

# Year 8 Science Knowledge Booklet

## Term 5

**Name:**

**Class:**

**Homework 1 Due: 21<sup>st</sup> April**

**Homework 3 Due: 19<sup>th</sup> May**

**Homework 2 Due: 5<sup>th</sup> May**





## Knowledge Booklet: 2.4 Diseases and Drugs

### Big Questions and Vocabulary

- What are drugs?
- What are microorganisms?
- How do pathogens cause disease?
- What are communicable diseases?
- How does the body defend itself against pathogens?
- How are diseases transmitted?

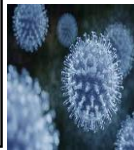
### Science Homework Task 1

Read all of this  
knowledge organiser.

<b>Antibiotic</b> A drug used to kill or prevent the growth of bacteria.	<b>Antibiotic resistance</b> When bacteria aren't killed by an antibiotic.	<b>Antibody</b> A protein produced by white blood cells in response to the presence of an antigen.
<b>Antigen</b> A molecule on the surface of a cell. A foreign antigen triggers white blood cells to produce antibodies.	<b>Antitoxin</b> A protein produced by white blood cells, which counteracts the toxins produced by invading bacteria.	<b>Bacterium/Bacteria (sig/pl.)</b> A microorganism 1-5 µm long. Its DNA is not contained within a nucleus. Some bacteria are able to cause disease.
<b>Bias</b> Prejudice towards or against something.	<b>Blood</b> A tissue, which transports substances around the body in the circulatory system.	<b>Cardiovascular disease</b> Disease of the heart or blood vessels.
<b>Clinical Trial</b> A set of drug tests on human volunteers.	<b>Communicable disease</b> A disease that can spread between individuals.	<b>Double blind trial</b> A clinical trial where neither the doctors nor the patients know who has received the drug and who has received the placebo until all the results have been gathered.
<b>Efficacy</b> Whether something, e.g. a drug, works or not.	<b>Epidemic</b> A big outbreak of a disease.	<b>Fungus</b> A microorganism that can cause disease, and that produces spores that can be spread to other organisms.
<b>Immunity</b> The ability of white blood cells to respond quickly to a pathogen.	<b>Non-communicable disease</b> A disease that cannot spread between individuals.	<b>Vaccination</b> The injection of dead or inactive microorganisms to provide immunity against a particular pathogen.
<b>Pathogen</b> A microorganism that causes disease. (bacterium, virus, fungi or protist.)	<b>Protist</b> A pathogen that is often transferred to other organisms by a vector, which doesn't get the disease itself.	<b>Virus</b> A disease-causing agent about 1/100 <sup>th</sup> of the size of a bacterial cell. Can only replicate within the host body cells.

Viruses	Bacteria (prokaryotes)	Protists (eukaryotes)	Fungi (eukaryotes)
<i>e.g. cold, influenza, measles, HIV, tobacco mosaic virus</i>	<i>e.g. tuberculosis (TB), Salmonella, Gonorrhoea</i>	<i>e.g. dysentery, sleeping sickness, malaria</i>	<i>e.g. athlete's foot, thrush, rose black spot</i>
DNA or RNA surrounded by a protein coat	No membrane bound organelles (no chloroplasts, mitochondria or nucleus). Cell wall. Single celled organisms	Membrane bound organelles. Usually single celled.	Membrane bound organelles, cell wall made of chitin. Single celled or multi-cellular





Viruses live and reproduce inside cells causing damage



Most **protist diseases** in humans are **caused** by protozoa. Protozoa make humans sick when they become human parasites.



The human body has several non specific ways of defending itself from pathogens getting in

	<b>Nose</b>	Nasal hairs, sticky mucus and cilia prevent pathogens entering through the nostrils.
	<b>Trachea and bronchus (respiratory system)</b>	Lined with mucus to trap dust and pathogens. Cilia move the mucus upwards to be swallowed.
	<b>Stomach acid</b>	Stomach acid (pH1) kills most ingested pathogens.
	<b>Skin</b>	Hard to penetrate waterproof barrier. Glands secrete oil which kill microbes

Bacteria may produce toxins that damage tissues and make us feel ill

Some **fungi cause disease** when they become human parasites.



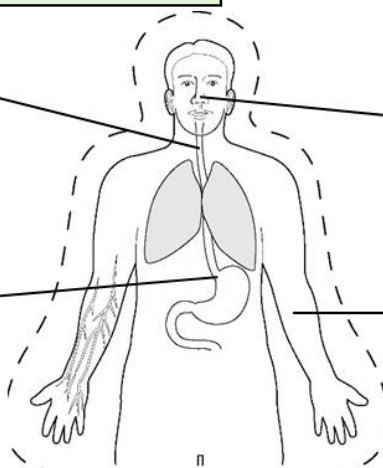
## Pathogens are microorganisms that cause infectious disease

### Trachea and Bronchi

Produces **mucus** to **trap pathogens**. Contains **cilia** to **move mucus** for swallowing

### Stomach

Contains **hydrochloric acid** to destroy pathogens.



### Non Specific Defences

#### Nose

Contains **hairs** and **mucus** to **trap pathogens**

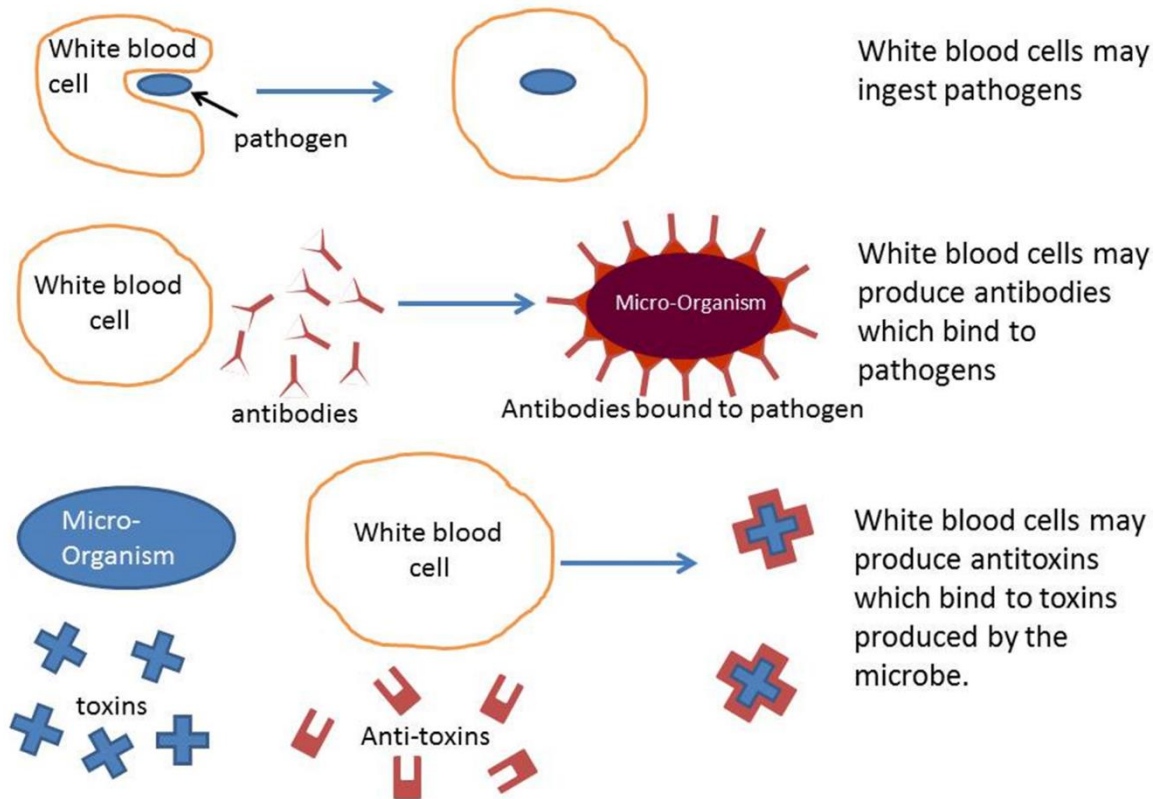
#### Skin

A **physical barrier** to pathogens.

Pathogen	Disease	Symptoms	Method of transmission	Control of spread
Virus	<b>Measles</b>	Fever, red skin rash.	Droplet infection from sneezes and coughs.	Vaccination as a child.
Virus	<b>HIV</b>	Initially flu like systems, serious damage to immune system.	Sexual contact and exchange of body fluids.	Anti-retroviral drugs and use of condoms.
Virus	<b>Tobacco mosaic virus</b>	Mosaic pattern on leaves.	Enters via wounds in epidermis caused by pests.	Remove infected leaves and control pests that damage the leaves.
Bacteria	<b>Salmonella</b>	Fever, cramp, vomiting, diarrhoea.	Food prepared in unhygienic conditions or not cooked properly.	Improve food hygiene, wash hands, vaccinate poultry, cook food thoroughly.
Bacteria	<b>Gonorrhoea</b>	Green discharge from penis or vagina.	Direct sexual contact or exchange of body fluids.	Use condoms. Treatment using antibiotics.
Protists	<b>Malaria</b>	Recurrent fever.	By an animal vector (mosquitoes).	Prevent breeding of mosquitoes. Use of nets to prevent bites.
Fungus	<b>Rose black spot</b>	Purple black spots on leaves.	Spores carried via wind or water.	Remove infected leaves. Spray with fungicide.

<b>Vaccination</b>	<i>Small amount of dead or inactive form of the pathogen</i>	<i>1<sup>st</sup> infection by pathogen</i>	White blood cells detect pathogens in the vaccine. Antibodies are released into the blood.
		<i>Re-infection by the same pathogen</i>	White blood cells detect pathogens. Antibodies are made much faster and in larger amounts.

## How white blood cells protect us from disease

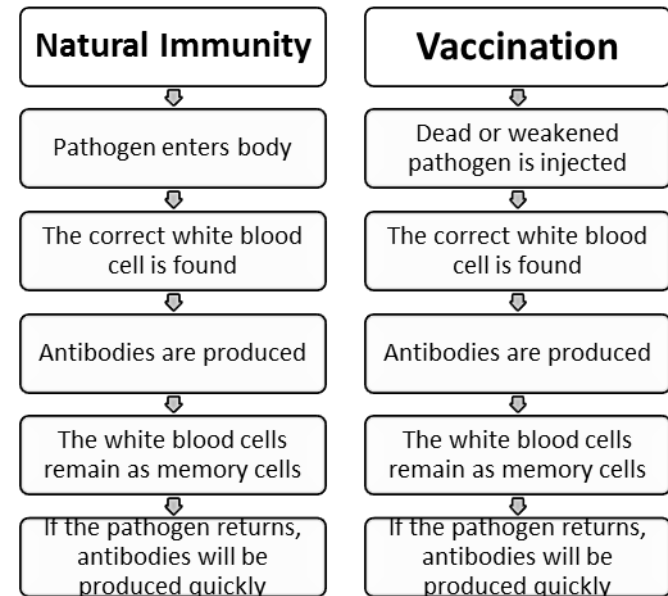


**Drugs** -A drug is a substance that has an effect on the body:

- medicines are drugs that help people suffering from pain or disease
- Recreational drugs are taken by people because they like the effects they have on their bodies

Some recreational drugs are legal, such as tobacco and alcohol, although there are restrictions on who can buy them. Caffeine, found in coffee, is another recreational drug. Most other recreational drugs are illegal, and these include cannabis, ecstasy and heroin.

Recreational drugs can be classified as a depressant or a stimulant. Most recreational drugs can be addictive.





**Have a go at this - Diseases Question**

**Q1.**

Pathogens are microorganisms that cause infectious disease.

- (a) Draw **one** line from each disease to the way the disease is spread.

Disease	Way the disease is spread
	Animals that draw blood
Cholera	Drinking contaminated water
Cold	Droplets in the air when people cough or sneeze
Malaria	Eating food that is contaminated
	Breathing air polluted with carbon dioxide

Match box exercise – take note of the number of lines you need to draw, draw the lines with your ruler!

A word you don't know!  
But look this is what it means!

- (b) One way the human body protects itself against the entry of pathogens is by producing antimicrobial chemicals.

Antimicrobial chemicals kill pathogens.

Give **two** other ways the human body protects itself against the **entry** of pathogens.

1. \_\_\_\_\_
- \_\_\_\_\_
2. \_\_\_\_\_
- \_\_\_\_\_

(3)

(2)



- (c) Measles is a childhood disease caused by a microorganism. Measles is **not** treated by antibiotics.

Give the reason why.

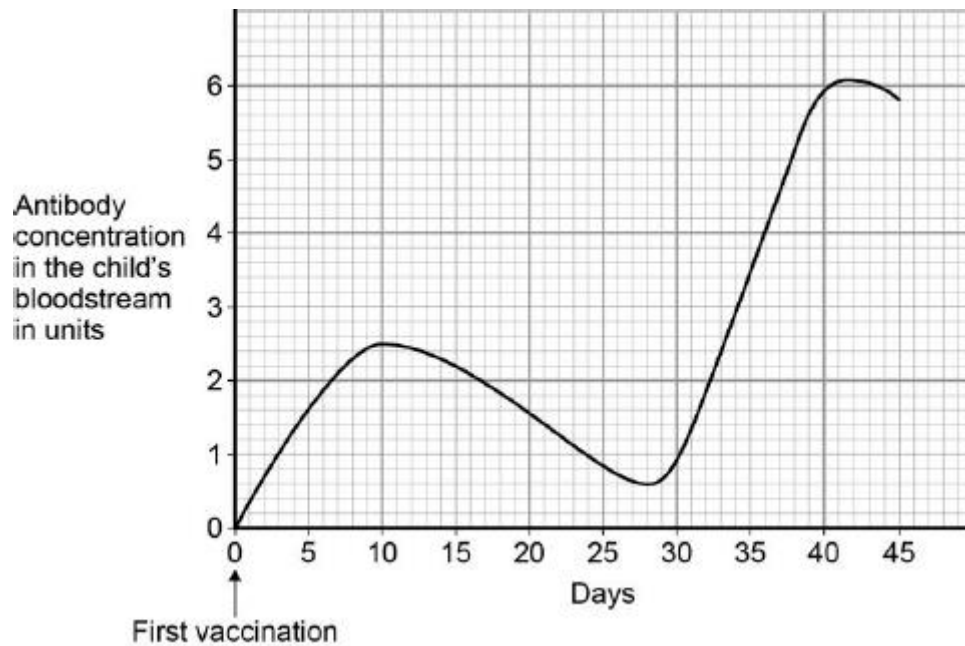
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(1)

- (d) Vaccinations help people become immune to infections.

In 2013, 92% of children in the UK had two vaccination injections against measles.

The figure below shows how the concentration of antibodies in the blood changes after each measles vaccination.



Graph questions are really popular when it comes to questions on diseases – what is this one actually showing you?

Suggest what day the second vaccination was given.

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(1)

- (e) What is the highest concentration of antibodies produced by the first vaccination?

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(1)

- (f) How will the number of children getting measles change as more children are vaccinated against measles?

Give a reason for your answer.

Change \_\_\_\_\_

Reason \_\_\_\_\_

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(2)

(Total 10 marks)

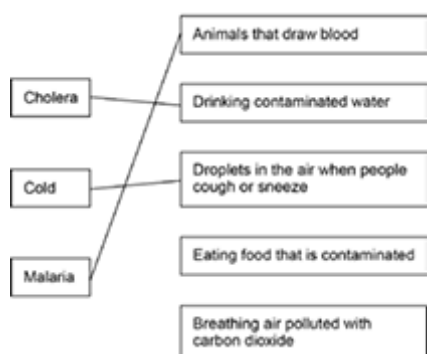


## Knowledge Booklet: Cell Biology

### Sample Diseases question Answer

#### Q1.

(a) **Disease**      **Way the disease is spread**



*extra lines from left cancel the mark*

3

(b) any **two** from:

- skin acts as a barrier
- blood clots (over cuts)
- nose (hairs) catch particles (breathed in)
- mucus (in trachea / bronchi) traps microorganisms
- acid in stomach kills microorganisms

2

(c) because measles is a virus

1

(d) 28 / twenty eight

*± 0.5 small square tolerance*

1

(e) 2.5

1

(f) number will decrease

1

less likely to come into contact with someone with measles / the disease

1

**[10]**



# Science Homework 2

## Pillar 2.4 Diseases and Drugs

### Literacy –

Learn these spellings

pathogen

bacteria

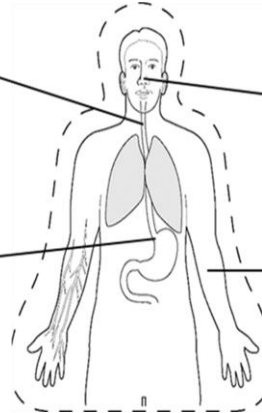
vaccination

### Memory –

Learn to label this diagram

**Trachea and Bronchi**  
Produces **mucus** to **trap pathogens**.  
Contains **cilia** to **move mucus** for swallowing

**Stomach**  
Contains **hydrochloric acid** to destroy pathogens.



**Nose**  
Contains **hairs** and **mucus** to **trap pathogens**

**Skin**  
A **physical barrier** to pathogens.

### Video - 10 minutes

Watch these videos

**How pathogens are spread:**

<https://www.youtube.com/watch?v=vO51sFre6fg>

**Parasites:**

<https://www.youtube.com/watch?v=4j6jikayKZA>

### Exam Practice (turn over)

BUG the question (draw a **Box** around the instruction word, **Underline** scientific key words, **Go** for the right number of marks)

Complete the exam questions on the back of this page.

### Research

Find out about a particular disease – what causes it, how is it transmitted. Write a short summary of what you found out

### Question

What is the difference between a pandemic and an epidemic – when was the last pandemic, what caused it?

### Skills you are working on

Learning spellings using look, cover, write, check.  
Making notes from the video.

Using memory techniques to learn the definitions.  
Understand what the exam questions are asking.  
Using key words in your answers.



Q1.

Food poisoning can be caused by eating food that is contaminated with *Salmonella* bacteria.

(a) Give one difference between a bacterial cell and an animal cell.

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Year	Confirmed cases per 100 000 population
2006	23.82
2007	22.24
2008	18.82
2009	17.17
2010	15.39
2011	15.12
2012	14.00
2013	13.16
2014	12.63
2015	14.50

The table shows the number of confirmed cases of salmonella food poisoning in the UK.

It is estimated that in the UK, for every confirmed case of salmonella poisoning there are another 3 unconfirmed cases.

(b) Estimate the total probability of suffering from salmonella food poisoning in 2015.

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(c) Describe the trend in the number of confirmed cases of salmonella food poisoning between 2006 and 2014.

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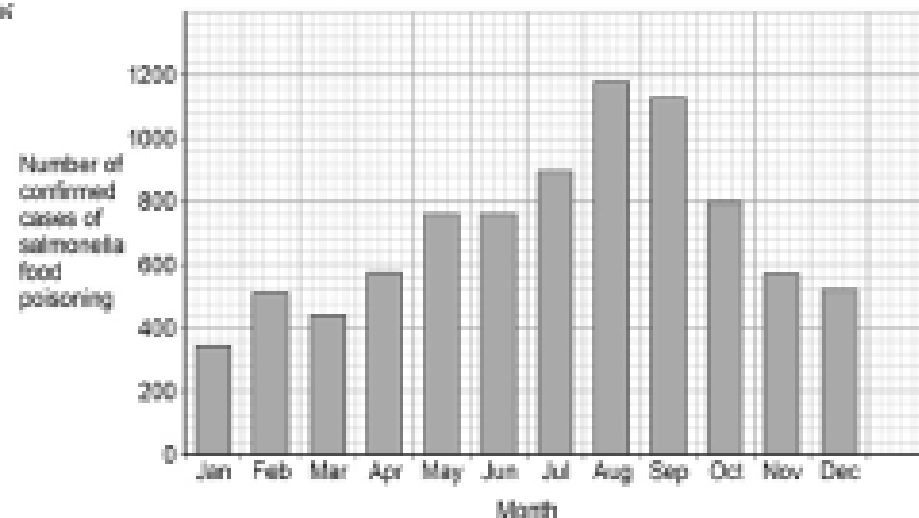
(d) Suggest two reasons for the trend in the data between 2006 and 2014.

1. \_\_\_\_\_
2. \_\_\_\_\_

(2)

(1)

(e) The graph shows the number of confirmed cases of salmonella food poisoning in the UK during one year.



(3)

Suggest one reason for the high number of cases of salmonella food poisoning in the summer.

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(1)

(1)

## Knowledge Booklet: **Metals**

### Big Questions and Vocabulary

- Why do metals rust / tarnish in air
- Why do metals react with acid ?
- Why are some metals more reactive than others?
- What is a redox reaction
- Why have some metals been known for thousands of years but other have only recently been discovered?
- 

<b>Properties</b> Characteristic of the substance in particular states. Typical example include melting point, conductivity or malleability	<b>Melting point</b> The temperature required to get a change in state for a substance from solid to liquid. Metals typically have high melting points	<b>Ductile</b> The ability to be drawn into a thin wire
<b>Lustrous</b> The scientific term for shiny. Metals are lustrous, when they appear dull it is because they have TARNISHED, typically coated with the metal oxide	<b>Tarnish</b> A term used to describe the oxidation of metals. Compounds don't share all the properties of the metal	<b>Malleability</b> This is where the substance can be bent or hammered into a new shape without shattering.
<b>Conductivity</b> A measure of how well electricity and heat able to flow through a substance. Metals are good conductors of both heat and electricity due to delocalised electrons	<b>Delocalised electrons</b> The outer shell electrons which are able to move throughout the structure and not attached to an individual atom.	<b>Oxidation</b> Chemical reaction where oxygen is added to a substance, forming an oxide. Tarnishing and rusting are examples of oxidation
<b>Reduction</b> Chemical reaction where oxygen is removed from a compound.	<b>pH scale</b> A scale used to determine the acidity or alkalinity of a solution. 7 is neutral. Less than 7 is acidic, More than 7 is alkaline	<b>Acids</b> Release H <sup>+</sup> ions when dissolved in water. React with metals to form a salt and hydrogen
<b>Ore</b> A rock that contains enough metal/ metal compound to make it worth extracting	<b>Reactivity Series</b> A list of elements (typically metals) in order from most reactive to least reactive. It's based on reactions with oxygen, water and acid	<b>Alkali Metals</b> Metals found in group one that react vigorously with water to form alkaline solutions, they are not typical metals

**Sample Extended Questions / Practical based questions**

**Compare the relative reactivity's of Copper, Iron, Magnesium and Potassium**

**Why has gold, silver and copper been known for thousands of years but Aluminium is a relatively new discovery**

**How could you extract Copper from copper oxide in the school laboratory.**

**What is the importance of Carbon's position in the reactivity series**

**Describe the typical properties of metals**

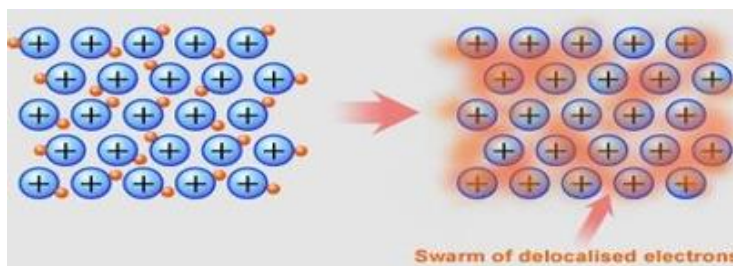
**Sketch the bonding in a metal and explain how this links its properties**

The majority of the elements in the periodic table are metals. These are found on the left hand side of the stepped line often shown on the periodic table.

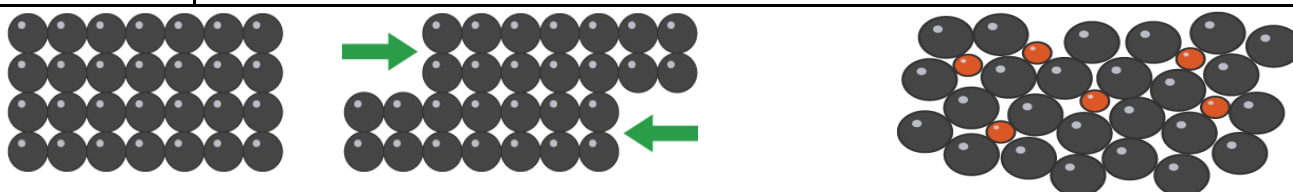
Many metals have similar properties, typically those found in the middle block of the periodic table known as the transition metals

Metals	Non-metals
Shiny	Dull
High melting points	Low melting points
Good conductors of electricity	Poor conductors of electricity
Good conductors of heat	Poor conductors of heat
High density	Low density
Malleable and ductile	Brittle

Metallic properties can be explained by linking it to its structure. The metallic structure is a regular arrangement of positive metal ions with a "sea" of delocalised electrons. The delocalised electrons are able to move throughout the metal, making them excellent conductors



Property	Explanation
<b>High melting point</b>	Metallic bonds are strong forces of attraction between the positive metal ions and the delocalised electrons. They require large amounts of energy to break the metallic bond, therefore requiring high temperatures to change state
<b>Malleability</b>	The regular arrangements of positive metal ions can slide over each other when a force is applied, allow the material to be bent or shaped
<b>Conductivity</b>	The delocalised electrons are able to move throughout the structure, allowing electricity to flow through them (good electrical conductors) and heat (good thermal conductors) as the delocalised electrons can also transfer thermal energy



The diagram on the left shows a pure metal, due to the regular arrangement of the positive metal ions, when a force is supplied the ions can slide past each other.

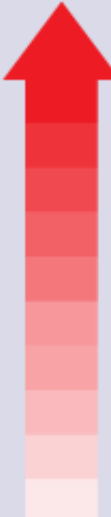
On the right, the diagram shows an alloy, this is where other substances are added to the metal and distorts the arrangement of the ions, this means they can't slide over each other

Metals vary drastically in their reactivity. Some metals like those in group 1 are incredibly reactive while some transition metal are extremely unreactive. As you will have discussed in previous topics this is dependent on how easily they lose their electrons to form compounds.

	Reactions with water	Reactions with acid
<b>Group 1 metals</b>	<i>Reactions get more vigorous as you go down the group, as it is easier to lose electrons due to weaker force of attraction between nucleus and outer electron. Metal hydroxide and Hydrogen are the products</i>	<i>Reactions get more vigorous as you go down the group, for the same reasons as reactions with water. A salt and Hydrogen is produced.</i>
<b>Group 2 metals</b>	<i>More reactive with water as you go down the group. Magnesium doesn't react with cold water but will react with steam. Calcium and those below will react with cold water</i>	<i>Observable reactions include fizzing and a temperature increase. Salt and hydrogen are produced</i>
<b>Zinc, iron and copper</b>	<i>Do not react with cold water</i>	<i>Zinc and iron react slowly with acid. Copper does not react with acid.  Again salts and Hydrogen are produced</i>

Acid name	Salt name
<i>Hydrochloric acid</i>	Metal Chloride
<i>Sulfuric acid</i>	Metal Sulfate
<i>Nitric acid</i>	Metal Nitrate

Metals and oxygen	<i>Many metals react with oxygen to form metal oxides</i>	magnesium + oxygen → magnesium oxide $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
Reduction	<i>This is when oxygen is removed from a compound during a reaction</i>	e.g. metal oxides reacting with carbon, a reaction used to extract low reactivity metals
Oxidation	<i>This is when oxygen is gained by an element or compound during a reaction</i>	e.g. metals reacting with oxygen, rusting of iron

Metal	Reaction with cold water	Reaction with dilute acids	Reactivity
Potassium	Violent	Violent	<div><div>Most reactive</div><div>Least reactive</div></div>
Sodium			
Lithium			
Calcium	Fast	Rapid	
Magnesium	Very slow		
(Carbon)			
Zinc	Usually no reaction	Slow	
Iron	Rusts slowly		
(Hydrogen)			
Copper	No reaction	No reaction	
Gold			

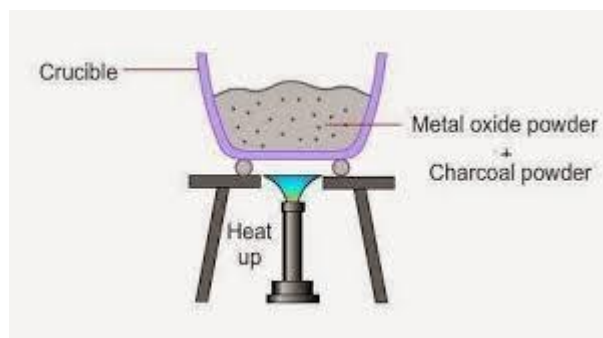
Metals form positive ions when they react, they are oxidised	<i>A more detailed explanation of reactivity series is that the reactivity of a metal is based on ability to form positive ions, the easier it is to lose the electron, the more reactive it is</i>
Carbon and hydrogen	<i><u>Carbon</u> and <u>hydrogen</u> are non-metals but are included in the reactivity series, as they are used to reduce less reactive metal compounds to extract the metal. Carbon is oxidised to carbon dioxide, and Hydrogen is oxidised to water</i>
Displacement	<i>A more reactive element can take the place of a less reactive element in a compound. E.g Sodium + Iron oxide → Sodium oxide + Iron Typically a colour change in solution or appearance of differently coloured solid shows displacement reaction has taken place</i>

	Magnesium sulfate solution	Copper sulfate solution	Iron sulfate solution	Number of reactions
Magnesium	Not done	Brown coating	Black coating	2
Copper	No visible reaction	Not done	No visible reaction	0
Iron	No visible reaction	Brown coating	Not done	1

Extraction	Description
<b>Reduction with Carbon</b>	Any metal that is below carbon can be extracted from its ore by heating with carbon / coal. It is a redox reaction, as the metal oxide is reduced to form the metal, and the carbon is oxidized to form carbon dioxide
<b>Electrolysis</b>	Any elements above carbon cannot be extracted with carbon, and must instead be electrolysed.

Metal extraction for elements below carbon can be done relatively easily in the lab and you should have covered this practical / demo in class. Grinding up the metal oxide and mixing carbon / charcoal and heating it in a crucible will produce carbon dioxide and the metal.

A lid is typically used to stop loss of product, but will need to be lifted occasionally during the reaction to stop pressure build up as carbon dioxide produced



Writing equations for reactions.

The metal never changes its name, whether it is the element or compound. So word equations become quite simple as long as you remember the rules for the acids / non metals.

e.g Iron + oxygen  $\rightarrow$  Iron oxide

Magnesium + oxygen  $\rightarrow$  Magnesium oxide

Lithium + Hydrochloric acid  $\rightarrow$  Lithium Chloride + hydrogen

Magnesium + sulphuric acid  $\rightarrow$  Magnesium sulfate + hydrogen

Iron oxide + carbon  $\rightarrow$  Iron + carbon dioxide

Copper oxide + carbon  $\rightarrow$  Copper + carbon dioxide

Most metals don't react with water, those that do typically form Metal hydroxides and Hydrogen

Sodium + water  $\rightarrow$  Sodium hydroxide + hydrogen



Draw **one** line from each metal to its usual method of extraction.

Metal	Method of extraction
Gold	Electrolysis of molten compound
Iron	Mined as the pure metal from the ground
	Reduction of metal oxide with carbon

Need to use each elements position in reactivity series for this, Gold is near the bottom, showing it is very unreactive, so can be mined as pure metal from ground (doesn't oxidise)

Iron is below carbon so it can be extracted by heating with carbon.

(2)

(iii) Scientists were not able to extract aluminium until the 19th century.

Explain why.

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Again need to use the reactivity series, elements above carbon can only be extracted by a process called electrolysis. The carbon isn't reactive enough to displace / reduce the metal.

(2)

(f) Explain why titanium conducts electricity.

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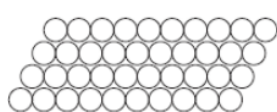
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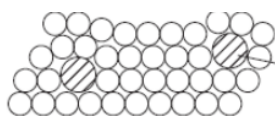
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Conductivity in a metal is down to the delocalised electrons. The outer shell electrons able to move throughout the structure.

(3)



Pure iron



Cast iron

Region of carbon atoms

Use the diagrams to help you answer the questions.

(i) Draw a ring around the correct answer to complete the sentence.

Pure iron is an element because pure iron

- contains only one sort of atom.
- is magnetic.
- is a metal.

(ii) Suggest why cast iron is harder than pure iron.

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Always use diagrams to help you phrase answer, elements made up of only one type of atom, in metals this leads to a regular arrangement of the ions.

Other elements have different sizes and disrupt the regular arrangement so the ions cant slide past each other when force applied

### Science Homework Task 3

Read all of this knowledge organiser and revise ready for the end of term Pillars test, there will be questions on Disease and Drugs and Metals. Make sure you can answer these questions.

Question	Answer
What is drug?	
What is the difference between medicinal and recreational drugs?	
Give the definition for drug addiction.	
Define withdrawal symptoms.	
What is an overdose?	
Name 4 types of drugs.	
What is a pathogen?	
Name the 4 main types of pathogen.	
What are toxins?	
Name 3 ways that pathogens are spread.	
What is meant by oxidation?	
Name the salt produced when using hydrochloric acid	
Name the salt produced when using nitric acid	
Name the salt produced when using sulfuric acid	
Metals which are more reactive than carbon are extracted using which method?	
Metal carbonate + acid $\rightarrow$ ..... + ..... + .....	
Metal oxide + acid $\rightarrow$ ..... + .....	
Metals + acid $\rightarrow$ ..... + .....	
What is an ore?	