Year 7 Knowledge Organisers

Topic summaries for revision and to help with homework.

Autumn Term 1.1

Student Pod is a website, just for Rye Hills students. It houses lots of school information and resources for every subject.

Here you will find Student Knowledge Organisers, which aim to support students at home. Student Knowledge Organisers are brief summaries of important key words and information for a topic. They are a great starting point for revision – use them to help make flashcards and mind maps. They are also a useful tool when completing homework.

You can access Student Pod through EASI or the school website.
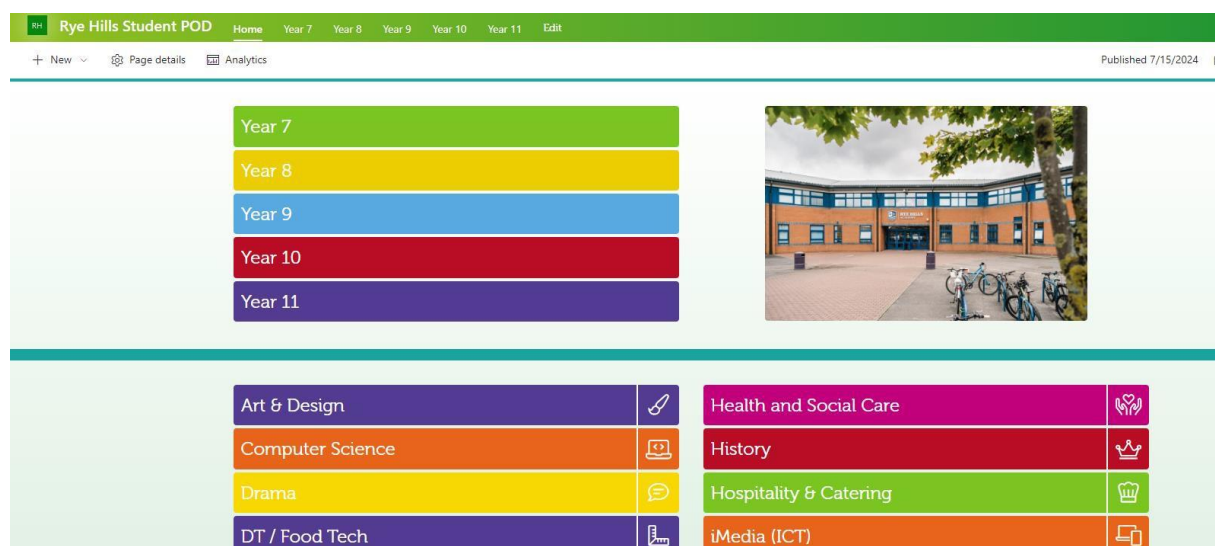
The Student Knowledge Organisers for the current half term are embedded into this booklet, alternatively you can access all the Student Knowledge Organisers for the year via each subject page.

This half term we will be hosting an information evening where we will talk about how to support students at home and how to use Student Pod and Knowledge Organisers. We will send more information soon.

Sound like an expert

See the wall display for a larger version

Theist - a person who does believe in the existence of God.

Atheist - a person who does not believe in the existence of God.

Agnostic - a person who believes nothing is known about the existence of God, and therefore can't be sure of God's existence.

Secular – not connected with religion.

Omnipotent – all-powerful.

Omniscient – all-knowing.

Omnibenevolent – all-loving.

- 7%
- 37%
- 50%
- 6%

- ■ Yes - Christian denomination
- ■ Yes - Non-Christian denomination
- ■ No
- ■ Not sure/Don't know/Prefer not to say

Not very/not at all religious — **77%**

Very/fairly religious — **23%**

Why do people believe in God?
- Community
- Forgiveness
- Family
- Hope
- Guidance
- Existence of the universe
- Religious experience

Britain is a multi-faith society because several religions are practised in Britain and everyone is free to practise their faith.

religion
/rɪˈlɪdʒ(ə)n/

Noun
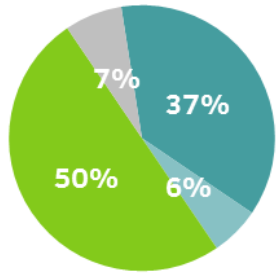The belief in and worship of a superhuman (**deity**) controlling power, especially a personal God or gods.

7 Stages of Faith – A religious philosopher James W. Fowler came up with the idea that through any persons life, they may experience the 7 stages of faith in their life. These 7 stages may lead someone to develop a faith in one of the religions.

1. Stage 0 - develop a sense of trust and safety
2. Stage 1 – patterns of stories
3. Stage 2 – understanding right from wrong
4. Stage 3 – respecting and conforming to authority
5. Stage 4 – responsibility
6. Stage 5 – questions about how the world exists and works
7. Stage 6 – a sense of community for everyone

Humanism – a belief system that does not believe in God due to a lack of evidence. Humanism values everyone's individuality and recognises there is no one ultimate meaning to life. They also look to science to gain truth about how the universe came to exist as it is.

Knowledge Organiser - E-Safety - Cyber Bullying

Cyberbullying is when a person, or a group of people, use the internet, mobile phones or other digital technologies to threaten, tease or abuse someone.

Types of cyber bullying

- **EMAIL:** Sending threatening emails or intimidating someone
- **SOCIAL NETWORKING SITES:** Posting hurtful comments on someone's profile, faking profiles
- **CHAT**: Saying nasty things in chat and instant messaging
- **GAMING:** Ganging up on another player or excluding them
- **PHONES:** Making prank calls, nasty texts and photo messages
- **WEBCAMS:** Making people do things on webcams that upset them
- **FORUMS AND MESSAGE BOARDS:** Ganging up on someone, excluding someone, making hurtful comments
- **EMAIL:** Sending threatening emails or intimidating someone
- **SOCIAL NETWORKING SITES:** Posting hurtful comments on someone's profile, faking profiles
- **CHAT**: Saying nasty things in chat and instant messaging
- **GAMING:** Ganging up on another player or excluding them
- **PHONES:** Making prank calls, nasty texts and photo messages
- **WEBCAMS:** Making people do things on webcams that upset them
- **FORUMS AND MESSAGE BOARDS:** Ganging up on someone, excluding someone, making hurtful comments

How to avoid cyber bullying

- **Don't post stuff that is very persona**l – keep information general
- **Think carefully about posting pictures online** – once it's there, anyone can see it or use it
- **Don't share your passwords** – keep your personal information private!
- **It's not a good idea to meet up with anyone you meet online** – you don't really know who they are!
- **Try to think carefully before you write things online** – people can get the wrong end of the stick
- **Respect other people's views** – just because you don't agree with them, it doesn't mean you have to be rude or abusive
- **Understand everyone is unique – everyone is different!**

What you can do

- **Talk to someone you trust** like a **teacher**, or a **parent**. They can help stop or prevent bullying!
- **Report** any cyberbullying, even if it's not happening to you
- **Never** respond as it could make matters worse
- **Save** any bullying messages, posts, pictures or evidence that you receive
- **Make a note** of the dates and times they occurred
- **Keep your passwords private!**
- **Do not post** any personal information online

Have fun… But be safe when using the internet!

CEOP

There is a Click **CEOP button** on the Shotton Hall website in order to provide children and young people with information, advice and a direct reporting route to **CEOP**.

Who can you contact in school

- Pastoral Department
  - Mrs Walshaw
  - Mrs Bridgewater
  - Mrs Heseltine
- Sept Tutors
- Teaching Staff
- Head of Year

Year 7- Developing Skills

Key terminology

Vocal skills

Pitch- how high or low your voice is.

Pace- how quickly or slowly you speak

Pause- how you use pauses in your speech

Volume- how loud or quiet you speak

Accent- the sound of your voice reflecting the region you are form

Tone- how you sound when you speak (sincere, sarcastic, angry, happy etc.)

Movement/interaction

Eye contact (or lack of)- to show character relationships.

Posture – the position you hold your body when standing or sitting.

Proxemics- your awareness of distance between yourself and other actors

Stance- how you balance your weight (lunging, wide, narrow etc)

Gait- The way you walk

Expression

Facial expression- showing your character's thoughts, feelings or emotions by altering the appearance of your face.

Vocal expression- using your vocal skills to convey your character's emotion through their dialogue.

Gesture- non-verbal communication through the movement of your hands or arm. Example: To show that I had done a good job in understanding gestures, my teacher gave my a thumbs up.

Body language- communicating character emotions or feelings through our bodies.

Unit key words

Stimulus- a catalyst used to create something else. I.e- A photograph can be used to create an entire character biography

Tableau(x)- a still image used to depict a moment in time (x=plural)

Reacting- to respond to the action of something else. Example: jumping at a scary moment in a film

Student knowledge Organiser

2D Drawing Techniques

Construction Lines

Use construction lines to plan out your drawing. Construction lines help divide your drawings into smaller chunks. They help you plan the size of each part to keep drawings in the correct scale/ratio. Ensure construction lines are light as they will not form part of your final drawings.

Below is an example of a drawing being built up using construction lines.
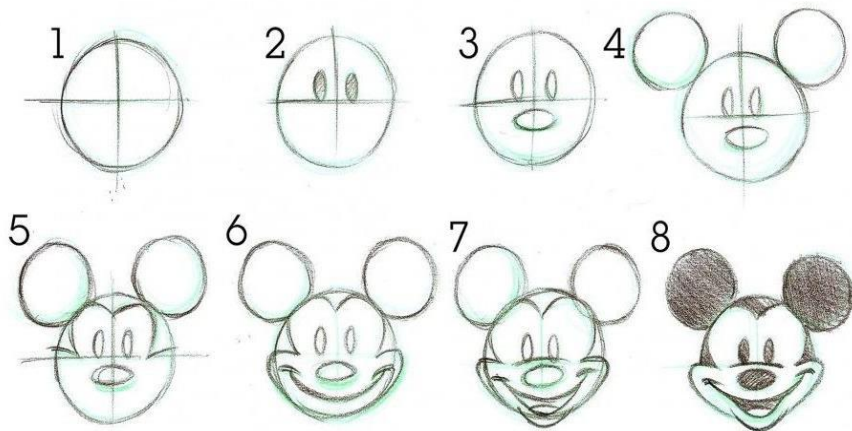
Grid Method

The grid method can be used by drawing a grid around an existing image you wish to duplicate.

Usually, the existing image would be divided into equal sections forming a grid. The grid would be duplicated exactly on a blank piece of paper.
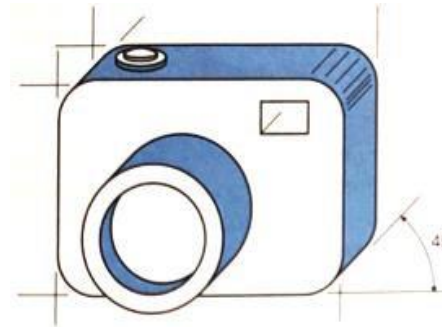
Using the existing image with the grid, copy each smaller section into the new grid.

This method helps break the image down, ensuring the duplication is identical with each part of the image in the exact place.
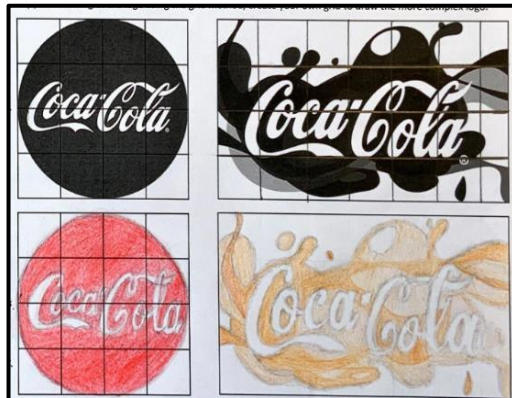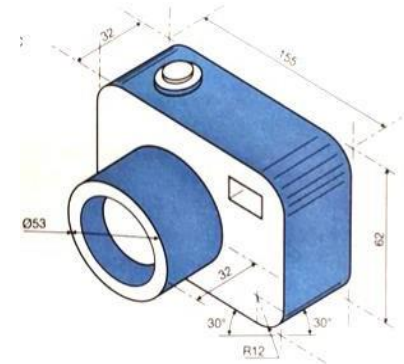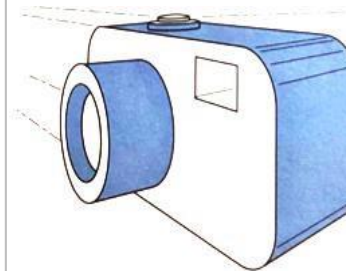
3D Drawing Techniques

Cabinet Oblique

Isometric Projection

Two Point Perspective

Cabinet Oblique: Design is drawn from the front in 2D. 45° lines are drawn to show the depth of the product. This is the quickest and easiest 3D drawing technique.

Isometric Projection: Uses 30° lines (parallel) to show the width and depth of a product. The height is drawn with vertical lines. Much more detailed than Cabinet Oblique and can be a quick drawing technique if practiced.

2 Point Perspective: Uses Vanishing Points. The Width and Depth are drawn towards the vanishing points. 2 point perspective is the most time consuming technique but also the most accurate as it emulates how the human eye would view a product.

Tone

Tone is the various shades of a colour which can be achieved by how heavy we press on a pencil.

We use tone to show how light projects onto an object. This helps demonstrate the 3D qualities of our drawings.
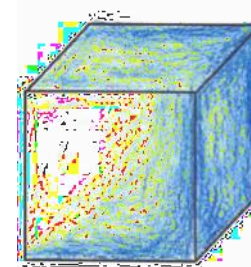
Texture

Adding colour in certain ways can help demonstrate the texture and materials on our designs/drawings.

This, paired with tone, is known as 'rendering'. Rendering is used to bring drawings to life and make them look as realistic as possible.

Brain Spill

Write down as many symptoms of food poisoning you can remember!

CHALLENGE: What are the main causes of food poisoning??

Objective: Food Safety

BUILDING CORE SUBJECT KNOWLEDGE

Developing of core subject knowledge and build understanding for assessment

Why is this a useful thing to do?

LEARNING

To **EXPLAIN** the impact of cross contamination and methods to reduce

So that….

OUTCOME

Student can work in a hygienic and safe manner to create high quality dishes
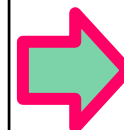
Previous theory lesson
Personal and Kitchen Hygiene

Today's theory lesson
Food safety

Bigger Picture
To develop understanding on how to limit contamination when preparing food products

SKILL UP

Knowledge Organisers FIND ME ON POD FOR REVISION

Important as this means cooking cleanly and safely, so your food is safe to eat. it

- Representing the business
- Clean, neat and tidy
- Long sleeved, white cotton jacket
- Knee length apron
- Sturdy and well fitted shoes, with toe protectors and low heels

Why is it important
- Designed to protect the body, MUST be conformable, portray a professional image, absorb sweat, be a hygiene barrier between the food handler and the food.
- Hat is designed to protect hair from smoke and oil, stop loose hairs from falling into foods

How to wash your hands properly

How to store foods in the fridge

FRIDGE
0-5C
16

Types of contamination

Physical: Hair, jewellery, plasters, glass and plastic
Chemical: Cleaning products, washing up liquid, pesticides
Biological: Bacterial Fungi and Mould

Preventing cross contamination
- Washing hands before and during food preparation
- Washing hands after touching raw meats
- Using colour coded chopping board
- Wearing correct clothing (Apron and Hat)
- Keeping raw foods and cooked foods separate
- Keeping food stored at the correct temperature

FOOD WILL BE SAFE STORED IN THIS WAY:
- Always cover foods
- Keep raw foods and cook foods separate to prevent cross contamination
- Don't over crowd as this will increase the overall temperature of the fridge
- Stock rotate to use old ingredients first

Critical Temperatures

100°C — Bacteria are destroyed
Hot food zone
60°C
Temperature danger zone — Bacteria grow quickly
5°C
Cold food zone
0°C — Bacteria don't grow
Frozen food zone — 18°C

PREVENT CROSS CONTAMINATION
USE CORRECT COLOUR CODED CHOPPING BOARDS & KNIVES
- RAW MEAT
- RAW FISH
- COOKED MEATS
- SALADS & FRUITS
- VEGETABLES
- DAIRY PRODUCTS

If not stored correctly these foods could grow harmful bacteria.

High risk foods are moist and high in protein as this is the food for bacteria

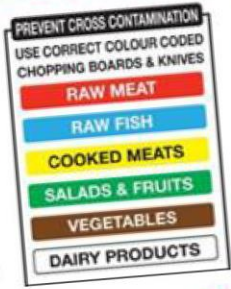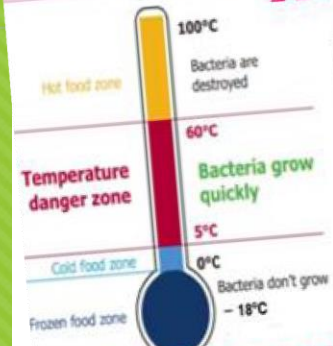## High Risk Foods

High risk foods have a short shelf life

REMEMEBER: raw food isn't classed as a high risk food because you don't eat it raw

4C's of Food Safety
Cleaning, Cross contamination, Cooking and chilling

How to prevent food poisoning?
- Cooking food thoroughly and to the correct temperature
- Wash hands regularly
- Check the dates of food
- Wash surfaces and equipment thoroughly
- Use the correct colour coded equipment

Remember: some symptoms are visible and non visible

Font — Paragraph — Drawing

- **Balanced diet:** A diet that provides a person with the right amount of nutrients for their needs
- **Good Nutrition:** Eating a wide variety of foods that are mostly unprocessed foods
- Drinking plenty of water
- **Nutrients:** Natural chemical substances in foods that are essential for body growth, function and health
- **Eat well guide:** Based on five food groups, size of each section matches government recommendations for a health balanced diet

Remember: You need a WIDE variety of food to gain all necessary nutrients for a balanced diet

Eatwell Guide
Use the Eatwell Guide to help you get a balance of healthier and more sustainable food. It shows how much of what you eat overall should come from each food group.

5 A DAY YOUR WAY

Eat 5 portions of fruits and vegetables a day (must be a variety) to lower the risk of serious health problems, such as heart disease, stroke and some types of cancer.

Nutrition	Function	Food examples
Carbohydrates	The main source of energy	Breads, rice, potatoes, pasta and cereals
Proteins	For growth and repair of cells and 2nd source of energy	Chicken, meats, eggs, fish (tuna) Alternatives: Lentils, baked beans, nuts
Fats	Insulations the body, protects vital organs	Oils and Spreads
Vitamins (A, B, C and D)	Keeps the body healthy (eyes, skin) Releases energy throughout the body	Dark leafy green vegetables, apples, strawberries, tomatoes, apricots
Minerals (Calcium and Iron)	Calcium: Helps to keep bones and teeth strong. Iron: Keeps red blood cells healthy	Calcium: Dairy such as milk, yogurt, soya. Iron: dark leafy vegetables, red meat

Fibre: is not absorbed by the body, it is needed by the body to aid digestion. As it passes through the body and collects all the rubbish and waste

Government Guidelines
- Eat at least 5 portions of a variety of fruit and vegetables every day.
- Base meals on potatoes, bread, rice, pasta or other starchy carbohydrates; choosing wholegrain versions where possible.
- Eat some beans, pulses, fish, eggs, meat and other proteins (including 2 portions of fish every week, one of which should be oily).
- Have some dairy or dairy alternatives (such as soya drinks); choosing lower fat and lower sugar options.
- Choose unsaturated oils and spreads and eat in small amounts.
- Drink 6-8 cups/glasses of fluid a day.
- If consuming foods and drinks high in fat, salt or sugar have these less often and in small amounts.

Too little
- Little or no energy
- Become very tired
- growth affected- could stop all together
- Weakened bones and teeth especially in children and the elderly

Unsatisfactory diet

Too much
- Too much fat, carbohydrates and protein can lead to weight gain
- In extreme cases it can lead to obesity
- Especially in children it could lead too tooth decay

Bacteria

When handling food, there are many areas that contamination can occur. Create a mind map identifying ways that contamination can occur…

Contamination

CHALLENGE: What is cross contamination?

Cross contamination is the transference of bacteria from one food or object to another with harmful effect.

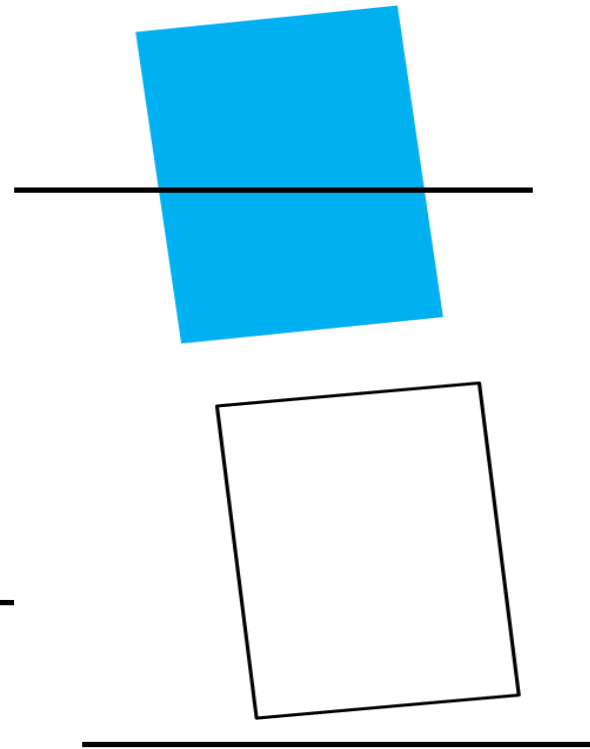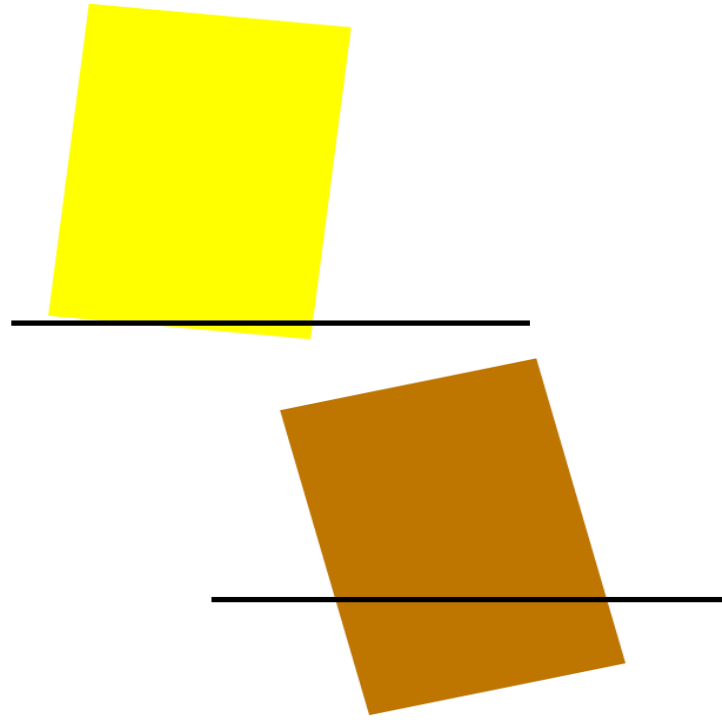## Preventing Cross Contamination

Using colour chopping boards can stop a chef from cross contaminating ingredients and other pieces of equipment. Which food group belongs to which coloured chopping board?

_____

_____

_____

_____

_____

_____

Task 1: Match the temperature to the correct definition

-18°C

75°C

37°C

5°C

63°C

Lowest danger zone temperature range.
Bacteria grows slowly or not at all

Safe reheating and cooking temperature.
Bacteria Destroyed

Highest temperature danger zone range.

Optimum temperature for bacteria to multiply.

The temperature of a freezer.
Bacteria is dormant
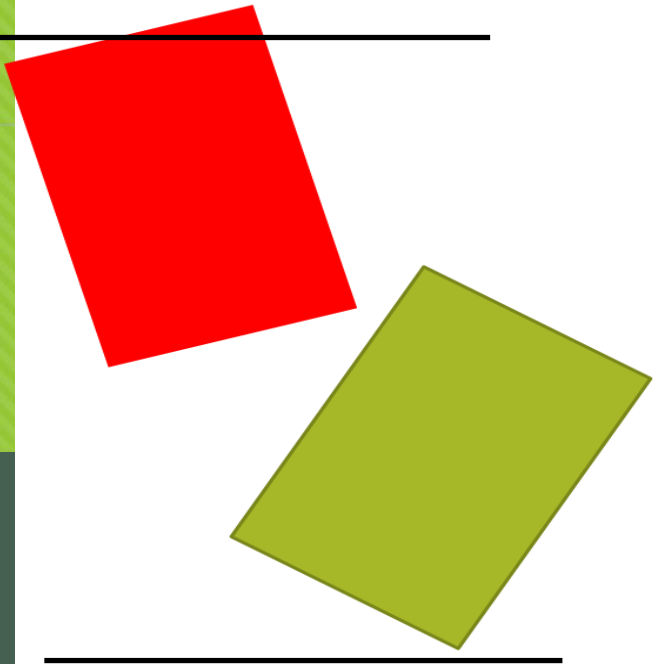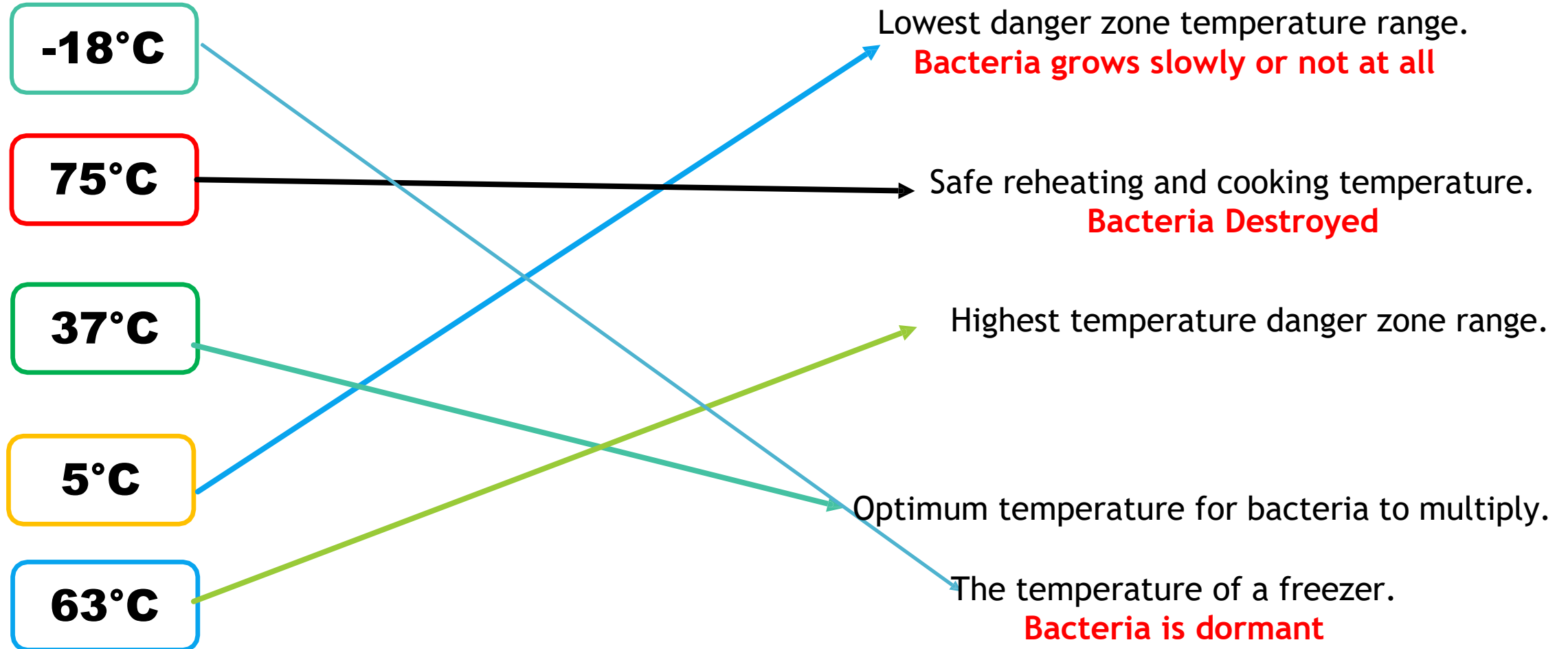
DEMONSTRATE: Critical Temperatures

75°C

Safe reheating and cooking temperature.
Bacteria Destroyed

63°C

Highest temperature danger zone range.

37°C

Optimum temperature for bacteria to multiply.
This is where bacteria is most active!

5°C

Lowest danger zone temperature range.
AND
The temperature of the fridge
Bacteria grows slowly or not at all

-18°C

The temperature of a freezer.
Bacteria is dormant, it is there but can not grow

Consolidate

1. What temperature is the danger zone. Explain what is happening to bacteria in that time zone?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Personal Hygiene Factors

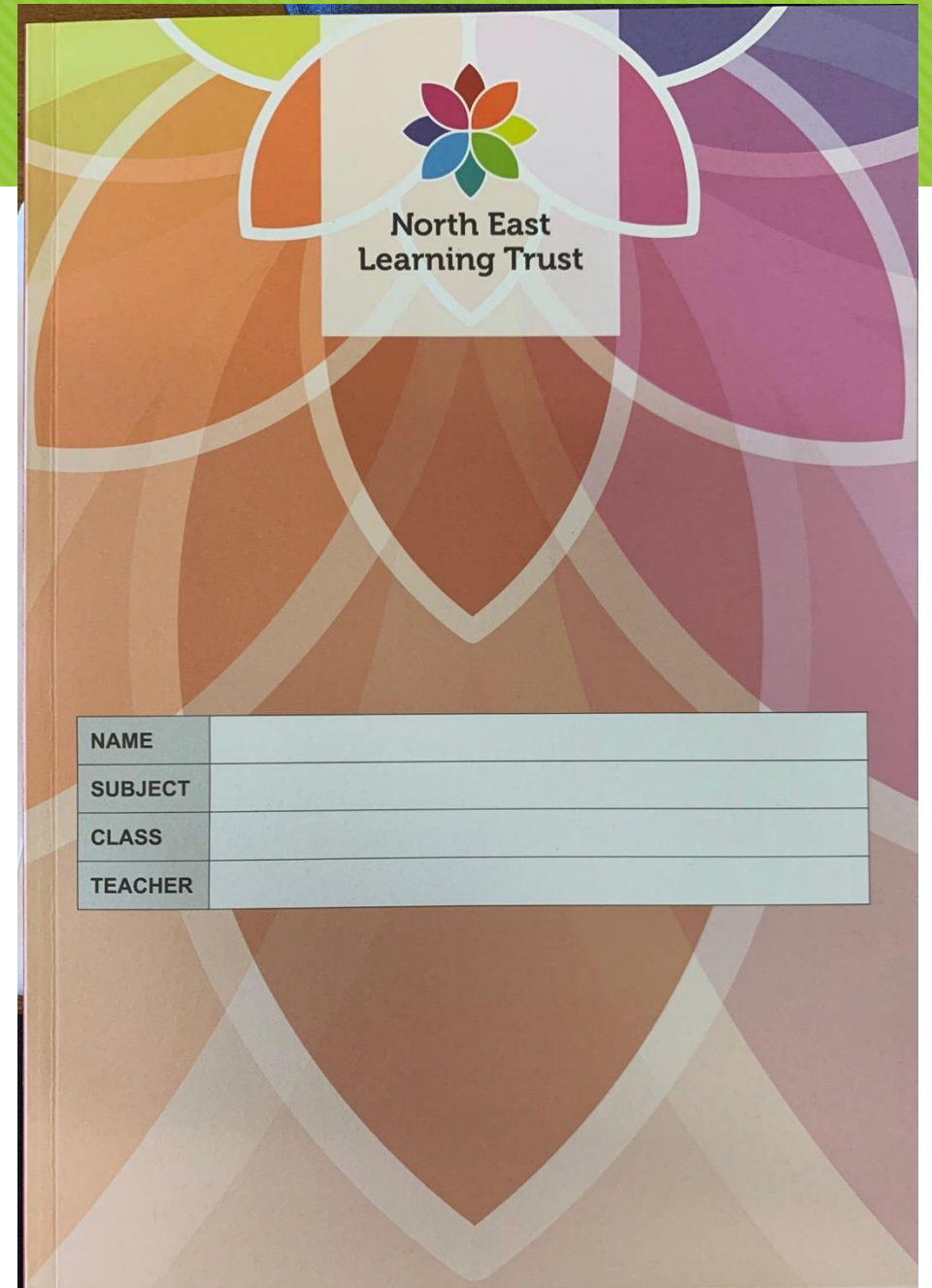Key Stage 3
Year 7

Recipe Book

Expectations
- Always try your best
- Work neatly in this booklet
- Use pens to write
- Use pencils to draw and colour
- Always respond to teachers'

Name:

Group/Teacher:

Date started:

Target	
Assessment	
Final	

North East
Learning Trust

NAME	
SUBJECT	
CLASS	
TEACHER	

Lets get organised

Important as this means cooking cleanly and safely, so your food is safe to eat. it

- Representing the business
- Clean, neat and tidy
- Long sleeved, white cotton jacket
- Knee length apron
- Sturdy and well fitted shoes, with toe protectors and low heels

Why is it important
- Designed to protect the body, .MUST be conformable, portray a professional image, absorb sweat, be a hygiene barrier between the food handler and the food.
- Hat is designed to protect hair from smoke and oil, stop loose hairs from falling into foods

How to wash your hands properly

1 Wet your hands
2 Liquid soap
3 Lather and scrub – 20 sec
4 Rinse – hot
5 Dry your hands
6 Turn off tap

DON'T FORGET TO WASH:
- between your fingers
- under your nails
- the tops of your hands

How to store foods in the fridge

FRIDGE 0-5C

Types of contamination

Physical: Hair, jewellery, plasters, glass and plastic
Chemical: Cleaning products, washing up liquid, pesticides
Biological: Bacterial Fungi and Mould

Preventing cross contamination
- Washing hands before and during food preparation
- Washing hands after touching raw meats
- Using colour coded chopping board
- Wearing correct clothing (Apron and Hat)
- Keeping raw foods and cooked foods separate
- Keeping food stored at the correct temperature

FOOD WILL BE SAFE STORED IN THIS WAY.

- Always cover foods
- Keep raw foods and cook foods separate to prevent cross contamination
- Don't over crowd as this will increase the overall temperature of the fridge
- Stock rotate to use old ingredients first

Critical Temperatures

100°C – Hot food zone – Bacteria are destroyed
60°C
Temperature danger zone – Bacteria grow quickly
5°C – Cold food zone
0°C – Bacteria don't grow
– 18°C – Frozen food zone

PREVENT CROSS CONTAMINATION
USE CORRECT COLOUR CODED CHOPPING BOARDS & KNIVES
- RAW MEAT
- RAW FISH
- COOKED MEATS
- SALADS & FRUITS
- VEGETABLES
- DAIRY PRODUCTS

If not stored correctly these foods could grow harmful bacteria.

High risk foods are moist and high in protein as this is the food for bacteria

4C's of Food Safety
Cleaning, Cross contamination, Cooking and chilling

High risk foods have a short shelf life

High Risk Foods

REMEMEBER: raw food isn't classed as a high risk food because you don't eat it raw

How to prevent food poisoning?
- Cooking food thoroughly and to the correct temperature
- Wash hands regularly
- Check the dates of food
- Wash surfaces and equipment thoroughly
- Use the correct colour coded equipment

Remember: some symptoms are visible and non visible

CHILLS HEARTBURN DIZZINESS NAUSEA

YEAR 7 FOOD SAFETY AND NUTRITION

Word of the week	Meaning	Used in context

CORE KNOWLEDGE

Building core knowledge on food safety and hygiene when handling food.

Why is this a useful thing to do?

Last Lesson	Today's Objectives	The Bigger Picture
	To **JUSTIFY** the importance of personal food hygiene in the kitchen **SO THAT** We can identify key processes to carry out prior to prevent cross contamination	Students can explore and understand key features of food safety and develop an understanding on the importance of handling food safely and correctly

THE WOW
WORD OF THE WEEK

Hygiene

Definition:

conditions or practices to maintaining health and preventing food poisoning, through cleanliness.

Identify ALL the hazards you can see in the image below

Identify ALL the hazards you can see in the image below

Cat on worktop, could lead to hairs in food, that will transfer bacteria to food and the bench.

Challenge: Identify one hazard and explain how you could prevent this from happening?

What is personal hygiene?

CHALLENGE : How is this different to safety?

From the mind map list <u>3 essential personal hygiene rules</u> a chef must follow in the kitchen.

EXTEND: Explain why these are important?

1. …………………

2. …………………

3. …………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

THINKING HARD – Why is it important that a chef wears the correct footwear?

What is food hygiene?

CHALLENGE:
How is this different to safety?

Activate Title: <u>Food Hygiene…</u>

Where and how should we store food?

<u>There are three main storage areas in the kitchen. What are they?</u>

1. _____ 2. _____ 3. _____

- Fresh orange juice
- Dried pasta
- Tinned tomatoes
- Jar of curry sauce
- Frozen pizza
- Onions
- Ice cream
- Raw chicken
- Breaded fish fingers
- Mayonnaise
- Apples
- Crisps
- Butter
- Milk
- Cheese

Demonstrate
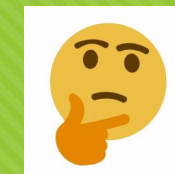
How many hazards can you see in the image???

YOUR FOOD WILL BE SAFE STORED IN THIS WAY.

YOUR FOOD MAY NOT BE SAFE STORED IN THIS WAY.

Consolidate

1) Why do you wear an apron to cook?

2) When would you wash your hands?

3) Why do you wash your hands?

4) Explain why it is important to tie your hair back?

5) What colour plaster would you use if your cut yourself during a practical lesson?

True OR False:

You are allowed to wear fake nails and nail varnish when preparing food?

You are allowed to wear sandles when preparing food?

Year 7 Fantastic Places
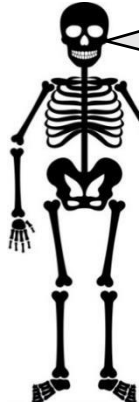
Make sure you know the 'bare bones' of this unit.

Keywords:

- **Continent** – the main land masses on Earth. It is divided into countries that have boarders to separate them
- **Ocean** – large body of water that separate continents
- **Physical Geography** – linked to the natural feature of the world
- **Human Geography** – linked to people and how we live
- **Relief** – height and shape of the land
- **Contour lines** – orange/brown lines on a map showing the relief
- **Longitude** – lines running east and west of the Greenwich Meridian
- **Latitude** – lines running north and south of t he equator
- **Conservation** – protecting resources and landscapes from harm
- **Climate** – the average temperature and precipitation of a location
- **Scale** –difference in distance between different points.

Continents and Oceans

Longitude and Latitude
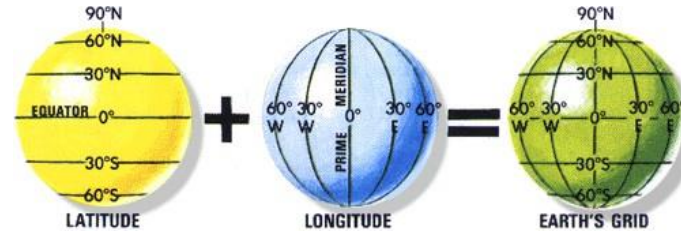
Instructions to find longitude and latitude:
1. Find the **latitude**. Remember to follow the lines that go left to right.
2. Write down the number
3. Is it North or South of the equator? Add this to your number
4. Now look at the **longitude**. Remember these are the lines that go up and down.
5. Write down the number
6. Is East or West of the Greenwich Meridian? Add this to your number
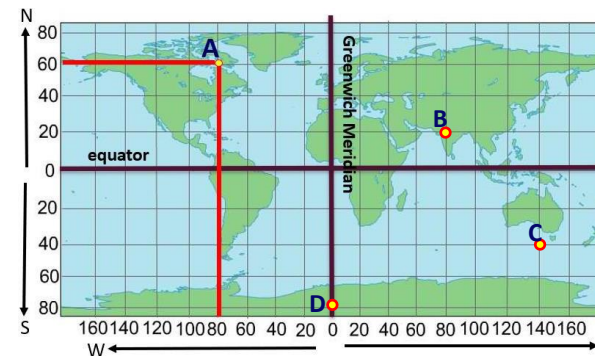
A = 60°N 80°W

Practice Questions:
B =

C =

D =

Geography of the UK
The UK is made up of England, Northern Ireland, Scotland and Wales. Each has its own capital city (shown on the map)

Physical Geography of the UK
- Ben Nevis (the tallest mountain at 1,345m)
- River Severn (longest river)
- Coastlines

Human Geography of the UK
- Towns and cities
- Famous landmarks like Big Ben, Buckingham Palace, The Angel of the North and Blackpool Tower

Antarctica
- It is located in the Southern Hemisphere; it is the most southern continent
- Antarctica does not have a permanent population, instead a there is a scientific research base with up to 4,000 scientific researchers
- Antarctica is one of the coldest places on Earth with ninety-nine percent of it covered by an ice sheet. Average temperatures inland are -57°C and in the summer it can be up to 8°C. It can be classed as a cold desert as it receives less than 250mm of rainfall per year

Treats
- Climate change melting the ice
- Oil leaks from tourist ships
- Tourists scaring wildlife e.g. penguins during mating season

Management
- SSSIs (Sites of Special Scientific Interest) - tourists cannot access the area and cannot disrupt wildlife
- The IAATO (International Association of Antarctic Tour Operators) – Ensure companies look after the environment.

Africa
- Africa is the second biggest continent – remember it is not a country!
- It is the oldest inhabited continent with people living here for 5 million years.
- It has a total of 54 countries; the biggest being Algeria

Physical Geography
Due to the large scale of the continent the climate and ecosystems vary. In the North you have the Sahara Desert and south of this is the semi arid region of the Sahel. In central Africa you have grasslands and along the Congo River Basin you have tropical rainforest.

Human Geography
Many cities in Africa are facing rapid population, Lagos in Nigeria has 21m people living there! There rapid Population growth is resulting in some countries having rapid development and attracting global businesses.
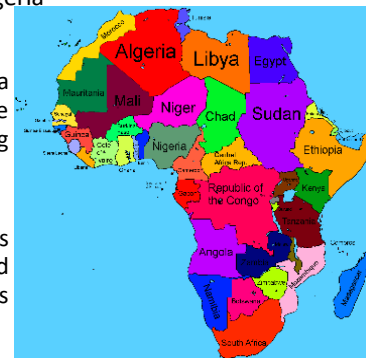
The Great Barrier Reef
The Great Barrier Reef is located off the north eastern coast of Queensland Australia. The reef stretches for 1429 miles.

Importance

- **provide food and livelihoods** for hundreds of millions of people around the world
- Tourism creates jobs – it attracts 1.6 million tourists every year
- protect shorelines from erosion
- Makes up 10% of the worlds coral reef and is home to a range of species

Threats

- Overfishing
- Climate change – warmer oceans are killing off the coral causing it to bleach
- Mining coral for building materials
- Endangered species

The Himalayas
This is a mountain range in Asia. It is found in India, China and Nepal. The worst tallest mountain, Mount Everest, is found here.

Opportunities

- The slopes have forest coverage so there are trees which provide timber
- snow melts providing water to the rivers which settlements use to generate electricity
- attracts lots of mountain climbers and tourists bringing money to the area

Challenges

- Earthquakes and avalanches threaten lives
- cold climate makes staying warm difficult, there are limited energy resources for heating
- mountains make it virtually impossible to build roads making large areas inaccessible.

The Galapagos
They are made up of 19 islands in the Pacific Ocean
They belong to the continent of South America and form part of the country of Ecuador.

Importance

- Around 260,000 people visit the Galapagos Islands each year creating jobs and supporting the economy

Threats

- Tourists can bring foreign animals, plants, seeds and bacteria onto them without knowing.
- Over fishing
- Oil leaks from boats

Conservation
In order to protect the species found on the islands, in 1959 97% of the Islands were declared a national park.
Tourists must follow strict rules when they are there to protect the wildlife and islands for the future. This includes staying 2m from the animals, not using a flash when taking photos, no water sports.

Super Volcanoes – Yellow Stone
Yellow Stone is a National Park located in the USA. Yellowstone has an amazing landscape with deep canyons, rivers, lush forests, hot springs and geysers (blasts of hot spring water due to the heat from within the Earth).

Yellowstone has a super volcano beneath it; this is a huge volcano which would have global impacts if it was to erupt. Luckily, they don't erupt often, and it occurs around every 100,000 years.

Social Impacts – 87,000 could be killed in the area, Two thirds of the USA would be uninhabitable

Economic Impacts - Air travel would be hugely disrupted, causing economic damage, The global economy will be placed under huge pressure and likely collapse due to the damage in the USA

Environmental Impacts - The ash in the atmosphere could lower global temperatures by 10oC for up to 10 years!

Graphic Design

Graphic design is the art of creating visual content, which includes using typography, images, colours, and shapes to communicate messages or ideas. Its ultimate goal is to make information easy to comprehend.
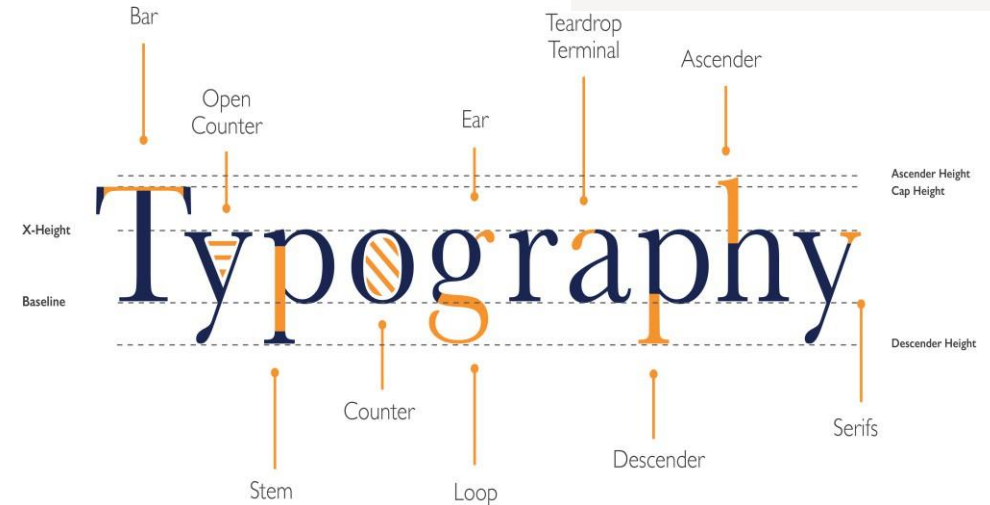
Serif – easy to read, looks traditional.

Sans serif – strong, bold and clear. Modern looking. Often used for titles and headings.

Script – looks more personal, and depending on the styles used, historical. Can be difficult to read.

Decorative – attracts attention, and gives text a particular feel or association. Can be difficult to read. Best used for main titles.

PET	HDPE	PVC	LDPE	PP	PS	OTHER
1	2	3	4	5	6	7
POLYETHYLENE TEREPHTHALATE	HIGH-DENSITY POLYETHYLENE	POLYVINYL CHLORIDE	LOW-DENSITY POLYETHYLENE	POLYPROPYLENE	POLYSTYRENE	OTHER
WATER BOTTLES; JARS; CAPS	SHAMPOO BOTTLES; GROCEY BAGS	CLEANING PRODUCTS; SHEETINGS	BREAD BAGS; PLASTIC FILMS	YOGURT CUPS; STRAWS; HANGERS	TAKE-AWAY AND HARD PACKAGING; TOYS	BABY BOTTLES; NYLON; CDS

drop line   drop shade   drop shadow

make it as bold and thick as you want

imagine the sun is there to more easily add shadows

play with its texture and intensity

add a vanishing point and connect all edges to it

for wave   for TRAPEZE   for JAZZ   for KARATE

Google   McDonald's   adidas   Starbucks   NIKE   Coca-Cola   facebook   amazon

Bar   Teardrop Terminal   Ascender

Open Counter   Ear

Ascender Height / Cap Height

X-Height

Baseline

Descender Height

Counter   Serifs

Stem   Loop   Descender

The Romans

Reasons for Invasion
The Romans had many reasons for invading Britain.
Firstly they wanted revenge on the Britons for helping the Gauls to fight the Romans in Europe. Secondly, they knew that they could turn the Britons and Celts into slaves, to work throughout the Empire in fields or on galleys.
The Romans also wanted the valuable metals in Britain such as lead, tin, silver and gold. Other resources were also important. The Romans knew they could grow a lot of food in Britain as it had fertile land. They also knew that they could produce a lot of wool and leather from the sheep and cows.
In addition there were more personal reasons. Many Romans were ambitious and wanted more power and glory. They thought they could get this through conquering Britain.

Strength of the Army
The Roman army was strong for many reasons.
Equipment- Firstly, the soldiers in the Roman army were very well equipped. They had huge shields, along with the pilum (spear), short sword and body armour.
Tactics- The Romans also had superior tactics to their enemies. They were well drilled in formations. The most famous formation was the tortoise, in which a protective shell was formed by shields to prevent being hit by missiles.
Training- Another strength of the Roman army was the professionalism of the soldiers. Strict and harsh discipline meant that soldiers were obedient over their 25 year service. They also practised combat for long periods of the day, making them very fit.

Hadrian's Wall
Emperor Hadrian needed to defend the northern edge of the Empire from barbarians. So in the year AD122 he visited Britannia and ordered that a wall be built spanning from the west coast all the way to the east coast of the island.

Every mile there was to be a mile-castle built. Extra protection was also provided by the ditch dug just in-front of the wall.

The wall was 15 foot high and took 5000 skilled soldiers to build it.

The Romans also built forts along the wall. These could garrison soldiers. This meant that if a section of the wall was attacked, that the Romans could quickly respond.

Water, hygiene, fitness and medicine
Rome needed a huge water supply in order for them to have the sewerage system, public baths and have drinking water. The Romans built huge aqueducts in order to transport water from miles away into the city.
The Romans tried to be as hygienic as possible. They had public baths and would also train in the gym to keep fit. Slaves would use stirgils to scrape dirt, sweat and oil off people's skin. Hospitals were not widely used, with most treatment only taking place with the army. However, Galen's ideas on medicine were popular. He stated that the body was made up of 4 humours (liquids) and it was imbalance in these liquids which made people ill. This led to his 'theory of the opposites', in which he stated you could get rid of a cold through eating a hot chilli, or get rid of a high temperature through eating a cucumber.

Towns
The Romans built many towns in Britain, the key towns being Colchester and London. It was safer for Romans to stick together, rather than risk being attacked on their own. Towns usually had a garrison and a fort nearby.
The towns were organised like a chessboard, divided into different blocks.
Roman towns had many key buildings. These included the temple (where people made offerings to the Gods), the forum (the market place area where important meetings were held) and the bath houses (were Romans took part in leisure activities, socialised and washed).
Roman towns also had public latrines and sometimes underground sewers!
Most people lived in apartments known as 'insulae' above shops. These were dangerous as were often made from wood.
Cats were used to chase away rats, while dogs were also kept tot help protect the family.

Time to leave
From 408AD Roman military units began to withdraw from Britain. They had many reasons for doing so.
Firstly, most Romans did not like living in Britain. The cold and wet weather was unlike most of the Roman Empire and so the Romans did not like the conditions.
The Romans were also increasingly short of money. This meant the cost of fighting to hold on to Britain was deemed not worthwhile.
Rome also had bigger issues than holding onto Britain. The Roman army had been split in two, and the Romans in Britain could not rely on support coming from other areas of the Empire.
However, the biggest issue for Rome was that the Empire was being attacked on all sides. Barbarians even managed to enter Rome and sack the city. With so many enemies and a Saxon army ready to invade Britain, it was decided that the Romans should leave Britain in order to help defend land much closer to Rome.

Knowledge Organisers and Practice questions

North East
Learning Trust

Key words and definitions

Odd numbers– a number ending in 1, 3, 5, 7 or 9, can not be divided by 2

Even numbers – a number ending in 2, 4, 6, 8 or 0, can be divided by 2

Prime numbers – a number that can only be divided by 1 and itself

Square numbers– multiply by itself, e.g. 2 x 2 = 4 written as 2^2

Cube numbers – multiply by itself 3 times e.g. 2 x 2 x 2 = 8 written as 2^3

Factors – numbers which divide into another number with no remainder

Multiples – answers to times tables

Multiplication and division

Answer: 3224

Answer: 28·8

North East Learning Trust

Types of numbers

Here are a list of numbers
23, 24, 27, 28, 31, 33, 34, 35

a)   List the prime numbers   23, 31
Can only be divided by 1 and itself, 24, 28, 34 can be divided by 2, 27 and 33 are in the 3 times table (and others), 35 is in the 5 times table

b)   Find the cube number   27
1 x 1 x 1 = 1, 2 x 2 x 2 = 8, 3 x 3 x 3 = 27

BIDMAS – Order of operation

B	Brackets	10 × (4 + 2) = 10 × 6 = 60
I	Indices	$5 + 2^2 = 5 + 4 = 9$
D	Division	10 + 6 ÷ 2 = 10 + 3 = 13
M	Multiplication	10 - 4 × 2 = 10 - 8 = 2
A	Addition	10 × 4 + 7 = 40 + 7 = 47
S	Subtraction	10 + 2 - 3 = 5 - 3 = 2

Using a given number fact

Given that 37 x 432 = 15984

3.7 x 4.32 = 19.984
3.7 is 10 times smaller than 37, 4.32 is 100 times smaller than 432. So the answer is 1000 times smaller than 15984

159.84 ÷ 43.2 = 3.7   Rearrange original 15984 ÷ 432 = 37
159.84 is 100 smaller than 15984, 43.2 is 10 times smaller than 432. So the answer is 10 times smaller than 37

Addition and subtraction

Negative numbers - directed

	SAME SIGNS - POSITIVE
+ + = + 3 + + 4 = + 7 - 2 + + 8 = + 6	- - = + 3 - - 4 = + 7 - 2 - - 8 = + 6
+ - = - 3 + - 4 = - 1 - 2 + - 8 = - 10	- + = - 3 - + 4 = - 1 - 2 - + 8 = - 10

Hegarty Maths Skills Links

Addition and Subtraction	9, 18, 19, 20, 40, 41, 47
Multiplication and division	6, 10, 11, 21, 22, 23, 48, 49, 50, 144, 145
Order of operations	24, 44, 120, 150
Negative numbers	37, 38, 39, 40 ,41, 42, 43, 44

Addition and subtraction

1) 34 + 57

2) 237 + 645

3) 64 − 37

4) 234 − 148

5) 2.3 + 5.7

6) 5.9 − 3. 6

7) 2.45 + 4.6

8) 10 − 3.29

Multiplication and division

1) 6 x 7

2) 3 x 17

3) 234 x 27

4) 2.4 x 3.57

5) 28 ÷ 7

6) 5096 ÷ 14

7) 9310 ÷ 15

8) 1.24 ÷ 0.4

BIDMAS

1) 3 x 4 + 5

2) 4 + 8 x 3^2

3) $(5 + 2)^2$ x 2

4) 12 − 15 + 7

5) 5 x 21 ÷ 3

6) (4 + 2) ÷ (10 − 7)

Using a given number fact

Given that 49 x 253 = 12397

1) 4.9 x 25.3

2) 490 x 2.53

3) 123.97 ÷ 49

4) 1239.7 ÷ 253

5) 50 x 253

Types of number

2 5 8 10 13 14 16 18 64 From the list of numbers find,

1) An odd number   5) Both a cube and square number

2) A multiple of 6   6) A prime number

3) A square number   7) A multiple of 7

4) A cube number   8) Any factors of 16

Negative numbers

1) -3 x –4

2) -6 + -3

3) +18 ÷ -3

4) 6 - -5

Applying knowledge

Neil buys 30 pens, 30 pencils, 30 rulers and 30 pencil cases.

Price list

pens	6 for 82p
pencils	15 for 45p
rulers	10 for £1.25
pencil cases	37p each

What is the total amount of money Neil spends?

The price list shows the normal price of some items in a catalogue.

Normal Price

Bubble bath	£3.00
Shower gel	£2.95
Soap	£2.50
Hand cream	£3.50

There is a special offer.
Joanna can buy any 3 **different** items from the list for a total price of £5

Work out the most money she can save.

North East Learning Trust

Key words and definitions

Factors – numbers which divide into another number with no remainder

Multiples – answers to times tables

Prime factor decomposition – write a number as a product of its prime factors

Rounding – make a number simpler but still close to the original number

Significant figures – the importance of each single digit in a number

Approximate – estimate calculations by rounding each number to 1 significant figure first

Factors and Highest common factor

To find the factors of a number, find all of the numbers that can divide exactly into that number with no remainders
To find the HCF of two or more numbers, find the factors of each number and then find the highest number that appears in both lists

$16 \Rightarrow 1, 2, 4, (8), 16$

$24 \Rightarrow 1, 2, 3, 4, 6, (8), 12, 24$

So the highest common factor of 16 and 24 is 8

North East Learning Trust

Multiples and LCM

To find multiples of a number, list the answers in that ties table.
To find the LCM of two or more numbers, find multiples of each number then loo for the lowest number in each list

Multiples of 3:
0, 3, 6, 9, 12, 15, 18, 21, 24 ...

Multiples of 4:
0, 4, 8, 12, 16, 20, 24, 28 ...

The LCM of 3 and 4 is 12.

Prime factor decomposition

Write these numbers as a *product* of prime factors

12
18
24
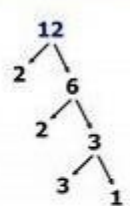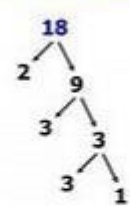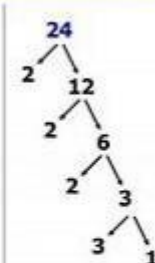
$12 = 2 \times 2 \times 3$ $18 = 2 \times 3 \times 3$ $24 = 2 \times 2 \times 2 \times 3$
$12 = 2^2 \times 3$ $18 = 2 \times 3^2$ $24 = 2^3 \times 3$

Significant figures

Rounding to 1.s.f

$304.2 \approx 300$ $18.97 \approx 20$ $2.47 \approx 2$ $0.3901 \approx 0.4$

Approximate calculations

Round each number to 1 significant figure then calculate

$19 \times 1.73 \approx 40$
20×2

$98.1 \times 41.8 \approx 4000$
100×40

$73.8 \div 4.85 \approx 14$
$70 \div 5 = 14$

$\frac{(82.1 + 17.3)}{(11.4)} \approx 10$
$\frac{80 + 20}{10} = \frac{100}{10}$

$\frac{4.1 \times 6.4}{3.25 + 4.91} \approx 3$
$\frac{4 \times 6}{3 + 5} = \frac{24}{8}$

$\frac{22.03 \times 38.4}{0.179} =$

Using a calculator
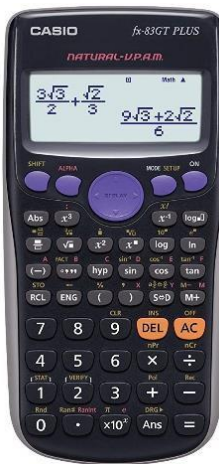
Be familiar with, and be able to use the following keys – this is not an exhaustive list.
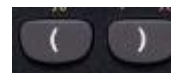
( )   Brackets keys

S⇔D   Change between fraction and decimal form

Fraction key

√☐   Find the square root of a number

x^2 Press to square a number

Hegarty Maths Skills Links

Factors and multiples	27, 31, 32, 33, 34, 35
Significant figures	130
Approximate calculations	131
Using a calculator	129
Product of prime factors	29,30

Types of numbers

Here is a list of 8 numbers.

15   16   17   18   20   22   24   29

(a) Write down a prime number

....

(b) Write down a factor of 30

....

(c) Write down a multiple of 3, which is even.

....

Here is a list of numbers

6   10   11   16   24   30   40

(a) Write down a multiple of 20

....

(b) Write down a factor of 12

....

(c) Write down a prime number

....

Product of prime factors

Write 28 as the product of its prime factors.

Write 18 as the product of its prime factors.

Express 36 as a product of its prime factors.

Express 144 as the product of its prime factors.
Write your answer in index form.

Problems

Jenny is organising a barbecue.
There are 30 bread rolls in a pack.
There are 16 sausages in a pack.
She needs **exactly** the same number of bread rolls as sausages.
What is the smallest number of each pack she must buy?
You **must** show all your working.

Tom, Sam and Matt are counting drum beats.
        Tom hits a snare drum every 2 beats.
Sam hits a kettle drum every 5 beats.
Matt hits a bass drum every 8 beats.
        Tom, Sam and Matt start by hitting their drums at the same time.
How many beats is it before Tom, Sam and Matt **next** hit their drums at the **same** time?

Polly Parrot squawks every 12 seconds.
Mr Toad croaks every 21 seconds.
They both make a noise at the same time.
After how many seconds will they next make a noise at the same time?

Year 7 Topic 3 Charts and Averages Student Knowledge Organiser

Key words and definitions

Primary data – data collected first hand, in a survey or experiment

Secondary data – data collected by someone else

Discrete – can only take certain values, usually something you can count

Continuous – data that can be measured, can take any value

Average – a typical value for some data, see mean, mode and median

Distribution – how data is spread out, takes account of average & range

Averages

Mode
Most common

Mean
Sum of values
Number of values

Median
Middle value
in ascending order

Average	Advantages	Disadvantages
Mean	Every value makes a difference	Affected by extreme values
Median	Not affected by extreme values	May not change if a data value changes
Mode	Easy to find. Not affected by extreme values. Can be non-numerical	There may not be one. There may be more than one.

Tally Charts and bar charts

Complete a tally chart for the most popular colour of car
Red, blue, red, green, red, purple, red, green, red, purple, green, blue, red, green, blue, red, red, red

Colour	Tally	Frequency
Red	� IIII	9
Blue	III	3
Green	IIII	4
Purple	II	2

Favourite Colour of Car
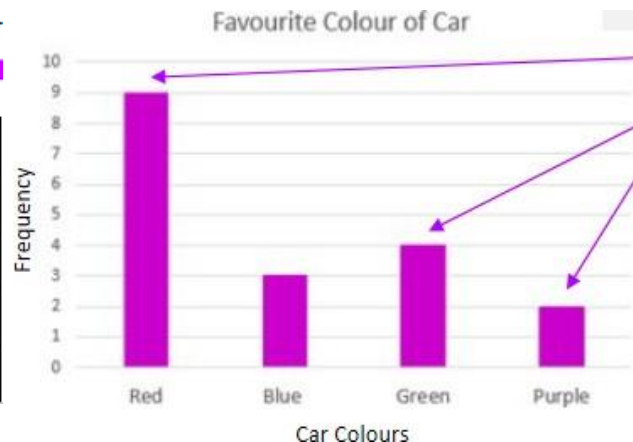
The number of red, blue, green and purple cars is the frequency (height of the bars).

IMPORTANT

The bars are the SAME width

The gaps between the bars are the SAME width

Both axes are labelled

The graph has a title

Frequency starts at 0

Range

Range
Largest value – smallest value

Pie chart

1	Sum (add up) the frequency	
2	360° ÷ frequency	
	360° ÷ 72 = 5	
3	Multiply each category x5 to find sector size	

Fish	Frequency	
Perch	10	x 5 = 50°
Bream	23	x 5 = 115°
Carp	39	x 5 = 195°
TOTAL	72	360°

360° ÷ 72 = 5

Draw an accurate pie chart to show this information.
This table give information about then number of fish in a lake.

Perch 50°
Bream 115°
Carp 195°

Scatter graphs

Positive Correlation   **Negative Correlation**   **No Correlation**
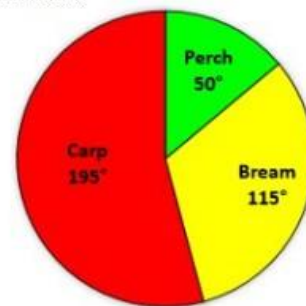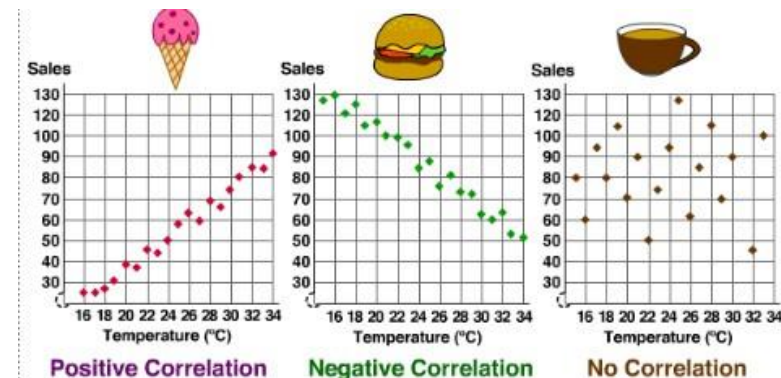
Hegarty Maths Skills Links

Averages	404, 405, 406, 407, 408, 409, 410, 413
Tally and bar charts	401, 425
Scatter graphs	453, 454
Pie charts	427, 428, 429

North East Learning Trust

Averages

1) Here are fifteen numbers.
10 12 13 15 15 17 19 20 20 20 21 25 25 25 25
   a) Find the mode.

   b) Find the median.

   c) Work out the range.

2) A rugby team played 7 games.
Here is the number of points they scored in each game.
3 5 8 9 12 12 16
   a) Find the median.

The rugby team played another game.
They scored 11 points.
   b) Find the median number of points scored in these 8 games.

3) The mean of eight numbers is 41
The mean of two of the numbers is 29
What is the mean of the other six numbers?

North East Learning Trust

Bar Carts

Six students each sat a history test and a geography test.
The marks of five of the students, in each of the tests, were used to draw the bar chart.
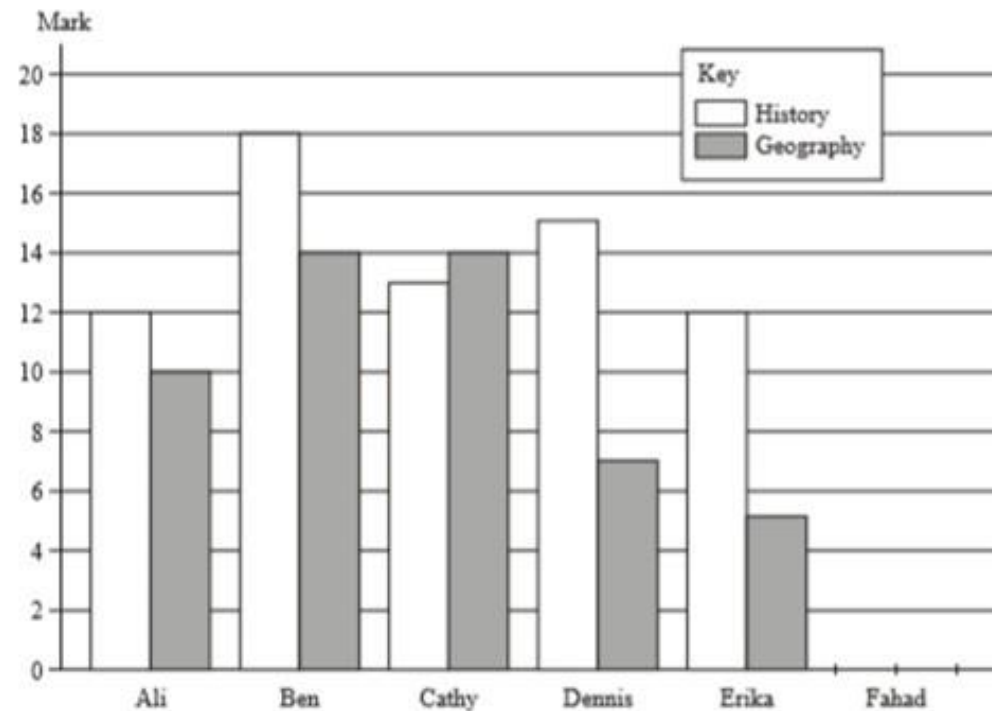
(a) How many marks did Ali get in his history test?

....

(b) How many marks did Dennis get in his geography test?

....

(c) One student got a lower mark in the history test than in the geography test.
Write down the name of this student.

Pie charts

Harry asked each student in his class how they travelled to school that day.
He used the results to draw this pie chart.

How did most of the students travel to school?

Harry asked a total of 24 students.
Work out the number of students who cycled to school.

Scatter Graphs

The scatter graph shows some information about 8 cars.
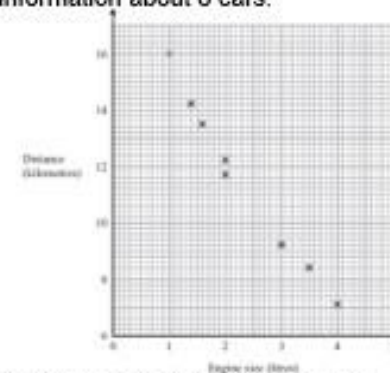
What type of correlation does the scatter graph show?

A car has an engine size of 2.5 litres.
Estimate the distance travelled on one litre.

Key words and definitions

Area – the area of a 2D shapes is the amount of space inside it

Perimeter – the perimeter is the total distance around the outside of a shape

Circumference – the distance around the outside of a circle

Surface area – sum of the areas of all the faces in a 3D shape

Volume – the amount of 3D space occupied by an object

Area and Circumference
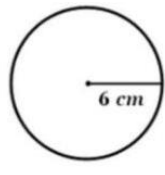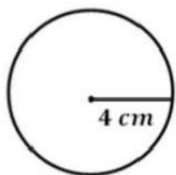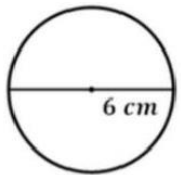
$C = \pi d$
$= 3.142 \times 6 \, cm$
$= 18.85 \, cm$

$C = 2\pi r$
$= 2 \times 3.142 \times 4 \, cm$
$= 25.14 \, cm$

$A = \pi r^2$
$= 3.142 \times 6^2$
$= 3.142 \times 36$
$= 113.11 \, cm^2$

Compound area

The area of this shape ⟶ EQUALS ⟶ the area of these two
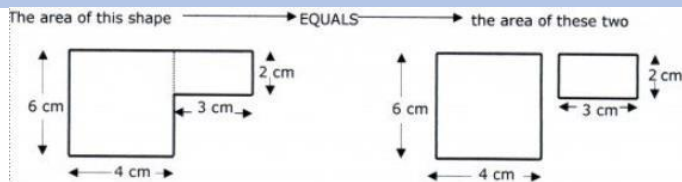
The area of this shape $= (6 \times 4) + (2 \times 3)$
$= 24 + 6$
$= 30 \, cm^2$

North East Learning Trust

Area

SQUARE	
$A = Length^2$	Length, length
RECTANGLE	
$A = Length \times width$	width, length
TRIANGLE	
$A = \frac{1}{2}$ Base x height*	height, base
TRAPEIZUM	
$A = \frac{1}{2}(a + b) \times height*$	a, height, b
PARALLELOGRAM	
$A = Base \times height*$	height, base

Perimeter

10cm

5cm

Add the sides
10 + 10 + 5 + 5
= 30cm

Volume of a cuboid

What is the volume of this cuboid?
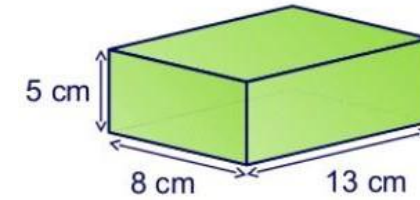
Volume of cuboid
= length × width × height
= 5 × 8 × 13
= **520 cm³**

5 cm, 8 cm, 13 cm

Surface area of a cuboid

We can find the formula for the surface area of a cuboid as follows.
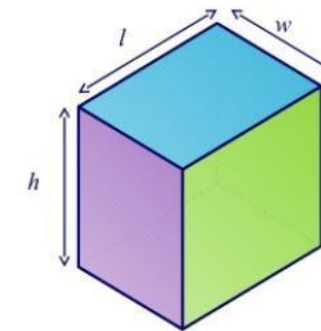
Surface area of a cuboid =

$2 \times lw$	Top and bottom
$+ 2 \times hw$	Front and back
$+ 2 \times lh$	Left and right side

$= 2lw + 2hw + 2lh$

Hegarty Maths Links

Area	553, 554, 555, 556, 557, 558
Perimeter	548, 549, 550, 551, 552
Circles	534, 535, 536, 537, 538, 539, 540,541, 542, 543
Volume	567,568
Surface area	584, 590

Area and perimeter

Calculate the area and perimeter of the following shapes:

1)

8 cm

5 cm

2)

5 cm

3 cm

4 cm
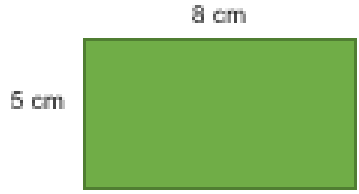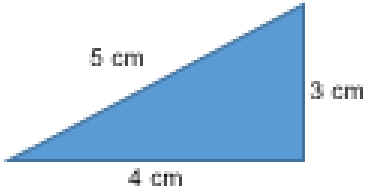
Calculate the area of the following shapes:

3)

6 cm

4 cm

10 cm

North East Learning Trust
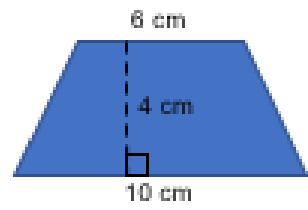
Circles

Calculate the area and circumference of the following shapes:
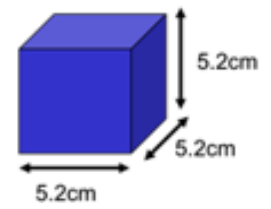
1)

7cm

2)
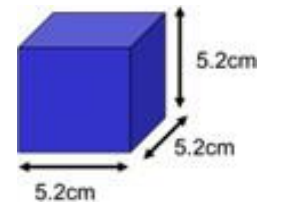
9 cm

Surface Area

1) How many vertices does a cube have?

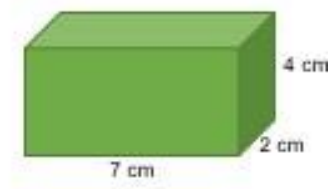2) Draw the net of a cube
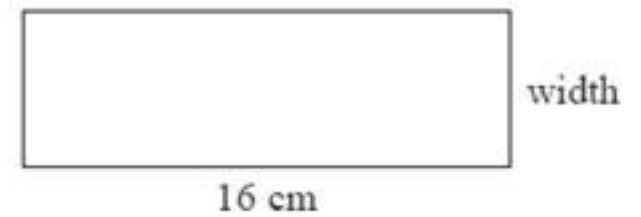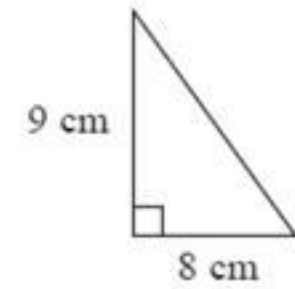
3) Calculate the surface area of the following:

5.2cm

5.2cm

5.2cm

Volume

Calculate the volume of the following

4 cm

2 cm

7 cm

5.2cm

5.2cm

5.2cm

Problem Solving

Here are a triangle and a rectangle.

9 cm

8 cm

16 cm

width

The area of the rectangle is 6 times the area of the triangle.

Work out the width of the rectangle.

Key words and definitions

Fraction – represents part(s) of a whole

Percentage – how many parts per hundred

Equivalent – equal in value

Improper – a fraction where the numerator (top number) is larger than the denominator (bottom number)

Finding a fraction of an amount
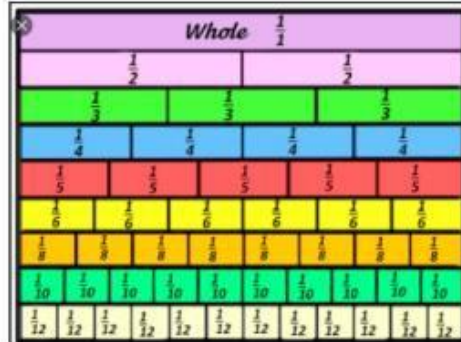
When we work out a fraction of an amount we

> **multiply by the numerator**
> **and**
> **divide by the denominator**

For example,

$\frac{2}{3}$ of 18 litres = 18 litres ÷ 3 × 2

= 6 litres × 2

= 12 litres

Equivalent fractions

Represent equivalence with fraction walls

Calculating with fractions

Add	$\frac{1}{2} + \frac{1}{3} = \frac{1\times3}{2\times3} + \frac{1\times2}{3\times2} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$	**6** is the lowest common denominator for 2 and 3
Subtract	$\frac{7}{8} - \frac{1}{3} = \frac{7\times3}{8\times3} - \frac{1\times8}{3\times8} = \frac{21}{24} - \frac{8}{24} = \frac{13}{24}$	**24** is the lowest common denominator for 8 and 3
Multiply	$\frac{3}{4} \times \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$	Multiply the numerators, multiply the denominators and the then simplify if possible
Divide	$\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times \frac{3}{1} = \frac{3}{2} = 1\frac{1}{2}$	Turn the 2nd fraction over (reciprocal) and change the sign to multiplication

Improper fractions and mixed numbers

$\frac{14}{3}$ How many 3's fit into 14? $4\frac{2}{3}$	$7\frac{2}{5}$ (5 x 7) + 2 = $\frac{37}{5}$

Equivalent fractions

$\frac{6}{48}$ ÷2 → $\frac{3}{24}$ ÷3 → $\frac{1}{8}$

÷2 ... ÷3

Hegarty Maths Skills Links

Fraction, decimal, percentages	73, 74, 75, 76
Equivalent fractions	59, 60, 61, 62
4 operations with fractions	65, 66, 67, 68, 69, 70, 71, 72
Fraction of an amount	77, 78
Improper fractions/mixed numbers	63, 64
Percentage of an amount	84, 85, 86

North East Learning Trust

Simplifying Fractions

Simply fully:

1) $\frac{10}{12}$

2) $\frac{25}{50}$

3) $\frac{120}{300}$

4) $2\frac{12}{30}$

Improper Fractions and Mixed Numbers

Write as an improper fraction:

1) $1\frac{2}{5}$

2) $5\frac{4}{9}$

3) $11\frac{7}{10}$

4) $6\frac{5}{8}$

Write as a mixed number:

1) $\frac{12}{5}$

2) $\frac{45}{11}$

3) $\frac{90}{4}$

Calculating with fractions

Calculate and simplify:

1) $\frac{4}{5} \times \frac{3}{10}$

2) $\frac{6}{7} \times \frac{5}{6}$

3) $\frac{5}{6} \times \frac{10}{11}$

4) $\frac{4}{9} \times \frac{3}{5}$

5) $\frac{4}{5} \div \frac{2}{3}$

6) $\frac{2}{3} \div \frac{4}{5}$

7) $\frac{1}{6} \div \frac{2}{3}$

8) $\frac{10}{11} \div \frac{5}{7}$

9) $\frac{2}{3} + \frac{1}{8}$

10) $\frac{4}{5} - \frac{1}{3}$

11) $\frac{5}{9} - \frac{4}{11}$

12) $\frac{1}{5} + \frac{6}{11}$

Fractions of an Amount

1) Find $\frac{3}{4}$ of £80

2) Find $\frac{2}{5}$ of £24

3) Find $\frac{3}{10}$ of 70 litres

4) Find $\frac{9}{10}$ of 12 kg

Problem Solving

Danny shares a bag of 20 sweets with his friends.

He gives Mary $\frac{3}{5}$ of the sweets.

He gives Ann $\frac{1}{10}$ of the sweets.

He keeps the rest for himself.

How many sweets does Danny keep for himself?

A school has 1200 pupils.
575 of these pupils are girls.

$\frac{2}{5}$ of the girls like sport.

$\frac{3}{5}$ of the boys like sport.

Work out the total number of pupils in the school who like sport.

North East Learning Trust

Year 7 Expressions Student Knowledge Organiser

Key words and definitions

Expression – numbers, symbols and operators grouped together

Term – number or variable or numbers and variables multiplied together

Equation – a mathematical statement that shows two things are equal

Expand – multiply to remove brackets

Factorise – the reverse of expanding, taking out a common factors

Substitution – putting numbers in place of letters

Simplify – collect like terms

Simplifying expressions

Simplifying

$3e + 6r - e + 5t$

$2e + 11t$

If there is **no sign** in front of the term,
it is *POSITIVE*

Substitution

Evaluate 3a - 2b, for a = 10 and b = 4

$$3a - 2b \quad (a = 10 \quad b = 4)$$

$$= 3(10) - 2(4)$$

$$= 30 \quad - \quad 8$$

$$= \quad 22 \checkmark$$

Expand a single bracket

Expanding single brackets

$3 (x + 2)$

$3x + 6$

Common misconceptions

$3 (x + 2)$

$3x + 5$ ✗   This is incorrect

The last term has been **added INSTEAD of multiplying.**

Solve simple equations

Balancing method	Function machine method
8a - 5 = 11	8a - 5 = 11
+5 +5	a →×8 → -5 → 11
8a = 16	2 ← ÷8 ← +5 ← 11
÷8 ÷8	a = 2
a = 2	

Factorising

$$4x + 16$$

4 is a factor of both 4 and 16.

$$4(x+4)$$

Hegarty Maths Links

Expression – 156, 157, 158, 159

Expand – 160, 161

Factorise – 167, 168, 169, 170, 171

Substitution – 780, 781, 782, 783, 784

North East Learning Trust

Simplifying

a) $3x + 6y - 4y + 2x$

b) $y + y$

c) $3p \times 5q$

d) $p \times p \times p \times p$

Expanding

1) $3(a + 4)$

2) $5(c + 6b)$

3) $4(x - 3y)$

4) $a(a + 5)$

5) $x(4y - 2x)$

Factorising

1) $3x + 33$

2) $5y + 25$

3) $4a - 18$

4) $x^2 + 4x$

Substituting

1) Find $3x + 5y$ when $x = 4$ and $y = 2$

2) Find abc when $a = 2$, $b = 3$ and $c = 5$

3) Find $7s - 2t$ when $s = 4$ and $t = -3$

4) Find $4(2n - 3)$ when $n = 5$

Expanding and simplifying

1) $4(2x + 3y) + 2(x + 2y)$

2) $5(a + 3b) - 3(a - b)$

3) $4(x + 4) - 2x(x + 5)$

Writing expressions

My age is C, write expressions for the ages of the members of my family if:

a) My brother is 3 years older than me

b) My sister is 2 years younger than me

c) My mum is double my age

Write an **expression** for the **area** of the rectangle.
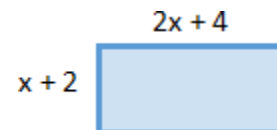
2x + 4

x + 2

North East Learning Trust

Key words and definitions

Fraction – represents part(s) of a whole

Percentage – how many parts per hundred

Equivalent – equal in value

Improper – a fraction where the numerator (top number) is larger than the denominator (bottom number)

Fraction, decimal and percentage equivalence

Fractions	Decimals	Percentages
$\frac{1}{5}$	0.2	20%
$\frac{3}{4}$	0.75	75%
$\frac{1}{8}$	0.125	12.5%
$\frac{1}{2}$	0.5	50%

Improper fractions and mixed numbers

Improper to mixed number & visa versa

$\frac{14}{3}$ How many 3's fit into 14? $4\frac{2}{3}$

$7\frac{2}{5}$ $(5 \times 7) + 2 = \frac{37}{5}$

on a calculator

39% of 82 ⟹ Change to a decimal and multiply

0.39 × 82

fraction to %

×5

$\frac{15}{20} = \frac{75}{100}$ = 75%

×5

OR

15 ÷ 20 × 100 = 75%

Percentages

%

without a calculator

50% - half   10% - divide by 10

25% - half and half   5% - half 10%

75% - 50% + 25%   20% - double 10%

increasing

Increase £60 by 12%

12% of 60 = 0.12 × 60 = £7.20

New amount = £60 + £7.20
= £67.20

ADD

decreasing

decrease £60 by 12%

12% of 60 = 0.12 × 60 = £7.20

New amount = £60 - £7.20
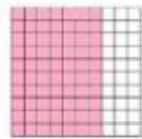= £52.80

SUBTRACT

Convert FDP

$\frac{70}{100}$ → This also means 70 ÷ 100 → 70 out of 100 squares 70 "hundredths" = 7 "tenths" 0.7 → 70 hundredths = 70%

Using a calculator

$\frac{\blacksquare}{\square}$ → S⊐D Convert to a decimal

This will give you the answer in the simplest form

× 100 converts to a percentage

Be careful of recurring decimals

eg $\frac{1}{3}$ = 0.3333333

= 0.$\dot{3}$

The dot above the 3

Hegarty Maths Skills Links

Equivalent fractions

1) Complete the table below.

Fraction	Decimal	Percentage
½		
	0.6	
		15%
¼		

2) Would you rather have ¾, 70% or 0.72 of a pizza? Why?

Here are four numbers.

$$0.43 \qquad \frac{3}{7} \qquad 43.8\% \qquad \frac{7}{16}$$

Write these numbers in order of size.

Start with the smallest number.

North East
Learning Trust

Percentage of an amount

1) Calculate 40% of 600 ml.

2) Calculate 67% of £120.

3) Bobby went to the shop and there was a 20% sale. He was going to buy a top for £24. How much does he save?

4) Sarah went to the shop and there was a 15% sale. She was going to buy a CD for £8. How much does she save?

Problem Solving

Shafira had collected £720 in a sponsored event.

She gave $\frac{1}{2}$ of the amount collected to her local youth club.

She gave 40% of the amount collected to a children's hospital.

She gave the rest of the money to a mountain rescue group.

How much money did Shafira give to the mountain rescue group?

What percentage of the £720 did Shafira give to the mountain rescue group?

Key words and definitions

Ratio – Measuring how two quantities compare to each other in size

Proportion – comparing two or more things against the whole

Bar model – a pictorial representation of a number to help understanding

Simplify – reduce to its simplest terms

Highest common factor – the highest number that can be divided exactly in to two or more numbers

Simplify ratio

Ratios can be fully **simplified** just like fractions.

To simplify a ratio, divide all of the numbers in the ratio by the same number (**highest common factor**) until they cannot be divided any more.

Simplify: 6 : 12

Divide both by 6

1 : 2

Write in the form 1:n

When asked to write a ratio in the format 1 : n, you need to **divide BOTH sides** by **the ratio where the 1 is.**

Write 7 : 21 in the ratio **1**: n

7 : 21 divide both sides by 7

1 : 3

Share in a given ratio

Monty and Mosaurus get A TOTAL of £72 pocket money.

They share it in the **ratio 5 : 3**

How much do they each get?

- Add the ratios: 3 + 5 = 8
- Divide 72 by 8 (72 ÷ 8 = 9)
Each ONE portion is worth £9

Monty has 5 portions
5 x 9 = £45
Mosaurus has 3 portions
3 x 9 = £27

In a school the ratio of boys to girls is 9 : 4.

There are 270 boys in the school. How many students are there in the school altogether?

Divide the total number of boys by the boy's ratio

270 ÷ 9 = 30

This gives the number for 1 'portion'

Girls
4 x 30 = 120
Total = 270 + 120 = 390

Recipes

A recipe for 6 people uses 900g of mince. How much mince is needed for

a 12 people

P : M

x2 (6 : 900g) x2

12 : 1800g

b 3 people

P : M

÷2 (6 : 900g) ÷2

3 : 450g

c 9 people?

6 people + 3 people = 9 people

900 + 450 = 1350g

Exchange rates

The exchange rate is:
£1 buys $2.12

Find how many dollars ($) can be bought for £1500

(x1500) £1 = $2.12 (x1500)

£1500 =

$ _____

(1)

Maps and scales

6. Each diagram is part of a map. Find the actual distance between the two places for each map. Give your answers in metres.
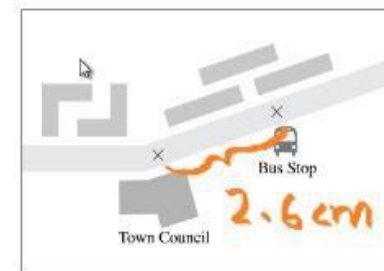
(a) Scale 1 : 12 500

1 cm : 12 500cm
2.6 cm : 32 500 cm) x2.6

if 100 cm is 1m

32 500cm is **325** m

32500

Bus Stop
Town Council
2.6 cm

Bar modelling

sharing a quantity in a given ratio

share £20 in the ratio 3 : 2

£20

| £4 | £4 | £4 | £4 | £4 |

draw bar model showing ratio 3 2 and total length £20
find 1 part is £4
answer is £12 : £8

Hegarty Maths Links

Ratio – 328, 329, 330, 331, 332, 333, 334

Proportion – 339, 340

Recipes – 739, 740, 741, 742

Maps and scales – 864, 865, 866

North East Learning Trust

Simplify ratio

Write the ratio of blue beads to yellow beads for each necklace.
Simplify each ratio if possible. The first one has been started for you.

a

blue : yellow = 4 : 2 = 2 : ☐

b

c

Write each ratio in its simplest form.

a 2 : 20
b 25 : 5
c 4 : 24
d 6 : 30
e 8 : 24
f 6 : 10
g 30 : 25
h 24 : 10
i 16 : 6
j 40 : 15

Write each ratio as a whole number ratio in its simplest form.

a 0.4 : 6
b 3.5 : 4.2
c 45 : 13.5
d 25.6 : 46.4

Discussion What should you multiply by if a number in a ratio has 2 decimal places?

Write each ratio as a whole number ratio in its simplest form.

a 0.25 : 3.1
b 1.4 : 0.28
c 1.62 : 1.8
d 4.8 : 11.2

Which of these ratios are equivalent?

A 36 : 16
B 135 : 60
C 28 : 16
D 126 : 56
E 49 : 28

North East Learning Trust

Recipes

Real A recipe for six people uses four eggs. How many eggs are needed for

a 12 people
b 3 people
c 9 people
d 15 people?

A recipe for 4 people uses 6 eggs. How many eggs are needed for

a 8 people
b 2 people
c 6 people
d 10 people?

Scale

Write these conversions as ratios.

a mm : cm
b cm : m
c km : m
d kg : g
e ml : l
f m : cm

Complete these conversions.

a 9 m = ☐ cm
b 2 cm = ☐ mm
c 7 l = ☐ ml
d 5000 m = ☐ km
e 200 cm = ☐ m
f 30 mm = ☐ cm
g 12000 ml = ☐ l
h 10 cm = ☐ mm
i 100 m = ☐ km

Complete these conversions.

a 3.6 m = ☐ cm
b 2.8 kg = ☐ g
c 3.1 cm = ☐ mm
d 8.9 kg = ☐ g
e 3900 m = ☐ km
f 630 cm = ☐ m
g 84 mm = ☐ cm
h 8600 ml = ☐ l
i 70 m = ☐ cm

Sharing in a given ratio

Share these amounts between Alice and Ben in the ratios given.
Show how you check your answers.

a £21 in the ratio 2 : 1
b £45 in the ratio 2 : 3
c £96 in the ratio 7 : 5
d £28 in the ratio 4 : 3
e £72 in the ratio 3 : 5
f £60 in the ratio 11 : 4

Talil is going to make some concrete mix.
He needs to mix cement, sand and gravel in the ratio 1 : 3 : 5 by weight.
Talil wants to make 180 kg of concrete mix. Talil has

- 15 kg of cement
- 85 kg of sand
- 100 kg of gravel

Does Talil have enough cement, sand and gravel to make the concrete mix?   (4 marks)

Ratio problems

Real Hummingbirds eat nectar made from sugar and water in the ratio 1 : 4. How much water is needed for 3 teaspoons of sugar?

Real A recipe for Thai chicken uses Thai sauce and fresh ginger in the ratio 2 : 1. Anna uses 4 tablespoons of Thai sauce. How much ginger does she use?

Finance / Problem-solving Harry invests some money in low-risk and high-risk investments in the ratio 7 : 3.
He invests £1800 into the high-risk investments.
How much money does he invest altogether?
Discussion Is there more than one way to work out the answer to this question?

Key words and definitions

Equation – a statement that two things are equal, each side of equals sign

Substitution – replacing an unknown with a number

Unknown – a number we do not know, usually shown by a letter

Solve – find the value of a variable that makes an equation true

Expand – multiply out the brackets

Inverse – doing the opposite function

Substitution

Evaluate 3a - 2b, for a = 10 and b = 4

$$3a - 2b \quad (a = 10 \quad b = 4)$$

$$= 3(10) - 2(4)$$

$$= 30 \quad - \quad 8$$

$$= \quad 22 \checkmark$$

Simple equations

Solve the equation $x - 3 = 7$

| $x - 3$ | = | 7 |

Visualise the equation as balanced scales.

| $x - 3 + 3$ | = | $7 + 3$ |

The inverse of –3 is + 3. Do this to both sides to keep the equation balanced.

$x = 7 + 3$
$x = 10$
Check: $x - 3 = 10 - 3 = 7$ ✓

3 term equations

Solve the equation $3a + 7 = 13$

$3a + 7 - 7 = 13 - 7$ — Subtract 7 from both sides.

$a \to \boxed{\times 3} \to \boxed{+7} \to 13$

$3a = 6$

$\frac{3a}{3} = \frac{6}{3}$

$\square \leftarrow \boxed{} \leftarrow \boxed{-7} \leftarrow 13$

$a = 2$

Divide both sides by 3.

$\square \leftarrow \boxed{\div 3} \leftarrow \boxed{-7} \leftarrow 13$

Check: $3a + 7 = 3 \times 2 + 7 = 13$ ✓

Equations with brackets

$$2(4p + 1) = 18 \qquad \{\text{Use Distributive Law}\}$$
$$8p + 2 = 18 \qquad \{\text{Subtract 2 from both sides}\}$$
$$8p + 2 - 2 = 18 - 2$$
$$8p = 16 \qquad \{\text{Divide both sides by 8}\}$$
$$\frac{8p}{8} = \frac{16}{8}$$
$$p = 2$$

Unknown on both sides

Solve $4d + 17 = 8d - 3$

| $4d + 17$ | = | $8d - 3$ |

$-4d$ ... $-4d$

Visualise the equation as balanced scales. Subtract $4d$ from both sides.

$17 = 4d - 3$

$17 + 3 = 4d - 3 + 3$ — The inverse of –3 is + 3. Do this to both sides.

$20 = 4d$ — Divide both sides by 4.

$5 = d$

$d = 5$

Check: LHS = $4d + 17 = 4 \times 5 + 17 = 37$
RHS = $8d - 3 = 8 \times 5 - 3 = 37$ ✓

Forming and solving equations

PQR is a triangle. Form and solve an equation to find the value of y.
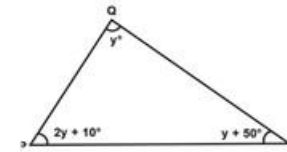
What do the angles in a triangle add up to?

180

How can we write an equation for this?

$2y + 10 + y + y + 50 = 180$

Can we collect like terms?

$4y + 60 = 180$
$4y = 120$
$y = 30$

Hegarty Maths Links

Solve equations – 177, 178, 179, 180, 181, 182, 183

Solve unknowns on both sides – 184, 185, 186

Set up and solve – 176, 188

North East Learning Trust

Simple equations

Solve

a $a + 3 = 4$

b $c - 6 = 4$

c $15 = g + 4$

d $21 + h = 23$

e $11 = k - 6$

f $l - 7 = 14$

Solve

a $4h = 40$

b $3m = 15$

3 term equations

Solve these equations.

a $2a + 1 = 5$

b $2a - 1 = 5$

c $3a + 2 = 8$

d $3a + 5 = 4$

e $7f - 12 = 9$

f $-5c + 12 = 2$

g $3a + 1 = 8$

h $2p - 4 = -5$

i $8t + 2 = -3$

Equations with brackets

Expand and solve

a $5(a - 5) = 70$

b $6(b + 5) = 30$

c $3(d - 5) = 15$

d $3(2d - 5) = 27$

e $4(m - 4) = 12$

f $9(b - 11) = 9$

g $7(4 - c) = 35$

h $-2(e + 2) = -10$

i $-3(7 - f) = -3$

Solve

a $\dfrac{3c + 4}{3} = 2$

b $\dfrac{4g - 5}{5} = 3$

c $\dfrac{5g + 7}{4} = 6$
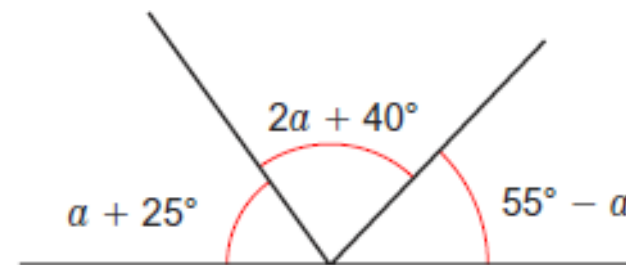
Unknowns on both sides

Solve these equations.

a $2a + 9 = a + 5$

b $8b + 9 = 3b + 14$

c $4d + 17 = 8d - 3$

d $6v - 7 = 3v + 7$

e $3e = 7e - 18$

f $2h + 7 = 8h - 1$

Solve these equations.

a $40 - 3x = 1$

b $9 - 5x = 3x + 1$

c $1 - 6x = 9 - 7x$

d $8 + 3x = 1 - 4x$

e $13 - 2x = 3 - 7x$

f $3 - 9x = 5 - 6x$

Form and solve

Angles: $2a + 40°$, $a + 25°$, $55° - a$

Find the value of a.

Reasoning The length of a rectangle is 3 cm greater than its width. The perimeter of the rectangle is 54 cm. Find its length.

Key words and definitions
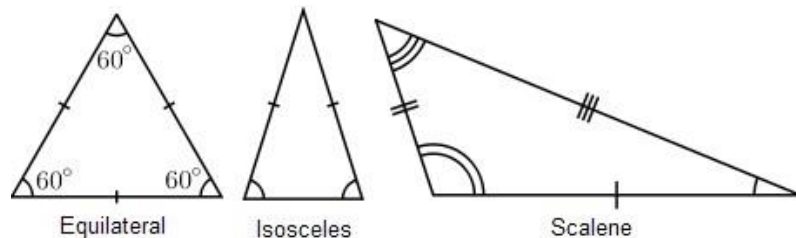
Triangle – a three sided shape

Quadrilateral – a general name for a four sided shape

Parallel lines – lines which never meet, they stay the same distance apart

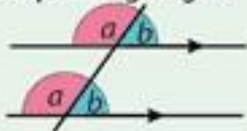Plan view – looking down on an object from above

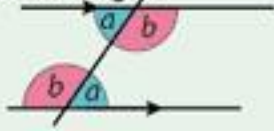Elevation – view from the front or side of an object

Types of triangles

Equilateral
Isosceles
Scalene

Angles in parallel lines

Corresponding Angles

Corresponding angles are equal. They can be found in F shapes.

Alternate Angles

Alternate angles are equal. They can be found in Z shapes.

Types of special quadrilaterals

Quadrilateral	Properties	
Rectangle	4 right angles and opposite sides equal	
Square	4 right angles and 4 equal sides	
Parallelogram	Two pairs of parallel sides and opposite sides equal	
Rhombus	Parallelogram with 4 equal sides	
Trapezium	Two sides are parallel	
Kite	Two pairs of adjacent sides of the same length	

Plans and elevations

Plan

Front

Side
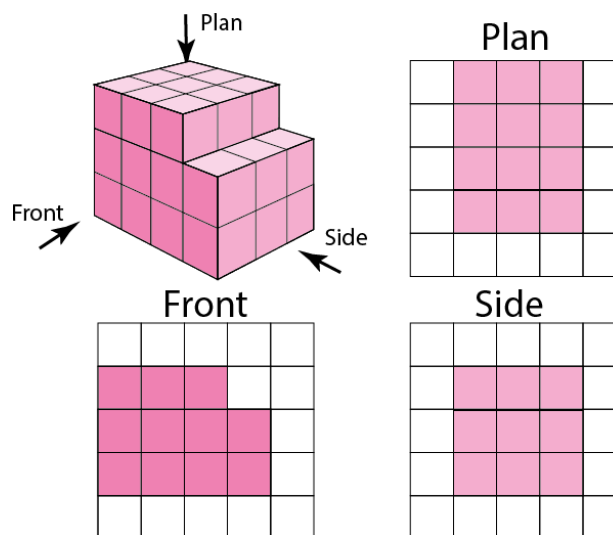
Angle facts

The angles on a straight line add up to 180°.
a + b = 180°
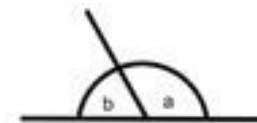
The angles in a triangle add up to 180°.
a + b + c = 180°
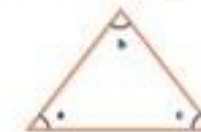
The angles at a point add up to 360°.
m + n + p = 360°
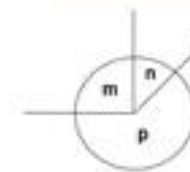
The angles in a quadrilateral up to 360°.
w + x + y + z = 360°
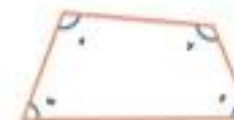
Vertically opposite angles are equal.
A = B
D = C
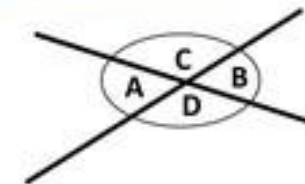
Hegarty Maths Links

Triangle – 823

Quadrilateral – 824, 825, 826

Parallel lines – 481, 482, 483

Plans and elevations – 837, 838, 839, 840, 841, 842, 843, 844

North East Learning Trust

Angles facts

Reasoning Work out the angles marked with letters.
Give your reasons.

Reasoning Work out the angles marked with letters.
Give reasons for your answers.

a

b

c
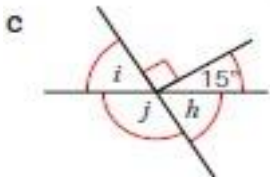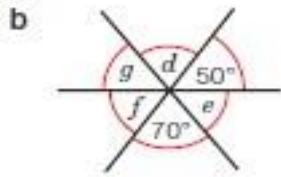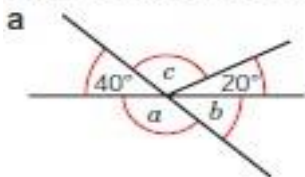
Angles in triangles and quadrilaterals

Calculate the size of each unknown angle.

a

b

c

Calculate the size of each unknown angle.

a

b

c

d
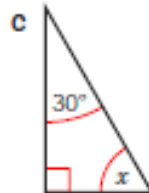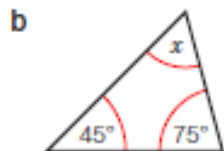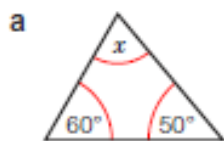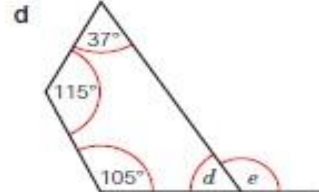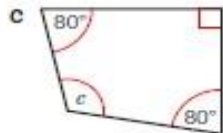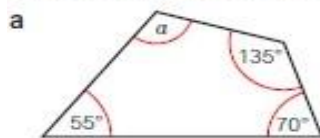
Angles in parallel lines

Reasoning Work out the angles marked with letters.
Give reasons for your answers.

a

b

c

d
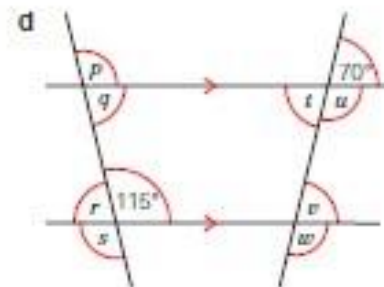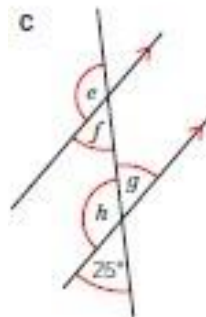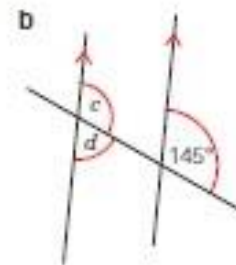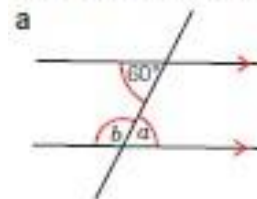
Plans and elevations

Draw the plan, the front elevation and the side elevation of each 3D solid on squared paper.

a

b

c
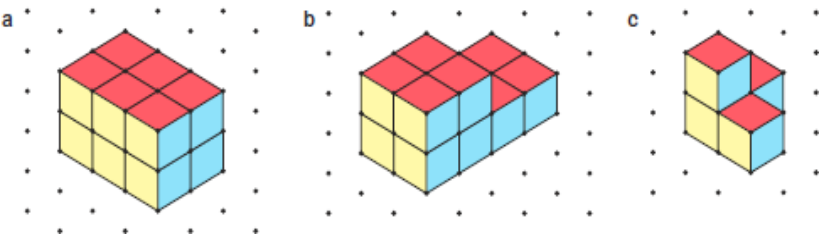
These solids are made from centimetre cubes.
Draw the plan, front elevation and side elevation of each solid on squared paper.

a

b

c

d

North East Learning Trust
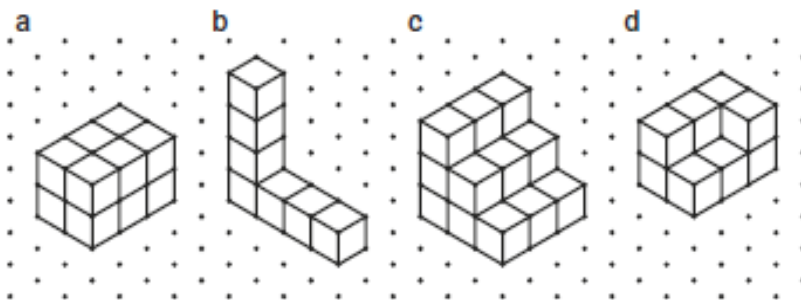
Angle problems

The diagram shows a quadrilateral.
a Write an equation in terms of x for the sum of the angles.
b Solve your equation to find the value of x.
c Write down the sizes of the four angles in the quadrilateral.

$2x + 20°$

$x - 5°$

$2x$

$x + 75°$
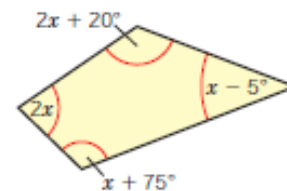
Problem-solving In triangle ABC, ∠ABC is twice the size of ∠BAC and ∠BCA is three times the size of ∠BAC.
Work out the sizes of the three angles in the triangle.

Key words and definitions

Sequence – a list of numbers or patterns in a special order

Pattern – things arranged following a rule

nth term – a formula to help you find any term in a sequence

Position-to-term – this is another way of saying the nth term

Term-to-term – find the next number in a sequence if you know the previous one

Linear – a sequence which increase/decrease by the same amount each time

Using a term-to-term rule

Find the next term in the sequence 28, 37, 46, 55, 64, —.

① ② ③ ④ ⑤ ⑥

28, 37, 46, 55, 64, $\underline{73}$, ...

+9 +9 +9 +9 +9

← ARITHMETIC SEQUENCE

Answer 73

nth term of a linear sequence

3   8   13   18   23

+5   +5   +5
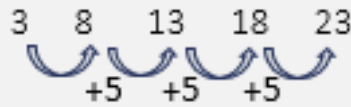
1. Find the *difference* between each term:

   5

2. Always put 'n' next to it (n = term number)

   5n

3. Add or subtract to get the first term in the sequence?

   5 - 2 = 3

   The nth term is **5n – 2**

Geometric sequence

A geometric sequence is one where to get from one term to the next you multiply by the same number each time. This number is called the *common ratio, r.*

Eg

	1	2	3	4

2, 10, 50, 250 ...

x5   x5   x5
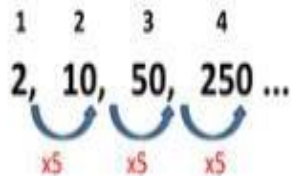
r=5

Sequences from patterns

Shape number	1	2	3	4	5	6	7	8	9	10	50
Number of matchsticks	3	5	7	9	11	13	15	17	19	21	101
Function rule	Number of matchsticks = Shape number x __2__ + __1__										

Finding missing terms

Find the missing terms and rule for: 48, ___, 70 , ___, 92

48 → 70 (2 jumps!) gives us: Add 22

So our rule for one jump is half this →   Add 11 (common diff = +11)

Number after 48 → 48 + 11=   59

[CHECK: 59 → 59 + 11 = 70!]

Number after 70 → 70 + 11 =   81

Hegarty Maths Links

Pattern – 196

Term-to-term – 197

nth-term – 198

Geometric sequences – 264

North East Learning Trust

Term to term rules

Write down the next two terms in each sequence.

a $1.5, 2, 2.5, 3, \square, \square$ b $-\frac{2}{3}, -\frac{1}{3}, 0, \frac{1}{3}, \square, \square$

c $3.5, 2.7, 1.9, 1.1, \square, \square$ d $-1.5, -2.5, -3.5, -4.5, \square, \square$

e $\frac{3}{5}, -\frac{1}{5}, -1, -1\frac{4}{5}, \square, \square$ f $-10.6, -9.9, -9.2, -8.5, \square, \square$

Use the first term and the term-to-term rule to generate the first five terms of each sequence.

a start at 3 and add 0.4   b start at 10 and subtract 0.2   c start at 7 and add 3

d start at 7 and add 2   e start at –3 and add 2   f start at –7 and subtract 5

In a Fibonacci sequence, the term-to-term rule is 'add the two previous terms to get the next one'. Write the next 3 terms in each Fibonacci sequence.

a $1, 1, 2, 3, 5, \ldots$ b $3, 3, 6, 9, 15, \ldots$ c $5, 5, 10, 15, 25, \ldots$

Patterns

Here are some patterns made from white centimetre squares and grey centimetre squares.

a Draw pattern 4.

b Find the number of grey squares in Pattern 6.

A pattern has 20 grey squares.

c Work out how many white squares there are in this pattern.
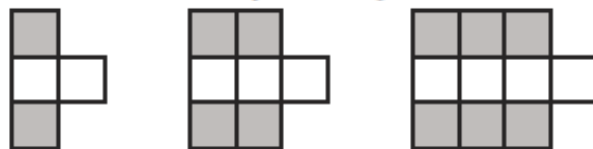
Pattern 1   Pattern 2   Pattern 3   **(4 marks)**

Patterns and nth term

Here is a pattern made from dots.

4   7   10

a Draw the next pattern in the sequence.

b Copy and complete this table for the numbers of dots used to make the patterns.

Pattern number	1	2	3	4	5	6
Number of dots						

c Write, in terms of n, the number of dots needed for pattern n.

d How many dots are needed for pattern 30?   **(5 marks)**

nth term

Find the nth term for each sequence.

a $2, 5, 8, 11, 14, 17, \ldots$ b $2, 6, 10, 14, 18, 22, \ldots$ c $2, 7, 12, 17, 22, 27, \ldots$

d $5, 7, 9, 11, 13, 15, \ldots$ e $19, 17, 15, 13, 11, 9, \ldots$ f $20, 18, 16, 14, 12, 10, \ldots$

For each sequence, explain whether each number in the brackets is a term in the sequence or not.

a $2, 5, 8, 11, 14, \ldots$ (50, 66)   b $5, 8, 11, 14, 17, \ldots$ (50, 62)

c $1, 5, 9, 13, 17, \ldots$ (101, 150)   d $4, 9, 14, 19, 24, \ldots$ (168, 169)

e $40, 35, 30, 25, 20, \ldots$ (85, 4)   f $5, 11, 17, 23, 29, \ldots$ (119, 72)

> **Q6a hint** Work out the nth term
> $\square n - \square = 50$
> $n = \square$

Using the nth term given, find the 20th term.

a $2n$ b $3n + 1$ c $11 - 3n$

> **Q7 hint** Use a function machine to help you visualise.

Find the nth term for each sequence. Use it to work out the 10th term.

a $1, 3, 5, 7, \ldots$ b $3, 6, 9, 12, \ldots$ c $10, 8, 6, 4, \ldots$ d $3, 7, 11, 15, \ldots$

Find the first term over 100 for each sequence.

a $9, 18, 27, 36, 45, \ldots$ b $7, 10, 13, 16, 19, \ldots$

c $4, 9, 14, 19, 24, \ldots$ d $10, 15, 20, 25, 30, \ldots$

> **Q9 hint** Solve nth term = 100

North East Learning Trust

Key words and definitions

Co-ordinate – values that show an exact position. First number tells you how far along, second number how far up or down

Mid points – a point that divides a line segment in two equal parts

Straight line graphs – plotting a constant rate of change between two variables

Distance-time graphs – describes a journey where the gradient will give the speed.

Plotting co-ordinates

Plot the following points.

(x, y)

1. A(-3, 2)
2. B(-1,4)
3. C(-2,-4)
4. D(0,-2)
5. E(3,0)
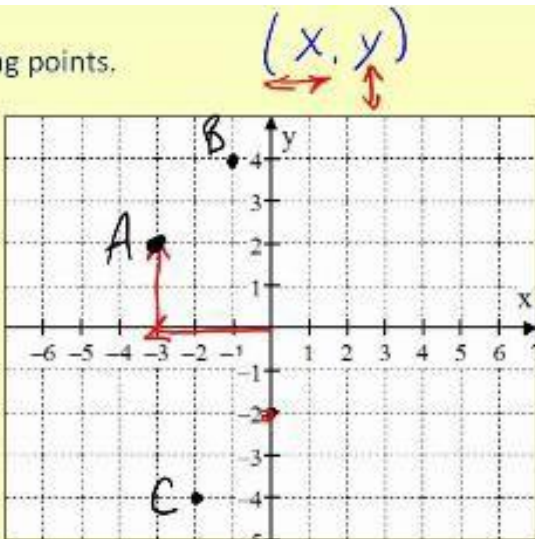
Drawing a straight line graph

e.g.   y = 2x + 1

x	2x + 1	y
-2	2(-2) + 1	-3
-1	2(-1) + 1	-1
0	2(0) + 1	1
1	2(1) + 1	3
2	2(2) + 1	5

Choose values for x.

Calculated y values

The points to plot are:
(-2,-3) (-1,-1) (0,1)
(1,3) (2,5)
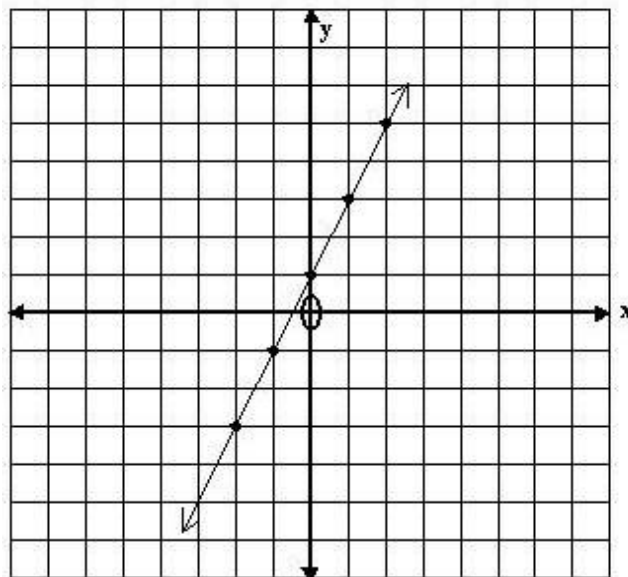
Finding a mid-point

Midpoint Formula

Midpoint = $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

(5, 4)

m

(-2, 1)
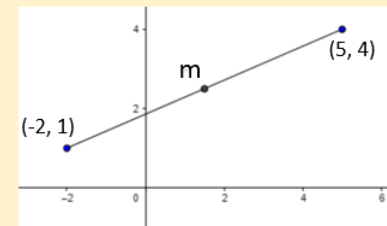
$m = \left(\dfrac{-2+5}{2}, \dfrac{1+4}{2} \right)$

$= \left(\dfrac{3}{2}, \dfrac{5}{2} \right)$

$= (1.5, 2.5)$

Distance time graphs

FAST, STEADY SPEED

GETTING FASTER

STATIONARY

STEADY SPEED

RETURNING TO START
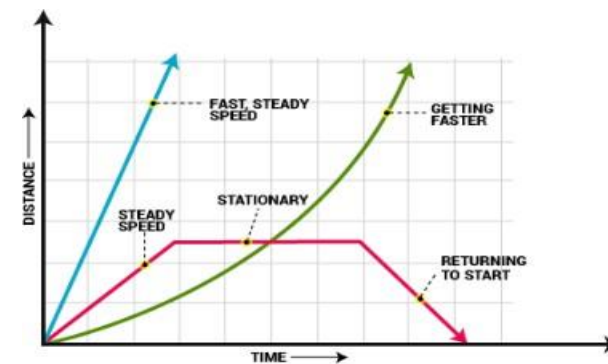
DISTANCE

TIME

Hegarty Maths Links

Co-ordinate – 199

Mid points – 200

Straight line graphs – 201, 205, 206, 207

Distance-time graphs – 874, 875, 876

North East Learning Trust

Coordinates and midpoints

Reasoning a David uses this rule to generate coordinates.
The x-coordinate is always 1, no matter what the y-coordinate is.
Which of these coordinate pairs satisfy David's rule?
(1, 5), (5, 1), (1, 1), (−1, 3), (1, 0), (1, 4), (3, 1), (1, 2)

b Draw a coordinate grid from −5 to +5 on both axes.
Plot the points from part **a** that satisfy David's rule.
Reflect What do you notice about the points you have plotted?

c Charlie uses this rule to generate coordinates.
The x-coordinate is always 3, for any y-coordinate.
Charlie generates the coordinates (3, 0), (3, −2), (3, 4) and (3, 2).
Where do you expect these points to be on the grid?

d Plot the points on the same grid. Were you correct?
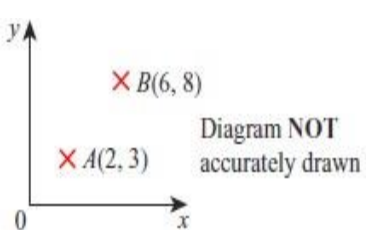
The point A has coordinates (2, 3).
The point B has coordinates (6, 8).
M is the midpoint of the line AB.
Find the coordinates of M.   **(2 marks)**
June 2014, Q1, 1MA0/2H

Diagram NOT accurately drawn

$B(6, 8)$ $A(2, 3)$

Work out the midpoints of the line segments with these start and end points.

a (3, 5) and (7, 9)   **b** (2, 7) and (5, 10)
c (−3, 4) and (1, 6)   **d** (−2, −5) and (0, 3)

North East Learning Trust

Straight line graphs

a Copy and complete the tables of values for these straight-line graphs.

i

x	−3	−2	−1	0	1	2	3
$y = x + 1$				0	1		

ii

x	−3	−2	−1	0	1	2	3
$y = 2x - 3$			−5	−3			

b Draw a coordinate grid with −3 to +3 on the x-axis and −8 to +8 on the y-axis.
Draw and label the graphs of $y = x + 1$ and $y = 2x - 3$, using your tables of values from part **a**.

Draw and label these straight-line graphs for $x = -3$ to +3.
Copy the coordinate grid from **Q6**. Draw all four graphs on the same grid.

a $y = 3x - 2$ **b** $y = 2x + 4$
c $y = 4x - 6$ **d** $y = 0.5x + 1$

a Complete the table of values for $y = 2x + 2$

x	−2	−1	0	1	2	3	4
y	−2				6		

b On the grid, draw the graph of $y = 2x + 2$ **(4 marks)**
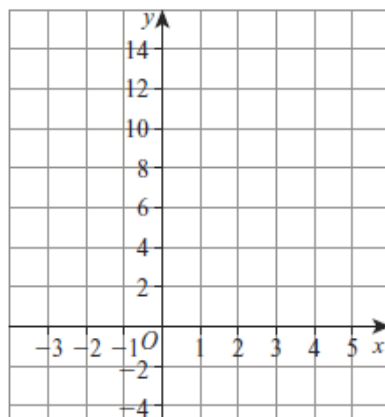
Distance time graphs

This distance–time graph shows Isaac's journey on his bicycle

Isaac's bike ride
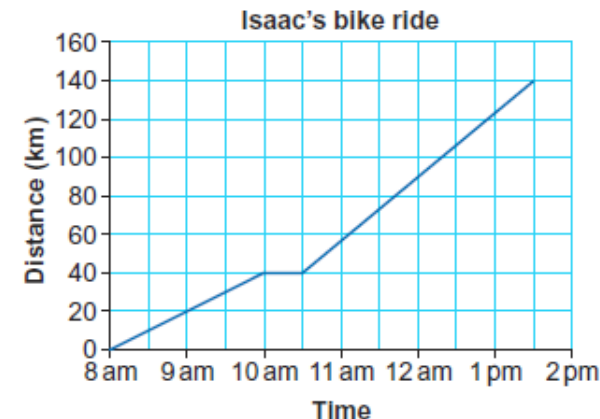
a How far did Isaac ride his bike on the first part of the jour
b At what time did he stop to rest?
c How long did the first part of his journey take?
d What was his average speed on the first part of the journe
e How many minutes did Isaac rest for?
f How long did the last part of his journey take?
g How far did he ride on the last part of the journey?
h What was his average speed for the last part of the journe

BUILDING BRICKS

Exploring the Elements of Music

A. Pitch

The **highness** or **lowness** of a sound.

Getting Higher Stepwise (Conjunct)

High Pitch

Low Pitch

Getting Lower Leaps (Disjunct)

B. Tempo

The **speed** of a sound or piece of music.

FAST: *Allegro, Vivace, Presto*

SLOW: *Andante, Adagio, Lento*

GETTING FASTER – *Accelerando (accel.)*

GETTING SLOWER – *Ritardando (rit.)* or *Rallentando (rall.)*

C. Dynamics

The **volume** of a sound or piece of music.

VERY LOUD: *Fortissimo (ff)*

LOUD: *Forte (f)*

QUITE LOUD: *Mezzo Forte (mf)*

QUITE SOFT: *Mezzo Piano (mp)*

SOFT: *Piano (p)*

VERY SOFT: *Pianissimo (pp)*

GETTING LOUDER: *Crescendo (cresc.)*

GETTING SOFTER: *Diminuendo (dim.)*

D. Duration

The **length** of a sound.

SHORT ⟶ LONG

E. Texture

How much sound we hear.

THIN TEXTURE: *(sparse/solo)* – small amount of instruments or melodies.

THICK TEXTURE: *(dense/layered)* – lots of instruments or melodies.

F. Timbre or Sonority

Describes the **unique sound or tone quality** of different instruments voices or sounds.

Velvety, Screechy, Throaty, Rattling, Mellow, Chirpy, Brassy, Sharp, Heavy, Buzzing, Crisp, Metallic, Wooden etc.

G. Articulation

How individual notes or sounds are **played/techniques**.

LEGATO – playing notes in a long, smooth way shown by a **SLUR**.

STACCATO – playing notes in a short, detached, spiky way shown by a **DOT**.

H. Silence

The opposite or absence of sound, **no sound**. In music these are **RESTS**.

I. Notation

How music is **written** down.

STAFF NOTATION – music written on a **STAVE** (5 lines and spaces)

GRAPHIC NOTATION/SCORE – music written down using shapes and symbols to represent sounds.
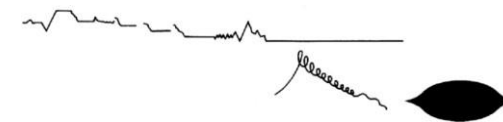
SKO The Elements of Music: Dr Matt Smith

D	**Dynamics**	The volume of music	Pianissimo, piano, mezzo piano, mezzo forte, forte, fortissimo, crescendo, diminuendo, sforzando
R	**Rhythm**	The duration of notes and rests	Dotted rhythm, hemiola, polyrhythm, bi-rhythm, cross-rhythm, augmentation, diminution, ostinato
M	**Metre**	The number of beats in a bar	Simple time, ¾, 4/4, compound time, 6/8, 9/8, 12/8, regular time signature, irregular time signature
A	**Articulation**	How an instrument is played	Pizzicato, con arco, tremolo, vibrato, con sordino, pitch bending, portamento, glissando
T	**Texture**	The layers of the music	Monophonic, homophonic, polyphonic, melody and accompaniment, acappella
T	**Tempo**	The speed of the music	Largo, andante, moderato, allegro, vivace, presto, accelerando, rallentando, ritenuto, rubato
S	**Structure**	The sections and order of the music	Popular song form, binary, ternary, rondo, sonata, through composed, theme and variations
M	**Melody**	The main tune of the music	Conjunct, disjunct, scalic, triadic, arpeggio, passing note, acciaccaturas, trill, legato, staccato, ostinato, motif, sequence, imitation
I	**Instrumentation**	The instruments used	Violin, viola, cello, double bass, trumpet, French horn, trombone, tuba, flute, oboe, clarinet, bassoon, piano, guitar, drum kit, voice
T	**Tonality**	The key of the music	Tonal, atonal, major, minor, modulation, modal
H	**Harmony**	The chords in the music	Diatonic, chromatic, consonant, dissonant, cadences, pedal note.
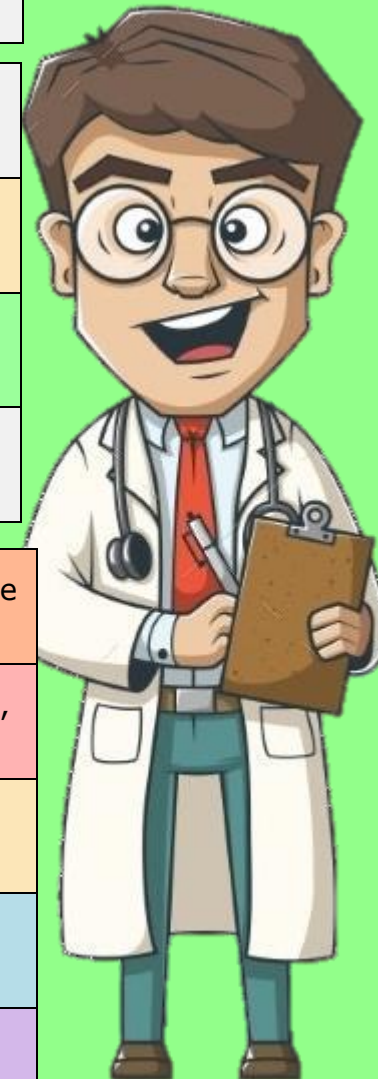
Key Skills/Techniques

Forehand/ Backhand: Hitting the ball with your hand's most natural position. For instance, a right-hander would hit the ball from the right side of his body, while a left-hander would hit from the left side.

Push: A forehand drive is an attacking shot. It's played with a little bit of topspin, but mainly it's a flat hit and can be very powerful. As the ball approaches, bring your bat forwards and down. Brush under the ball – this will generate backspin and your bat should finish in front of you, pointing in the direction in the direction you want the ball to go

Drive: You'd normally play the forehand drive close to the table when your opponent's return is a little high. You can play a forehand drive if the ball has topspin, no spin or even light backspin on it, as long as the ball is high enough.

Service: The stroke that starts every rally/game. Drop the ball onto the bat. The ball should be projected forwards and upwards. The first bounce should be on the player's side of the table such that the ball clears the net and then bounces on the opponent's side.

Slice: The forehand slice is struck slightly to the side of the body, so you don't have to get behind the ball, but to the side. The movement of the arm is forward, to hit the ball. This strike is struck slightly from top to bottom, with movement coming primarily from the elbow and forearm.

Topspin: Topspin strokes are created when your opponent's racket brushes against the ball using an upward stroke action. This causes the ball to accelerate and dip due to a combination of ball rotation and air resistance. After the ball makes contact with your racket, the topspin will cause it to rebound in an upward direction.

Rules

Service

1. At the start of service the ball shall be stationary, resting freely on the flat, open palm of the server's free hand, behind the end line and above the level of the playing surface.
2. The server shall then project the ball near vertically upwards, without imparting spin, so that it rises at least 16cm after leaving the palm of the free hand.
3. As the ball is falling from the highest point of its trajectory, the server shall strike it so that it touches first his/her court and then, after passing over or around the net assembly, the receiver's court.
4. The ball and the racket shall be above the level of the playing surface from the last moment at which the ball is stationary before being projected, until it is struck.

Singles

A game shall be won by the player or pair first scoring 21 points unless both players or pair score 20 points, when the game shall be won by the player or pair first scoring subsequently 2 points more than the opposing player or pair. For example, 22-20, 25-23 and so on.

A Match: A match shall consist of the best of 3 or 5 games. The Choice of Serving, Receiving and Ends

1. When one player or pair has chosen to serve or to receive first or to start at a particular end, the other player or pair shall have the other choice.
2. After 2 points have been scored the receiving player or pair shall become the serving player or pair and so on until the end of the game, unless both players or pairs have scored 20 points or expedite system is in operation, when the sequences of serving and receiving shall be the same but each player shall serve for only 1 point in turn.

Glossary

Forehand/ Backhand	**Push**	**Drive**
Service	**Slice**	**Topspin**
Body Position/ stance	**Grip**	**Point**
Block	**Loop** **Let**	**Rally**

Pictures

Shakehands grip

Forehand

Backhand

6in 15.25cm
5ft 1.525m
1/8", 3mm wide white line for doubles play
2ft 6in 0.76m
White line 3/4" 2.0cm all round edge
9ft 2.74m
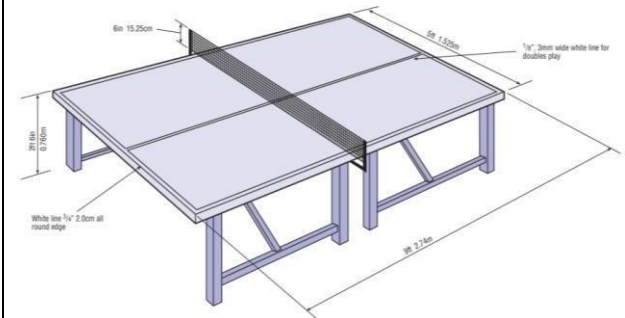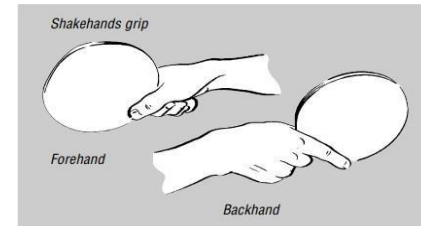
Grip: The grip favoured by most players in the Western world is known as the "shake hands" grip. Although there are alternatives, notably the "penhold" types used predominantly in the Far East (e.g. China and Japan).

Stroke	Examples of when to use
Backhand push	Returning short services
Forehand drive	Returning long services
	Against a long pushed ball
Backhand drive	Returning topspin in a rally
	Returning topspin services
Forehand push	To bring a defensive player close to the table
	Returning short balls
Block	Reacting quickly to topspin
Loop	Returning chopped balls
	Attacking long, pushed balls
Push	Away from the table against topspin

Tactics:

Width and depth in shots
Hitting into space
Moving opponent around
Disguise
Variety of service

Doubles

Serving:
the ball can only bounce on the right half portion of the table for both the server and the receiver. the service still alternates every two points between teams, but it also alternates between players on the same team.
Once your team has finished your two serves, you swap sides with your partner. The person you were serving to now serves and your partner is the new receiver.
Doubles matches have a certain order of play that must be followed.
- E.G two teams ... players A & B and players X & Y.
- Player A serves to player X who then returns the ball. Player B must then play the next shot and player Y the shot after.
- This pattern goes on (A, X, B, Y) until the point is decided.
- If the wrong player makes the return, the team loses the point.
Change of Service:
At each change of service, the last receiver shall become the server and the partner of the previous server shall become the receiver. For example, a correct pattern would be:
- Player A has played his two serves to player X
- Player X then plays his two serves to player B.
- Player B will then play his two serves to Player Y
- player Y will play his two serves to Player A.
Player A will then restart the sequence all over again and the sequence will repeat itself until a changeover or the end of the game.
Change of Ends: A changeover occurs when one team has scored 5 points. This will also change up the order of receiving. For instance, players A & B score 5 points first, whilst A is serving to X. After changing ends, player A will serve to player Y for the remainder of the game.

A Point : Unless the rally is a let, a player shall lose a point:
1. If he/she fails to make a good service.
2. If he/she fails to make a good return.
3. If he/she strikes the ball twice successively.
4. If he/she strikes the ball with a side of the racket blade which surface does not comply with the requirements.
5. If he/she, or anything he/she wears or carries, touches the net assembly.

Knowledge organiser for Rugby League KS3

The game.

You have 6 attempts to score a try . The defending side must stop the opposition from scoring by tackling the player with the ball. Once 6 tackles have been completed by the defending team the ball is turned over for the other team to try and score with 6 attempts.

Positions at kick off.

1. Full-back
2. Wing
3. Centre
4. Centre
5. Wing
6. Stand-off
7. Scrum-half
8. Prop forward
9. Hooker
10. Prop forward
11. Second row
12. Second row
13. Loose forward

Scoring system/points

Points are scored when a try has been awarded. A conversion immediately follows a try. Penalties are kicked and points awarded if successful.

Try = 4 points
Conversion = 2 points
Penalty = 2points
Drop goal = 1 point

The pitch.

Role of player positions

1- gathers and catches kicks from the opposition, tackles any player breaking through the line of defence and supports players 2,3,4,5 and 6 when attacking Generally one of the fastest and smallest player on the pitch.

2,3,4,5 and 6 Attacking and creative players. Main role is to score tries and defend the wide channels.

6- the most creative player. Main role is to generate gaps and spaces to set up opportunities for players 2,3,4,5 to score.

7- collects the ball from all restarts and links up with player 6 to create opportunities for attacking players.

8,9,10,11,12 and 13 are the biggest players who form the scrum. They are responsible for defending the centre of the pitch, trying to break through the defensive wall of the opposition and set up opportunities for others to score.

General rules

Game starts with a 'kick off' and this must be a 'drop kick'
There are 13 on field players per team and substitutions off the field.
The ball must be passed (out of hand) backwards only.
After 6 completed tackles the 'hand over' rule applies and the ball is given to the other team.
No tackle should be above shoulders and shoulder barging is penalised.
No 'stripping' the ball carrier of the ball.
No rucks or mauls can be formed.
Offside is when a player is in front of the ball and interferes with play or the ball is past to them.
If the ball is kicked off the field of play this is called 'out of play' and the game restarts with a 'tap kick' and pass in field to a designated player.
A 'Scrum' is awarded for a 'knock on' or a forward pass.
Players 8,9,10,11,12 and 13 form the scrum .
Player 9 is called the 'hooker' and is responsible for striking the ball back with his foot to player 13, 'Loose forward'
Player 7 is responsible for putting the ball in the scrum.
Penalty kicks are awarded for infringement of the rules, dangerous play, gamesmanship and dissent.
Referee can 'sin bin (yellow card)' a player if they decided the offending player was unsafe in a tackle, dissent, carried out a dangerous act on the field and not playing to the laws of the game. If a player is sin binned they must leave the field of play for 10 minutes . The player can not be replaced and this would leave his team with only 12 on the field.
Red cards are awarded for serious offences and the player can not return to the game or be replaced eg 12 versus 13 for the remainder of the game.
More than 1 player can be sin binned at any one time.
'Play the ball'-After every completed tackle the tackled player must stand up and play the ball. No other player can perform this for them.
Kicking the ball is allowed at any time but is generally tactical and performed after the 4th or 5th tackle. Kicking is deemed to gain field position advantage, different type of pass, start the game or to kick for points.

Skills and Techniques

Forehand- A forehand shot is where the racket is away from the body, for example if you are right handed the racket will be towards the right side of your body.

Backhand- A backhand shot is where the racket is across the body and towards the opposite side to your strong hand. For example if you are right handed it will be across your body and hitting from the left side.

Serving- There are 4 types of serve: Low, High, Flick and Drive. The low is gently placed over the net to land at the front of the court. The high is opposite, a powerful serve which lands at the back of the court. The flick serve is similar to the high but lands more mid court. The drive serve is a flat, low and powerful serve which is aimed towards the back of the court.

Grip- The grip of the racket is very similar to a hand shake. To test you have the correct grip hold the racket head in your hand, then carefully slide your hand down the racket. Then, wrap your fingers around the handle. You will slightly change your grip when you play a backhand shot as your wrist will turn towards the net.

Footwork- Side stepping will be the majority of the footwork you do, it allows you to move around the court efficiently while still maintaining proper hitting form. Your legs should be square with your body and move side-to-side. Regardless of the direction you are moving, your head should always be facing the net.

Skills and Techniques

Drop shot – A drop shot is a front of court shot, similar to a net shot but from mid court. It travels a long distance but aims to drop to the floor as soon as it goes over the net. The shuttle needs to be hit with a high elbow at the highest point possible to ensure it reaches the opponents court side.

Smash shot – This is a powerful shot which most of the time will win you the point. It is a mid-court shot which moves in a downwards motion very powerfully so it is almost impossible for your opponent to return the shuttle. This is in a downwards motion and power is needed from your shoulder and arm.

Net shot – This is where the shuttle glides just over the net, almost in touching distance. This is a hard shot to return as it is very low to the floor when it goes over the net so the player must be quick to get low and return this. You must lean over the net ensuring you do not touch it and hit the shuttle gently in a downwards motion.

Clear shot – This is a long shot which aims to land in the back tram line of the court. This is helpful if your opposition tends to play close t the net as they will not have much time to get to the back of the court to return the shuttle. To ensure this is successful you must ensure your elbow is high and you make contact with the racket and shuttle at its highest point with a lot of power.
Singles court – short and wide
Doubles court – Long and narrow

Glossary

Shot   Serve   Net   Rally   Smash   Drop   Drive

Forehand   Backhand   Grip   Footwork   Underarm

Shuttlecock   Racket   Overarm   Tramline   Flick

Singles   doubles   High   Low   Short   Long

Pictures

Forehand

Backhand


shuttle direction
swing
Smash shot

Rules

- After the serve is returned, you and your opponent will hit the shuttle alternately until s 'fault' is made or the shuttle goes out of play. This is called a rally.
- A badminton match consists of the best of 3 games. In men's, the first side to score 15 points wins the game. In women's, the first side to score 11 points wins the game.
- To score a point you need to get the shuttle to land anywhere on your opponent's floor without them being able to return it. Also, you can score if your opponent returns the shuttle and it lands outside of the court on your side. Similarly, you can score a point if any of the following faults are made by your opposition:
  1. The shuttle goes under the net
  2. The shuttle hits the wall, ceiling or any player
  3. The player touches the net with any part of their body or racket
  4. Deliberately distracting your opposition
  5. If the shuttle is hit twice before it goes over the net

- In doubles the whole court is used however, in singles the back tram line is classed as out.

Tactics

- Hitting the shuttle consistently high and deep to give time to recover
- Try to aim shots to the opponent's weaker side (usually backhand), to give the advantage of a weak return.
- Try to pace shots before adding more power, because more power will usually result in more errors.
- Try to keep your opponent on the move as much as possible, rather than 'rally'. Try moving the opponent from the net to the back of the court and from the forehand to the backhand side to fatigue them quicker.
- Keep winning: Keep playing the same way
- Keep losing; Change the style of play
- Try to change the speed of play, by mixing up shots. For example hit some slower shots, such as, drop shots and net shots, with faster shots in between, such as smashes and drives.
- Always play to your personal strengths – shots/movements you are good at.
- Exploit your opponent's weaknesses. Find out their weaknesses and play shots to force errors.

Drop shot

Overhead clear

Net shot
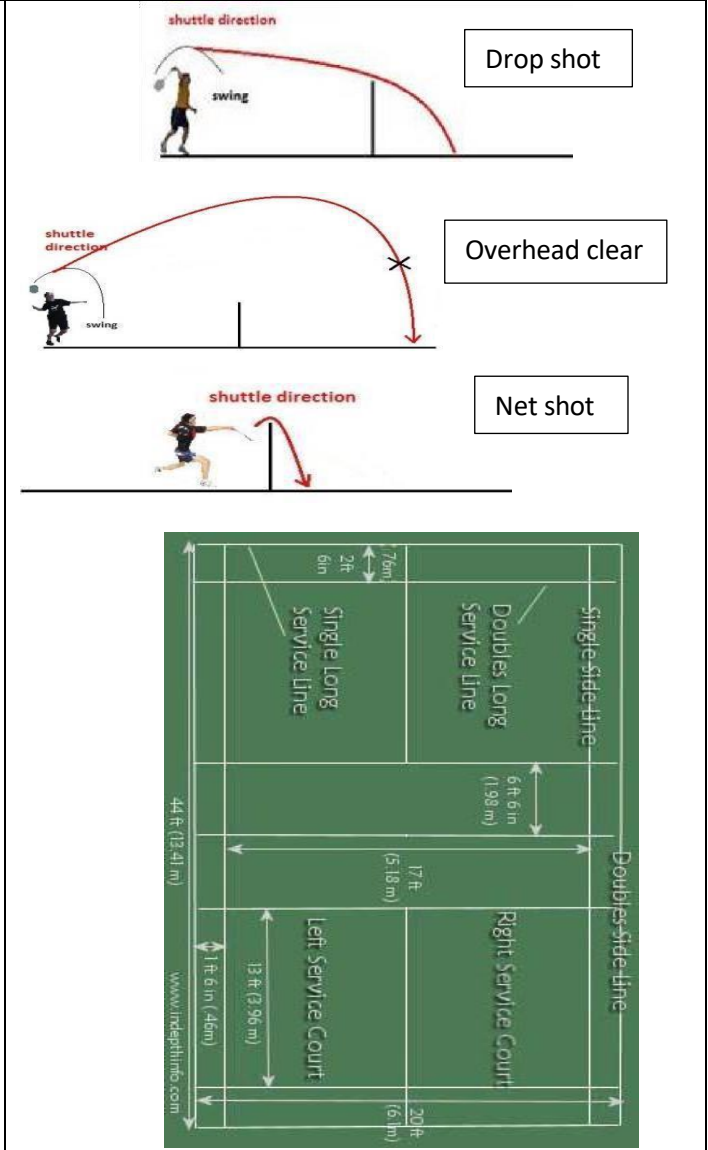
Key Words!

Power: How quickly energy is transferred by a device (watts).
Energy resource: Something with stored energy that can be released in a useful way.
Non-renewable: An energy resource that cannot be replaced and will be used up.
Renewable: An energy resource that can be replaced and will not run out.
Fossil fuels: Non-renewable energy resources formed from the remains of ancient plants or animals.
Thermal energy store: Filled when an object is warmed up.
Chemical energy store: Emptied during chemical reactions when energy is transferred to the surroundings.
Kinetic energy store: Filled when an object speeds up. Gravitational potential energy store: Filled when an object is raised.
Elastic energy store: Filled when a material is stretched or compressed.
Dissipated: Become spread out wastefully.

Energy stores

Energy is measured in J and kJ.
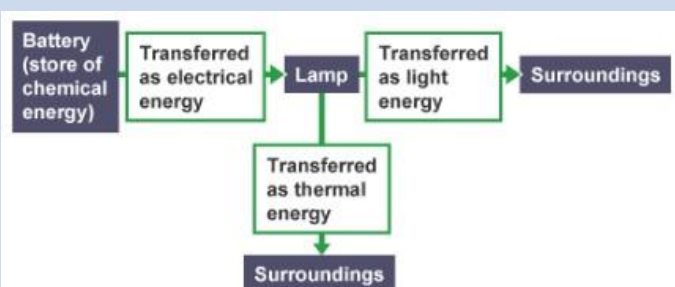There are different forms of energy stores, including:

Energy to do with...	Type of energy store
food, fuels, batteries	chemical energy store
hot objects	**thermal energy store**
moving objects	**kinetic energy store**
position in a gravitational field	**gravitational potential energy store**
changing shape, stretching, or squashing	**elastic energy store**

Energy transfers

Energy cannot just disappear, and you cannot end up with more than you had at the start. Energy cannot be created or destroyed, only transferred. This is the **law of conservation of energy**.

Energy can transfer from one store to another in different ways:

- By heating
- Mechanically
- Electrically
- By radiation
- By waves

← We can represent energy transfers as a flow diagram.

We can see that not all the energy transferred is useful, and some is wasted, typically by increasing the temperature of the surroundings.

How much energy?

Different foods are stores of different amounts of energy. Food labels tell you how much energy is in the store associated with food.
You need different amounts of energy depending on what you what you do each day.

Food	Energy (kJ) per 100 g
apple	200
banana	340
peas	250
chips	1000
cooked beef	1000
chocolate	1500

Sleeping uses around 300 kJ of energy per hour.

Energy in food

Power

You can calculate power using this formula:

$$power\ (W) = \frac{energy\ (J)}{time\ (s)}$$

Most appliances in your house will have a power rating. The higher the power rating – the more the appliance costs to use.
➔ The bulbs are the same brightness, but the one on the right has a much lower power rating.

Energy suppliers use a different unit. This is the kilowatt hour, shown as kW hour or kWh. You can calculate the cost of energy using the following equations.

energy in kWh = power in kW × time in hours
cost = energy used in kWh × cost of 1 kWh

Renewable and non-renewable fuels

Non-renewable energy includes coal, gas and oil. Most cars, trains and planes use non-renewable energy. They are made by burning fossil fuels to create energy.

Renewable energy includes solar, hydro and wind energy. Wind energy is made when the wind moves the blades on a wind turbine. This movement creates wind energy which is converted into electrical energy.
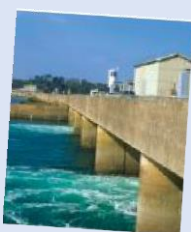
Wind   Tidal   Wave   Hydroelectric   Solar

Further Reading

Energy	
Energy stores/transfers	https://www.bbc.co.uk/bitesize/guides/z99jq6f/revision/1
Fuels and resources	https://www.bbc.co.uk/bitesize/guides/zggk87h/revision/1
Energy in the home	https://www.bbc.co.uk/bitesize/guides/zyfgr82/revision/1
Domestic energy	https://www.bbc.co.uk/bitesize/articles/zfm48mn
Solar energy	https://www.bbc.co.uk/bitesize/articles/zk9sv9q

Knowledge Organiser – Cells and Organisation

1. Key Words!

Cell: The unit of a living organism, contains parts to carry out life processes.
Uni-cellular: Living things made up of one cell.
Multi-cellular: Living things made up of many types of cell.
Tissue: Group of cells of one type.
Organ: Group of different tissues working together to carry out a job.
Diffusion: One way for substances to move into and out of cells.
Structural adaptations: Special features to help a cell carry out its functions.
Cell membrane: Surrounds the cell and controls movement of substances in and out.
Nucleus: Contains genetic material (DNA) which controls the cell's activities.
Vacuole: Area in a cell that contains liquid, and can be used by plants to keep the cell rigid and store substances.
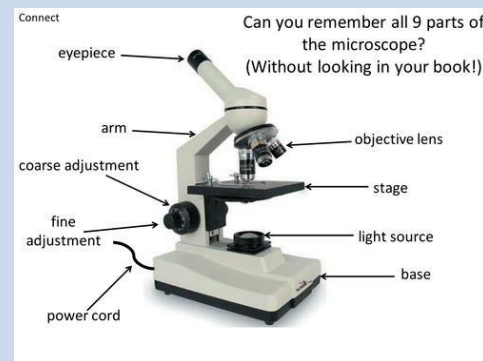**Mitochondria:** Part of the cell where energy is released from food molecules.
Cell wall: Strengthens the cell. In plant cells it is made of cellulose.
Chloroplast: Absorbs light energy so the plant can make food.
Cytoplasm: Jelly-like substance where most chemical processes happen.

2. Microscopes!

Connect

Can you remember all 9 parts of the microscope? (Without looking in your book!)

A microscope is used to examine very small specimens. Place the slide on the stage.. Look through the eyepiece. A light from the light source shines through the specimen allowing you to see the image. The adjustment wheels are used to bring the sample into focus.
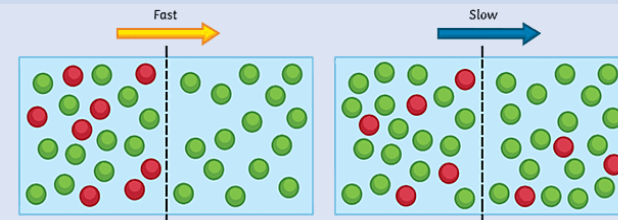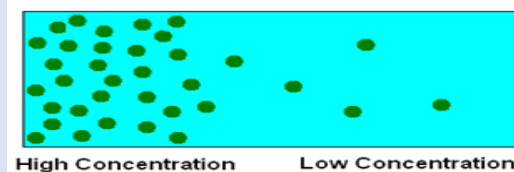
3. Plant and Animal Cells!
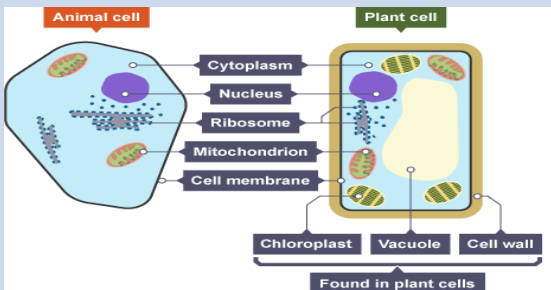
Animal cells usually have an irregular shape, and plant cells usually have a regular shape. Cells are made up of different parts.

Diffusion
In animals, oxygen diffuses in and carbon dioxide diffuses out. In plants, carbon dioxide diffuses in and oxygen diffuses out.

High Concentration   Low Concentration

4 Diffusion

Fast   Slow

The greater the difference in concentration, the quicker the rate of diffusion.

Structure	Function	Organisms found in
Cytoplasm	Chemical reactions happen here	Animal and Plant
Nucleus	Contains genetic material	Animal and Plant
Cell membrane	Controls the movement of substances in and out of the cell	Animal and Plant
Mitochondria	Where most energy is released in respiration	Animal and Plant
Chloroplasts	Absorb light energy for photosynthesis	Plant Only
Cell Wall	**Strengthens the cell and supports the plant**	Plant Only
Vacuole	Filled with cell sap to help keep the cell turgid	Plant Only

5. Levels of organisation

The fifth level of organisation is a multi-cellular organism. A multi-cellular organism is made up of several organ systems working together to perform all the processes needed to stay alive.

organism e.g., human
organ systems e.g., circulatory system
organs e.g., heart
tissues e.g., muscle
cells e.g., nerve

increasing complexity

This is the hierarchy of organisation in the human body.

Plants and animals consist of different types of cell that work together. Animal and plant cells have certain structures in common. Many cells are specialised and are adapted for their function.

6. Uni-Cellular Organisms

An amoeba is a single celled organism that live in water or damp places. Although it is just one cell, it has adaptations that let it behave a bit like an animal.

Unicellular algae are plant like organisms that contain chlorophyll and so make their own food using sunlight.

Yeast have a cell wall, like plant cells, but no chloroplasts. This means they have to absorb sugars for their nutrition, rather than being able to make their own food by photosynthesis. Yeast can reproduce by producing a bud. The bud grows until it is large enough to split from the parent cell as a new yeast cell.
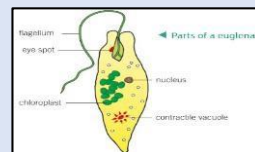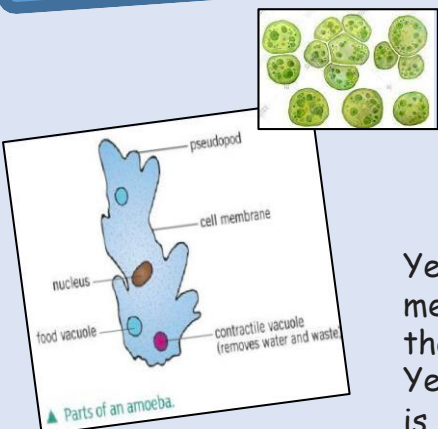
7. Further Reading

Organisms	
Plant and Animal Cells	https://www.youtube.com/watch?v=IH3kVOch9nU
What are cells?	https://www.bbc.com/bitesize/articles/zr69dxs
Using a Microscope	https://www.youtube.com/watch?v=xzjowD1KN20
Cells to Systems	https://www.bbc.com/bitesize/guides/z9hyvcw/revision/3
Diffusion	https://www.bbc.com/bitesize/articles/znqbcj6
Uni-cellular Organisms	https://www.bbc.com/bitesize/guides/z9hyvcw/revision/5

1. Key Words!

Accuracy: Data that is close to the true value
Line of Best Fit: A line which goes through as many points as possible on a graph.
Anomalies (Outlier): Results which do not fit the pattern
Evidence: Data which is used to back up a statement.
Fair Test: You only change one factor at a time to make something a fair test
Categoric : When there are limited number of possible values.
Continuous: When there are infinite number of possible values.
Observational Enquiry: Questions that can be investigated using observations.
Pattern Seeking Enquiry: Questions that can be investigated by collecting data from variables.

2. Hazard Symbols!

Physical hazards: Explosive, Flammable, Oxidizing, Compressed gas, Corrosive/Corrosive
Health hazards / Environmental hazards: Toxic, Irritating, Health hazard, Evi. hazard

You will find hazard symbols on bottles of chemicals in the laboratory. They will tell you about any hazards of the chemical in the bottle you are working with. They are there to keep us safe in the lab.
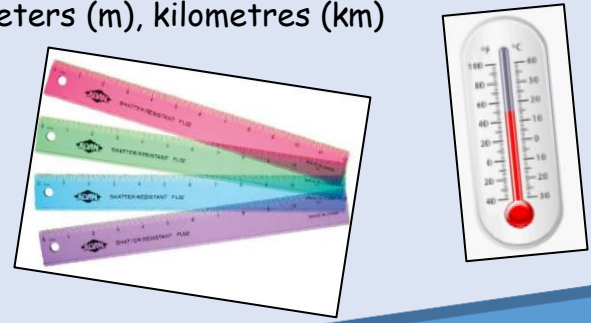
3. Lab Equipment!

Beaker
Conical Flask
Bunsen burner
Gauze
Boiling Tube
Test tube
Round Bottomed Flask
Heat Proof Mat
Test Tube Rack
Tripod
Measuring Cylinder

4. Measurements!

Units of length:
millimetres (mm), centimetres (cm), meters (m), kilometres (km)

Units of time:
seconds (s), minutes (mins), hours (h)

Units of mass:
Grams (g), kilograms (kg)

Units of volume: cm^3

Units of temperature: Celsius (°C) Fahrenheit (°F)

6. Microscopes!

- A microscope is used to examine very small specimens.
- Place the slide on the stage.
- Look through the eyepiece too see the specimen.
- A light is shone from the light source through the specimen allowing you to see the image.
- The adjustment wheels are used to bring the sample into focus.

Connect
Can you remember all 9 parts of the microscope?
(Without looking in your book!)

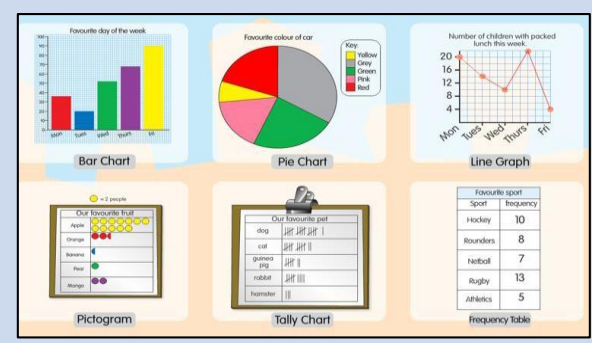eyepiece, arm, coarse adjustment, fine adjustment, power cord, objective lens, stage, light source, base
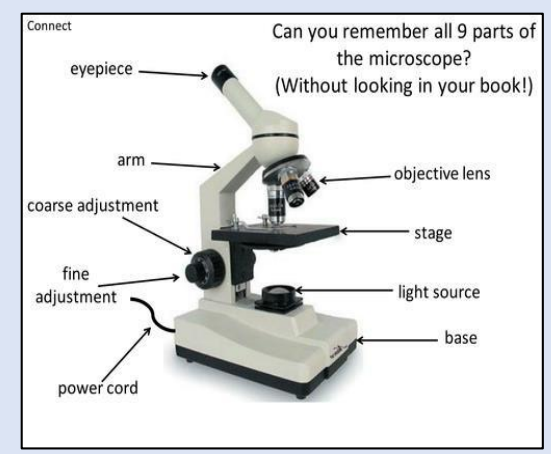
5. Graphs and Tables!

Depending on your data you will have to use different types of graph to represent your data.

- A bar chart is used when the data fits into distinct categories.
- A scatter graph is used to show the link between two different variables.
- A line graph is used to show how one variable changes over a period of time.

Bar Chart, Pie Chart, Line Graph
Pictogram, Tally Chart, Frequency Table

7. Writing a Method!

Aim What is the purpose of your investigation?
Prediction What you think you will find during the investigation
Hypothesis A scientific explanation of why you think this will happen
Variables:
      Independent / Dependent / Control
Equipment List detailed
Method Written in future tense. Step by step instructions
      It must tell you to repeat your readings 3 times
Risk Assessment
Conclusion What you discovered during the investigation
Evaluation How you would improve your investigation if you were to do it again

8. Further Reading!

Working Scientifically	
Lab Rules Song	https://www.youtube.com/watch?v=BRDApYgvDgQ
Bunsen Burners	https://www.youtube.com/watch?v=QjDUVMWacEQ
Graphs	https://www.youtube.com/watch?v=I2BwzZlgqj8
Tables	https://www.youtube.com/watch?v=Fpe0HYELH74
Hazard Symbols	https://www.youtube.com/watch?v=WQyObsamnMw
Variables Song	https://www.youtube.com/watch?v=hwU3YL_SD70
Accuracy, Reliability and Precision	https://www.youtube.com/watch?v=MRX2laaTZHY
Scientific Methodology	https://www.youtube.com/watch?v=qAJ8IF4HI20

How to use your knowledge organiser

Read through and highlight:

- what you already know
- cognates

Choose a section to revise:

- foldy sheet
- flashcards
- mindmap
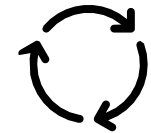- look-cover-write-check
- make your own quiz

Test yourself!

Fill in a blank copy of the section you chose.

- Spanish – English
- English to Spanish

Go back to step 2 and repeat with the next section.

Finally, read through the model task.
Copy each section and adapt the text by changing key words.

Saludos	Greetings
¡Hola!	hello
¡Adiós!	goodbye
¡Hasta luego!	see you later
por favor	please
gracias	thank you
lo siento	I'm sorry
me llamo	I'm called
sí	yes
no	no
bien	fine
fenomenal	great
regular	not bad
fatal	awful

Nacionalidades	Nationalities
alemán	German
argentino	Argentinian
británico	British
chileno	Chilean
chino	Chinese
colombiano	Colombian
cubano	Cuban
español	Spanish
europeo	European
francés	French
inglés	English
italiano	Italian
mexicano	Mexican

Key Questions	
¿Qué tal?	How are you?
¿Cómo te llamas?	What's your name?
¿Cuántos años tienes?	How old are you?
¿Cuándo es tu cumpleaños?	When is your birthday?
¿Qué tipo de persona eres?	What sort of person are you?

Los Meses	Months
enero	January
febrero	February
marzo	March
abril	April
mayo	May
junio	June
julio	July
agosto	August
septiembre	September
octubre	October
noviembre	November
diciembre	December

La Semana	The week
lunes	Monday
martes	Tuesday
miércoles	Wednesday
jueves	Thursday
viernes	Friday
sábado	Saturday
domingo	Sunday

High-frequency words	
bastante	quite
muy	very
pero	but
también	also
un poco	a little

Basic information	
Tengo … años	I'm … years old
Mi cumpleaños es el …	My birthday is on …
Me llamo ..	I'm called …
Soy …	I am …

Personalidad	Personality
alegre	cheerful
gracioso	funny
independiente	independent
listo	clever
nervioso	nervous
optimista	optimistic
perezoso	lazy
responsable	responsible
serio	serious
simpático	nice
tonto	silly
paciente	patient
contento/a	happy
inteligente	intelligent
tímido/a	shy

El número	Numbers
uno	1
dos	2
tres	3
cuatro	4
cinco	5
seis	6
siete	7
ocho	8
nueve	9
diez	10
once	11
doce	12
trece	13
catorce	14
quince	15
dieciséis	16
diecisiete	17
dieciocho	18
diecinueve	19
veinte	20
veintiuno	21
veintidós	22
treinta	30
treinta y uno	31

Adjectives

Adjectives describe nouns. There are three main groups of adjectives:

1) ending in –o or –a   2) ending in –e   3) ending in a consonant

Their endings change if you are describing a girl, like this:

masculine	feminine
seri**o**	seri**a**
alegr**e**	alegr**e**
español	español**a**

a alto	**e** elefante	**i** idea	**o** yo	**u** universo	**ll** libro / llamar / l
ca casa	**co** comer	**cu** cuerpo	**ce** cerca	**ci** cierto	**z** zona
ga ganar	**go** gol	**gu** preguntar	**ge** gente	**gi** imaginar	**j** ojo
ñ español / mano / n	**v** ver / b	**rr** celebrar / pero / r	**h** hablar	porque / **qui** que / quiero	guerra / **gui** guitarra

Model Text	
¡Hola! Me llamo Daniela.	Hi! My name is Daniela.
Soy cubana.	I am Cuban.
Tengo doce años.	I am 12 years old.
Mi cumpleaños es el quince de octubre.	My birthday is on the 15th October
Soy bastante lista y muy gracioso	I am quite clever and very funny
pero soy también un poco tímida	but I'm also a little shy.
¿Y tu?	And you?
¿Qué tipo de persona eres?	What kind of person are you?

North East Learning Trust