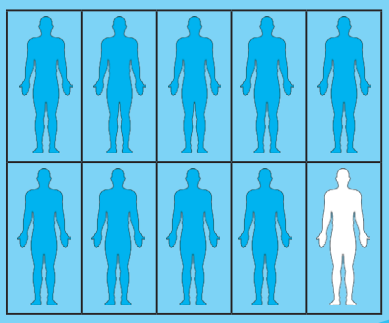
How many people have it?

According to Diabetes UK:

Around 10% of people in the UK with diabetes have type 1 diabetes.



Around 40,000 children in the UK have diabetes. 90% of these children have type 1 diabetes.



Roughly **85%** of people with type 1 diabetes have no known family history of the condition.

Around **50%** of new cases are diagnosed in people over the age of **18**.

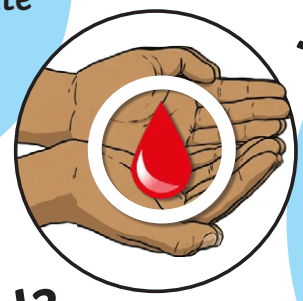
A person with type 1 diabetes will measure their blood glucose more than **80,000** times in their lifetime.

Homework 3

Type 2 Diabetes

What is it?

Type 2 diabetes is a condition in which a person's body struggles to regulate its blood glucose (sugar) levels.



What causes it?

For people with type 2 diabetes, the body's blood glucose (sugar) level is too high to be controlled with the body's levels of insulin, meaning that the blood glucose level remains too high. Unlike type 1 diabetes, type 2 can be caused by lifestyle choices such as diet and exercise levels. This means it can sometimes be managed or reversed without medication.

How is it treated?

Type 2 diabetes can be managed with or without medication, depending on the individual's blood glucose levels. For some people, changing their diet and increasing their activity level is enough to balance their glucose and insulin levels and keep their blood glucose in a healthy range. Others can take medications to reduce how much glucose the liver makes or to increase how efficiently the body uses its insulin stores. Some will need to increase their insulin levels through injections or an insulin pump. People with type 2 diabetes will need to monitor their blood glucose levels with either finger prick tests or a continuous glucose monitor (CGM).

Type 2 diabetes in numbers:

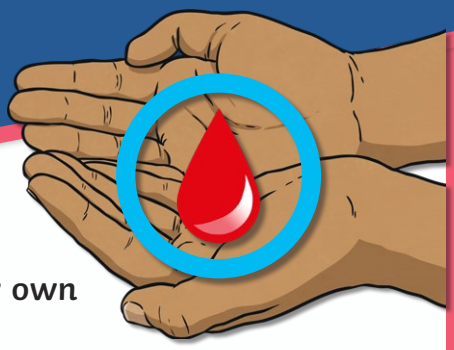
Around 90% of people with diabetes have type 2 diabetes (4.4 million people).

For children diagnosed with diabetes, only 10% have type 2 (1,600 children).

3 out of 5 cases of type 2 diabetes can be prevented through lifestyle management.

Homework 3

All About Diabetes



Read all the questions below before you begin. Conduct your own research to answer the questions.

What is diabetes?

What is the difference between type 1 and type 2 diabetes?

What are the symptoms of type 1 diabetes?

What are the symptoms of type 2 diabetes?

How can type 2 diabetes be prevented?

How is diabetes treated?

Find out an interesting fact about diabetes.

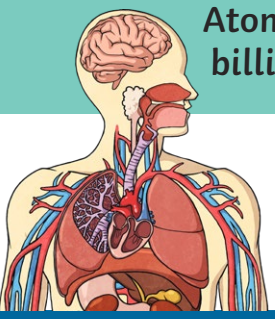
Homework 4

Atoms, Atoms Everywhere!

What are Atoms?

Atoms are everywhere. They are the basic building blocks for all matter in the universe. Every animal, person, plant, and object is made up of atoms. The word 'atom' stems from the Greek word atomos, meaning indivisible.

Atoms are small. They are so small we cannot see them with the naked eye. Scientists have to use a special kind of microscope called a transmission electron microscope to see atoms.



Atoms are plentiful. There are around seven billion billion billion atoms in the human body.

If you were to write that as a number, it would be a seven with 27 zeroes after it! Some people believe there are more atoms in the human body than stars in the observable universe.

Atoms can last forever because the centre of the atom, the nucleus, is tough to break apart.

What does an Atom Look Like?

Atoms are made up of a nucleus, protons, neutrons and electrons. These are also known as subatomic particles. The nucleus is the centre of the atom. Neutrons and protons can be found within the nucleus. Protons are positively charged particles, and neutrons are not charged at all. Spinning around the outside of the nucleus are electrons. Electrons are negatively charged particles that are attracted to the nucleus and the positively charged protons.

Every element on the periodic table has its unique structure determined by the number of protons within the atom, also known as its atomic number. Along with this, the atom's mass and radioactivity depend on how many protons and neutrons are in the atom. For example, the hydrogen atom has only one proton and one electron but no neutrons in its nucleus. In contrast, radium atoms have 88 protons, 138 neutrons and 88 electrons.

Most atoms have an equal number of protons and electrons, which means that the negative and positive charges are balanced.

Homework 4

Atoms, Atoms Everywhere!

1. **Test your Knowledge!**

   - What is an atom?

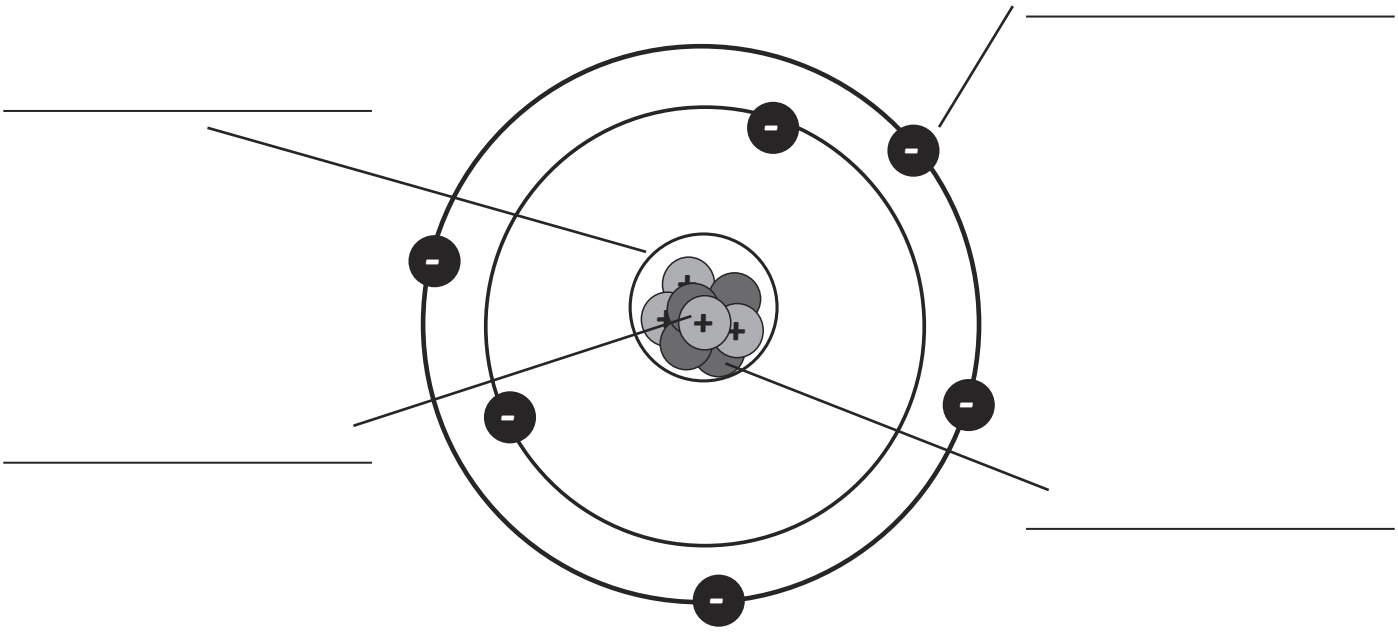
   - Can atoms be seen with your eyes? Why or why not?

   - How many atoms are in the human body?

   - What determines the atomic number of an atom?

   - What can change depending on the number of protons in an atom?

2. **Label this picture of an atom.**



Homework 4

3. **See if you can discover missing parts of this research table. Use the internet or a periodic table to help you.**

Element	Description	Atomic Number	Mass
	Helium		
O			
		79	
			126.904
Na			
		86	

Once you have finished this table, answer the following questions:

- Which atom has the heaviest mass?

_____

- Which atom has the most protons? How do you know?

_____

_____

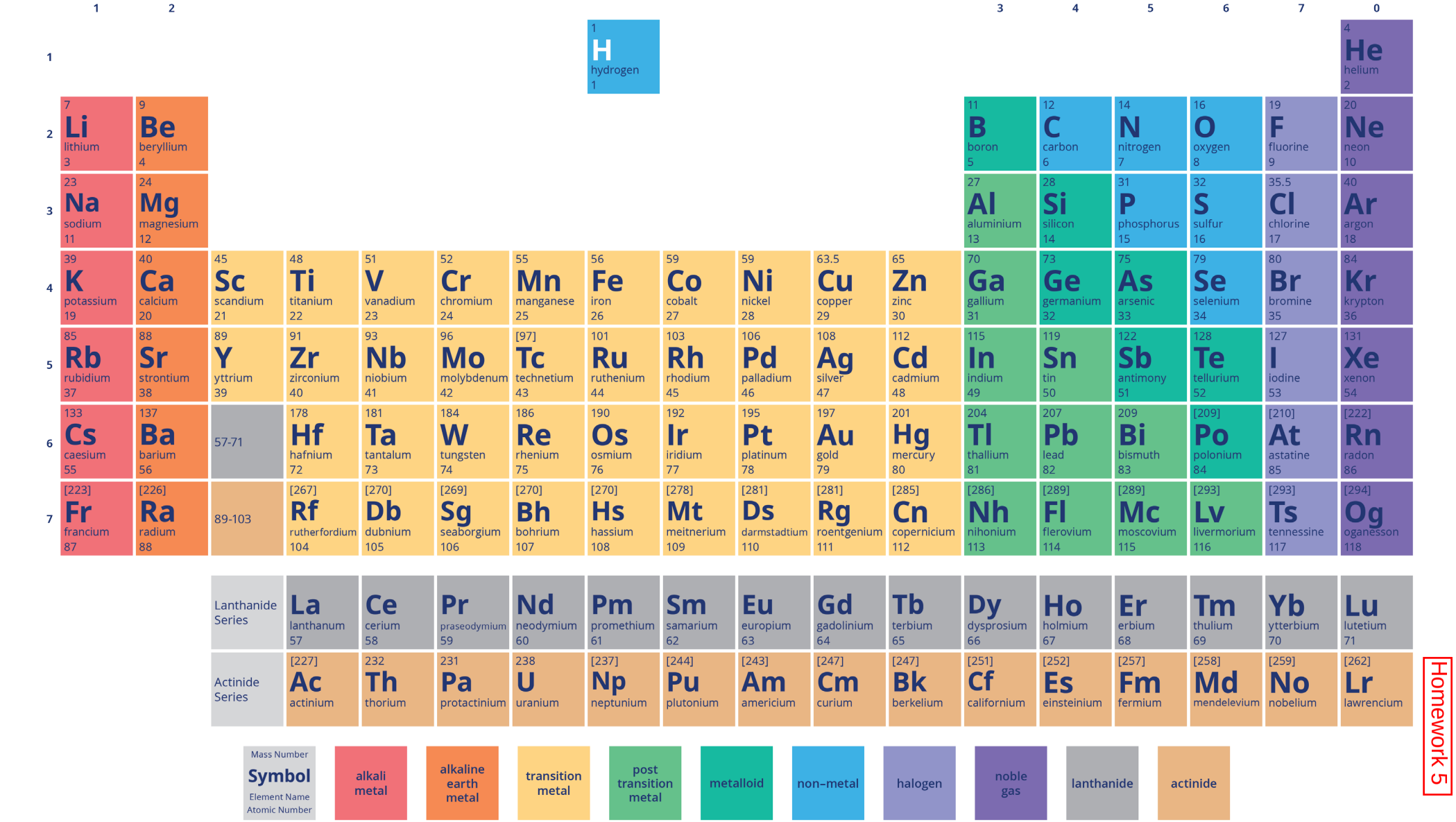
4. **Research Activity**

- Is there anything smaller than protons, neutrons and electrons? Do some research and write down what you discover.

_____

_____

Periodic Table of Elements

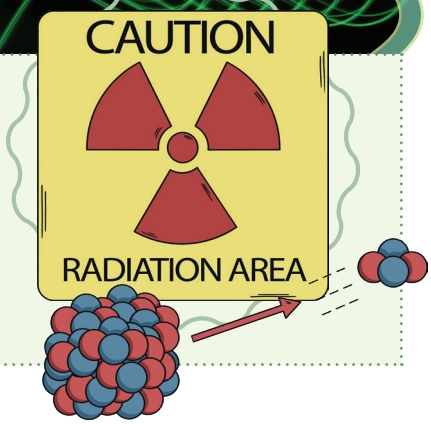


Homework 5

BEYOND SCIENCE

Radioactive Decay

Homework 5

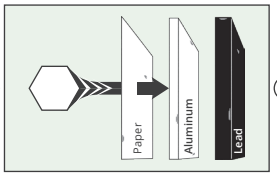
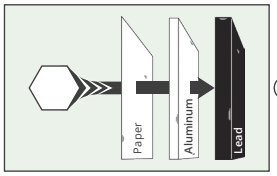
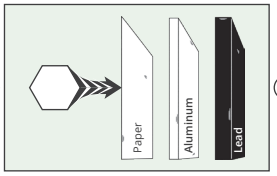


Prior Knowledge:

- Name and describe alpha, beta and gamma radiation.
- Some common uses of alpha, beta and gamma radiation and why these are selected for their particular use.
- Completing nuclear decay equations.
- How radioactive decay is measured in half-lives.

Questions

1. Match each type of radiation with its symbol, penetrating power and ability to ionise nearby atoms. Draw a line that matches each box to the one in the next column.

Beta	$^{0}_{0}\gamma$		Of the three types of radiation, this has an intermediate ionising ability.
Gamma	α $^{4}_{2}He$		Of the three types of radiation, this has the highest ionising ability.
Alpha	β $^{0}_{-1}e$		Of the three types of radiation, this has the lowest ionising ability.

2. Complete the table by adding in the information about each of the isotopes provided. You will need a copy of a periodic table to help you.

Isotope	Element Symbol (X)	Atomic Mass (A)	Atomic Number (Z)	Number of Protons	Number of Neutrons
hydrogen-1					
hydrogen-2					
hydrogen-3					
uranium-238					
uranium-235					
carbon-12					
carbon-14					
lead-210					
lead-214					

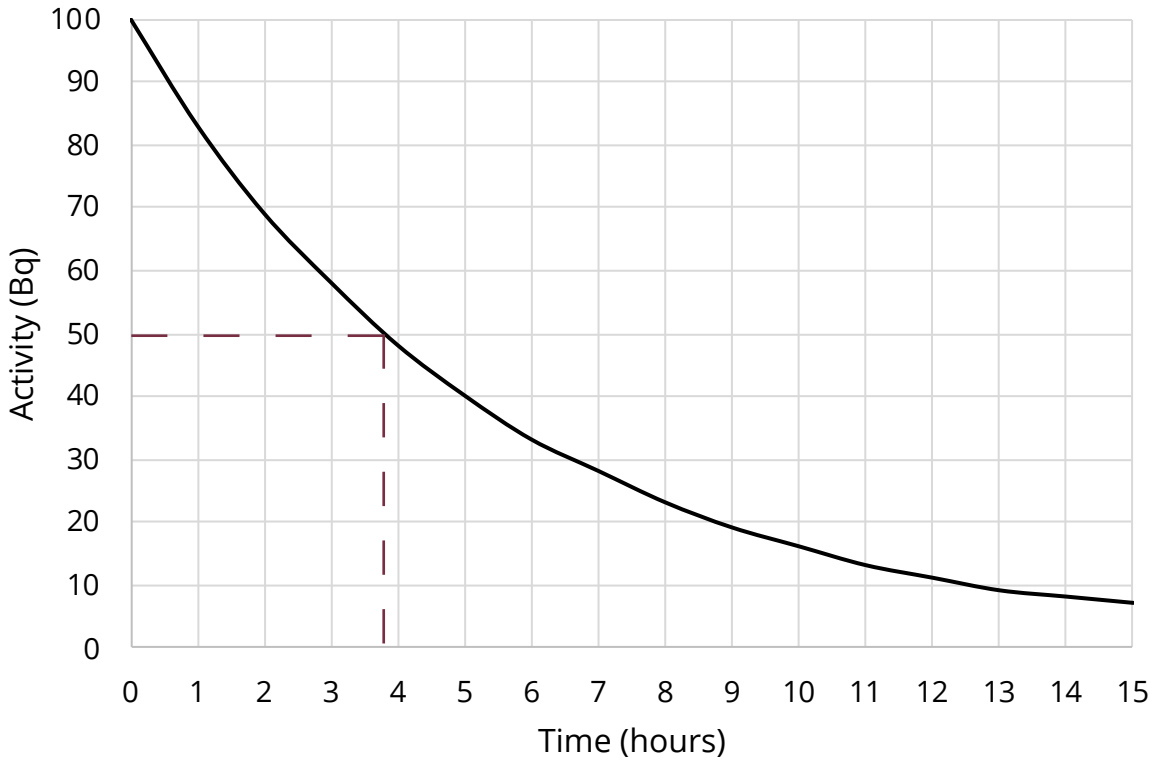
Half-Life and Radioactive Decay

Homework 5

Radioactive decay is a random process by which an unstable nucleus gives out radiation as it changes to become more stable. The **half-life** of a radioactive isotope is the time it takes for the number of nuclei of the isotope in a sample to halve, or the time it takes for the count-rate (or activity) from a sample containing the isotope to fall to half its initial level.

Determining Half-Life

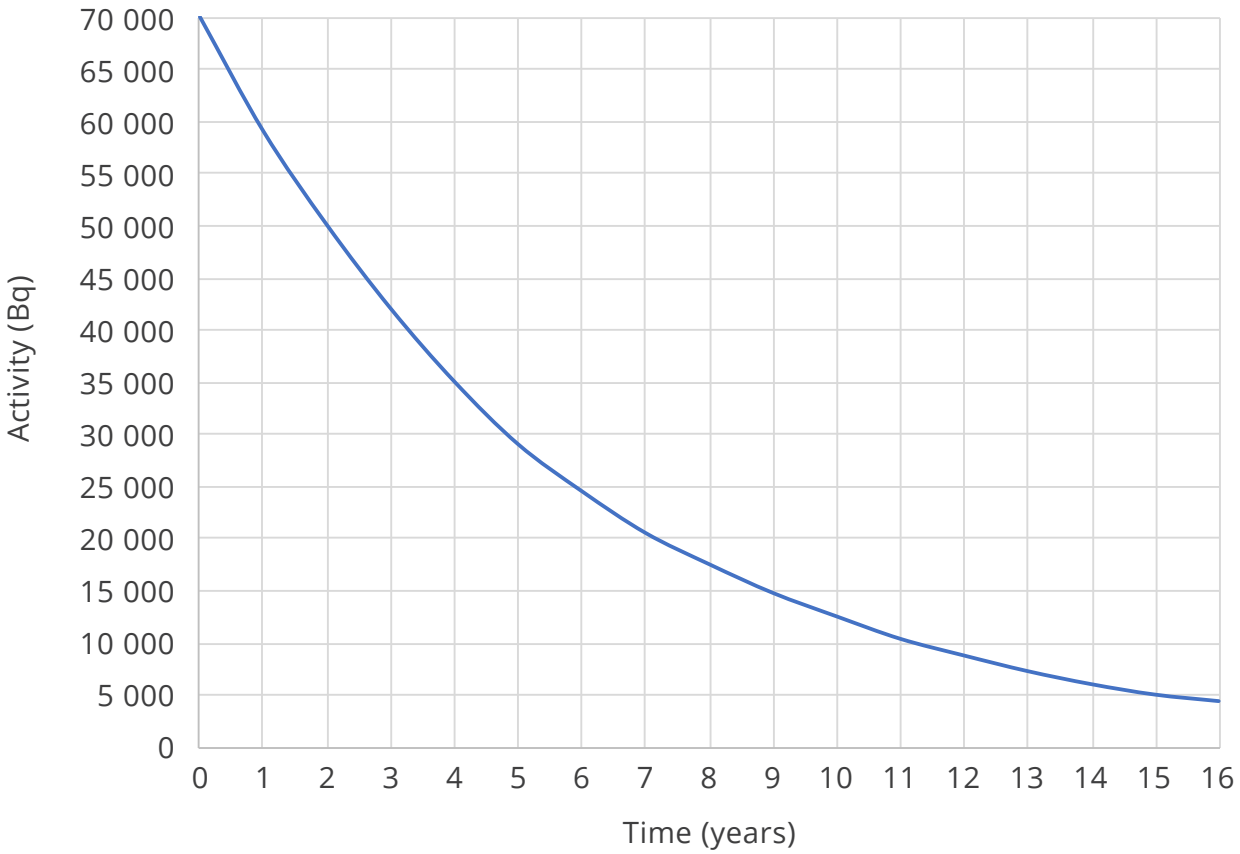
To work out the half-life of a substance, you locate the point on the graph where the initial value has halved. In the example below, the half-life of the substance is when the activity has decreased to 50Bq. To find this, read across from 50 on the y-axis and down from the line of best fit to the corresponding value on the x-axis.



In this example, the half-life would be 3.75 hours. This is the point at which the activity is 50% of the original value.

Figure 1 shows the radioactive decay of an unknown radioactive substance.

Figure 1



1. Write down the initial activity of the substance.

   _____ Bq

2. Write down the activity of the substance after 15 years.

   _____ Bq

3. Determine the half-life of the substance.

   _____ years

4. Determine the activity of the substance after two half-lives.

   _____ Bq

5. If the initial activity of the substance was double the initial activity shown in **Figure 1**, explain the effect this would have on the half-life.

_____

_____

Homework 6

The Chernobyl Disaster

The Chernobyl disaster was a terrible nuclear accident which happened on 26th April 1986. It is widely thought to be the most disastrous nuclear power plant accident in history.

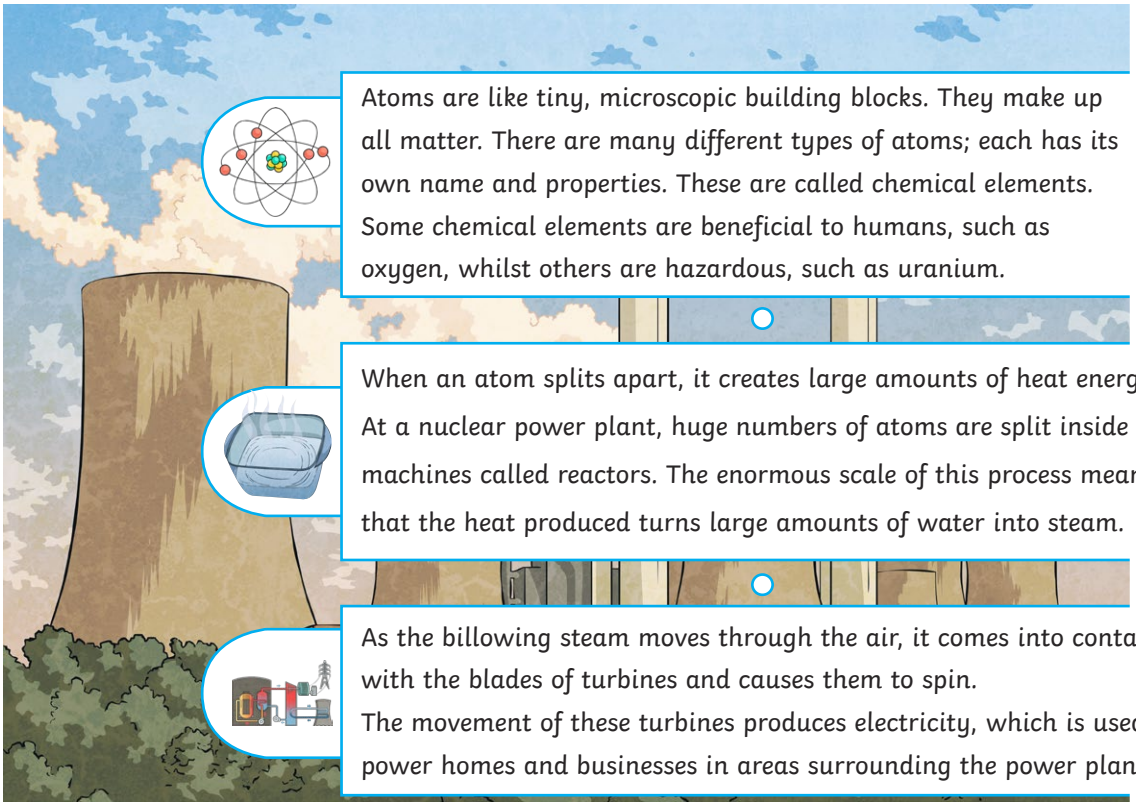
Chernobyl Itself

Chernobyl is a city in modern-day Ukraine, close to the country's border with Belarus. Before its evacuation, Chernobyl had a population of around 14,000 residents.

Chernobyl Nuclear Power Plant

Although it is called the Chernobyl Nuclear Power Plant, the power station is much closer to the neighbouring city of Pripyat than it is to Chernobyl itself. This is because Pripyat was built to give those who worked at the power station somewhere to live.

To understand why the Chernobyl Nuclear Power Plant was created, it is important to think about what happens inside a nuclear reactor:



By 1986, the Chernobyl Nuclear Power Plant housed four nuclear reactors. When working together, these reactors could create around 10% of Ukraine's electricity.

The Disaster

Late in the evening on 25th April 1986, a safety test began at the Chernobyl Nuclear Power Plant. The safety test aimed to train workers at the plant on how to deal with emergencies. However, just hours into the safety test, a real emergency occurred.

At 1:23 a.m. on 26th April, uncontrolled reactions began to occur.
An unstoppable chain of atoms split one after another, releasing huge amounts of heat energy. This caused both a huge steam explosion and a fire which released clouds of poisonous chemical elements into the environment.

The Impact

The impact of the nuclear disaster was very serious. Two workers at the power plant immediately lost their lives because of the explosion itself. However, due to the poisonous radiation sent into the atmosphere, the number of lives lost continued to rise over the days and weeks following the disaster.

Those exposed to the dangerous air produced during the explosion absorbed the chemical elements into their body. Sadly, this poisoned them and caused their deaths. Within months, 37 people (including power plant workers, firefighters and members of the military) had lost their lives.

Furthermore, because of the time of day that the disaster happened, people living in Pripyat and Chernobyl were unaware of what had occurred. They continued to sleep in their beds and were exposed to high amounts of poisonous air. Many became very sick.

Evacuation

Thinking about the danger to the people of Pripyat, buses were organised and 53,000 residents of the city and nearby villages were evacuated. Although they were told that they would only need to leave their homes for three days, those who lived in Pripyat have never been able to return. Ten days after the disaster, all people living within 30km of the Chernobyl Nuclear Power Plant were asked to leave for their own safety. This area remains one of the most dangerous places in the world and the area is completely abandoned to this day.

Homework 6

Questions

1. What was the approximate population of Chernobyl before its evacuation? Tick **one**.

   - ○ 1,986
   - ○ 14,000
   - ○ 30,000
   - ○ 53,000

2. Number the events below to show the order in which they happen within a nuclear power plant. The first one has been done for you.

   ☐ Heat energy is released.

   ☐ The turbine blades move.

   ☐ The atom is split.

   ☐ Steam moves through the air.

   ☐ The heat turns water into steam.

3. Look at the section called **The Disaster.**
   Find and copy **one** word which describes the reactions that began to happen.

   _____

4. Fill in the missing words.

   By _____ , the Chernobyl Nuclear Power Plant housed _____ nuclear _____ .

5. Find and copy the name of a chemical element which is harmful to humans.

   _____

6. Explain why the Chernobyl Nuclear Power Plant is closer to Pripyat than it is to Chernobyl.

   _____

   _____

   _____

Homework 6

7. Using evidence from the text, explain why the Chernobyl Nuclear Power Plant was beneficial to Ukraine before the disaster.

8. '**It is widely considered to be the most disastrous nuclear power plant accident in history.**'
   What does the phrase 'widely considered' mean?

9. Explain why the residents of Pripyat and Chernobyl were unaware that the disaster had occurred.