My Y5 General Home Learning Pack & answers

My Name is:_____

My Mathletics log on is:_____

My Mathletics password is:_____

My Education City log on is:_____

My Education City password is:_____

Dear Parents and Carers

With the government now asking all schools to shut, we have put together a pack of activities to enable your child to continue their learning at home. In the first instance, the pack is designed to last for approximately two weeks. We will also try, as far as possible to post further ideas and suggested websites, on our own school website, that you can use with your child.

If your family is currently self-isolating, wherever possible, could you arrange for another parent to collect your child's pack or arrange for someone else to collect it from the school by 12noon on the first day of closure at the latest.

As it is likely that children will be spending more time online than they would normally at school, it is important that as parents you remind children about **the importance of online safety.** In the parents' section of our website (How to help your child) we already have an online safety section with a variety of activities as well as links to websites.

https://www.st-marys-jun.hants.sch.uk/page/?title=Online+safety&pid=68

General Activities

- Reading with your child – a list of suggested questions is included in the pack
- Times tables practice – there are lots of websites available including: https://www.timestables.co.uk/ https://www.topmarks.co.uk
- Years 3/4 - Education City
- Years 5/6 – Mathletics
- Writing activities – a story related to books they read, diary entry, really detailed description of an object or place
- Art – still life pencil drawing of a toy, flower, other household item or even a trainer. The following website will give you further ideas - https://www.artforkidshub.com/
- Indoor PE activities – keep active indoors – www.gonoodle.com
- Cooking
- Gardening

If you do have a query about the work, you can email the teachers - please copy all the teachers for your child's year group into your email – someone will endeavour to get back to you, but with the rapidly changing circumstances we cannot guarantee this.

Teacher Emails

Year 3

n.eckett@st-marys-jun.hants.sch.uk

e.sherlock@st-marys-jun.hants.sch.uk

a.whincup@st-marys-jun.hants.sch.uk

Year 4

d.mcgregor@st-marys-jun.hants.sch.uk

a.gibbs@st-marys-jun.hants.sch.uk

s.gill@st-marys-jun.hants.sch.uk

Year 5

m.rundle@st-marys-jun.hants.sch.uk

e.candy@st-marys-jun.hants.sch.uk

h.parsons@st-marys-jun.hants.sch.uk

f.pressner@st-marys-jun.hants.sch.uk

Year 6

e.king@st-marys-jun.hants.sch.uk

c.cosgrove@st-marys-jun.hants.sch.uk

p.rimmel@st-marys-jun.hants.sch.uk

Further information can be found in the Parents section – 'How to help your child', on our website:

https://www.st-marys-jun.hants.sch.uk/page/?title=How+to+help+your+child%2E%2E%2E&pid=67

- On the year group pages
- Maths section
- English section
- Emotional Well-being
- Music
- French

Whilst we don't want to dictate a timetable, as every family's circumstances will be different, all children will benefit from continuing to have a structured day, which you could agree as a family. In the packs that you have been, given each year group has a timetable suggestion about time that you should be spending on each subject.

The Year 5 Learning pack

Advice and suggestions – below are a slightly random list of helps and hints for how to help your child with their learning at home, it is only advice and suggestions and it is aimed to help:

- At school learning is a social activity as well as just getting on individually so "get on with what you've got to do" won't work – children will become demotivated very quickly. Talk through regularly with your child what they are doing / learning. More than 10 minutes of individual, silent learning is hard to sustain for children unless they are really into it. So make it a fun family activity.
- Hear your child read, even if they are very good at reading already
- Have an agreed routine and timetable for your day that your child and you can refer to (at school we have written up what we will do / be learning and when). This will help your child not to be anxious, know what to expect is coming up in the day and also help you know what's going on for the day. It might just be a list of times and what learning you/they will be doing at that time.
- We are suggesting that you spend 20 minutes on mathematics, 20 minutes writing (see later on for suggestions about this), 20 minutes reading and then 20 minutes other subjects. This timetable below has been found online – you might find it helpful but you might not, it is just an example & the eagle eyed will notice it contains more academic time than suggested above!

Before 9:00am	Wake up	Eat breakfast, make your bed, get dressed, put PJ's in laundry
9:00-10:00	Morning walk	Family walk with the dog Yoga if it's raining
10:00-11:00	Academic time	NO ELECTRONICS Soduku books, flash cards, study guide, Journal
11:00-12:00	Creative time	Legos, magnetiles, drawing, crafting, play music, cook or bake, etc
12:00	Lunch	
12:30PM	Chore time	A - wipe all kitchen table and chairs B - wipe all door handles, light switches, and desk tops C - Wipe both bathrooms, sinks and toilets
1:00-2:30	Quiet time	Reading, puzzles, nap
2:30-4:00	Academic time	ELECTRONICS OK Ipad games, Prodigy, Educational show
4:00-5:00	Afternoon fresh air	Bikes, Walk the dog, play outside
5:00-6:00	Dinner	
6:00-8:00	Free TV time	Kid showers x3
8:00	Bedtime	All kids

- Hear your child read to you
- Screen time (gaming or watching stuff) is hard to break off from because of the different brain chemicals it causes to be released – so save it until after more formal paper based learning has been done
- Have a family story that you are reading together and perhaps at the end of a mealtime or on the run up to bedtime you read some together which all the children are enjoying
- Praise the learning behaviours you want to see, e.g. "I love how you have persevered at your handwriting today" or "I am so impressed that you have tidied up your junk modelling so well today"
- Read your child's book to them for a bit
- Chat about new and unusual words in your child's book and write them in their reading record
- Read together – a page each
- Be outdoors where and when you can
- Read something unusual like a seed packet or some cooking instructions / recipe together
- Low mood = food, we see a real dip in attention and interest in learning from 10.30am and just before lunch and towards the end of the day because often low mood = need food. Healthy snacks can quickly change the mood.

Other Suggestions from some children in year 5 and some from their teachers

- Write a diary each day – 3 to 5 sentences where you capture a best moment, a funny moment and something that you discovered new or surprising
- Junk Modelling – some have suggested turning cereal boxes inside out first so that you can then decorate them!
- Science experiments - https://www.stem.org.uk/resources and then click "primary" has some lovely experiments you could do, it is a website for teachers and the language is for grown-ups so we suggest you look ahead of time and decide what to do
- Another useful website is https://www.bbc.co.uk/teach/primary/zd7p47h or search "bbc teach primary" which has some fun short videos in subject areas as well as other resources that you might like to look at
- Create and play a board game
- Art topic – create a collage
- Use Mathletics - see front covers for log on details
- Use Education city – see front cover for log on details
- Do some exercise! Joe Wicks on youtube does a 5 minute work out for children – search "Joe Wicks 5 minute move"
- Create a garden sculpture
- Create a poster about anything you like, perhaps about your favourite thing to do
- Write a letter to a relative, photograph it and email it through to prevent the spread of germs
- Create a photo montage of picture you make then share it with a loved one you can't visit at present, perhaps turn a few pictures you draw into an animation
- Have a daily checklist of what you need to do and tick them off each day
- Do some cooking or baking together and use the experience to inspire you to write a short story or perhaps a recipe
- Draw a symmetrical pattern using a ruler and then add colour
- Create a comic strip
- Have some time sat quietly and calmly listening to the sounds around you
- Write a book review – what would people want to know or need to know to be persuaded to read that book
- Write a film review - what would people want to know or need to know to be persuaded to watch the film
- Make a time capsule (search online for more information)

PACKS – We have created these packs, there is a Maths pack and a general pack that includes answers to all we have set where answers are required.

Best wishes,

The Year 5 team

Practice ①

marvellous

mischievous

muscle

necessary

neighbour

Practice ②

nuisance

occupy

occur

opportunity

parliament

Practice (3)

persuade

physical

prejudice

privilege

profession

Practice (4)

programme

pronunciation

queue

recognise

recommend

Practice ⑤

relevant

restaurant

rhyme

rhythm

sacrifice

Practice ⑥

secretary

shoulder

signature

sincere

sincerely

Practice ⑦

soldier

stomach

sufficient

suggest

symbol

Practice ⑧

system

temperature

through

twelfth

variety

Practice (9)

vegetable

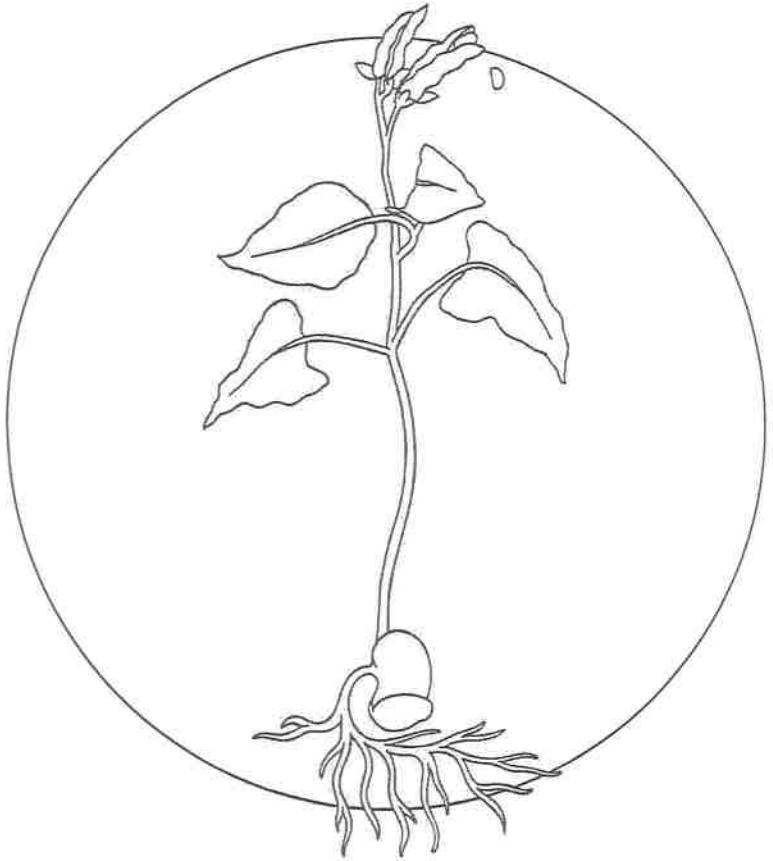
vehicle

yacht

Date: _____

Plants need these things to grow healthily:

Bean Plant Diary



Name: _____

Date: _____

Planting the bean seed

Equipment:

Date: _____

Picture:

Date: _____

Picture:

Date: _____

Picture:

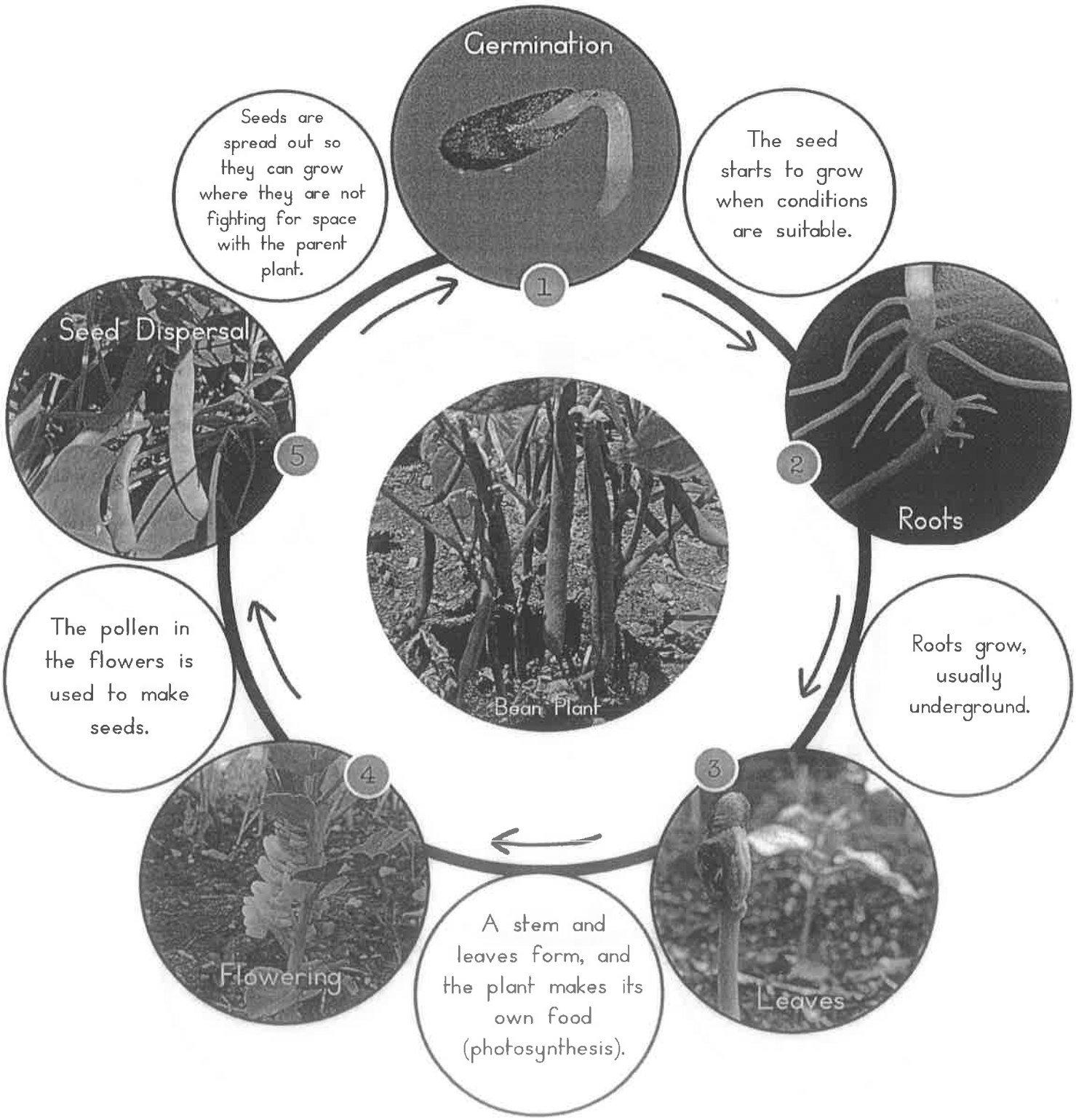
Date: _____

Picture:

Date: _____

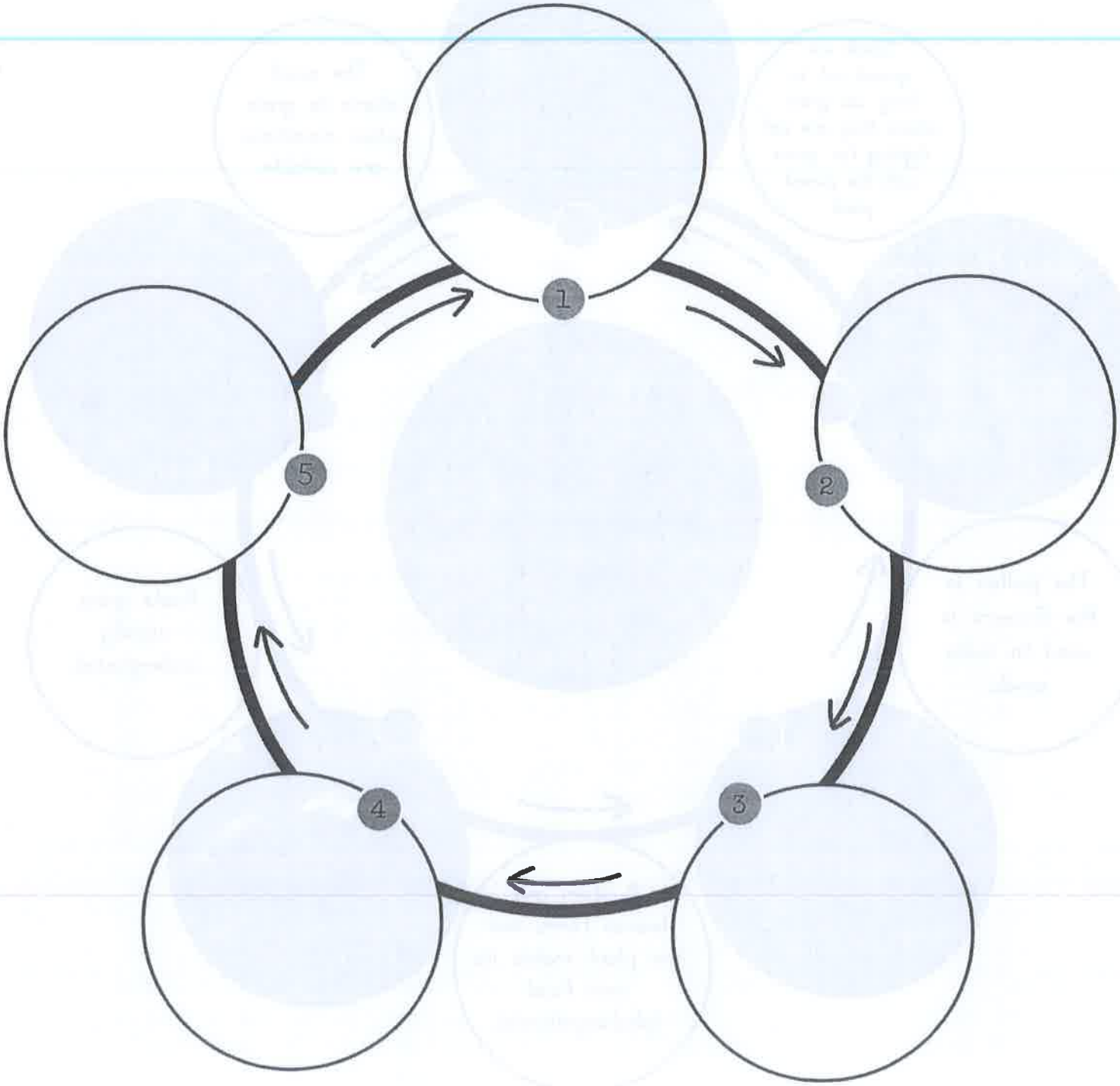
Picture:

The Flowering Plant Life Cycle

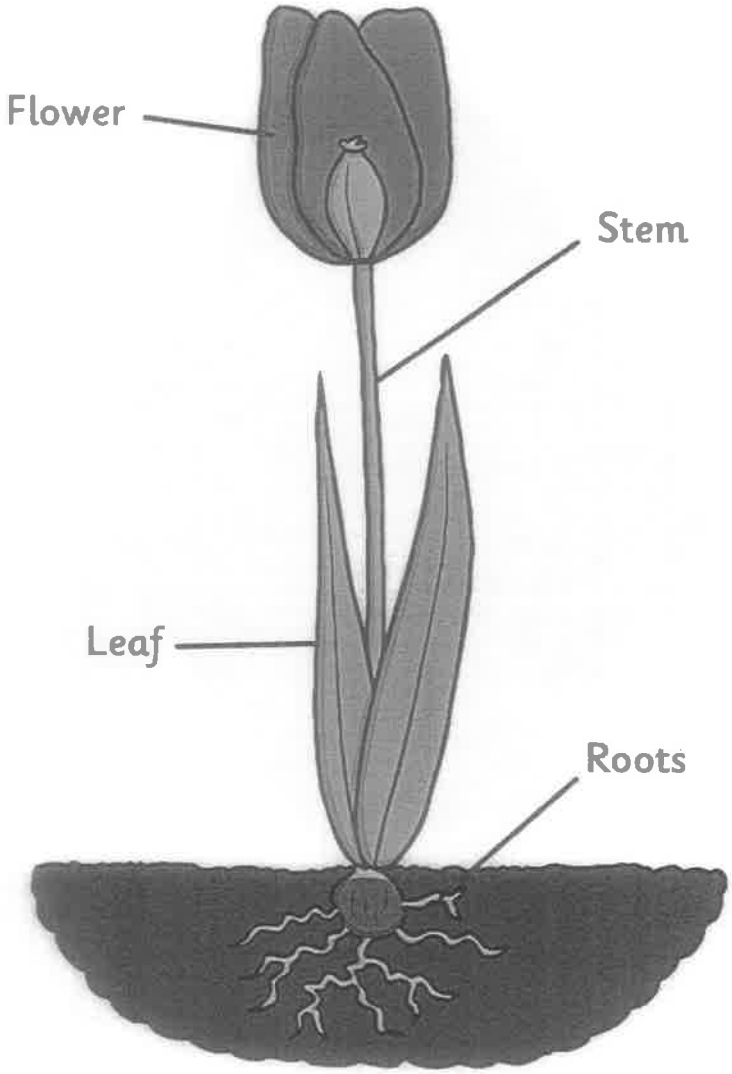


The Flowering Plant Life Cycle

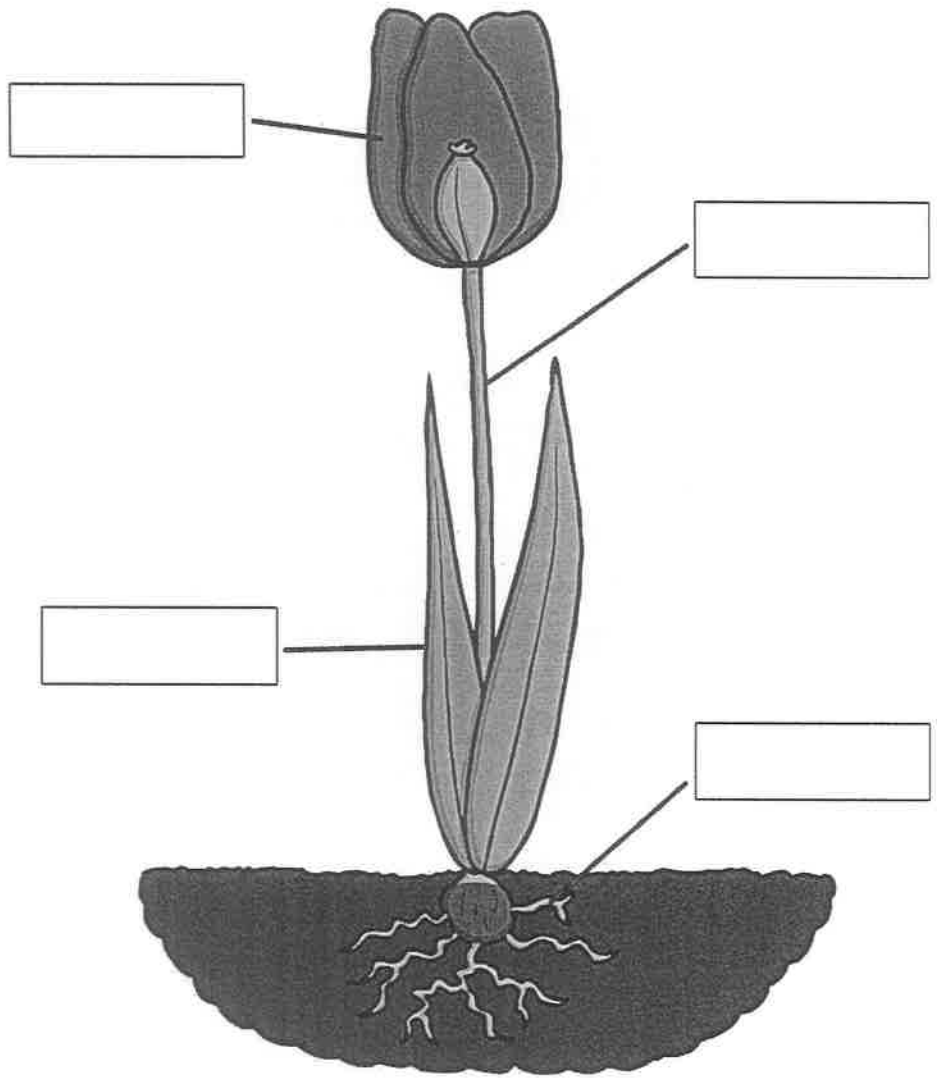
Complete by drawing a picture and writing a title / explanation for each stage.



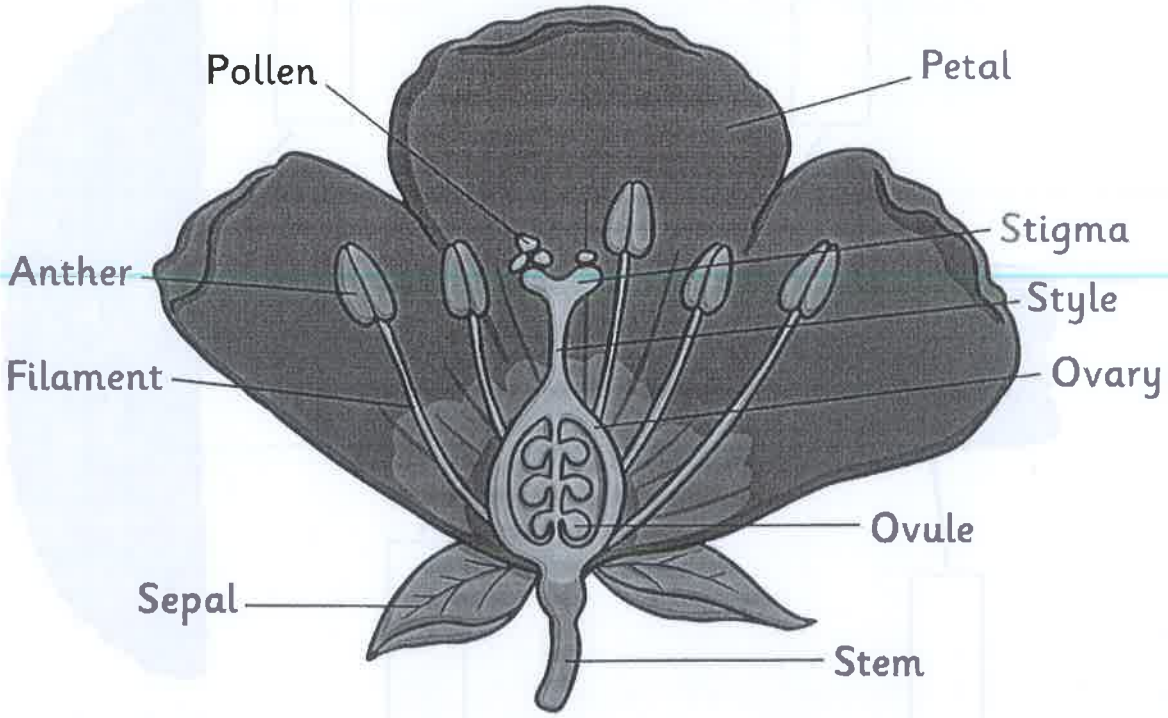
Parts of a Plant



Parts of a Plant

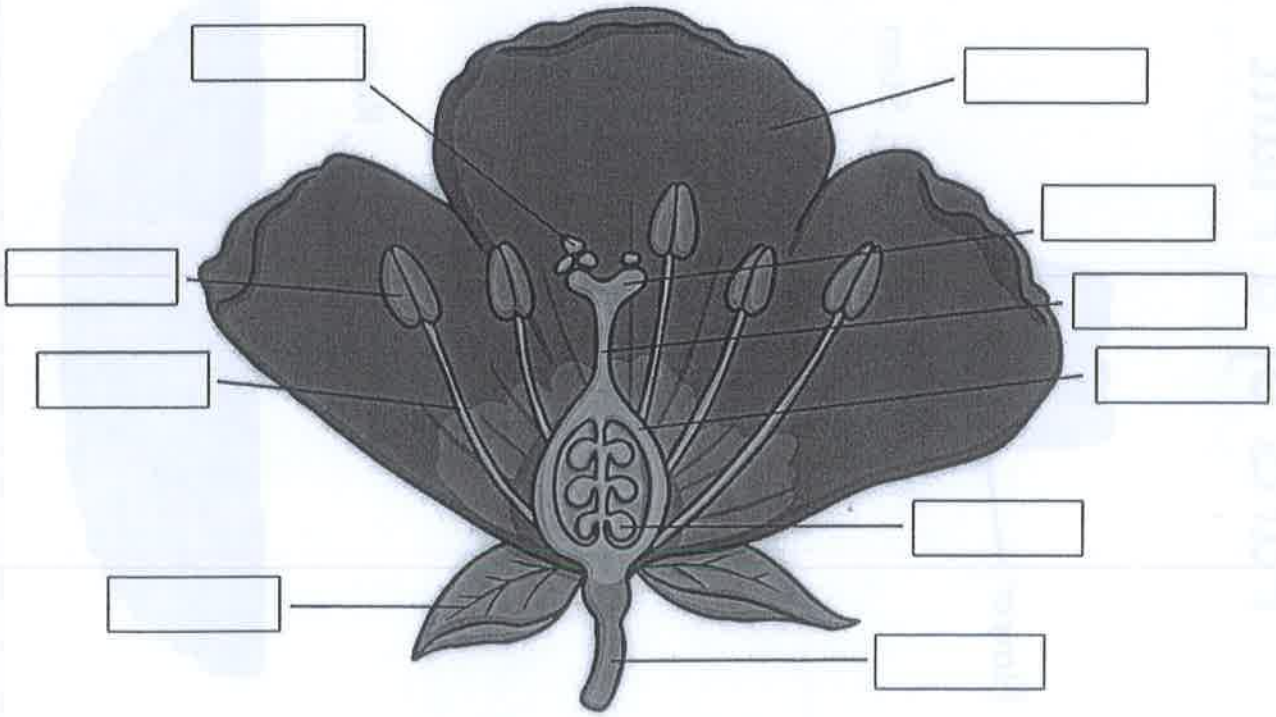


Parts of a Flower



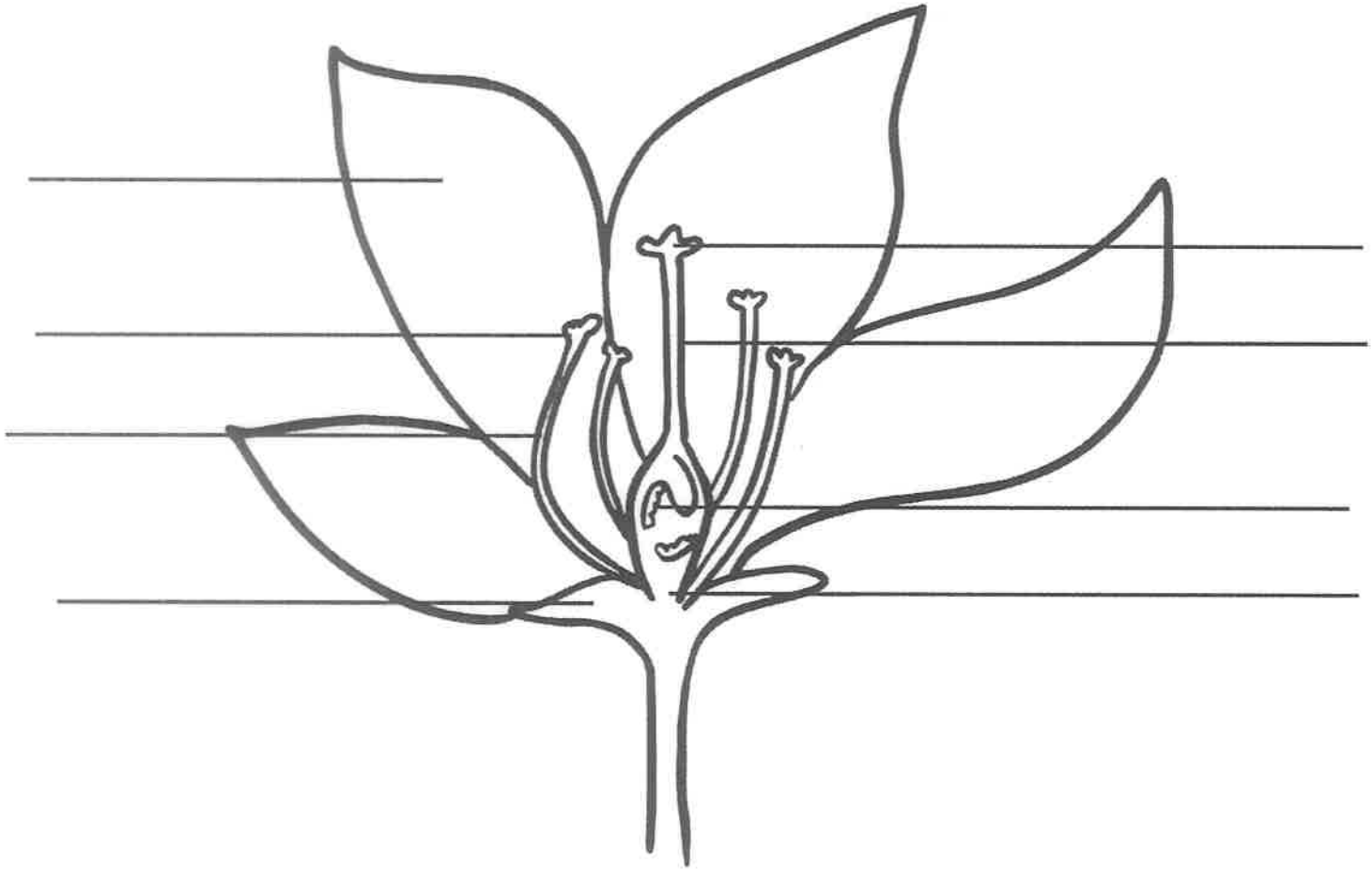
Label up and learn the names

Parts of a Flower



Parts of a Flower

Label the different parts of the flower and colour



Seed Dispersal Worksheet

Name: ..... Date: .....

A plant produces many seeds. If all the seeds fell to the ground not many would germinate. The area would become over crowded and there would not be enough water or minerals for all the seeds. Plants have developed so that seeds can be transported in a number of different ways: by the wind, by animals eating them, by water or by sticking to animals.

Write how each seed is dispersed.

sycamore

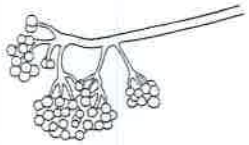
_____

poppy

_____

burdock

_____



berries

_____

coconut

_____

acorn

_____

Describe how an apple seed could be dispersed by water.

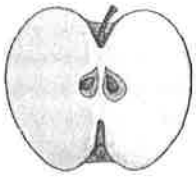
_____

_____

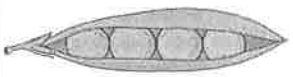
Seed Dispersal Sorting

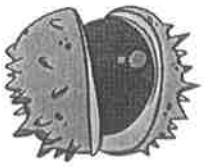
Cut out the squares and sort them into the correct page


sycamore


apple


poppy


peas


horse chestnut


dandelion


coconut


Himalayan balsam


ragwort


burdock


berries


acorn

Seed Dispersal Sorting

Some seeds can be dispersed in more then one way so some seeds can be put on more than one sheet.

Wind

Eaten by Animals

Some seeds can be dispersed in more then one way so some seeds can be put on more than one sheet.

Water

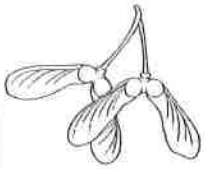
Exploding

Some seeds can be dispersed in more then one way so some seeds can be put on more than one sheet.

Catching a Lift

Answers

Wind



sycamore

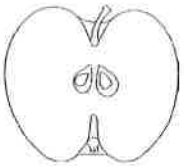
dandelion

ragwort

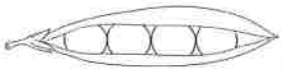
poppy

Eaten by Animals

ragwort



apple



peas

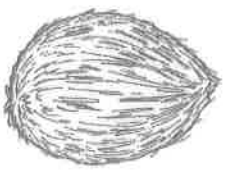
acorn

berries

horse chestnut

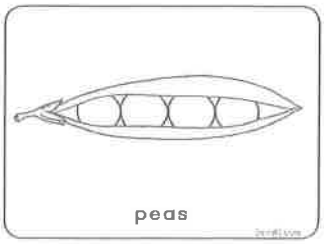
Water

Himalayan balsam



coconut

Exploding



peas

poppy

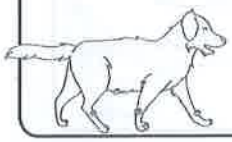
Himalayan balsam

Answers

Catching a Lift

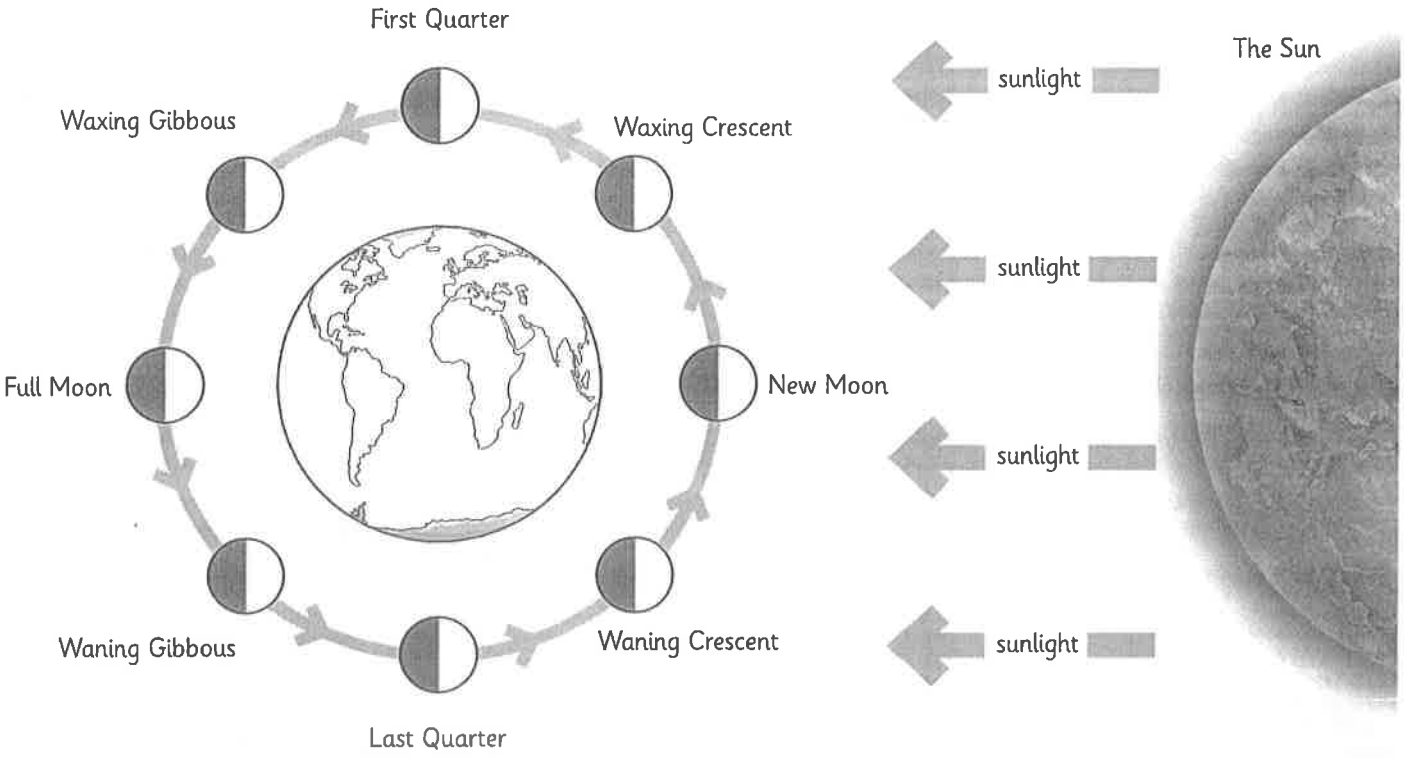
horse chestnut

burdock

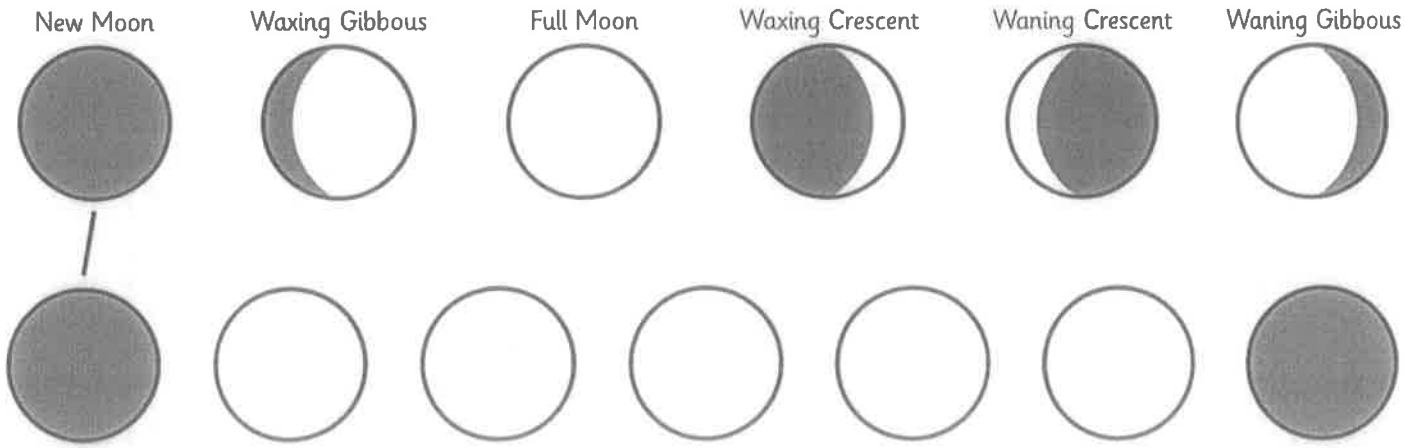


Waxing of the Moon

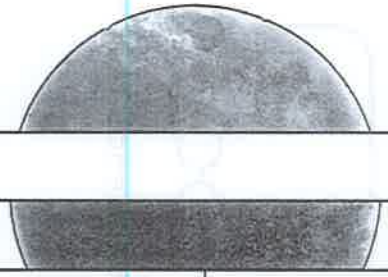
As the Moon travels around the Earth, we see different parts of the Moon that are lit by the Sun. These are called phases of the Moon.



Draw a line from each of the phases of the moon to the correct position in the sequence from new moon to new moon.



My Moon Diary



Time to check Moon each night:	Month of diary commencement:

Shade the circle so that the section of the Moon that is illuminated remains. Draw clouds over it if you can't see it!

Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____

All about...

Rainforest Deforestation

Rainforests are an essential part of our planet, providing oxygen, absorbing carbon dioxide and housing 50% of the animal and plant species of the planet. Not to mention, the medicines and cures that are made using plants only found in a rainforest environment.

Deforestation

Deforestation is the name given to the destruction of the rainforests and this is being done by burning them, chopping down the trees, or in some cases, flooding the areas. This is happening so fast that an area the size of twenty football pitches is being destroyed every minute! If the current rate of deforestation continues, it will take less than a hundred years to destroy all the rainforests on Earth.

Fact File in Numbers

- 20% of the world's oxygen is produced in the Amazon forest.
- 28,000 species of animals are expected to become extinct in the next 25 years due to deforestation.
- $\frac{1}{2}$ of the tropical rainforests that we had have already gone.

Why are they being destroyed?

The biggest reason rainforests are cleared is to make space for food, including cattle to be farmed for cheap beef and also growing large crops, such as soya beans and palm oil. In addition, other causes of deforestation, which are also related to making money include; chopping down and using the wood from the forest, building roads for mining metals, gold or diamonds, flooding areas to make dams to generate electricity and also digging for oil.

How can they be saved?

There are plenty of charities fighting against deforestation and people can always help by raising money for those charities. Also, think about the reasons that the forests are being destroyed and how some little changes in your everyday habits could help. For example, the cheap beef farmed in the areas that used to be rainforest land is often used in fast food chains. Could you avoid eating fast food from these outlets? You could also check on your supermarket food labels for the country of origin of any meat you buy. Was it farmed in an area where deforestation is taking place? You could also use rainforest-friendly wood so you know it is not a by-product of deforestation. Finally remember, paper comes from trees so any paper saving you can do, as well as recycling, will help the environment.

Questions about Rainforest Deforestation

1. Name a reason not to destroy rainforests given in the first paragraph.

2. Name **two** of the three ways given that a rainforest can be destroyed.

3. What **percentage** of the rainforests has already gone?

4. In the fact file, what does the author say will happen in the next quarter of a century?

5. Why does saving paper help the rainforests?

6. Why has the author used an exclamation mark in paragraph two?

7. What **fraction** of the earth's plant and animal species live in the rainforests?

8. List **two** main reasons why deforestation is occurring.

9. Which rainforest produces 20% of the world's oxygen?

10. What is your opinion about deforestation? How could you help to stop it?

Questions about Rainforest Deforestation

Answers

1. Name a reason not to destroy rainforests given in the first paragraph.

   Any from: medicines, cure for cancer, 50% of animal and plant species live there, gives out oxygen, absorbs carbon dioxide.

2. Name two of the three ways given that a rainforest can be destroyed.

   Any from: burning, chopping down, flooding.

3. What percentage of the rainforests has already gone?

   50% (it says ½ in the text).

4. In the fact file, what does the author say will happen in the next quarter of a century?

   (28,000) species of animals will become extinct (the text says twenty-five years).

5. Why does saving paper help the rainforests?

   Paper is made from wood (making it also causes more carbon footprint).

6. Why has the author used an exclamation mark in paragraph two?

   The rate of destruction is surprising (discuss this).

7. What fraction of the earth's plant and animal species live in the rainforests?

   ½ (the text says 50%).

8. List two main reasons why deforestation is occurring.

   Any two from: Food: Cheap beef, or agricultural crops including soya or palm oil, using the wood, building roads for mining, generating electricity or digging for oil.

9. Which rainforest produces 20% of the world's oxygen?

   The Amazon Rainforest.

10. What is your opinion about deforestation? How could you help to stop it?

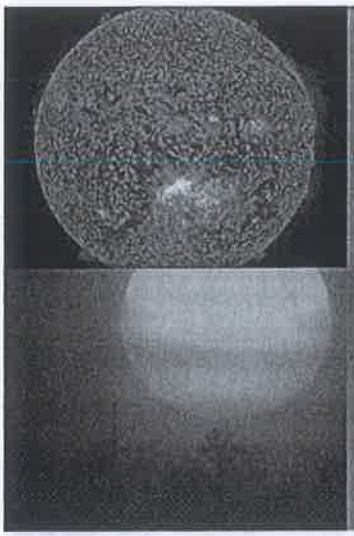
    Open ended for discussion. Answers could discuss raising money for charities, making different choices about food and conserving paper.

The Sun

The Sun is a star and is at the centre of our solar system. That is why it is called a solar system. The word solar means 'relating to the Sun'. The planets in our solar system stay together because the Sun is so big its gravity keeps us all locked in orbit around it.

Making Energy:

The Sun provides almost all the energy, light and heat needed on Earth and it mainly uses hydrogen and helium for this. Energy is made at its core in the centre of the Sun's sphere. Around the core is the radiative zone which carries the energy to the next layer – the convection zone. It takes about 170,000 years for the energy to move from the core to the convection zone! The photosphere is at the Sun's surface and the energy gets to there from the convection zone in large bubbles. From here, the energy escapes (through the chromosphere and corona) and some of it comes to Earth. It takes about 8 minutes for heat to reach us from the Sun.



Did you know?

Surface temperature: 5505°C

Distance to Earth: 149.6 million km

Radius: 696,342 km

Circumference: 4,366,813 km (2,713,406 miles)

Mass: 1,989,000,000,000,000,000,000,000,000,000kg

(About 1.3 million Earths could fit inside the Sun)

Lifespan:

The Sun is actually a yellow dwarf star and was created about 4.6 billion years ago. The Sun will eventually run out of energy and fade, but don't worry...this won't be for another 4.5 to 5.5 billion years yet! Before the Sun eventually fades, in an unimaginable time from now, it will get bigger and turn into what is called a 'red giant'. In 1.1 billion years from now, the Sun will be 10% brighter than it is today. This will make Earth a bit like a greenhouse – hot and moist. 3.5 billion years from now, it will be even brighter than that at 40% more than it is today. This will be so hot that the oceans will boil and the ice will melt. It's safe to say that there will be no life on Earth by then, but with space travel already making new discoveries and exploring other planets, where do you think humans will be by then?

Questions About The Sun

1. What gases is the Sun mainly made from?

2. How long does it take energy to reach Earth from the Sun?

3. How far away is the Sun from Earth?

4. What type of star is the Sun now?

5. List the different layers of the Sun from the centre to the outside.

6. What keeps our solar system of planets orbiting the Sun?

7. Solar means 'relating to the Sun'. Think of two (or more) examples where we use the word 'solar'.

8. Will the Sun last forever? If not, why not?

9. In the final paragraph it says that Earth will become 'a bit like a greenhouse'. A greenhouse is warm and moist inside because of the glass that lets heat and light in and keeps it in. Our Earth is not surrounded by glass, so what will let the heat and light in and keep it in?

10. Look at the final line - where do **you** think humans will be by then?

Questions About The Sun

Answers

1. What gases is the Sun mainly made from?

   Hydrogen and helium

2. How long does it take energy to reach Earth from the Sun?

   8 minutes

3. How far away is the Sun from the Earth?

   149.6 million km

4. What type of star is the Sun now?

   A yellow dwarf

5. List the different layers of the Sun from the centre to the outside.

   Core, radiative zone, convection zone, the photosphere, chromosphere, corona

6. What keeps our solar system of planets orbiting the Sun?

   The Sun's gravity

7. Solar means 'relating to the Sun'. Think of two (or more) examples where we use the word 'solar'.

   Any including: solar panels, solar energy, solar power, solar eclipse, solarium, solar cell, solar year

8. Will the Sun last forever? If not, why not?

   No. It will use all its energy eventually.

9. In the final paragraph it says that Earth will become 'a bit like a greenhouse'. A greenhouse is warm and moist inside because of the glass that lets heat and light in and keeps it in. Our Earth is not surrounded by glass, so what will let the heat and light in and keep it in?

   The atmosphere

10. Look at the final line - where do **you** think humans will be by then?

    Open ended for discussion.
    There's every possibility we may be in other solar systems or galaxies by then.

Planet Earth

We all live on Earth...why? Well, Earth is the only planet in our solar system that has all the things we need to survive: 21% oxygen in the air to breathe, water to drink and all at just the right temperature warmed by the Sun. Its name comes from the Old English word 'ertha' and the Anglo-Saxon word 'erda' which means ground or soil.

The Blue Planet:

Earth, the third planet from the Sun, is referred to as 'The Blue Planet' because of how it looks from space – blue. This is due to the fact that over ⅔ of the Earth's surface is covered in water.

Did you know?

Age: approximately 4.54 billion years

Diameter: 13,000 km

Distance to Sun: 150,000,000 km

Surface Temperature: 15°C

Highest point: Mount Everest 8.8 km

Lowest point: Challenger Deep 10.9 km below sea level

I'm Spinning Around:

The Earth spins on its axis once every 24 hours – that's what gives us day and night as we spin to face the Sun and then away from it again. You wouldn't notice but the Earth's spin is actually slowing down by 17 milliseconds per hundred years. Eventually this will lengthen our days but it will take around 140 million years before our day will have increased from 24 to 25 hours. I wonder if children 140 million years from now will have an extra hour at school.

Whilst it is spinning, the Earth is also orbiting The Sun, which takes 365 ¼ days to do one full circuit. This gives us the length of our years. Our seasons are also dependent on the orbit of the Earth as our planet is tilted at an angle. This means that around one side of the Sun we are tilted towards it – giving us warmer temperatures and longer days...our summer. However, around the other side of the Sun we are tilted away from it giving us less light and cooler temperatures – this is our winter. All in all, it's a pretty amazing planet and I, for one, am glad to call it home.

Questions About Planet Earth

1. What percentage of Oxygen is in the air we breathe?

2. What is the highest thing on Earth?

3. How long does it take the Earth to spin once on its axis?

4. Will the Earth always spin at this speed? If not, how will it change?

5. How many planets are between us and the Sun and can you name them?

6. Why do we experience summer around one side of the Sun?

7. Why is Earth also called 'The Blue Planet'?

8. What 3 things make it possible for us to survive on Earth?

9. Why do we need to add an extra day to our year every 4 years?

10. Which fact or piece of information has amazed you the most and why?

Questions About Planet Earth

Answers

1. What percentage of Oxygen is in the air we breathe?

   21%

2. What is the highest thing on Earth?

   A mountain (the question asks 'what thing')

3. How long does it take the Earth to spin once on its axis?

   24 hours/1 day

4. Will the Earth always spin at this speed? If not, how will it change?

   No – it is slowing down

5. How many planets are between us and the Sun and can you name them?

   2 (Mercury and Venus)

6. Why do we experience summer around one side of the Sun?

   The Earth is tilted towards The Sun

7. Why is Earth also called 'The Blue Planet'?

   Water makes up 2/3 of the surface so it looks blue from space.

8. What 3 things make it possible for us to survive on Earth?

   Water, air (or oxygen), warmth

9. Why do we need to add an extra day to our year every 4 years?

   Due to the fact we have an extra ¼ day every year we orbit the Sun

10. Which fact or piece of information has amazed you the most and why?

    Open ended to discuss.

The Moon

Do you ever look up in the sky at night and see the Moon shining down and lighting up the night-time town? Do you sometimes wonder what it would be like to visit the Moon or wonder why it shines so bright? Well here's some information that might interest you...

Moon and Sun:

The Moon shines very brightly, but is only reflecting the light of the Sun it can't make its own light. When the Sun comes back up for our day time we think that the Moon goes away but it doesn't, it's just harder to see because it is so bright. Sometimes, if you look carefully, you can see the Moon in the sky during the day time.

Did you know?

Average temperature in the day: 107°C

Average temperature at night: -153°C

Distance from Earth: 238,857 miles

Diameter: 2,160 miles

Length of Day: 708 hours

Selenophobia is fear of The Moon

Orbit:

The Moon is the Earth's only satellite (that means something that orbits a larger object). It takes the Moon about 28 days to orbit the Earth once, we call this a lunar month. During this time we only ever see the same side of the Moon as it rotates slowly whilst it moves around us.

During its orbit the Moon is sometimes covered by a shadow of the Earth, this is what gives us the phases of the moon, when it is waxing (growing bigger) and waning (getting smaller) with shapes including crescent and gibbous.

Moonwalking:

Only 12 people have ever walked on the Moon! The first person to do this was Neil Armstrong on 20th July 1969. There were two other men on the mission: Buzz Aldrin and Michael Collins and they all travelled on the Apollo 11 shuttle.

You may have seen a film of people walking on the Moon and it isn't quite the same as walking on the Earth...walking on the Moon looks bouncy because the Moon's gravity is not as strong as the Earth's, so people take longer to fall back down when they are up in the air.

Questions About The Moon

1. How many people were on the first moon landing mission?

2. How does the moon look like it lights up when it doesn't?

3. What is a satellite?

4. How much colder is the Moon at night than in the daytime?

5. What causes the shadow on the Moon?

6. Why is the Moon colder than Earth at night?

7. Where does the Moon go in the daytime?

8. How long does it take the Moon to orbit the Earth?

9. How far did Neil Armstrong travel to get to the Moon?

10. Work out how long it would take a car travelling at 70mph to get to the Moon.

a: In hours

b: In days

Questions About The Moon

Answers

1. How many people were on the first moon landing mission?

   Three

2. How does the moon look like it lights up when it doesn't?

   It reflects the Sun's light/rays

3. What is a satellite?

   Something that orbits a larger object

4. How much colder is the Moon at night than in the daytime?

   260°C (107 + 153)

5. What causes the shadow on the Moon?

   The Earth (casts a shadow as it gets in the way of the Sun's rays).

6. Why is the moon colder than the Earth at night?

   It is further away from the Sun at night.

7. Where does the Moon go in the daytime?

   Nowhere – it stays in the daytime sky

8. How long does it take the Moon to orbit the Earth?

   About 28 days / 4 weeks / 27.3 days / 29-30 days
   (The range is because it depends also on the position of The Earth)

9. How far did Neil Armstrong travel to get to the Moon?

   238,857 miles

10. Work out how long it would take a car travelling at 70mph to get to the Moon.

    a. In hours
    3412 hours (238857 ÷ 70)

    b. In days
    142 days (341 2÷ 24)

BACK TO EARTH WITH A BUMP!

Reported by Amanda Kelper, Media Correspondent, London

Last week, British astronaut Tim Peake returned home from an incredible six month stay aboard the International Space Station (ISS), alongside his crewmates Yuri Malenchenko and Timothy Kopra. He is the first British astronaut to have lived on the ISS.

The men were launched into space on 15th December 2015 and in the months before take-off, they trained intensively for their trip. The mission involved conducting experiments, testing out new technology and inspiring the next generation of space travellers. Peake told reporters that the highlight of his mission was a spacewalk where he had to make a repair on the space station. Whilst away from home, Tim also ran the equivalent of the London Marathon on his treadmill.

Having circled the planet nearly 3,000 times in 186 days, the crew returned home to Earth via a Soyuz capsule, which reached speeds of up to 28,000 kilometres per hour (25 times the speed of sound). The touchdown was bumpy due to high winds, however the astronauts landed safely in Kazakhstan. They all returned in good health. Having arrived back on solid ground, the astronauts were pulled out of the capsule and carried as their leg muscles were too weak to walk. Whilst sitting in their space suits, the men were checked over by medical staff. During these checks, Peake was asked how it felt to be home, 'The smells of Earth are so strong and it's wonderful to be back in the fresh air.'

Tim later flew from Kazakhstan to the headquarters of the European Stage Agency in Cologne, Germany where he is recovering and adjusting to life back on Earth. Scientists are carrying out tests to see how his body has been affected by his time in space.

Landing with a bump! Tim Peake lands safely in Kazakhstan.

In a recent press conference, Peake commented on how he'd missed family and friends, and even the rain. Tim expressed how much he was now looking forward to spending some quality time with his family. When asked if he'd return to space in the future, he replied, '...in a heartbeat.'

His service to science has earned him an honour from the Queen. Peake was made a CMG, or companion of the order of St Michael and St George. In response, Tim said, 'I am only one privileged person in a complex team of technicians, scientists, engineers, educators, trainers and flight directors, all working in pursuit of one of the greatest scientific and technical challenges of our time – exploring our solar system for the benefit of people on Earth. This award is for them.'

Comprehension Questions

Answer questions in full sentences.

1. How long had Peake been living on the ISS?

2. Write down **two** jobs Tim had to do on the mission.

3. Why were the astronauts carried out of the capsule?

4. What did Peake notice once he'd left the capsule?

5. What was hard about being on the ISS for so long?

6. Why do you think Tim dedicated his special honour to the entire team?

7. Give **two** reasons why space travel is important.

_____

_____

8. Why has a picture and caption been added to the report?

_____

_____

Back To Earth With A Bump! **Answers**

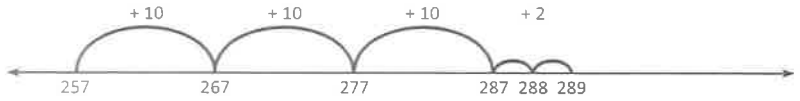
1. How long had Peake been living on the ISS?
   Tim Peake had been living on the ISS for six months.
2. Write down **two** jobs Tim had to do on the mission.
   Any two of; he conducted experiments, tested out new technology and did necessary repairs on the ISS.
3. Why were the astronauts carried out of the capsule?
   They were carried as their leg muscles were too weak to walk.
4. What did Peake notice once he'd left the capsule?
   He noticed the smells of Earth and the fresh air.
5. What was hard about being on the ISS for so long?
   Tim said that being away from his family and friends for such a long time wasn't easy.
6. Why do you think Tim dedicated his special honour to the entire team?
   Own answers, which may include reference to his space travel mission being a team effort.
7. Give a reason why space travel is important.
   Own answer, which may include to make new discoveries, to find out if there's life in other parts of the Solar System, to conduct important experiments in space, etc.
8. Why has a picture and caption been added to the report?
   It has been added to make the report more eye-catching and interesting to the reader.

Addition mental strategies – jump strategy

When we add we can use the jump strategy to help us. Look at 257 + 32:

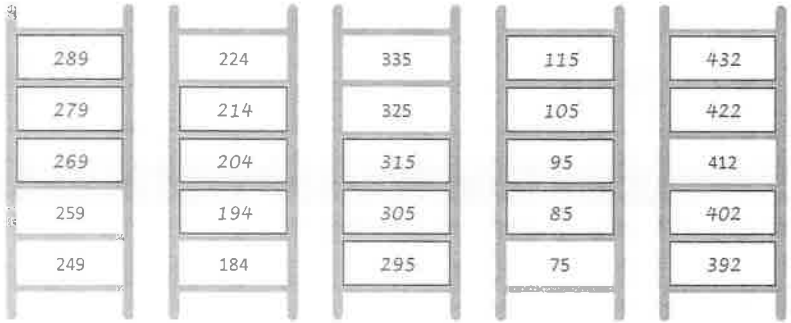
1 First we jump up by the tens

2 Then we jump up by the units



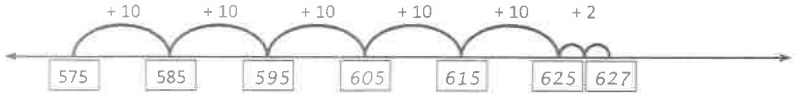
257 + 32 = 289

1 **Warm up with jumping by tens up and down these ladders:**

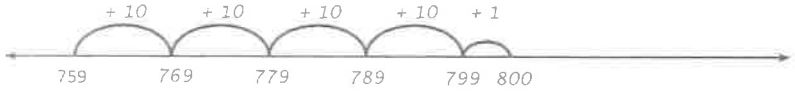


2 **Use the jump strategy to complete these additions:**

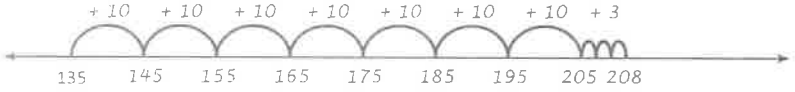
a 575 + 52 = 627



b 759 + 41 = 800

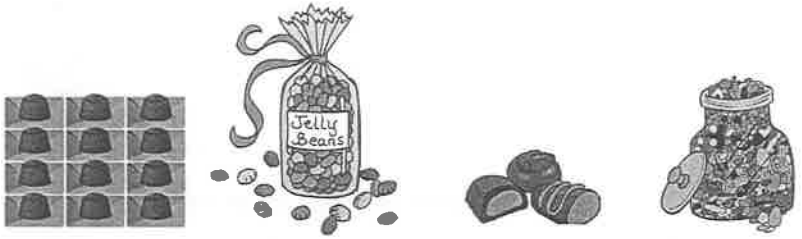


c 135 + 73 = 208



Addition mental strategies – jump strategy

3 **A group of friends each bought a bag of mixed sweets at a sweet shop. Practise using the jump strategy to solve each problem. Write your answer and any working out in the space below each problem:**



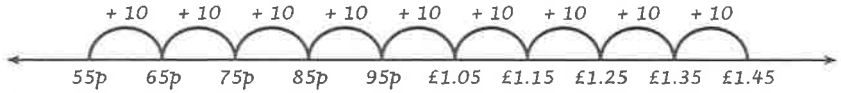
Choc mints 90p per scoop

Jellybeans 55p per scoop

Cream chocs 95p per scoop

Chocolate bonbons 75p per scoop

a How much did Liam spend if he bought a scoop of jellybeans and a scoop of choc mints?



b How much did Ruby spend if she bought a scoop of cream chocs and a scoop of chocolate bonbons?

£1.70

c How much did Rea spend if she bought one scoop of each type?

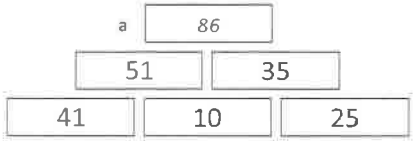
£3.15

d Rachel spent £1.85 on 2 scoops of sweets. Use guess, check and improve to work out which 2 scoops she could have bought.

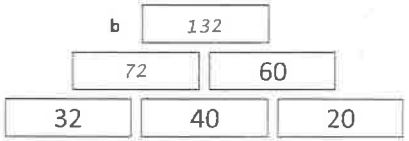
Choc minty and cream chocs.

4 **Use the jump strategy to help you finish these addition walls. Can you see how they work?**

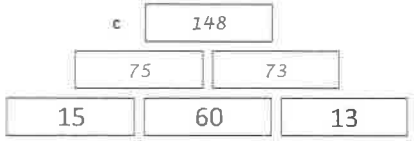
a



b



c



Addition mental strategies – split strategy

138 can be split into 100, 30 and 8.

When adding large numbers in our heads it can be easier to split one of the numbers into parts and add each part separately.

214 + 138 → 100, 30, 8 → 214 + 100 = 314 → 314 + 30 = 344 → 344 + 8 = 352

214 + 138 = 352

1 **Use the split strategy to add the numbers. The first one has been done for you.**

a 623 + 28 → 20, 8

623 + 20 = 643

643 + 8 = 651

623 + 28 = 651

b 38 + 25 → 20, 6

38 + 20 = 58

58 + 6 = 64

38 + 25 = 64

c 156 + 142 → 100, 40, 2

156 + 100 = 256

256 + 40 = 296

296 + 2 = 298

156 + 142 = 298

2 **These problems have been split and some have been solved already. Lucky, hey? You just have to work out what the second numbers were before they were split and answer any unsolved problems:**

a 416 + 90 + 1 = 507

was

416 + 91

b 230 + 30 + 3 = 263

was

230 + 33

c 283 + 60 + 7 = 350

was

283 + 67

d 532 + 60 + 1 = 593

was

532 + 61

e 425 + 100 + 40 + 2 = 567

was

425 + 142

f 129 + 200 + 40 + 6 = 375

was

129 + 246

3 **Work out the answers to these questions by using the split strategy. See if you can do the working in your head. If it helps, make notes as you go:**

a 173 + 36 = 209

b 446 + 51 = 497

c 112 + 83 = 195

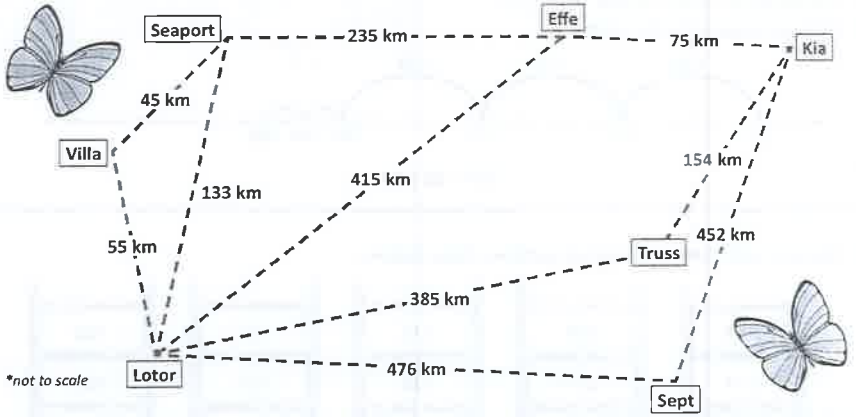
d 724 + 72 = 796

e 475 + 122 = 597

f 123 + 164 = 287

Addition mental strategies – split strategy

4 **Butterflies can fly great distances. Use the map and the split strategy to calculate the total distance flown by each butterfly in the table below:**

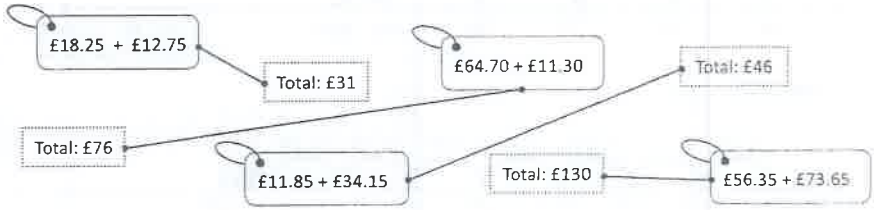


Flight path	Distances to add	Total distance
The Field Crescent flies from Lotor to Villa and then to Seaport	55 + 45	100 km
The Painted Lady flies from Sept to Lotor and then to Villa	476 + 55	531 km
The Fawn flies from Seaport to Effe and then to Kia	235 + 75	310 km
The Monarch flies from Sept to Kia and then to Effe	452 + 75	527 km

We often use the split strategy when adding money. We split the amounts into pounds and pence, work out each part and then add the two answers together:

£28.50 + £16.80 = (£28 + £16) + (£0.50 + £0.80)
= £44 + £1.30
= £45.30

5 **Match the price tags with the bills:**



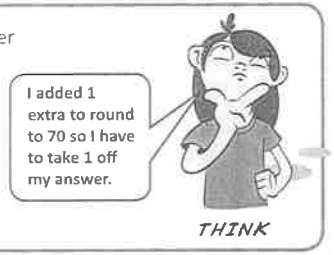
Addition mental strategies – compensation strategy

Sometimes we round one number in the problem to make it easier to do in our heads. Then we adjust our answer to compensate:

405 + 69 = 474

405 + 70 (−1) *I rounded up by 1*

475 (−1) = 474 *so I subtract 1.*



1 **Warm up by rounding these numbers to the closest ten:**

a 48 *50* b 67 *70* c 232 *230* d 74 *70*

e 89 *90* f 456 *460* g 955 *960* h 786 *790*

2 **Solve these problems using compensation:**

a 45 + 37 = 82

45 + 40 (−3)

85 (−3) = 82

b 66 + 18 = 84

66 + 20 (−2)

86 (−2) = 84

c 86 + 49 = 135

86 + 50 (−1)

136 (−1) = 135

d 124 + 57 = 181

124 + 60 (−3)

184 (−3) = 181

We can also round down to the closest ten. When we do this we add to compensate.

3 **Round these numbers to the closest ten. Then compensate by adding:**

a 26 + 42 = 68

26 + 40 (+2)

66 (+2) = 68

b 35 + 63 = 98

35 + 60 (+3)

95 (+3) = 98

c 96 + 21 = 117

96 + 20 (+1)

116 (+1) = 117

d 145 + 34 = 179

145 + 30 (+4)

175 (+4) = 179

Addition mental strategies – compensation strategy

4 **Connect the statements with their answer:**

When we round down we compensate by → subtracting

When we round up we compensate by → adding

5 **Solve these addition problems using compensation. Decide if you need to round up or down and compensate accordingly. Make as many notes as you need to:**

a 425 + 67 = 492

b 673 + 98 = 771

c 275 + 91 = 366

d 784 + 32 = 816

e 316 + 73 = 389

f 115 + 79 = 194

6 **A website tracked the number of visitors over 5 days:**

Monday	Tuesday	Wednesday	Thursday	Friday
124	199	213	158	236

Use the compensation method to answer the following questions. Try to do the sum in your head, then show how you did it in the space below:

a How many people looked at the website on Monday and Tuesday?

323

b How many people looked at the website on Thursday and Friday?

394

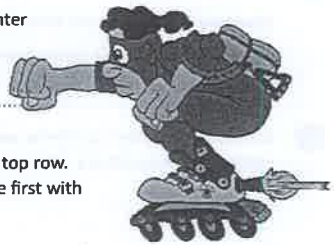
c On which 2 days did the total reach 449 visitors?

Wednesday and Friday

Checkerboard race — apply

Getting ready

This is a game for 2 players. You will need a counter each, a die and some paper to keep score.



What to do

Each of you will choose a starting square on the top row. The object of this game is to get to the finish line first with the largest total.

Roll a die. If you throw:

- a 1 or 2, you can only move one square across the row in either direction;
- a 3 or 4 means you can move one square diagonally;
- a 5 or 6 means you move one downwards.

Add the two numbers using a strategy of your choice. Record your total as you go. Who will arrive at the finish with the largest score? Good luck!

THINK

81	76	93	42	89	50	66	74
62	28	54	37	63	45	95	39
87	70	69	83	75	57	12	49
63	93	52	44	86	67	37	58
38	47	83	17	95	72	49	56
90	73	68	39	54	23	85	43
41	36	51	91	78	66	17	32
63	81	27	11	44	46	50	74
FINISH							

DISCOVER

Crack the city code — apply

Getting ready

Work out the answers to these sums in your head. Each answer matches a letter in the list on the right. Write the letters next to your answers, then unjumble the letters to find the name of a city.

What to do

Try competing with a friend to be the fastest to do all of the sums and work out the names of the three cities.

a

701 + 126 =	827	Letter	Y
501 + 81 =	582	Letter	D
810 + 117 =	927	Letter	E
304 + 205 =	509	Letter	S
810 + 17 =	827	Letter	Y
230 + 626 =	856	Letter	N

The city is SYDNEY

b

293 + 216 =	509	Letter	S
811 + 111 =	922	Letter	A
650 + 130 =	780	Letter	I
610 + 57 =	667	Letter	P
380 + 32 =	412	Letter	R

The city is PARIS

c

816 + 40 =	856	Letter	N
913 + 62 =	975	Letter	O
751 + 105 =	856	Letter	N
830 + 79 =	909	Letter	L
882 + 93 =	975	Letter	O
471 + 111 =	582	Letter	D

The city is LONDON

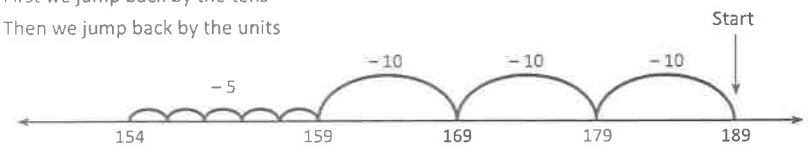
Code
A = 922
B = 754
C = 141
D = 582
E = 927
F = 735
G = 222
H = 358
I = 780
J = 989
K = 481
L = 909
M = 398
N = 856
O = 975
P = 667
Q = 555
R = 412
S = 509
T = 538
U = 656
V = 1110
W = 1150
X = 716
Y = 827
Z = 1907

Subtraction mental strategies – jump strategy

When we subtract we can use the jump strategy to help us. Look at 189 – 35:

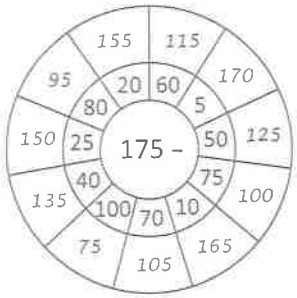
1 First we jump back by the tens

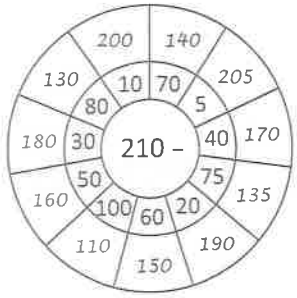
2 Then we jump back by the units



189 – 35 = 154

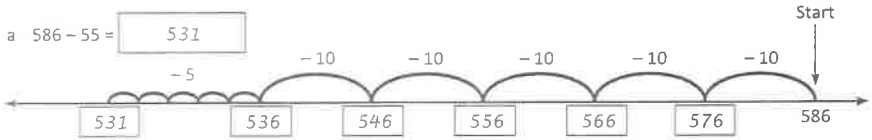
1 Warm up with these subtraction wheels:





2 Use the jump strategy to complete these subtraction problems. The first one has been started for you:

a 586 – 55 = 531



b 388 – 45 = 343

c 624 – 31 = 593

d 155 – 95 = 60

Subtraction mental strategies – jump strategy

3 **Work out the answers to these by using the jump strategy. See if you can do the working in your head:**

a 274 – 30 = 244

b 872 – 61 = 811

c 444 – 50 = 394

d 784 – 61 = 723

e 189 – 35 = 154

f 825 – 60 = 765

4 **An electronics store had a sale on the following video games. Use the jump strategy to work out the savings on each item:**

Bionic Bozo	Revenge of the Ponies	Fitness Frenzy	Taekwondo Team
Was £105	Was £135	Was £102	Was £155
Now £75	Now £60	Now £91	Now £111
Save £30	Save £75	Save £11	Save £44

5 **Use the prices above and the jump strategy to solve these problems. Show your answer and any working out:**

a Tahlia saved her pocket money for weeks to buy Fitness Frenzy. She had £120 saved and bought Fitness Frenzy in the sale. How much money did she have left after the purchase?

£29

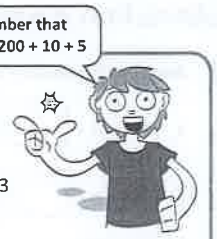
b Martin saved up especially for the sale and bought 2 items for £186. He bought Bionic Bozo and which other game?

Taekwondo Team

c Dana bought Taekwondo Team for her husband before the sale. What change did she receive if she paid with £200?

£45

Subtraction mental strategies – split strategy



When subtracting large numbers in our heads it can be easier to split the number to be subtracted into parts and work with each part separately.

468 – 215 (200, 10, 5) → 468 – 200 = 268 → 268 – 10 = 258 → 258 – 5 = 253

468 – 215 = 253

1 **Practise splitting these numbers into hundreds, tens and units. The first one is done for you.**

a 356 = 300 + 50 + 6

b 289 = 200 + 80 + 9

c 867 = 800 + 60 + 7

d 923 = 900 + 20 + 3

e 442 = 400 + 40 + 2

f 294 = 200 + 90 + 4

2 **Use the split strategy to subtract:**

a 468 – 316 (300, 10, 6)

468 – 300 = 168

168 – 10 = 158

158 – 6 = 152

468 – 316 = 152

b 574 – 155 (100, 50, 5)

574 – 100 = 474

474 – 50 = 424

424 – 5 = 419

574 – 155 = 419

c 457 – 323 (300, 20, 3)

457 – 300 = 157

157 – 20 = 137

137 – 3 = 134

457 – 323 = 134

3 **Work out the answers to these questions then cross out the letter above each answer in the puzzle. The letters that remain will form the answer to the riddle.**

a 484 – 74 = 410

b 400 – 80 = 320

c 406 – 106 = 300

d 410 – 40 = 370

e 403 – 13 = 390

f 455 – 60 = 395

g 497 – 92 = 405

h 505 – 25 = 480

i 520 – 25 = 495

j 795 – 150 = 645

k 410 – 100 = 310

S	Y	H	O	U	E	R	X	E	L	A
300	195	410	305	150	320	505	370	595	405	200

K	Z	R	I	D	R	J	U	M	V	A
390	495	220	395	210	385	480	500	205	645	310

Riddle: What is the most rhythmic part of your body?

Y O U R E A R D R U M

Subtraction mental strategies – split strategy

4 **These problems have been completed. Are they correct? If not, circle where it all began to go wrong:**

a 375 – 164 (100, 60, 4)

375 – 100 = 275

275 – 60 = 215

215 – 4 = 211

375 – 164 = 211 ✓

b 429 – 143 (100, 40, 3)

429 – 100 = (323)

323 – 4 = 319

319 – 3 = 316

429 – 143 = 316 ✗

c 179 – 158 (100, 50, 8)

179 – 100 = 79

79 – 50 = (39)

39 – 8 = 31

179 – 158 = 31 ✗

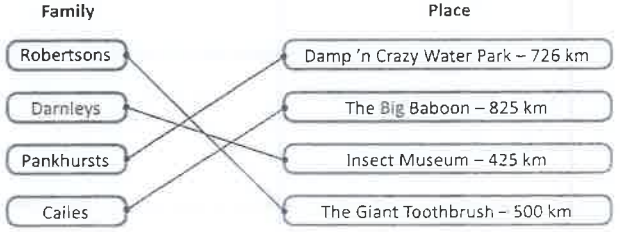
5 **The following problems require you to add and subtract. Use the split strategy to help you solve them:**

Four different families went on a holiday over Easter. Work out the distance that each car has travelled on the missing days:

	 Robertsons	 Pankhursts	 Cailes	 Darnleys
Day 1	125 km	225 km	300 km	130 km
Day 2	375 km	501 km	525 km	295 km
Day 3	235 km	110 km	125 km	270 km
Total distance	735 km	836 km	950 km	695 km

Make as many notes as you need to help you:

6 **Assuming that each family started their holiday from the same place, work out where each family was at the end of Day 2. Connect the place with the family by drawing a line:**



Subtraction mental strategies – compensation strategy

Sometimes we round one number in the problem to make it easier to do in our heads. Then we adjust our answer to compensate:

486 – 59 = 427

486 – 60 (+1) *I rounded up by 1, which means I subtracted*

426 (+1) = 427 *1 extra so we need to add 1 back.*

1 **Round these numbers to the closest ten. Then compensate by subtracting or adding to get back to the first number. The first one is done for you.**

a 93 = 90 + 3 b 48 = 50 – 2 c 52 = 50 + 2 d 76 = 80 – 4

e 57 = 60 – 3 f 37 = 40 – 3 g 27 = 30 – 3 h 68 = 70 – 2

2 **Solve these subtraction problems using compensation. Show all your working out:**

a 585 – 78 = 507

585 – 80 (+2)

505 (+2) = 507

b 894 – 71 = 823

894 – 70 (–1)

824 (–1) = 823

c 163 – 149 = 14

163 – 150 (+1)

13 (+1) = 14

3 **Solve these problems using compensation. Decide if you need to round up or down and compensate accordingly:**

a 555 – 63

555 – 60 (– 3)

495 – 3

= 492

b 775 – 98

775 – 100 (+ 2)

675 + 2

= 677

c 644 – 139

644 – 140 (+ 1)

504 + 1

= 505

d 594 – 329

594 – 330 (+ 1)

264 + 1

= 265

e 432 – 204

432 – 200 (– 4)

232 – 4

= 228

Subtraction mental strategies – compensation strategy

4 **Wally the work experience boy has solved these. He is happy because he solved them all correctly. Can you use his working out to establish what the original questions were?**

a 454 – 27 = 427

454 – 30 = 424 + 3 = 427

b 568 – 308 = 260

568 – 310 = 258 + 2 = 260

c 994 – 78 = 916

994 – 80 = 914 + 2 = 916

d 678 – 452 = 226

678 – 450 = 228 – 2 = 226

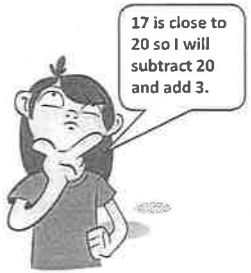
e 684 – 59 = 625

684 – 60 = 624 + 1 = 625

f 348 – 128 = 220

348 – 130 = 218 + 2 = 220

5 **Use the compensation method to count backwards and complete these number patterns.**



– 17	– 21	– 98	– 33
600	124	395	800
583	103	297	767
566	82	199	734
549	61	101	701

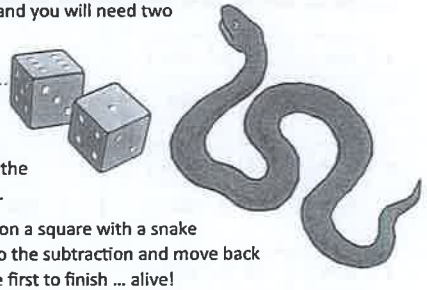
6 **These subtraction problems have been partially solved using compensation. Colour match the steps that were used and complete the missing parts. The first one has been done for you:**

£4.50 – £2.75	£5.70 – £3.00 = £2.70	£2.45 + £0.15 =	£4.35
£10.00 – £6.25	£4.50 – £3.00 = £1.50	£4.25 + £0.10 =	£3.75
£5.70 – £3.05	£17.25 – £13.00 = £4.25	£1.50 + £0.25 =	£2.60
£17.25 – £12.90	£9.45 – £7.00 = £2.45	£4.00 – £0.25 =	£2.65
£9.45 – £6.85	£10.00 – £6.00 = £4.00	£2.70 – £0.05 =	£1.75

Snakes but no ladders — apply

Getting ready

You can play with 1 to 4 players and you will need two dice and a love of snakes!



What to do

Start at 200. Throw the dice and add the numbers. The answer is the number of spaces you can move.

Follow the numbers. If you land on a square with a snake you must work out the answer to the subtraction and move back to that square! The winner is the first to finish ... alive!

263 **Finish**	262 (−25)	261	260	259 (−32)	258	257	256
248	249 (−14)	250	251	252	253 (−50)	254	255 (−17)
247	246	245	244 (−9)	243	242	241	240
232 (−20)	233	234	235	236 (−3)	237	238 (−14)	239
231	230	229 (−21)	228	227	226 (−11)	225	224
216 (−8)	217	218	219 (−5)	220 (−17)	221	222	223
215	214	213 (−10)	212	211	210	209 (−6)	208
200 **Start**	201	202	203	204 (−3)	205	206	207

Darts — apply

Getting ready

A game of darts is usually scored by subtracting the number that you throw from 301. Throwing darts can be dangerous in a classroom so you will be throwing dice instead!

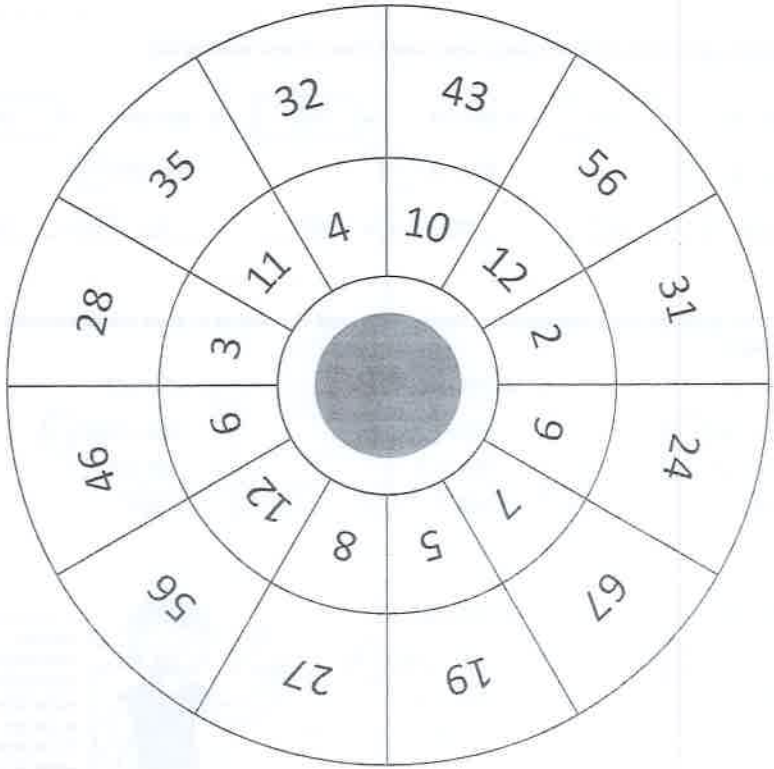
C copy

You can play with 1 to 4 people. You will take turns. You will need a copy of this page, two dice, a pencil and paper to keep score.

What to do

Throw two dice, find the total and look for the number in the inner ring. The number next to it in the outer ring is the one that you will subtract from. Start subtracting from 301, keeping score as you go.

The winner is the first to get past 0!



Written methods – addition

	H	T	U
	$^{1}2$	$^{1}3$	5
+	4	8	9
	7	2	4

How do we add using a written strategy?
First we estimate: 235 + 500 = 735. Our answer will be around 735.
We start with the units. 5 + 9 is 14 units. We rename this as 1 ten and 4 units.
We put the 4 in the units column and carry the 1 to the tens column.
3 tens plus 8 tens plus the carried ten is 12 tens.
We rename this as 1 hundred and 2 tens
We put the 2 in the tens column and carry the 1 to the hundreds column.
We add the hundreds. We put 7 in the hundreds column.
Finally we check against our estimate – do they match?

1 Solve these addition problems. First estimate the answers:

a e: 850

	H	T	U
	5	4	1
+	3	1	3
	8	5	4

b e: 800

	H	T	U
	$^{1}1$	7	3
+	5	9	2
	7	6	5

c e: 600

	H	T	U
	3	8	4
+	2	1	3
	5	9	7

d e: 700

	H	T	U
	$^{1}2$	$^{1}6$	8
+	4	9	3
	7	6	1

e e: 5 600

	Th	H	T	U
	2	2	$^{1}1$	7
+	3	4	0	8
	5	6	2	5

f e: 5 800

	Th	H	T	U
	4	5	1	6
+	1	3	4	3
	5	8	5	9

g e: 6 500

	Th	H	T	U
	5	$^{1}3$	$^{1}8$	9
+	1	2	7	4
	6	6	6	3

h e: 4 600

	Th	H	T	U
	3	$^{1}2$	8	1
+	1	4	2	8
	4	7	0	9

2 Use these cards to make 5 different addition problems using 2 and 3 digit numbers.
Show your working out:

2	3	4	5	6	7	8	9	=	+

Answers will vary.

Written methods – addition

	H	T	U
	5	6	2
+	1	4	5
			7
	1	0	0
	6	0	0
	7	0	7

We can also add each place value separately and then add these together:
2 + 5 = 7
60 + 40 = 100
500 + 100 = 600

7 + 100 + 600 = 707

3 Solve these addition problems using a written strategy of your choice:

a e: 800

	H	T	U
	3	8	5
+	4	2	3
			8
	1	0	0
	7	0	0
	8	0	8

b e: 600

	H	T	U
	4	1	2
+	2	3	8
		1	0
		4	0
	6	0	0
	6	5	0

c e: 990

	H	T	U
	9	2	2
+		6	9
		1	1
		8	0
	9	0	0
	9	9	1

d e: 600

	H	T	U
	1	8	8
+	4	1	4
		1	2
		9	0
	5	0	0
	6	0	2

e e: 750

	H	T	U
	7	2	4
+		2	9
		1	3
		4	0
	7	0	0
	7	5	3

f e: 180

	H	T	U
		3	6
+	1	4	4
		1	0
		7	0
	1	0	0
	1	8	0

4 Can you work out what the missing numbers should be?
Remember there may have been some regrouping!

a

	H	T	U
	4	3	5
+	4	2	2
	8	5	7

b

	H	T	U
	$^{1}1$	$^{1}5$	9
+	2	4	7
	4	0	6

c

	H	T	U
	5	$^{1}6$	7
+	4	2	9
	9	9	6

DISCOVER

Written methods – subtraction

	H	T	U
	9	$^{8}\not{9}$	$^{1}4$
−	2	7	8
	7	1	6

First we estimate: 1000 – 300 = 700

We start with the units. We can't take 8 away from 4 so we must rename one of the tens as units. We now have 14 units.

14 subtract 8 is 6 so we put the 6 in the units column.

8 tens subtract 7 tens is 1 ten so we put a 1 in the tens column.

We subtract the hundreds. 9 hundred subtract 2 hundred is 7 hundred. Put a 7 in the hundreds column.

We check the answer against our estimate.

1 **Complete the subtraction problems:**

e: 4 800

a

	Th	H	T	U
	4	9	$^{7}\not{8}$	$^{1}2$
−		1	5	3
	4	8	2	9

e: 2 100

b

	Th	H	T	U
	2	$^{8}\not{9}$	$^{14}\not{5}$	$^{1}1$
−		8	7	8
	2	0	7	3

e: 3 300

c

	Th	H	T	U
	3	$^{7}\not{8}$	$^{16}\not{7}$	$^{1}2$
−		5	8	6
	3	2	8	6

When a problem asks us to find the difference, we subtract. We always start with the larger number.

2 **Solve these to find the difference problems:**

a How far from Showtown to Ringer?

	Th	H	T	U
	7	8	6	9
−	4	1	2	9
	3	7	4	0

km

b What is the distance from Normanville to Tidings?

	Th	H	T	U
	3	2	$^{5}\not{6}$	$^{1}2$
−	1	2	3	3
	2	0	2	9

km

c What is the distance from Roper to Eagle Bay?

	Th	H	T	U
	$^{6}\not{7}$	$^{13}\not{4}$	$^{1}1$	9
−		5	9	5
	6	8	2	4

km

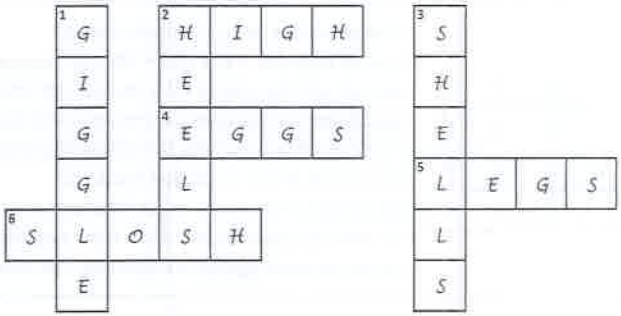
d How far from Normanville to Ace Bay?

	Th	H	T	U
	3	2	$^{5}\not{6}$	$^{1}2$
−	1	2	2	6
	2	0	3	6

km

Written methods – subtraction

3 **Use a calculator to add each group of numbers. Turn your calculator upside down to see a word on the screen. Use the key below to help you identify the letters. Write each word in the correct place in the crossword puzzle.**



CLUES

Across

2. 3 025 + 1 589 = 4 614
4. 4 456 + 1 207 = 5 663
5. 2 776 + 2 861 = 5 637
6. 12 824 + 32 251 = 45 075

Down

1. 34 569 + 342 047 = 376 616
2. 20 786 + 36 548 = 57 334
3. 456 789 + 120 556 = 577 345

Key

0	1	3	4	5	6	7	8
O	I	E	H	S	G	L	B

4 **The answer is 42. What could the missing numbers be? Come up with 5 possibilities:**

	H	T	U
−			
		4	2

	H	T	U
−			
		4	2

	H	T	U
−			
		4	2

Answers will vary.

	H	T	U
−			
		4	2

	H	T	U
−			
		4	2

Written methods – adding and subtracting decimals

When we add and subtract decimals we follow the same rules we use when working with whole numbers. We need to make sure we line up the place values and the decimal points:

	T	U	T
	$^{3}\not{4}$	$^{1}3$	• 3
−	1	7	• 2
	2	6	• 1

1 Estimate and solve these addition problems. Remember to put the decimal point into your answers:

a e: 85

	T	U	T
	5	4	• 1
+	3	1	• 3
	8	5	• 4

b e: 90

	T	U	T
	$^{1}3$	2	• 3
+	5	8	• 1
	9	0	• 4

c e: 90

	T	U	T
	4	8	• 4
+	4	1	• 3
	8	9	• 7

d e: 70

	T	U	T
	$^{1}2$	$^{1}7$	• 8
+	3	9	• 3
	6	7	• 1

e e: 90

	T	U	T	H
	5	$^{1}2$	• 1	7
+	3	5	• 9	2
	8	8	• 0	9

f e: 60

	T	U	T	H
	4	5	• 1	
+	1	4	• 0	5
	5	9	• 1	5

g e: 65

	T	U	T	H
	5	$^{1}3$	• $^{1}8$	9
+	1	2	• 1	4
	6	6	• 0	3

h e: 50

	T	U	T	H
	$^{1}3$	2	• 4	1
+	1	9	• 3	3
	5	1	• 7	4

2 Estimate and solve these subtraction problems. Remember to put the decimal point into your answers:

a e: 5

	T	U	T
	8	• 4	3
−	3	• 2	3
	5	• 2	0

b e: 4

	T	U	T
	$^{8}\not{9}$	• $^{1}0$	8
−	5	• 3	2
	3	• 7	6

c e: 5

	T	U	T
	7	• $^{5}\not{6}$	$^{1}3$
−	2	• 0	4
	5	• 5	9

d e: 6

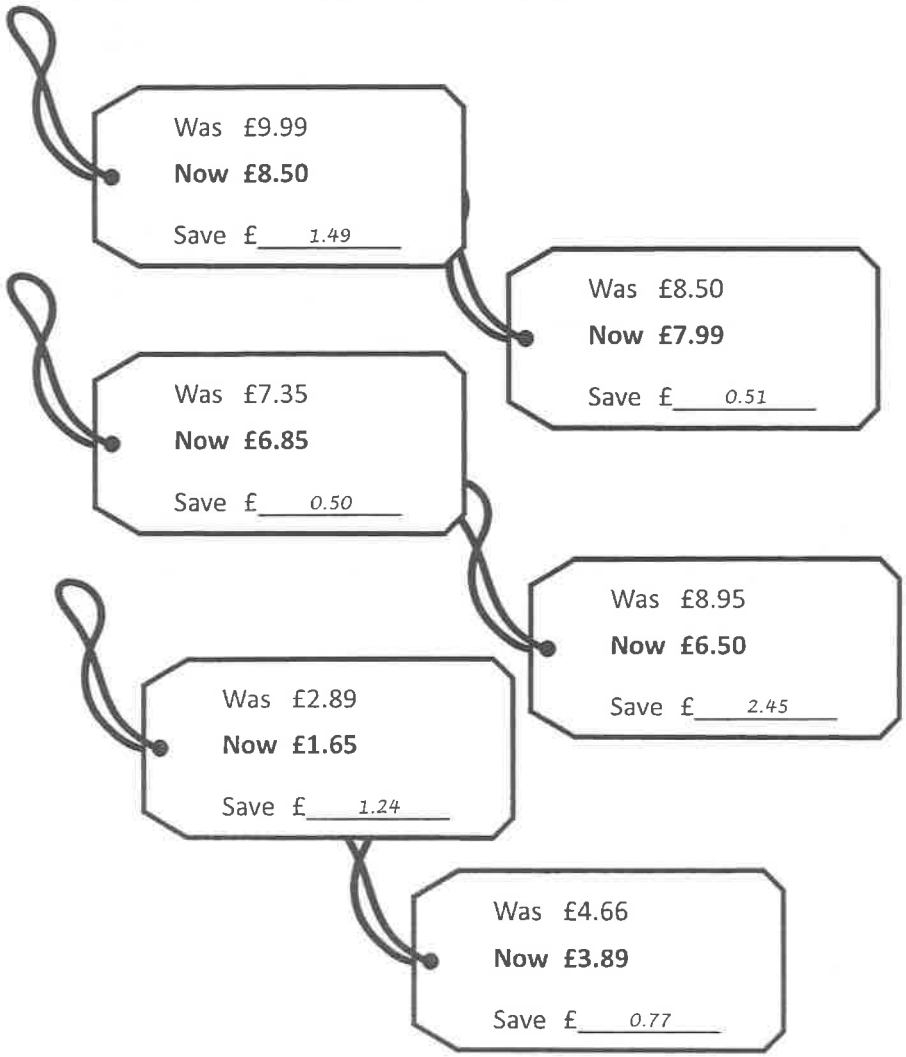
	T	U	T
	9	• $^{6}\not{7}$	$^{1}0$
−	3	• 2	3
	6	• 4	7

3 Bart finished his race in a time of 10.67 secs. Lisa finished in 11.24 secs. How much faster was Bart?

0.57 secs

Written methods – adding and subtracting decimals

4 **You bought the following. Find the difference between the discount price and regular price for each item, then calculate your total savings. Show all your working out:**



Total savings: *£6.96*

Written methods – word problems

1 **Solve the following word problems using addition or subtraction. Circle the process you use to calculate the answer:**

a Joe scored 346 more points than Zac. Joe scored 589 points. How many points did Zac score?

\+ 5 8 9
− 3 4 6
Answer 2 4 3

b Jenny is 32 cm taller than Jaala. Jaala is 143 cm tall. How tall is Jenny?

\+ 1 4 3
− 3 2
Answer 1 7 5 cm

c Manchester recorded 117 mm of rain. Birmingham recorded 58 mm more. How much rain did Birmingham record?

\+ 1 ^{1}1 7
− 5 8
Answer 1 7 5 mm

d Wayne has £17. How much more money does he need to buy a t-shirt that costs £39?

\+ £ 3 9
− £ 1 7
Answer £ 2 2

e Charlene had £132. After she paid for a ticket, she had £84. How much did the ticket cost?

\+ £ 1 ^{2}~~3~~ ^{1}2
− £ 8 4
Answer £ 4 8

f Sanjay spent £34 and had £92 left. How much did he have before the purchase?

\+ £ 9 2
− £ 3 4
Answer £ 1 2 6

g Jarred's bike cost £189. Molly's bike cost £263. What is the price difference between the two bikes?

\+ £ ^{1}~~2~~ ^{15}~~6~~ ^{1}3
− £ 1 8 9
Answer £ 7 4

h The rainfall in Two Wells was 73 mm. Gateshead recorded 36 mm less. How much rainfall did Gateshead record?

\+ ^{6}~~7~~ ^{1}3 mm
− 3 6 mm
Answer 3 7 mm

i Write your own word problem and solve it.

\+ Answers will vary.
−
Answer

Slide race

apply

Getting ready

Players 2

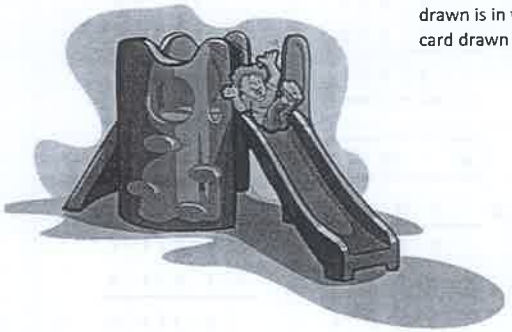
Objective To be the first to slide all the way down the slide and land in the sand.

Materials Game markers for each player, scrap paper, pencils, a deck of cards with the tens and the picture cards taken out. The ace has a value of 1.

What to do

To play

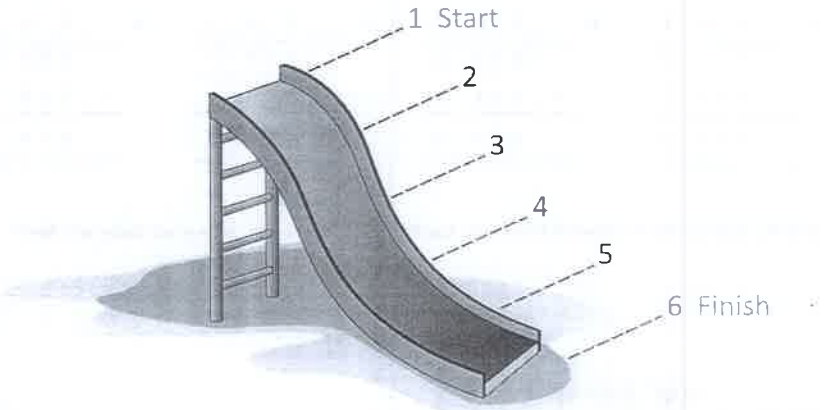
1. Mix up the cards and place them face down in a pile.
2. Players place the game markers at Start.
3. Each player draws 6 cards arranging them to make two 3 digit-numbers. Arrange the cards as shown: Remember, the first card drawn is in the hundreds place for the first number. The fourth card drawn is in the hundreds place for the second number.



\+ Answers will vary.

4. Add the 2 numbers. The player with the larger total moves the game marker one space down the slide.
5. Play until someone lands in the sand.

Variations Change the number of cards laid out.



Subtraction puzzles — solve

What to do

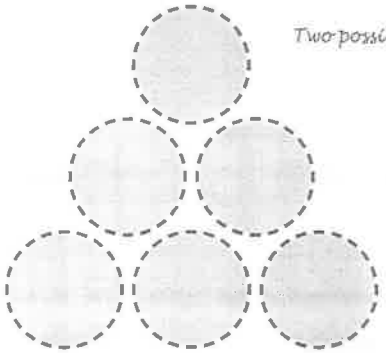
Puzzle 1

Place the numbers 1 to 6 in the grey circles so that each number is the difference between the two numbers just below it.

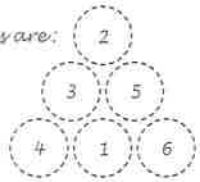
1 2 3 4 5 6

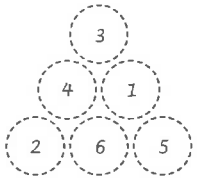
HINT: Place some stickers over a set of counters and write the digits 1 to 8 on each counter. Now you can move them around.

THINK



Two possibilities are:

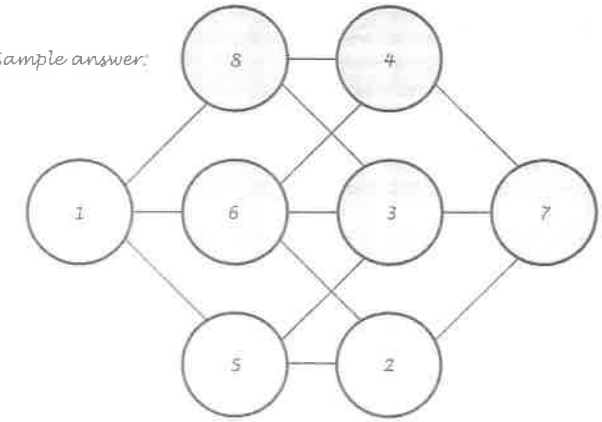




Puzzle 2

Place the digits from 1 to 8 in each circle. Numbers with a difference of 1 cannot be placed in circles directly connected by a straight line.

Sample answer:



Mental multiplication strategies – doubling strategy

Doubling is a useful strategy to use when multiplying.

To multiply a number by four, double it twice.

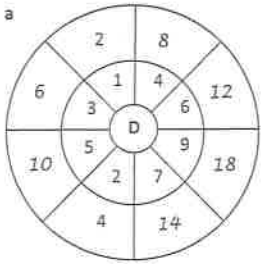
15 × 4 double once = 30
double twice = 60

To multiply a number by eight, double it three times.

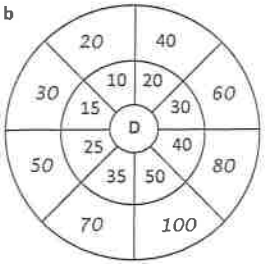
13 × 8 double once = 26
double twice = 52
double three times = 104

1 **Warm up with some doubling practice:**

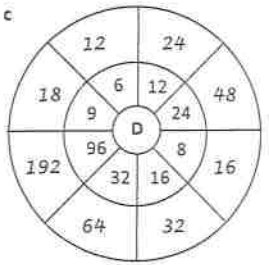
a



b



c



2 **Finish the doubling patterns:**

a 4	8	16	32	64	128
b 3	6	12	24	48	96
c 5	10	20	40	80	160
d 25	50	100	200	400	800
e 7	14	28	56	112	224
f 75	150	300	600	1 200	2 400

3 **Choose a number and create your own doubling pattern. How high can you go? What patterns can you see within your pattern?**

Answers will vary.

4 **Two sets of twins turn 12. They decide to have a joint birthday party with 1 giant cake but they all want their own candles. How many candles will they need?**

4 × 12 = 48

Mental multiplication strategies – doubling strategy

5 **Use the doubling strategy to solve these:**

		× 2	× 4
a	13 × 4	26	52
b	16 × 4	32	64
c	24 × 4	48	96
d	25 × 4	50	100
e	32 × 4	64	128
f	21 × 4	42	84
g	35 × 4	70	140

6 **Use the doubling strategy to solve these:**

		× 2	× 4	× 8
a	12 × 8	24	48	96
b	14 × 8	28	56	112
c	25 × 8	50	100	200
d	21 × 8	42	84	168
e	13 × 8	26	52	104
f	16 × 8	32	64	128

7 **Work out the answers in your head using the appropriate doubling strategy. Use a table like the one above if it helps.**

a 18 × 4 = 72 b 16 × 4 = 64 c 26 × 4 = 104

d 24 × 8 = 192 e 15 × 8 = 120 f 22 × 8 = 176

8 **Nick's dad offered him two methods of payment for helping with a 5 week landscaping project.**

Method 1: £24 a week for 5 weeks.

Method 2: £8 for the first week, then double the payment each week.

Which method would earn Nick the most money? Why?

Method 1 = £120 *24 × 5 = 120*

Method 2 = £248 *8 + 16 + 32 + 64 + 128 = 248*

Mental multiplication strategies – multiply by 10s, 100s and 1 000s

When we multiply by 10 we move the number one place value to the left.
When we multiply by 100 we move the number two place values to the left.
When we multiply by 1 000 we move the number three place values to the left.
Look at how this works with the number 45:

Ten Thousands	Thousands	Hundreds	Tens	Units	
			4	5	
		4	5	0	× 10
	4	5	0	0	× 100
4	5	0	0	0	× 1 000

1 **Multiply the following numbers by 10, 100 and 1 000:**

a

T Th	Th	H	T	U	
			1	7	
		1	7	0	× 10
	1	7	0	0	× 100
1	7	0	0	0	× 1 000

b

T Th	Th	H	T	U	
			4	3	
		4	3	0	× 10
	4	3	0	0	× 100
4	3	0	0	0	× 1 000

c

T Th	Th	H	T	U	
			8	5	
		8	5	0	× 10
	8	5	0	0	× 100
8	5	0	0	0	× 1 000

d

T Th	Th	H	T	U	
			9	9	
		9	9	0	× 10
	9	9	0	0	× 100
9	9	0	0	0	× 1 000

2 **Try these:**

a 14 × 10 = 140 b 14 × 100 = 1 400 c 14 × 1 000 = 14 000

d 92 × 10 = 920 e 92 × 1 000 = 92 000 f 92 × 100 = 9 200

g 11 × 1 000 = 11 000 h 11 × 100 = 1 100 i 11 × 10 = 110

3 **You'll need a partner and a calculator for this activity. Take turns giving each other problems such as "Show me 100 × 678". The person whose turn it is to solve the problem, writes down their prediction and you both check it on the calculator. 10 points for each correct answer, and the first person to 50 points wins.**

Answers will vary.

Mental multiplication strategies – multiply by 10s, 100s and 1 000s

It is also handy to know how to multiply multiples of 10 such as 20 or 200 in our heads.

4 × 2 helps us work out 4 × 20: 4 × 2 = 8 4 × 20 = 80

We can express this as 4 × 2 × 10 = 80 How would you work out 4 × 200?

4 Use patterns to help you solve these:

a	5 × 2	10	5 × 20	100	5 × 200	1000
b	2 × 9	18	2 × 90	180	2 × 900	1800
c	6 × £4	£24	6 × £40	£240	6 × £400	£2 400
d	8 × 3	24	8 × 30	240	8 × 300	2 400
e	3 × £7	£21	3 × £70	£210	3 × £700	£2 100
f	2 × 8	16	20 × 8	160	200 × 8	1 600
g	3 × 9	27	30 × 9	270	300 × 9	2 700

5 Answer these problems:

a Jock runs 50 km per week. How far does he run over 10 weeks?

500 km

b Huy earns £20 pocket money per week. If he saves half of this, how much will he have saved at the end of 8 weeks?

£80

c The sum of two numbers is 28. When you multiply them together, the answer is 160. What are the numbers?

20, 8

6 Finish these counting patterns:

a	10	20	30	40	50	60
b	20	40	60	80	100	120
c	30	60	90	120	150	180
d	40	80	120	160	200	240
e	50	100	150	200	250	300
f	100	200	300	400	500	600
g	200	400	600	800	1 000	1 200

Mental multiplication strategies – split strategy

Sometimes it's easier to split a number into parts and work with the parts separately.

Look at 64 × 8

Split the number into 60 and 4

Work out (60 × 8) and then (4 × 8)

Add the answers together 480 + 32 = 512

1 Use the split strategy to answer the questions:

a 46 × 4

(40 × 4) + (6 × 4)

160 + 24

= 184

b 74 × 5

(70 × 5) + (4 × 5)

350 + 20

= 370

c 48 × 4

(40 × 4) + (8 × 4)

160 + 32

= 192

d 37 × 7

(30 × 7) + (7 × 7)

210 + 49

= 259

e 62 × 8

(60 × 8) + (2 × 8)

480 + 16

= 496

f 91 × 5

(90 × 5) + (1 × 5)

450 + 5

= 455

2 Use the split strategy to answer the questions. This time see if you can do the brackets in your head:

a	48 × 8 =	320	+	64	=	384
b	52 × 7 =	350	+	14	=	364
c	9 × 43 =	360	+	27	=	387
d	8 × 29 =	160	+	72	=	232
e	86 × 7 =	560	+	42	=	602

3 These problems have been worked out incorrectly. Circle where it all went wrong.

a 37 × 6

(30 × 6) + (7 × 6)

180 + (13)

= 193

b 17 × 5

(10 × 5) + (7 × 5)

(70) + 35

= 105

c 32 × 9

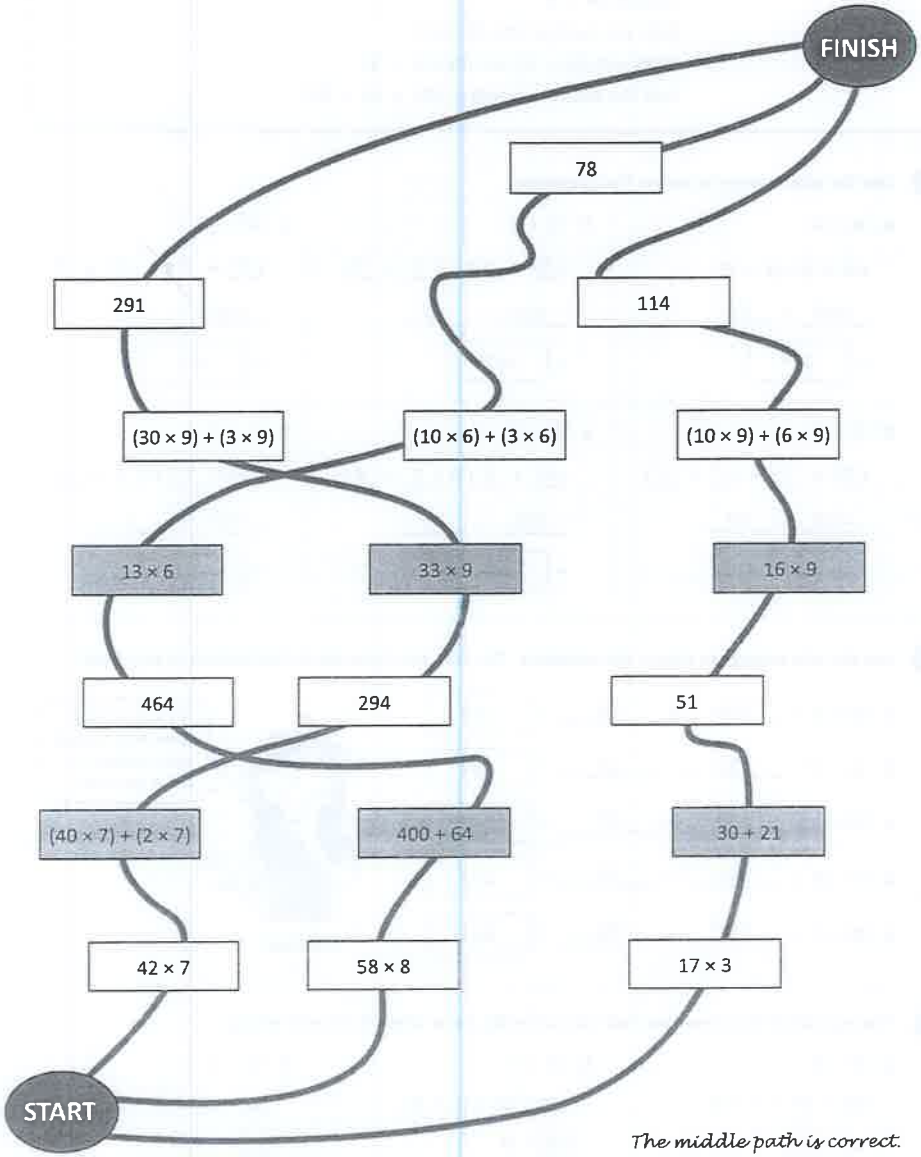
(30 × 9) + (2 × 9)

(27) + 18

= 45

Mental multiplication strategies – split strategy

4 **Each trail contains 2 multiplication problems and steps to solve them. Only one trail has been solved correctly. There are errors in the other two. Find and colour the winning trail.**



The middle path is correct.

Mental multiplication strategies – compensation strategy

When multiplying we can round to an easier number and then adjust.
Look how we do this with 4 × 29:
29 is close to 30. We can do 4 × 30 in our heads because we know 4 × 3 = 12
4 × 30 = 120
We have to take off 4 because we used one group of 4 too many: 120 − (1 × 4) = 116
4 × 29 = 116

1 **Use the compensation strategy to answer the questions. The first one has been done for you.**

a 19 × 3 = 20 × 3 − 3 = 57

b 8 × 29 = 8 × 30 − 8 = 232

c 18 × 6 = 20 × 6 − 12 = 108

d 7 × 39 = 7 × 40 − 7 = 273

e 28 × 5 = 30 × 5 − 10 = 140

We can also adjust up. Look how we do this with 6 × 62:
62 is close to 60. We can do 6 × 60 in our heads because we know 6 × 6 = 36
6 × 60 = 360
We have to then add 2 more lots of 6: 360 + 12 = 372
6 × 62 = 372

2 **Use the compensation strategy and adjust up for these. The first one has been done for you.**

a 41 × 3 = 40 × 3 + 3 = 123

b 81 × 4 = 80 × 4 + 4 = 324

c 22 × 9 = 20 × 9 + 18 = 198

d 32 × 9 = 30 × 9 + 18 = 288

e 7 × 62 = 7 × 60 + 14 = 434

Mental multiplication strategies – compensation strategy

3 In this activity you'll work alongside a partner. You'll each need two dice and your own copy of this page. For each line, roll the dice to find the tens digit and then roll it again to find the multiplier. Your partner will do the same. Use the compensation strategy to mentally work out the answers to the problems.

Tens	Units		Multiplier		Answer
	1	×		=	
	9	×		=	
	2	×		=	
	1	×		=	
	8	×		=	
	1	×		=	
	9	×		=	
	8	×		=	
	2	×		=	
	1	×		=	

Check individual answers.

a Check each other's calculations. You may want to use a calculator.

b Now, use the calculator to add your answers. The person with the highest score wins.

Mental multiplication strategies – factors and multiples

Factors are the numbers we multiply together to get to another number:

factor × factor = whole number

How many factors does the number 12 have? 4 × 3 = 12, 6 × 2 = 12, 1 × 12 = 12

4, 3, 6, 2, 1 and 12 are all factors of 12.

1 **List the factors of these numbers:**

a	18	*1*	*18*	*2*	*9*	*3*	*6*		
c	14	*1*	*14*	*2*	*7*				
e	16	*1*	*16*	*2*	*8*	*4*			
g	30	*1*	*30*	*2*	*15*	*3*	*10*	*5*	*6*

b	25	*1*	*25*	*5*				
d	9	*1*	*9*	*3*				
f	15	*1*	*15*	*5*	*3*			
h	42	*1*	*42*	*2*	*21*	*3*	*14*	*6*	*7*

2 **Fill the gaps in these sentences. The first one has been done for you.**

a *1* or *16* or *2* or *8* or *4* people can share 16 sweets evenly.

b *1* or *20* or *2* or *10* or *4* or *5* people can share 20 slices of pie evenly.

c *1* or *24* or *2* or *12* or *3* or *8* or *4* or *6* people can share 24 cherries.

d *1* or *30* or *2* or *15* or *3* or *10* or *5* or *6* people can share 30 pencils.

e *1* or *5* people can share 5 balls evenly.

3 **Use a calculator to help you find as many factors of 384 as you can:**

1, 384

2, 192

3, 128

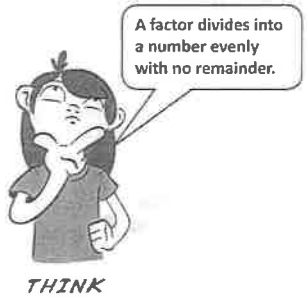
4, 96

6, 64

8, 48

12, 32

16, 24



Mental multiplication strategies – factors and multiples

Multiples are the answers we get when we multiply 2 factors.
Think about the 3 times tables where 3 is always a factor.
What are the multiples of 3?
3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 ...

3 × factor = multiple

4 **Fill in the gaps on these multiple boards:**

a	b	c	d
4	5	9	7
8	**10**	18	14
12	15	27	21
16	20	36	28
20	25	45	**35**
24	30	54	42
28	35	**63**	49

Numbers can be either factors or multiples depending on where they sit in the number sentence.

5 **Choose 2 numbers between 2 and 5 and put them in the first frame as factors. Your answer is the multiple. Now take that multiple and make it a factor in another number sentence. Write in the other factor and solve the problem. Then make the answer a factor again. Can you fill the grid? Use a calculator for the larger problems. The first one has been done for you.**

a	3	×	4	=	12	12	×	2	=	24	24 × 2 = 48
b	2	×	5	=	10	10	×	5	=	50	50 × 5 = 250
c	4	×	2	=	8	8	×	3	=	24	24 × 3 = 72
d	5	×	4	=	20	20	×	4	=	80	80 × 4 = 320

Sample answers – answers will vary.

Mental division strategies – use multiplication facts

Knowing our multiplication facts helps us with division as they do the reverse of each other.
They are inverse operations.

3 × 5 = 15 15 ÷ 5 = 3

1 **Use your knowledge of multiplication facts to help answer these division questions:**

a	56 ÷ 7	8	× 7 = 56	56 ÷ 7 =	8
b	121 ÷ 11	11	× 11 = 121	121 ÷ 11 =	11
c	72 ÷ 8	9	× 8 = 72	72 ÷ 8 =	9
d	49 ÷ 7	7	× 7 = 49	49 ÷ 7 =	7
e	36 ÷ 9	4	× 9 = 36	36 ÷ 9 =	4
f	64 ÷ 8	8	× 8 = 64	64 ÷ 8 =	8
g	108 ÷ 12	9	× 12 = 108	108 ÷ 12 =	9

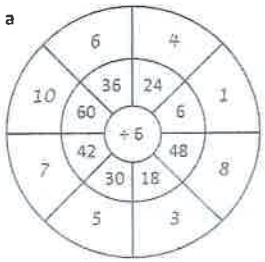
2 **Now try these:**

a	81 ÷ 9 =	9	b	40 ÷ 5 =	8
c	21 ÷ 3 =	7	d	54 ÷ 6 =	9
e	42 ÷ 7 =	6	f	63 ÷ 9 =	7
g	36 ÷ 4 =	9	h	45 ÷ 9 =	5
i	39 ÷ 3 =	13	j	24 ÷ 6 =	4

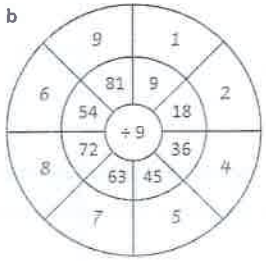
Doing maths without knowing your multiplication facts is hard. Learning them makes your life much easier. It's worth persevering to conquer them!

3 **Fill in the division wheels. Use multiplication facts to help you.**

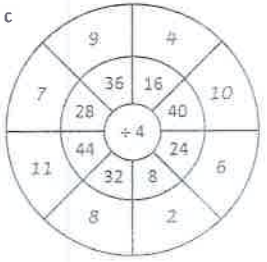
a



b



c



Mental division strategies – use multiplication facts

Knowing our families of facts is also helpful.

3 × 5 = 15 5 × 3 = 15 15 ÷ 5 = 3 15 ÷ 3 = 5

4 **Complete the following patterns. How many more multiplication and division facts can you find, given the first fact?**

a 7 × 8 = 56

8 × 7 = 56

56 ÷ 7 = 8

56 ÷ 8 = 7

b 8 × 9 = 72

9 × 8 = 72

72 ÷ 8 = 9

72 ÷ 9 = 8

c 7 × 9 = 63

9 × 7 = 63

63 ÷ 7 = 9

63 ÷ 9 = 7

5 **Write down another multiplication fact and two division facts for each question.**

a 6 × 7 = 42

7 × 6 = 42

42 ÷ 6 = 7

42 ÷ 7 = 6

b 5 × 9 = 45

9 × 5 = 45

45 ÷ 9 = 5

45 ÷ 5 = 9

c 9 × 6 = 54

6 × 9 = 54

54 ÷ 6 = 9

54 ÷ 9 = 6

d 17 × 8 = 136

8 × 17 = 136

136 ÷ 8 = 17

136 ÷ 17 = 8

e 12 × 8 = 96

8 × 12 = 96

96 ÷ 8 = 12

96 ÷ 12 = 8

f 11 × 21 = 231

21 × 11 = 231

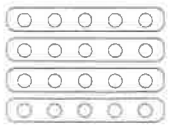
231 ÷ 21 = 11

231 ÷ 11 = 21

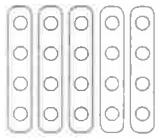
6 Look at these two division facts: 20 ÷ 5 = 4 and 20 ÷ 4 = 5

Imagine you're explaining to a younger child how they're related yet different. How would you do it? What would you say/write/draw?

20 ÷ 5 = 4



20 ÷ 4 = 5



Sample answer.

Mental division strategies – divide by 10s, 100s and 1 000s

When we divide by 10 we move the number one place value to the right.
When we divide by 100 we move the number two place values to the right.
When we divide by 1 000 we move the number three place values to the right.
Look what happens to 45 000 when we apply these rules:

Ten Thousands	Thousands	Hundreds	Tens	Units	
4	5	0	0	0	
	4	5	0	0	÷ 10
		4	5	0	÷ 100
			4	5	÷ 1 000

1 **Divide the following numbers by 10, 100 and 1 000:**

a

T Th	Th	H	T	U	
4	5	0	0	0	
	4	5	0	0	÷ 10
		4	5	0	÷ 100
			4	5	÷ 1 000

b

T Th	Th	H	T	U	
4	3	0	0	0	
	4	3	0	0	÷ 10
		4	3	0	÷ 100
			4	3	÷ 1 000

c

T Th	Th	H	T	U	
8	5	0	0	0	
	8	5	0	0	÷ 10
		8	5	0	÷ 100
			8	5	÷ 1 000

d

T Th	Th	H	T	U	
8	8	0	0	0	
	8	8	0	0	÷ 10
		8	8	0	÷ 100
			8	8	÷ 1 000

2 **Draw lines to match the answers with the questions:**

a What number is one thousand times smaller than 32 000?

b What number is one hundred times smaller than 32 000?

c What number is one hundred times smaller than 95 000?

d What number is ten times smaller than 95 000?

e What number is one hundred times smaller than 8 800?

f What number is ten times smaller than 8 800?

9 500

88

950

880

320

32

Mental division strategies – halving strategy

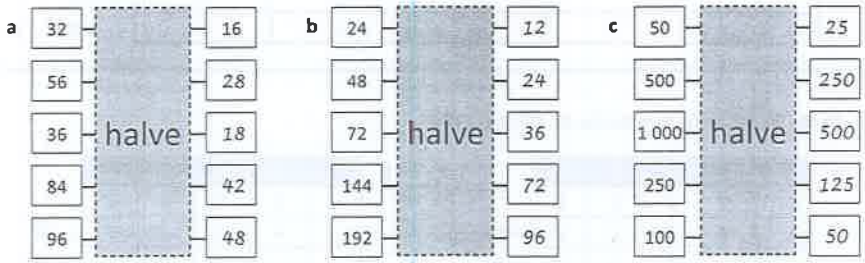
When the two numbers seem too large to work with in our heads, we can halve them till we get to a division fact we recognise. Both numbers must be even for this to work.

126 ÷ 14

(half 126) ÷ (half 14)

63 ÷ 7 = 9

1 **Practise your halving. The first one has been done for you.**



2 **Halve each number to get to a recognisable division fact. The first one has been done for you.**

a 112 ÷ 14 — 56 ÷ 7 = 8

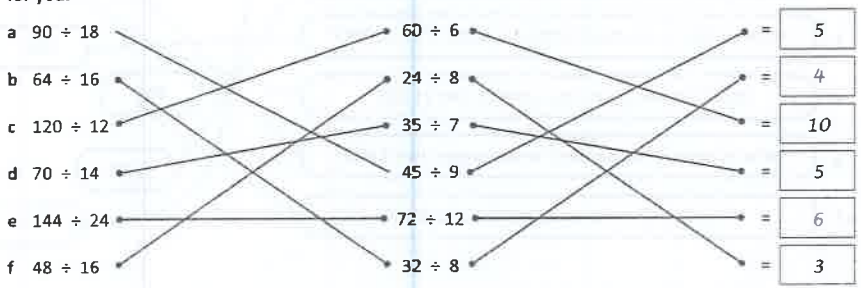
b 144 ÷ 16 — 72 ÷ 8 = 9

c 96 ÷ 12 — 48 ÷ 6 = 8

d 220 ÷ 4 — 110 ÷ 2 = 55

e 162 ÷ 18 — 81 ÷ 9 = 9

3 **Match the problems with their halved equivalents. Then solve the problem. The first one has been done for you.**



Mental division strategies – halving strategy

Sometimes we need to keep halving until we reach an easy division fact.

144 ÷ 36 → 72 ÷ 18 → 36 ÷ 9 = 4

4 **Keep halving until you get to a fact you can work with. If you can do it in your head, just fill in the last box. Otherwise, use the lines to help you.**

a 216 ÷ 36 = 108 ÷ 18 = 54 ÷ 9 = 6

b 196 ÷ 28 = 98 ÷ 14 = 49 ÷ 7 = 7

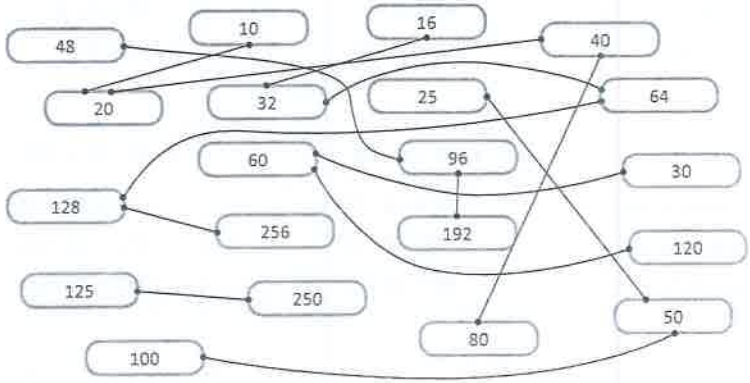
c 224 ÷ 32 = 112 ÷ 16 = 56 ÷ 8 = 7

d 168 ÷ 24 = 84 ÷ 12 = 42 ÷ 6 = 7

e 144 ÷ 36 = 72 ÷ 18 = 36 ÷ 9 = 4

f 288 ÷ 72 = 144 ÷ 36 = 72 ÷ 18 = 4

5 **Draw lines to connect numbers that could be doubled or halved to reach each other.**



6 **Work with a partner to solve this problem using halving:**

You have an after school job at the local sweet shop, making up the mixed sweet bags. Today, you have to evenly share 288 sweets among 48 bags. How many sweets will you put in each bag? Show each halved sum.

288 ÷ 48

144 ÷ 24

72 ÷ 12

36 ÷ 6 = 6

Mental division strategies – split strategy

Division problems also become easier if you split the number to be divided into recognisable facts.

Look at the problem 144 ÷ 9

Can we divide 144 into 2 multiples of 9?

We can divide it into 54 and 90. These are both easily divided by 9. Then we add the two answers together.

144 ÷ 9

90 54

÷9 ÷9

10 + 6 = 16

1 **Use the split strategy to divide these numbers. Use the clues to guide you:**

a 112 ÷ 8

80 32

÷8 ÷8

10 + 4 = 14

b 85 ÷ 5

50 35

÷5 ÷5

10 + 7 = 17

c 78 ÷ 6

60 18

÷6 ÷6

10 + 3 = 13

d 64 ÷ 4

24 40

÷4 ÷4

6 + 10 = 16

e 91 ÷ 7

21 70

÷7 ÷7

3 + 10 = 13

f 144 ÷ 8

80 64

÷8 ÷8

10 + 8 = 18

2 Now try these:

a 90 ÷ 6 = 60 ÷ 6 + 30 ÷ 6 = 15

b 105 ÷ 7 = 70 ÷ 7 + 35 ÷ 7 = 15

c 72 ÷ 4 = 48 ÷ 4 + 24 ÷ 4 = 18

d 144 ÷ 8 = 48 ÷ 8 + 96 ÷ 8 = 18

DISCOVER

Mental division strategies – split strategy

3 **Play this game with a partner. Use one copy of this page between you. Cut out the problems on the left and stack them face up. Cut out and spread the other cards face up. Work together (or race) to find two numbers you could divide to solve the problem on the top card of the pile. One card in the pair will be grey, the other white. For example, if the problem was 76 ÷ 4, you could locate 36 and 40.**

C copy

96 ÷ 4	45	90
75 ÷ 5	25	21
87 ÷ 3	60	50
98 ÷ 7	80	70
135 ÷ 9	55	36
78 ÷ 6	30	60
112 ÷ 8	60	60
51 ÷ 3	27	32
95 ÷ 5	24	40
84 ÷ 6	28	18

Mental division strategies – tests of divisibility

Divisibility tests tell us if a number can be divided evenly by another (that is with no remainders).

1 **Use the rules to test out the numbers in the last column. The first two have been done for you:**

Divisible by	Rule	Test
2	A number is divisible by 2 if it's even (ends in 0, 2, 4, 6 or 8).	Is 458 divisible by 2? *Yes, because it ends in an even number.*
3	A number is divisible by 3 if the sum of its digits is divisible by 3.	Is 7 281 divisible by 3? 7 + 2 + 8 + 1 = 18 *Yes, because 18 is divisible by 3.*
4	A number is divisible by 4 if the number made by the last 2 digits is divisible by 4.	Is 3 912 divisible by 4? *Yes, because 12 is divisible by 4.*
5	A number is divisible by 5 if there's a 0 or 5 in the units place.	Is 455 divisible by 5? *Yes, because 5 is in the units place.*
8	A number is divisible by 8 if the last 3 digits are divisible by 8.	Is 74 160 divisible by 8? *Yes, because 160 ÷ 8 = 20*
9	A number is divisible by 9 if the sum of its digits is divisible by 9.	Is 6 345 divisible by 9? *6 + 3 + 4 + 5 = 18* *Yes, because the digits add to 18 and that is divisible by 9.* *18 ÷ 9 = 2*
10	A number is divisible by 10 if there is a zero in the units place.	Is 5 680 divisible by 10? *Yes, because there is a zero in the units place.*

Mental division strategies – tests of divisibility

2 **These numbers can all be divided with no remainders. Work with a partner to find the rule/s that can be used to divide them. Fill in the tables.**

36	90	84	99	50	72
456	330	888	120	981	548
1 025	3 486	6 993	1 256	9 050	10 072

÷ 4
36
456
888
120
548
1 256
10 072
72
84

÷ 9
36
90
99
981
72
6 993

÷ 5
50
120
330
1 025
9 050
90

÷ 3
36
90
72
330
981
3 486
6 993
456
120
99
84
888

÷ 8
456
888
120
1 256
10 072
72

Written methods – contracted multiplication

Contracted multiplication is one way to solve a multiplication problem.

	H	T	U
	$^{1}1$	$^{1}5$	6
×			3
	4	6	8

First we use our mental strategies to estimate an easier problem:
3 × 150 = 450. The answer will be around 450.
We start with the units. 3 × 6 is 18 units. We rename this as 1 ten and 8 units.
We put 8 in the units column and carry the 1 to the tens column.
3 × 5 plus the carried 1 is 16 tens. We rename this as 1 hundred and 6 tens.
We put 6 in the tens column and carry the 1 to the hundreds column.
3 × 1 plus the carried 1 is 4 hundreds. We put 4 in the hundreds column.

1 **Solve these problems using contracted multiplication. Estimate first:**

a e: 990

	H	T	U
	3	$^{2}2$	7
×			3
	9	8	1

b e: 1 000

	H	T	U
	$^{1}2$	$^{2}4$	7
×			4
	9	8	8

c e: 750

	H	T	U
	$^{2}1$	$^{2}5$	4
×			5
	7	7	0

d e: 900

	H	T	U
	3	$^{1}1$	5
×			3
	9	4	5

e e: 560

	H	T	U
	$^{1}2$	$^{1}8$	6
×			2
	5	7	2

f e: 1 000

	H	T	U
	$^{4}1$	$^{2}9$	4
×			5
	9	7	0

2 **Solve these word problems. Show how you worked them out:**

a Dan's dad has resorted to bribery to counteract Dan's PlayStation addiction. For every evening, Dan spends away from the PlayStation, his dad pays him £3. So far, Dan has racked up an impressive 27 nights (though he looks like breaking any day now). How much money does this equate to?

	$^{2}2$	7
×		3
	8	1

£81

b Dan's mum thinks she might get in on the action too and pays Dan £4 for every week that he puts his dishes in the dishwasher and his dirty clothes in the basket. Dan is less keen on this plan but does manage 33 weeks in 1 year. How much has he made out of this scheme?

		$^{1}3$	3
×			4
	1	3	2

£132

Written methods – contracted multiplication

3 **Below are Jess and Harry's tests. Check them and give them a mark out of 5. If they made mistakes, give them some feedback as to where they went wrong.**

Jess

	$^{1}3$	$^{1}8$	7
×			2
	7	7	4

✓

	1	1	9
×			7
	7	7	3

✗

	2	0	3
×			3
	6	0	9

✓

	4	$^{1}3$	6
×			3
	1	2	0	8

✗

	4	0	1
×			7
	2	8	0	7

✓

Forgot to carry.

Harry

	$^{1}3$	$^{1}8$	7
×			2
	7	7	4

✓

	$^{1}1$	$^{6}1$	9
×			7
	8	3	3

✓

	2	0	3
×			3
	6	9

✗

	$^{1}4$	$^{1}3$	6
×			3
	1	3	0	8

✓

	4	0	1
×			7
	2	8	7

✗

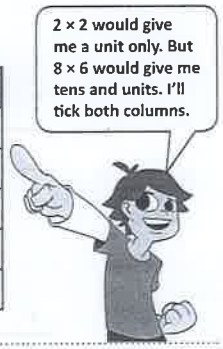
Did not multiply the zero.

Written methods – extended multiplication

	H	T	U	
	2	3	4	
×			3	
		1	2	← (3 × 4)
		9	0	← (3 × 30)
	6	0	0	← (3 × 200)
	7	0	2	

Extended multiplication is another way of solving problems. In extended muliplication we multiply the units, tens and hundreds separately then add the answers together.

1 **Use a calculator to help you work out the values you could expect when multiplying the following. Tick the columns:**



		T TH	TH	H	T	U
a	a unit by a unit → 9 × 7				✓	✓
b	a ten by a unit → 43 × 5			✓	✓	✓
c	a hundred by a unit → 126 × 7			✓	✓	✓
d	a ten by a ten → 13 × 72			✓	✓	✓
e	a ten by a hundred → 55 × 120		✓	✓	✓	✓

2 **Complete using extended multiplication. Estimate first:**

a e: 490

	2	4	5	
×			2	
		1	0	(2 × 5)
		8	0	(2 × 40)
	4	0	0	(2 × 200)
	4	9	0	

b e: 3 100

		4	5	2	
×				7	
			1	4	(7 × 2)
		3	5	0	(7 × 50)
	1 2	8	0	0	(7 × 400)
	3	1	6	4	

c e: 2 600

		3	2	7	
×				8	
			5	6	(8 × 7)
		1 1	6	0	(8 × 20)
	2	4	0	0	(8 × 300)
	2	6	1	6	

d e: 560

	2	7	9	
×			2	
		1	8	(2 × 9)
	1	4	0	(2 × 70)
	4	0	0	(2 × 200)
	5	5	8	

e e: 3 600

		4	1	2	
×				9	
			1	8	(9 × 2)
			9	0	(9 × 10)
	3	6	0	0	(9 × 400)
	3	7	0	8	

Written methods – extended multiplication

3 **Use extended multiplication to solve these problems:**

a Jack and his 2 friends bought tickets to the World Cup. Each ticket costs £68. How much did they spend altogether?

e: 210

	£	6	8	
×			3	
		2	4	(3 × 8)
	1	8	0	(3 × 60)
	£	2	0	4

b Jack has a paper round and earns £4 per day. He works for 18 days and saves it all. Has he earned enough to pay for his World Cup ticket?

e: 80

	£	1	8	
×			4	
		3	2	(4 × 8)
		4	0	(4 × 10)
	£	7	2	

c Yusuf's highest Level 1 Live Mathletics score is 112. Yes, he's fast. If he scores this 7 times in a row, how many correct answers has he achieved?

e: 770

	1	1	2	
×			7	
		1	4	(7 × 2)
		7	0	(7 × 10)
	7	0	0	(7 × 100)
	7	8	4	

d Kyra's class of 24 all had to stay in for 11 minutes of their playtime. Something to do with too much talking. How many minutes is this in total?

e: 240

		2	4	
×		1	1	
			4	(1 × 4)
		2	0	(1 × 20)
		4	0	(10 × 4)
	2	0	0	(10 × 20)
	2	6	4	

4 **Once you have the hang of extended multiplication, you can apply it to larger numbers. Try these:**

a

		2	4	5	
×			3	2	
			1	0	(2 × 5)
			8	0	(2 × 40)
		4	0	0	(2 × 200)
		1	5	0	(30 × 5)
	1	2	0	0	(30 × 40)
	6	0	0	0	(30 × 200)
	7	8	4	0	

b

			3	2	9	
×				4	3	
				2	7	(3 × 9)
				6	0	(3 × 20)
			9	0	0	(3 × 300)
			3	6	0	(40 × 9)
			8	0	0	(40 × 20)
	1	2	0	0	0	(40 × 300)
	1	4	1	4	7	

c

			2	3	8	
×				5	2	
				1	6	(2 × 8)
				6	0	(2 × 30)
			4	0	0	(2 × 200)
			4	0	0	(50 × 8)
		1	5	0	0	(50 × 30)
	1	0	0	0	0	(50 × 200)
	1	2	3	7	6	

Written methods – short division

In short division, we use our knowledge of multiplication to help us. We can split 936 into 900 + 30 + 6.

$$3\overline{)9\,3\,6} = 312$$

900 divided by 3 is 300, so we put a 3 in the hundreds place.
30 divided by 3 is 10, so we put a 1 in the tens place.
6 divided by 3 is 2, so we put a 2 in the units place. **936 ÷ 3 = 312**

1 **Divide these numbers:**

a $4\overline{)8\,4} = 2\,1$

b $5\overline{)5\,5} = 1\,1$

c $3\overline{)9\,3} = 3\,1$

d $9\overline{)9\,9\,0} = 1\,1\,0$

e $4\overline{)4\,8\,4} = 1\,2\,1$

f $6\overline{)6\,6\,6} = 1\,1\,1$

g $3\overline{)9\,9\,9} = 3\,3\,3$

h $2\overline{)4\,6\,2} = 2\,3\,1$

i $3\overline{)6\,9\,3} = 2\,3\,1$

Sometimes it's easier to split the numbers differently. We can also split 936 into 900 + 36.

$$3\overline{)9\,3\,6} = 312$$

900 divided by 3 is 300 so we put a 3 in the hundreds place
36 divided by 3 is 12. We put the 1 in the tens place and the 2 in the units place.
936 ÷ 3 = 312

2 **Decide how you'll split these numbers and then divide. Remember to put in zeros as needed.**

a $5\overline{)5\,1\,5} = 1\,0\,3$

b $3\overline{)6\,6\,9} = 2\,2\,3$

c $9\overline{)9\,2\,7} = 1\,0\,3$

d $4\overline{)8\,0\,4} = 2\,0\,1$

e $4\overline{)8\,1\,2} = 2\,0\,3$

Written methods – short division with remainders

Sometimes numbers don't divide evenly. The amount left over is called the **remainder.**

$$5\overline{)5\,2\,7} = 1\,0\,5\ r2$$

Look at 527 divided by 5.
500 divided by 5 is 100.
27 divided by 5 is 5 with 2 left over (this is the remainder).
This can be written as r 2.
527 ÷ 5 = 105 r 2.

1 **Divide these 2 digit numbers. Each problem will have a remainder.**

a $9\overline{)7\,5} = 8\ r3$

b $4\overline{)4\,7} = 1\,1\ r3$

c $6\overline{)3\,8} = 0\,6\ r2$

d $5\overline{)6\,3} = 1\,2\ r3$

e $4\overline{)4\,9} = 1\,2\ r1$

f $6\overline{)6\,2} = 1\,0\ r2$

2 **Divide these 3 digit numbers. Each problem will have a remainder.**

a $5\overline{)5\,5\,7} = 1\,1\,1\ r2$

b $3\overline{)6\,6\,1} = 2\,2\,0\ r1$

c $4\overline{)4\,8\,1} = 1\,2\,0\ r1$

d $9\overline{)9\,9\,4} = 1\,1\,0\ r4$

e $4\overline{)8\,4\,5} = 2\,1\,1\ r1$

f $6\overline{)6\,3\,8} = 1\,0\,6\ r2$

3 **Solve these problems:**

a Giovanni's Nan has given him a bag of gold coins to share among him and his two sisters. There are 47 gold coins altogether. How many does each child get if they're shared evenly? How would you suggest they deal with the remainder? **15**

Answers will vary.

b You have 59 jelly beans to add to party bags. Each bag gets 5 jelly beans. How many full party bags can you make? **11 r 4**

$$5\overline{)5\,9} = 1\,1\ r4$$

Written methods – short division with remainders

There are 3 ways of expressing remainders. How we do it depends on how we'd deal with the problem in the real world. Look at:

$$5\overline{)\,5\;2\;7} = 1\;0\;5\;r2$$

4 **One way is to write *r 2* as in the example above. We use this when we don't care about being absolutely precise and when the remainder can't be easily broken up. An example would be sharing 527 jelly beans among 5 people. Solve these problems expressing the remainders as *r*.**

a Share 126 blue pencils among 4 people.

$$4\overline{)\,1\;2\;6} = 3\;1\;r2$$

b Share 215 paper clips among 7 people.

$$7\overline{)\,2\;1\;5} = 3\;0\;r5$$

5 **We can also express a remainder as a fraction. We do this when we can easily share the remainder. For example, 19 cakes shared among 3 people is 6 and one third each. Solve these problems expressing the remainder as a fraction:**

a Share 13 pizzas among 4 people.

$$4\overline{)\,1\;3} = 3\;\frac{1}{4}$$

b Share 50 sandwiches among 3 people.

$$3\overline{)\,5\;0} = 1\;6\;\frac{2}{3}$$

6 **We express remainders as decimals when we must be absolutely precise. Sharing pound amounts is a good example of this. We add the pence after the decimal point to help us. Try these:**

a Share 12 pounds among 4 people.

$$4\overline{)\,1\;2.0\;0} = 3.0\;0$$

b Share 27 pounds between 2 people.

$$2\overline{)\,2\;7.0\;0} = 1\;3.5\;0$$

Written methods – solving problems

We regularly come across multiplication and division problems in our everyday life. It doesn't matter which strategy we use to solve them, we can choose the one that suits us or the problem best.

1 **One real-life problem is comparing prices to find the best deal. It's easy if the prices and amounts are the same but what if the amounts are different? Use a strategy to help you find the best deal on these:**

a

$$^{2}1.^{1}9\;5 \times 3 = 5.8\;5 \quad \text{or} \quad 3\overline{)\,5\;^{2}4\;3} = 1\;8\;1$$

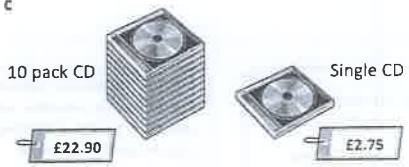
Best deal is *£5.43 for 300 g*

b

$$^{1}3.^{1}9\;5 \times 2 = 7.9\;0 \quad \text{or} \quad 2\overline{)\,8.5\;0} = 4.2\;5$$

Best deal is *£3.95 for 500 g*

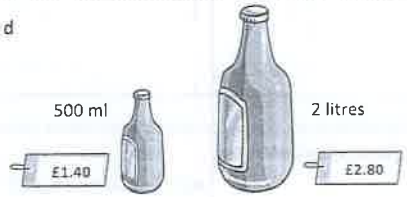
c



£22.90 ÷ 10 = £2.29
or
£2.75 × 10 = £27.50

Best deal is *10 pack CD*

d



$$^{1}1.^{1}4\;0 \times 4 = 5.6\;0 \quad \text{or} \quad 4\overline{)\,2.8\;0} = 0.7\;0$$

Best deal is *2 litres*

2 **You go to the service station with your weekly pocket money of £5. When you take a £1.75 chocolate bar to the counter, they offer you the special of 3 bars for £4.50. Which is a better deal? Show why.**

$$3\overline{)\,4.^{1}5\;0} = 1.5\;0 \quad \text{or} \quad ^{2}1.^{1}7\;5 \times 3 = 5.2\;5$$

Best deal is 3 bars for £4.50 – £1.50 each.
Cheaper than £1.75 each.

Written methods – solving problems

3 **You're planning a trip to the Wet and Wild theme park and there are many ticket options. Use a strategy of your choice and the price list below to answer the following questions:**

Entry	Extras
1-day pass **£16**	5-minute helicopter ride **£21**
2-day pass **£24**	10-minute helicopter ride **£35**
Annual pass **£45**	30-minute helicopter ride **£105**
Individual rides **£6**	Sunset cruise **£6**
10-ride pass **£50**	Lunch cruise **£11**
Order online **£2 discount**	Swim with the dolphins **£35**

a If you buy a 2-day pass, what is the cost per day? *£12*

b How much cheaper is this option than buying two 1-day passes? *£8*

c If you bought an annual pass, how many times would you need to visit to make it a better option than buying either a 1-day or 2-day pass? *2*

d What if you choose just the rides? How much would you save if you bought the 10-ride pass instead of the individual rides? *£10*

e If you took a 5-minute helicopter ride, what would be the cost per minute? *£4.20*

f What about if you chose the 10-minute flight option? What would be the cost per minute? *£3.50*

g Plan a day's itinerary for you and a partner. How much will this cost? *Answers will vary.*

Crack the code — apply

What to do

Use the code below to work out the hidden message.

M	A	T	H	L	E	T	I	C	S		I	S		F	U	N
2	1	3	6	4	5	3	8	7	9		8	9		10	12	11

A × A = A	A is *1*	F = H + L	F = *10*
M × M = M + M	M is *2*	E = F ÷ 2	E = *5*
T − M = A	T is *3*	2 × L = I	I = *8*
T + T = H	H is *6*	(2 × L) − A = C	C = *7*
H − M = L	L is *4*	F + A = N	N = *11*
3 × L = U	U is *12*	3 × T = S	S = *9*

DISCOVER

What to do

Try this one:

A	S	T	R	O	N	A	U	T	S		A	R	E
2	9	4	12	13	8	2	7	4	9		2	12	3

T	A	L	L	E	R		I	N		S	P	A	C	E
4	2	6	6	3	12		0	8		9	1	2	5	3

A × A = A + A	A is *2*	L + E = S	S is *9*
A + A = T	T is *4*	N − N = I	I is *0*
T × 2 = N	N is *8*	U − A = C	C is *5*
AT ÷ N = E	E is *3*	S − (2 × T) = P	P is *1*
2 × E = L	L is *6*	2 × U − P = O	O is *13*
E + T = U	U is *7*	S + E = R	R is *12*

Smart buttons — apply

Getting ready

In this activity, you'll use your knowledge of multiplication, division, subtraction and addition to find as many number statements you can to create one number.

What to do

Using ONLY the number 2, +, ×, – and ÷ keys on your calculator, find as many ways as you can to create the number 13.
For example, you could make:

22 + 2 + 2 = 26 ÷ 2 = 13

Record your statements on a piece of paper.

Now, compare your answers with a partner's. How many did they find? Can you supplement each other's lists?

What's the longest statement? What's the shortest?

What to do

Choose another number to make and see how many statements you can find *or* challenge a partner to a competition. Set a time limit and see who can find the most ways to make the number 15 within the time span.

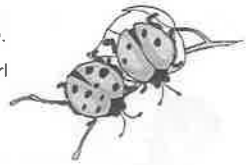
Answers will vary.

Bugs — investigate

Getting ready

Use your knowledge of multiples to help you work out how many boy bugs and girl bugs there are in the problem below. Listing all the multiples is a strategy that would help.

What to do



Girl bugs have 4 splodges on their backs, boy bugs have 9.

Altogether there are 48 splodges. Work out how many girl bugs and how many boy bugs there are.

3 girl bugs.

4 boy bugs.

What to do next

What if girl bugs have 8 splodges and boy bugs have 6 and there are 120 splodges altogether? How many different answers can you find?

Answers will vary.

Puzzles — apply

What to do

Use your knowledge of multiplication to work out the missing values:

a

	2	8
×		3
	8	4

b

	7	2
×		4
2	8	8

c

	4	7
×		5
2	3	5

d

	8	1
×		9
7	2	9

e

	6	8
×		3
2	0	4

f

	8	2	3
×			8
6	5	8	4

g

	2	6	1
×			4
1	0	4	4

h

		4	2
×		4	3
	1	2	6
1	6	8	0
1	8	0	6

i

		5	6
×		2	7
	3	9	2
1	1	2	0
1	5	1	2

What to do

Fill in the multiplication and division tables by working out the missing digits. The arrows show you some good starting places.

×	10	8	7	6
2	20	16	14	12
5	50	40	35	30
6	60	48	42	36
3	30	24	21	18

×	2	8	9	4
12	24	96	108	48
3	6	24	27	12
7	14	56	63	28
6	12	48	54	24

×	5	2	3	8
4	20	8	12	32
7	35	14	21	56
9	45	18	27	72
12	60	24	36	96

×	3	4	9	8
2	6	8	18	16
11	33	44	99	88
7	21	28	63	56
8	24	32	72	64

Puzzles — apply

What to do

Complete this crossnumber puzzle:

1 1	2	■	2 1	2	5
2	■	3 4	2	■	■
1	■	4 9	0	■	5 1
■	6 1	■	■	7 2	1
■	4	■	8 1	■	■
9 5	4	■	10 3	0	0

Across

1 $60 \div 5$
2 25×5
3 7×6
4 15×6
7 7×3
9 9×6
10 6×50

Down

1 11×11
2 12×10
3 7×7
5 $66 \div 6$
6 12×12
8 $39 \div 3$

What to do

Test your speed and accuracy. Race against a partner or the clock to complete each table:

÷8	
56	7
16	2
64	8
80	10
32	4
72	9
24	3
8	1

Time:

÷3	
9	3
6	2
18	6
12	4
24	8
30	10
27	9
33	11

Time:

÷7	
21	3
7	1
14	2
70	10
49	7
28	4
42	6
35	5

Time:

What to do

Use the "guess, check and improve" strategy to solve this problem. You could use a calculator to help if you wish.

Tracey paid £3.10 for 7 jelly snakes and 4 sherbets. Madison paid £2.95 for 4 jelly snakes and 7 sherbets. How much does one jelly snake cost? How much does one sherbet cost?

1 jelly snake = 30p

1 sherbet = 25p

Types of graphs 1 – picture graphs

Picture graphs are used to display large amounts of data. A symbol is chosen to represent a specific amount. Picture graphs have a title that tells us what data has been collected, category labels and a key to show the value of the symbol.

How many chocolate cupcakes were sold?

$4 + 4 + 4 + 4 + 4 + 2 = 18$

Cupcakes Sold in a Day Key: = 4 cupcakes

Strawberry	
Chocolate	
Cherry	
Choc-chip	

1 **At the bus terminal buses arrive and depart at regular intervals. This picture graph shows the number of buses that departed the bus terminal in one week. Use the graph and the key to answer the following:**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Key: = 10 buses

a On which day did 55 buses depart?
Friday

b Which is the terminal's busiest day?
Wednesday

c How many buses depart on this day? *70*

d How many buses leave on Tuesday? *45*

e How many more buses depart on Friday than Saturday? *15*

2 **This graph shows the number of tickets bought at the local cinema.**

Movie Classification	Tickets Bought
Comedy	
Children	
Horror	
Action/Drama	

Key: = 100 tickets

a How many tickets were bought for Comedy and Childrens' movies? *1 150*

b What was the total amount of tickets bought? *1 900*

Types of graphs 1 – picture graphs

3 **5F put on their own version of "So You Think You Can Dance". Use the graph and key to answer the following:**

Ticket Sales **Key:** = 20 tickets

Week 1	
Week 2	
Week 3	
Week 4	
Week 5	

a How many tickets does each represent? 20

b How many tickets were sold in Week 1? 80

c How many tickets were sold in Week 5? 70

d In which week were the most tickets sold? Week 3

e How many tickets were sold that week? 120

f During which two weeks were the same number of tickets sold? Week 2 and Week 4

g How many more tickets were sold in Week 3 than Week 1? 40

h How many tickets were sold during the entire sales period? 450

4 **In a scandal that rocked the school, it was found that ticket sales data was exaggerated. The maximum attendees for any one week was actually 60.**

a How many tickets does each symbol now represent? 10

b How many tickets were really sold during the entire sales period? 225

Types of graphs 1 – picture graphs

5 **Pupils sold chocolates to raise money for charity. This picture graph shows their collection for the first week. Use this graph to answer the following:**

Week 1 Chocolate Sale Key: = 4 bars

Ethan	
Claire	
Pablo	
Heba	
Reece	
Mia	
Rania	
Hassan	

a Who sold 56 chocolate bars? Pablo

b Who sold $\frac{1}{2}$ dozen bars? Heba

c Mia sold 48 chocolate bars.

d How many bars did Ethan sell? 40

e How many bars were sold altogether? 246

f If each bar sold for £2, how much money did the group raise for charity? £492

6 **Bars sold in Week 2 of the charity drive appear in the tally column of this table. Represent this information using symbols. The first pupil has been done for you:**

Week 2 Chocolate Sale Key: = 4 bars

Pupil	Tally	Picture Graph
Ethan	𝍸 𝍸 𝍸 𝍸 ||||	
Claire	𝍸 𝍸 𝍸 |||	
Pablo	𝍸 𝍸 𝍸 |	
Heba	𝍸 𝍸 ||	
Reece	𝍸 |||	
Mia	𝍸 𝍸 𝍸 |	
Rania	𝍸 𝍸 ||	
Hassan	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||	

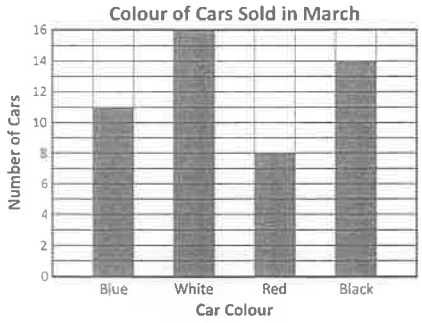
a During Week 2, how much money was raised altogether? Each chocolate bar is £2. £276

b A prize was given at the end of the 2 weeks to the pupil who raised the most money. Who won? Pablo

Types of graphs 1 – column graphs

We often use column graphs when we want to compare data. All column graphs have a title and each axis is labelled.

From this we can quickly see that 16 white cars were sold in March and that this was the most popular colour choice.



1 **Answer the questions about this column graph:**

a Which city had the highest rainfall in October?

Rome

b What was this city's rainfall? 100 mm

c Which cities had a rainfall between 70 mm and 90 mm?

London and Sydney

d How many more millimetres of rain did Rome have than Paris? 45 mm

2 **Below are the November figures for the same cities. Add them to the graph (above). Think first how best to do this:**

Paris 65 mm London 40 mm Sydney 95 mm Tokyo 60 mm Rome 30 mm

a Will you use the same colour columns?

No – add a key to show which column is which.

b Will you need to change anything else on the graph?

Yes, the title to: Total Rainfall in October and November.

3 **Write a problem using the new data for a partner to solve:**

Answers will vary.

Types of graphs 1 – column graphs

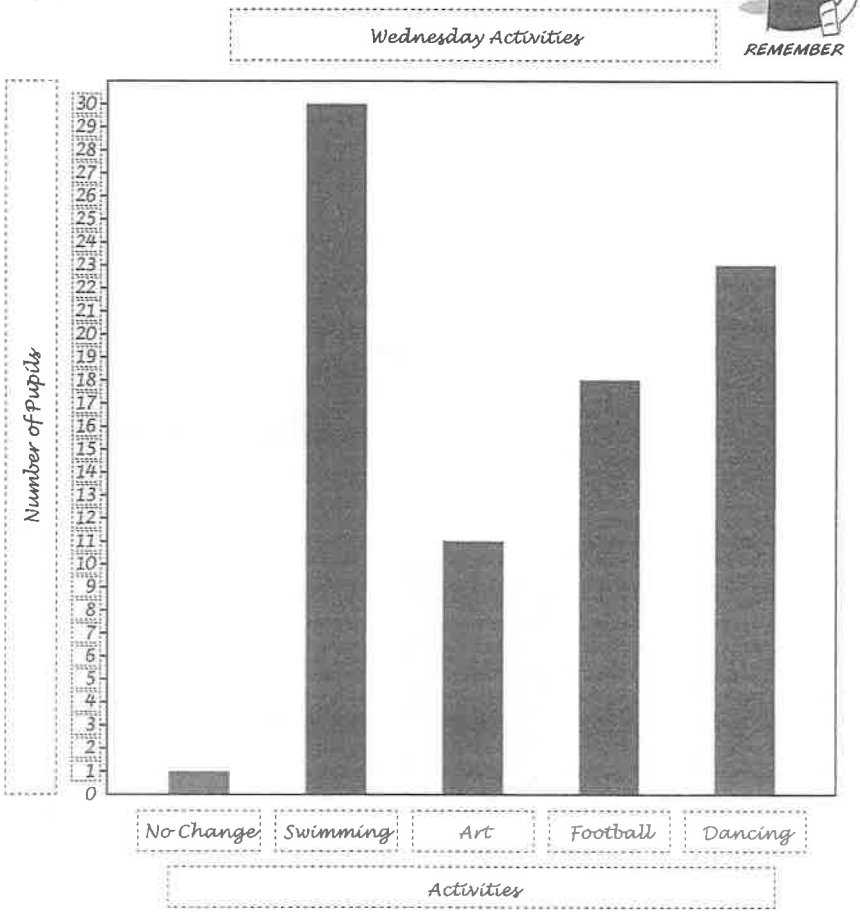
- ☐ Name your graph and both axes
- ☐ Label each column
- ☐ Select and label an appropriate scale

REMEMBER

4 **The after school club kids are staging a mutiny. They are over watching the same DVDs and making popcorn every day and want to do something new and exciting on Wednesdays. This table shows the activities they'd prefer.**

Activity	Number of Pupils
No change	1
Swimming	30
Art	11
Football	18
Dancing	23

a Help them present a case to the head teacher by completing the column graph:

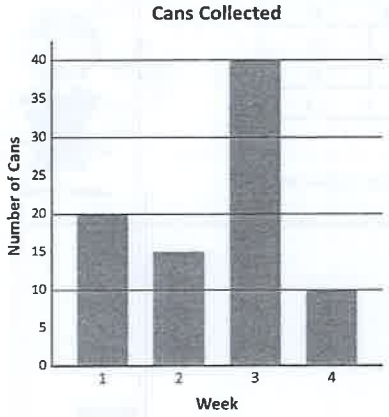


b What are some key issues on the graph you'd point out? Work in a small team to come up with a solution. Pretend your teacher or another group is the head teacher and present your case.

Answers will vary.

Types of graphs 1 – column graphs

5 **5D decide to run a recycling campaign and collect cans in and around the school. They recorded how many cans were collected each week and started constructing this column graph. In Week 3 they collected 40 cans and in Week 4 they collected 10 cans.**



a Add Week 3 and 4 data to the graph.

b There was a soft drink special at the local store during one of the weeks. Which week do you think it was and why?

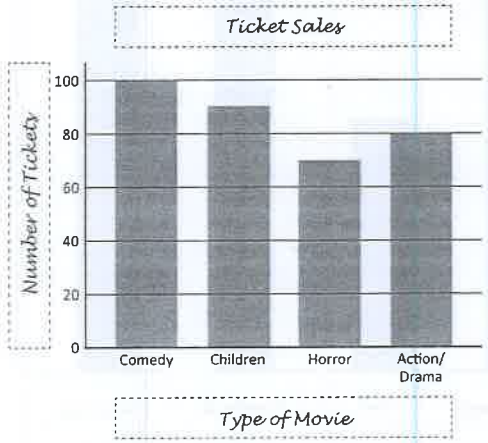
Week 3 because the most cans were collected.

c How many cans were collected in all? *85*

d If each can is worth 5p, how much money did 5D make from the campaign? *£4.25*

6 **The same information can be represented in different graphs.**

a Design a column graph to represent the data shown in this picture graph.



Type of Movie	Ticket Sales
Comedy	
Children	
Horror	
Action/Drama	

Key: = 20 tickets

- ☐ Name your graph
- ☐ Label both axes
- ☐ Select and label an appropriate scale
- ☐ Label each column

REMEMBER

b If you ran a cinema and wanted to plan your weekly movie schedule, which graph would you prefer? Which type of graph makes it easier to analyse and compare data?

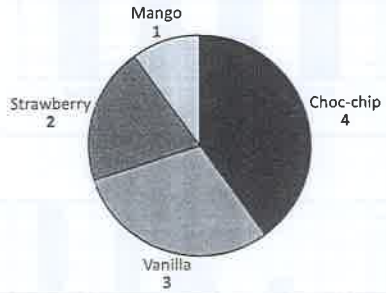
Answers will vary.

Types of graphs 2 – pie charts

A pie chart shows data as parts of a whole. The circle represents the total amount while the segments are the parts. When we compare the parts to the whole, we're looking at proportion. This is often written as a fraction.

This pie chart shows the favourite ice cream flavours of 10 people.

Favourite ice cream flavours of 10 people

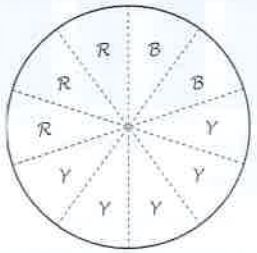


The table below summarises the information displayed on this graph.

Category	Amount	Fraction
Vanilla	3	$\frac{3}{10}$
Strawberry	2	$\frac{2}{10}$
Mango	1	$\frac{1}{10}$
Choc-chip	4	$\frac{4}{10}$
Total	10	$\frac{10}{10}$

1 **Colour and label this pie chart according to the information in the table:**

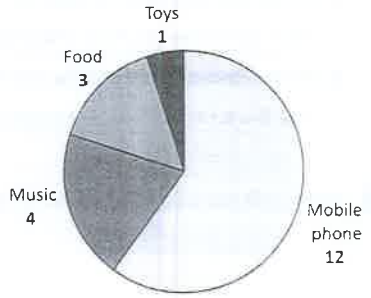
Favourite colours of 10 people



Category	Amount	Fraction
Red	3	$\frac{3}{10}$
Blue	2	$\frac{2}{10}$
Yellow	5	$\frac{5}{10}$
Total	*10*	$\frac{10}{10}$

2 **A group of pupils was surveyed to find out what they spend their pocket money on. This pie chart shows the results. Circle True or False next to each statement.**

What do pupils spend their pocket money on?



a More than half the pupils surveyed spent their money on a mobile phone.
(True) / False

b $\frac{4}{20}$ surveyed spent their money on food.
True / (False)

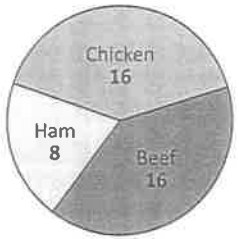
c 20 pupils were surveyed in total.
(True) / False

3 **5F and 5H were planning a pizza party and conducted a survey of favourite toppings. This pie chart shows the results.**

a Complete the summary table if there are 40 pupils altogether.

Category	Amount	Fraction
Chicken	16	$\frac{4}{10}$
Ham	8	$\frac{2}{10}$
Beef	16	$\frac{4}{10}$
Total	40	$\frac{10}{10}$

Pizza Topping Survey

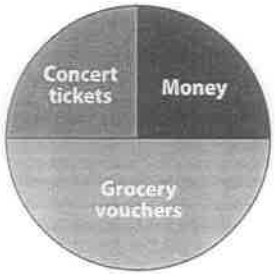


b Their teacher said they could order 10 pizzas. How many of each flavour should they get?

Chicken [4] Ham [2] Beef [4]

4 **To boost ratings, Radio Non-Stop-Hits ran a promotion where they gave away prizes every hour. This pie chart shows the distribution of 60 prizes that they gave away.**

Types of Prizes



a How many of each prize were given out?

Concert tickets	Grocery vouchers	Money
15	30	15

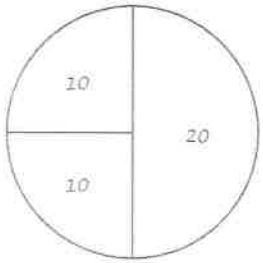
b The radio station's accountant realised the pie chart was correctly divided but there'd been a miscalculation in the number of prizes given out. There'd actually been 25 money prizes given away. Calculate the actual amounts:

Concert tickets	Grocery vouchers	Money
25	50	25

5 **The total amount that this graph is representing is 40. What could this be about? Give this pie chart a title and describe it by completing the table below:**

Answers will vary.

Category	Amount	Fraction
-	10	$\frac{10}{40}$ or $\frac{1}{4}$
-	10	$\frac{10}{40}$ or $\frac{1}{4}$
-	20	$\frac{20}{40}$ or $\frac{1}{2}$
Total	40	$\frac{40}{40}$



Proportions as shown

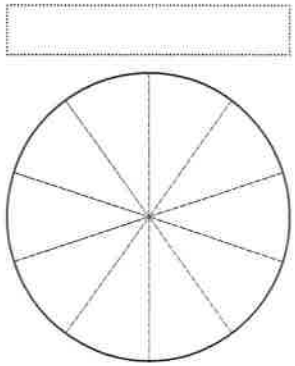
6 **Create your own pie chart.**

a Ask 10 pupils to choose which of these gaming consoles they like best.

b Use the table below to collect your data.

c Show the results on a clearly labelled pie chart.

Gaming Console	Tally	Amount
Wii		
Xbox 360		
Playstation 3		
Nintendo Game Cube		



d What fraction of the group surveyed chose Wii?

Answers will vary.

7 **Survey 10 children on the topic of favourites. You can ask about favourite foods, TV shows, music or whatever you like.**

a Write the topic at the top of the first column.

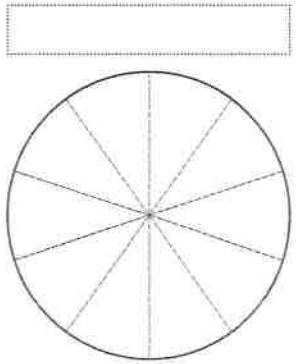
b Write 4 options to choose from underneath.

c Record your results in the frequency table below.

d Transfer the data from the frequency table to the pie chart.

e Label all sections correctly.

	Tally	Amount

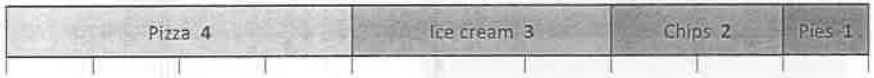


f Write a statement about what your pie chart shows:

Answers will vary.

Types of graphs 2 – divided bar graphs

A divided bar graph is used to show how a total is divided.
It's similar to a pie chart except it's a rectangle divided into parts that represent the information.
This divided bar graph shows the favourite food of 10 children.



1 **The Nicholls' family grocery budget is £200 per week. This table shows how the money is spent:**

Fruit	Vegetables	Meat	Snacks	Drinks
£20	£40	£60	£40	£40

a Show the information in this table as a divided bar graph. Each space represents £20.

b What was $\frac{3}{10}$ of the budget spent on? *Meat*

2 **This divided bar graph shows how Paula spent £360 on her party. Answer the questions below about how much she spent on each category. You may use a calculator.**

a What is each segment worth? *£40*

b $\frac{1}{3}$ was spent on decorations. How much is this? *£120*

c $\frac{2}{9}$ was spent on food and drink. How much is this? *£80*

d How much was spent on entertainment? Show your workings below:

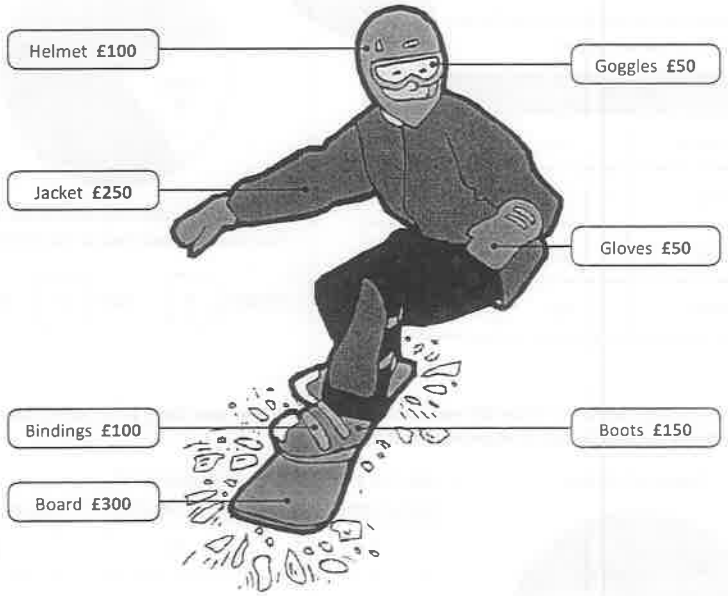
$\frac{4}{9}$ *of* £360 = £160

or

£360 − £200 = £160

Types of graphs 2 – divided bar graphs

3 **You want to try snowboarding and you need to ask your parents for £1 000 to buy all the gear. Understandably, they want to know how their hard earned cash will be spent.**



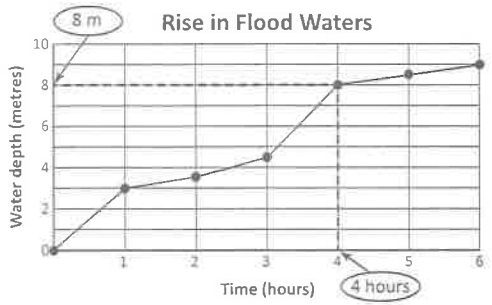
Complete a divided bar graph to show them. Colour in each category a different colour, label it clearly and include a title.

Title *Cost of Snowboarding Gear*

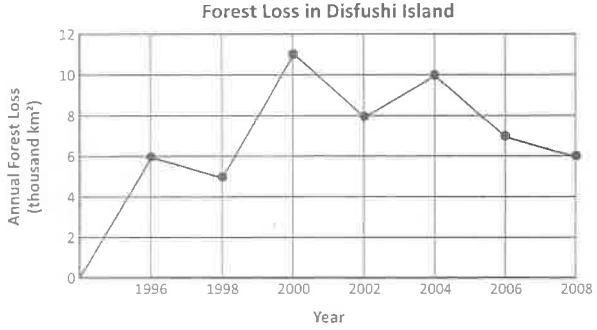
Types of graphs 3 – reading line graphs

Line graphs show how something changes over time in relation to something else. In this topic, we'll look at different examples of line graphs. Look at the line graph below. See how the more time passed, the higher the water got?

In which hour was the water 8 metres deep? Look below for how we read this information:



1 **Look carefully at this line graph and answer the questions:**



a How many square kilometres of forest was lost in 1996? *6 000 km²*

b How many square kilometres of forest was lost in 2000? *11 000 km²*

c In which year were 7 000 square kilometres of forest lost? *2006*

d How much more forest was lost in 2000 than in 2008? *5 000 km²*

e Use the graph to estimate the forest loss in 1999. *8 000 km²*

f Use the graph to estimate the forest loss in 2003. *9 000 km²*

Types of graphs 3 – reading line graphs

2 **Polly and her friend Molly were practising reading a thermometer for homework. They boiled water in a kettle and then took turns measuring the temperature every minute as it cooled down. To make this more interesting, they made it a guessing game.**

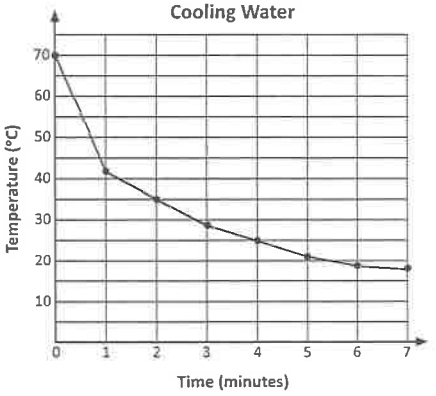
Look at the graph and answer the questions to see how they went:

a Polly guessed that after 1 minute the temperature would be 46 °C. Was she right?

No

b Molly guessed that after 2 minutes the temperature would be 34 °C. Was she right?

No



Look closely at the graph they made showing the temperature of the water in the kettle.

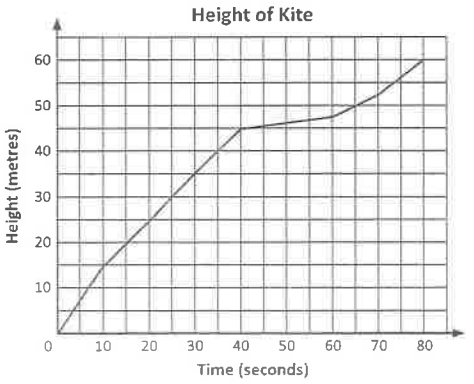
c What is the value of each small division on the temperature axis?

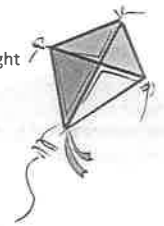
5 °C

d By how much did the water cool down between 2 minutes and 4 minutes? *10 °C*

e How long did the water take to cool to 19 °C? *6 mins*

3 **This graph shows a kite's height at different times. Answer the questions below:**





a What was the kite's height at 65 seconds?

50 metres

b How long did the kite take to rise from 25 metres to 40 metres?

15 seconds

c Estimate the height of the kite at 1 minute.

47/48 metres

d If the kite continued to rise, how high do you think it would be after 90 seconds?

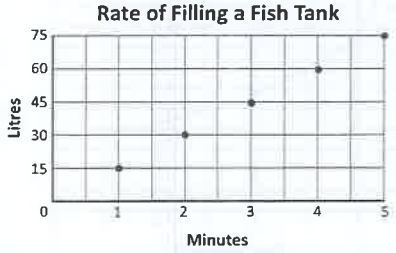
70 metres

Types of graphs 3 – constructing line graphs

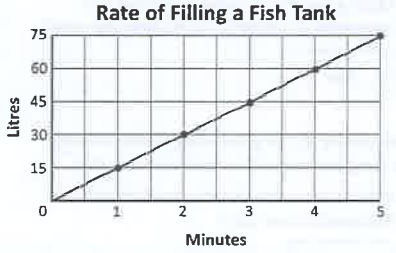
Let's see how to build a line graph from a data table.
This data shows the rate of filling a fish tank with water.

Minutes	1	2	3	4	5
Litres	15	30	45	60	75

Step 1
Carefully plot the data from the table.



Step 2
Join the points with straight lines.

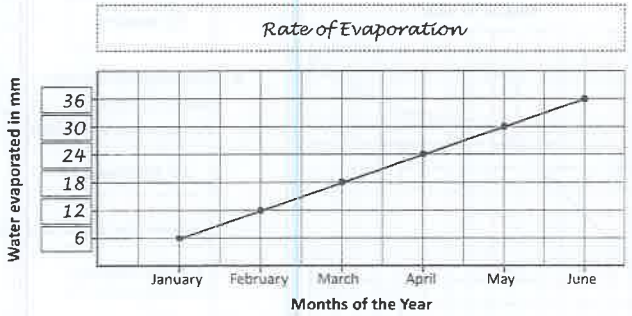


1 **The average rate that water evaporates from an indoor swimming pool is 6 mm a month.**

a Complete this table to show how much water will evaporate over 6 months:

Millimetres	6	12	18	24	30	36
Month	January	February	March	April	May	June

b Label the vertical axis with an appropriate scale, then plot the points and join the points with a ruler.
What else do you need to add to make this graph complete?



Answers may vary.

c Write 2 questions about this graph and write the answers.

Answers will vary.

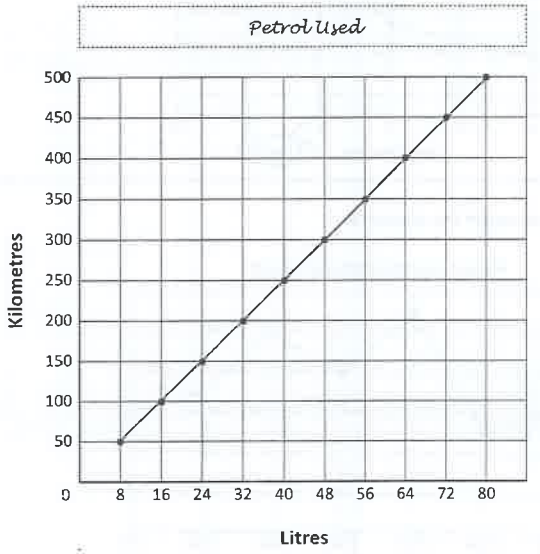
Types of graphs 3 – constructing line graphs

2 **A car uses 8 litres of petrol for every 50 km travelled.**

a Complete this table to show how much petrol is needed for a journey:

Litres	8	16	24	32	40	48	56	64	72	80
Kilometres	50	100	150	200	250	200	350	400	450	500

b Complete this line graph:



Answers may vary.

c How far can the car go on 32 litres of petrol? 200 km

d How many litres of petrol are needed to travel 450 km? 72 litres

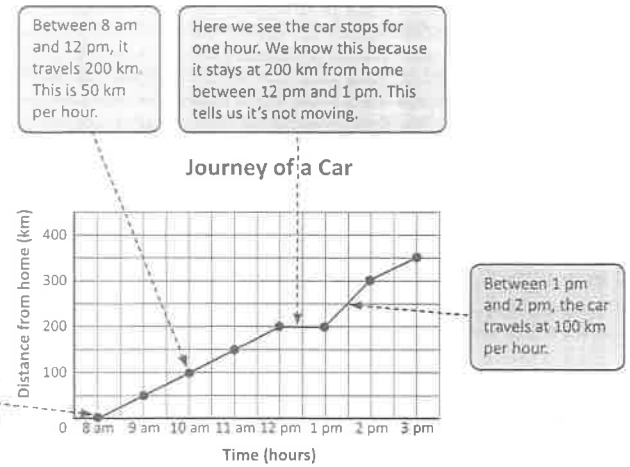
e How far would a car travel on 12 litres of petrol? 75 km

f How far would you have travelled if you used 96 litres of petrol? 600 km

g If this car's fuel tank had a capacity of 40 litres, how many times would you need to fill it if you wanted to travel 500 km? 2

Types of graphs 3 – travel graphs

A travel graph is a type of line graph that shows the distance travelled and the time taken to travel that distance. We can tell a lot about a journey just by the shape of a line.



1 **This travel graph shows the journey of the Henderson family on a driving holiday.**

a What time did they leave home?

8 am

b How long was their first rest stop?

1 hour

c How far had they travelled by 10 am?

100 km

d At what speed were they travelling between 3 pm and 5 pm?

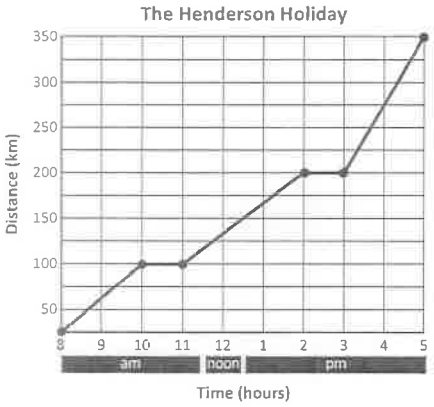
75 km/hr

e What could they have been doing at 2.30 pm?

Having lunch or taking a break

f How long was the journey, excluding rest stops?

7 hours



Types of graphs 3 – travel graphs

2 **Look carefully at this journey of a cyclist and fill in the blanks.**

a I started training at *5 am*.

b I met a friend for breakfast at *6 am*.

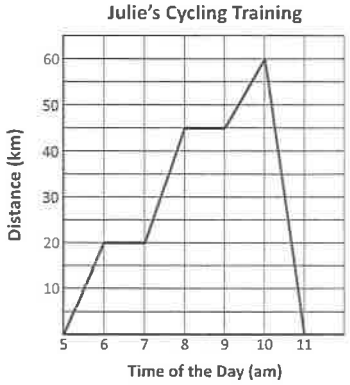
I continued again at *7 am*.

c By 8 am I had cycled *45* km.

d Due to a flat tyre, I had to stop again at *8 am*.

e I turned around to cycle all the way home at *10 am*.

f I got home at *11 am* and had a nice long bubble bath.

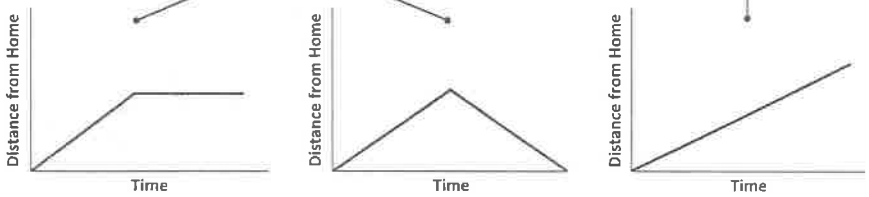


3 **Connect each travel graph to the matching statement with a line.**

I was on my way to school when I felt sick, so I turned around and went home again.

On the way to the shops we stopped to get petrol.

We travelled at the same speed, not stopping until we got there.



Collecting and analysing data – frequency tables

Raw data is often collected in a frequency table. Tally marks are a quick way to record numbers. When we're finished, we add the marks to find totals:

Car Types in Car Park	Tally	Frequency
4WD	𝍸 𝍸 𝍸 𝍸	20
Sedan	𝍸 𝍸 𝍸 ||	17
Station wagon	𝍸 𝍸 𝍸 𝍸	20
Hatchback	𝍸 𝍸 ||||	14

1 **Charlie sold drinks at the beach for an hour each day. He wrote down the drinks he sold each day:**

Monday	Coke	Lemonade	Water	Juice			
Tuesday	Juice	Juice	Coke	Coke			
Wednesday	Water	Juice	Juice	Juice	Coke	Lemonade	
Thursday	Water	Water	Water	Coke	Coke	Juice	Lemonade
Friday	Lemonade	Water	Juice	Coke	Coke	Juice	
Saturday	Coke	Coke	Coke	Juice	Juice	Water	Water
Sunday	Lemonade	Lemonade	Coke	Juice	Water	Coke	

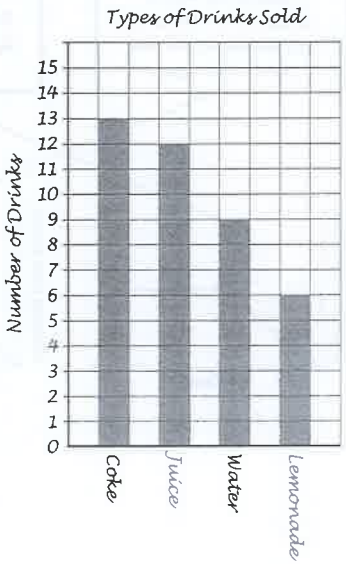
a This is a time-consuming way to record data. Show Charlie how to set up a frequency table to record the same data faster. The first one has been done for you.

Type of Drink	Tally	Frequency
Coke	𝍸 𝍸 |||	13
Juice	𝍸 𝍸 |||	12
Water	𝍸 ||||	9
Lemonade	𝍸 |	6

- ☐ Name your graph and both axes
- ☐ Label each column
- ☐ Select and label an appropriate scale

REMEMBER

b Represent your data in a column graph:



Collecting and analysing data – mean

When we say we're finding the 'average', we're finding the mean. To do so, we add all the scores then divide by the number of scores:

For example, the mean of 2, 3, 4, 5, 6 = $\frac{2+3+4+5+6}{5}$ = 4

So if the numbers above represented eggs found by 5 children in an Easter egg hunt, it'd be fairest if each child received 4. Of course, in egg hunts, it's usually every person for themselves!

1 **Find the mean in each set of data by adding the scores and then dividing by the number of scores:**

a 13, 4, 7, 11, 5

$= \frac{13+4+7+11+5}{5}$

$= 40 \div 5$

$= 8$

b 9, 13, 5

$= \frac{9+13+5}{3}$

$= 27 \div 3$

$= 9$

c 3, 5, 9, 2, 6

$= \frac{3+5+9+2+6}{5}$

$= 25 \div 5$

$= 5$

2 **Look at the following diving scores:**

Marita 7.2	Ben 9.4	Ari 4.6	Mia 7.6

a Calculate the mean. 7.2

b Who was closest to the mean? Marita

3 **The table below shows the number of goals scored over a 5 week period by 3 football teams:**

	6/3	13/3	20/3	27/3	3/4	Total	Mean
Fantastic Footballers	2	0	2	8	4	16	3.2
Serious Socceroos	3	2	4	1	5	15	3
Dangerous Dribblers	0	0	0	0	15	15	3

a Complete the table by filling in the missing information.

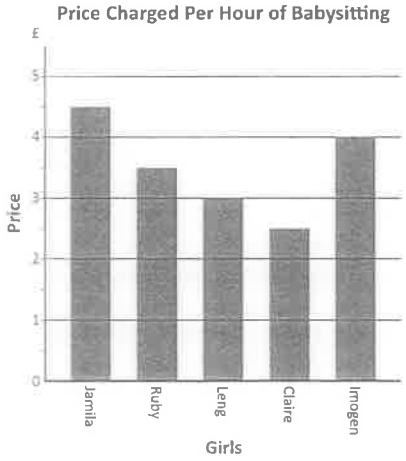
b Which team has scored the most goals? Fantastic Footballers

c Which team has the highest mean? Fantastic Footballers

d You're thinking of joining either the Serious Socerooos or the Dangerous Dribblers. They both have a mean of 3 goals per game. Which team do you think would be more competitive and why?

Serious Socceroos because they score more regularly

4 **Emma has just moved into a new neighbourhood and wants to start babysitting. She asks the girls at school what they charge and records this information in a graph:**



a If Emma wants to undercut all the others, what would you recommend she charge per hour?

Less than £2.50

b If Emma wants to position herself as an exclusive (expensive) babysitter, what would you recommend she charge per hour?

More than £4.50

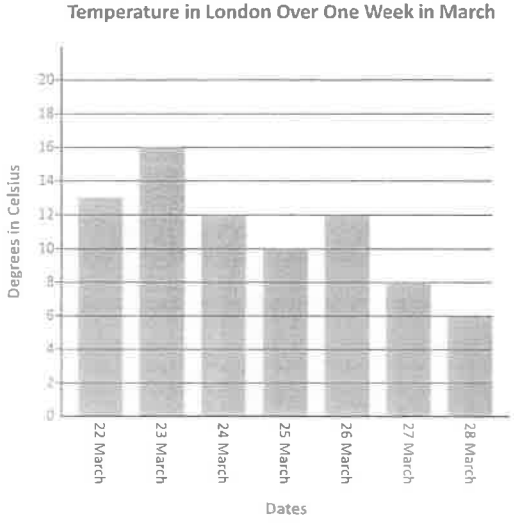
c Emma decides to charge the mean price per hour. What does she charge?

£3.50

d Ruby decides to add a booking fee of 50p per hour. She reckons if online booking agencies can get away with it, so can she. How does this change the mean price charged by the group?

The mean is now £3.60.

5 **Here is a graph showing the temperature in London:**



a Calculate the mean temperature for the week:

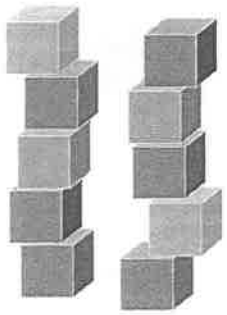
11 °C

b If you were travelling to London for the week, what clothes would you pack?

Warm clothes.

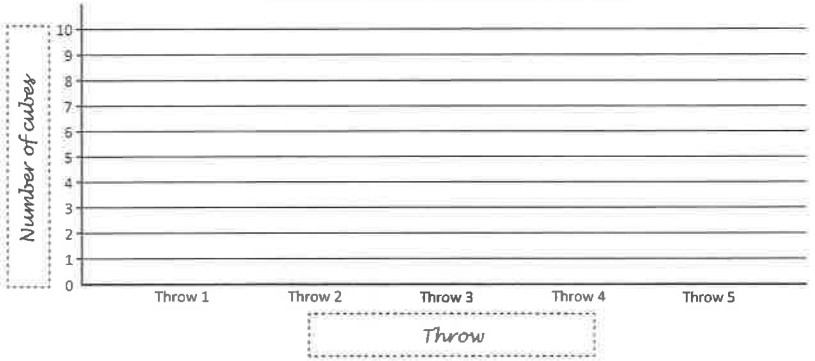
6 **You and a partner are going to record how many cubes land in a box. You will need 10 unifix cubes and an empty lunchbox.**

1 Place the lunchbox 1 metre in front of you.
2 Sit on the floor.
3 Take turns throwing all 10 cubes at the same time.
4 Each record your results in the data table on the right.
5 Repeat the process 5 times.



Throw	Tally
1	
2	
3	*Answers will vary.*
4	
5	

7 **Create a column graph of your results. Label each axis.**



a What is your mean number of cubes that landed in the box?

b What was your partner's mean number of cubes that landed in the box?

Answers will vary.

c What was the mean of both sets of data together?

d Do you think the mean paints an accurate picture of the process?

Collecting and analysing data – collecting data

1 **Study all the different types of graphs showing sales of chocolate bars. Match each graph to its main feature by completing the table below:**

Picture Graph

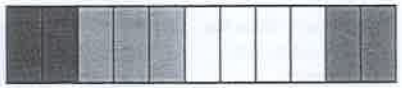
Sales of Chocolate Bars

Monday	🍫🍫
Tuesday	🍫🍫🍫
Wednesday	🍫🍫🍫🍫
Thursday	🍫🍫

Key: 🍫 = 10 chocolate bars

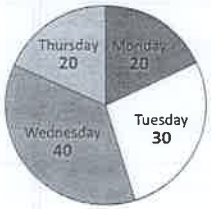
Divided Bar Graph

Sales of Chocolate Bars



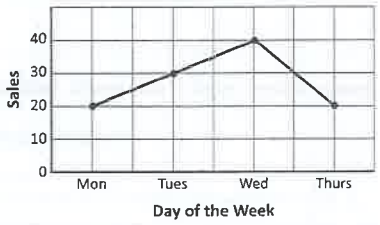
Pie Chart

Sales of Chocolate Bars



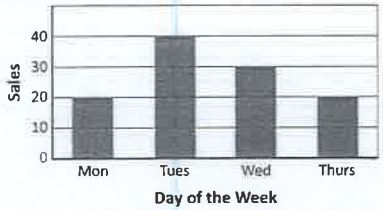
Line Graph

Sales of Chocolate Bars



Column Graph

Sales of Chocolate Bars



Main Feature	Name of Graph
Clear to see how big each category is compared to the whole. Sometimes has a key and looks like a pie.	*Pie chart*
Shows an exact amount in each category and allows you to compare categories.	*Column graph*
Compares sizes of categories at a glance and takes up very little space.	*Divided bar graph*
Shows numerical data using pictures. Has a key.	*Picture graph*
Shows how data changes in relation to something – usually time.	*Line graph*

Collecting and analysing data – collecting data

2 **Here are 3 different sets of data. Read over each table of data and decide which is the most appropriate graph to use.**

Graph 1

Name	Number of Books
Blair	8
Charlie	4
Amity	5
Nicky	12

Graph 2

Week	Height of Plant
1	2.5 cm
2	3 cm
3	5 cm
4	7.5 cm
5	9 cm
6	9.5 cm

Graph 3

Item	Profit
Hot food	£40
Chips	£30
Drinks	£20
Fruit	£10

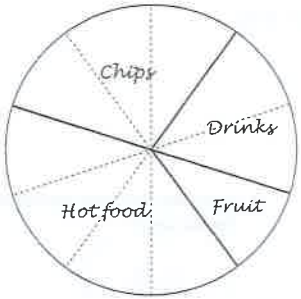
Construct the graphs using the templates below. You must work out the scale, label the axes and include a heading for each graph:

a Show how many books each person read over the holidays. It should be clear to see who read the most and who read the least.

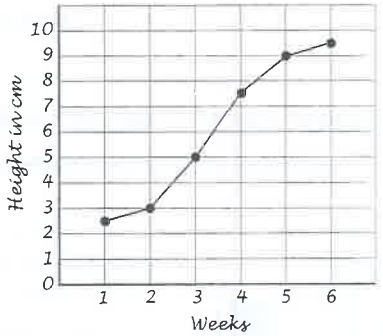
b Show how much a plant has grown over 6 weeks. It should be clear to see where the biggest growth spurt was.

c Show what the £100 profit that the canteen made yesterday was made up of.

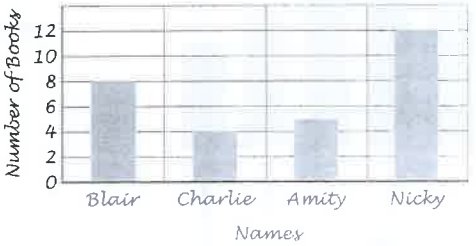
Canteen Profits



Growth of a Plant



Holiday Reading



Getting ready

Many crimes are solved by analysing paperwork. Detectives spend countless hours sifting through data. It can be one tiny fact that breaks a case open.

What to do

Read this next part very carefully. A bank was robbed during the month of May. Since it was the bank with all your savings, you have a vested interest in tracking down the offender.

An informant has told you that the crime was committed on the thief's birthday. They treated themselves to a shopping spree with your money! Apparently they crept in during a busy weekday and quietly cracked a safe.

The next three pages contain data about criminals in your area. Use the information to identify the thief and get your money back. You'll need to flick between graphs and clues to crack the case.

CLUE 1

MAY						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 / 31	25	26	27	28	29	30

CLUE 2

Birthdays of Local Criminals

	EG										
	FF		SK	HC					MH		
	NK		EW	PJ		BJ	LM		CW		
DC	MC	BT	FC	BB		EK	DK	LL	RB		SM
J	F	M	A	M	J	J	A	S	O	N	D

More clues on page 25.

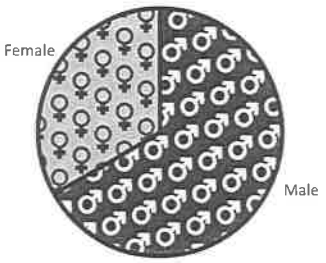
CLUE 3

Birthdates by Gender

Males	Females
04.01.75	11.02.85
23.02.86	14.02.78
17.02.66	03.03.80
02.04.73	13.05.84
04.04.75	07.07.77
24.04.67	17.10.78
10.05.81	31.10.87
23.05.82	
18.07.81	
09.08.67	
18.08.63	
26.09.66	
13.10.72	
24.12.65	

CLUE 4

Gender Breakdown of Local Criminals



CLUE 5

Known Crims

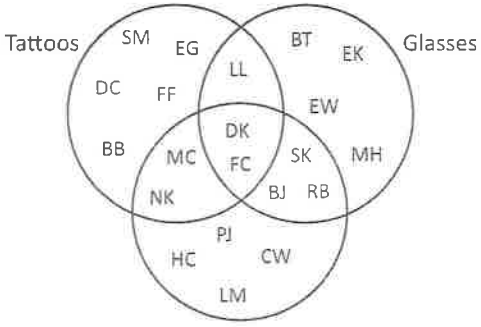
Sam McNab	Earl Wyatt
Master Criminal	Frannie Fingers
Bobette Trimbole	Emma Getaway
Ned Kelly	Shifty Keys
Dan Kelly	Betty Balaclava
Ellen Kelly	Ron Biggs
Pretty-boy Jones	Buster Jones
Harry Cracker	Luke Moran
Mata Hari	Dan Cuffme
Light-fingered Larry	Carla Williams
Fred Capone	

You should know who the criminal is by now!
Use the following data to find out more about them.

DISCOVER

CLUE 6

Distinguishing Features



More clues on page 26.

Whodunnit? — solve

CLUE 7

Hair Colour

black	blonde	brown	red
SM DC BT	BB EK EW LL	FF MH DK FC CW BJ PJ RB MC NK LM SK EG	HC

CLUE 8

Height of Known Criminals

150–59 cm	160–169 cm	170–179 cm	180–189 cm	190–199 cm
	CW	PJ		
	BJ	EG	NK	LM
FF	FC	RB	MC	HC
EK	MH	DC	EW	DK
SM	BB	BT	SK	LL

Height

Whodunnit? Give a name and a detailed description to the police superintendent:

Betty Balaclava
Date of birth: 13.05.84
Tattoos
Blonde hair
160–169 cm tall

What to do next

Create a WANTED poster for the guilty party.

Answers will vary.

Data disaster — create

Getting ready

You work for the chocolate company Cocoa Delights. In less than an hour, you're presenting the annual report to the Board.

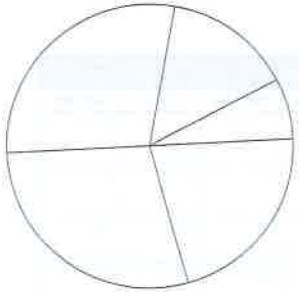
They're keen to know yearly sales figures, best selling lines, the breakdown of monthly expenses and how each product sells compared to the others.

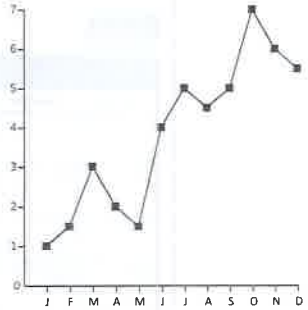
Your team has slaved to prepare the following data. However, someone didn't bother to add titles and labels to the graphs.

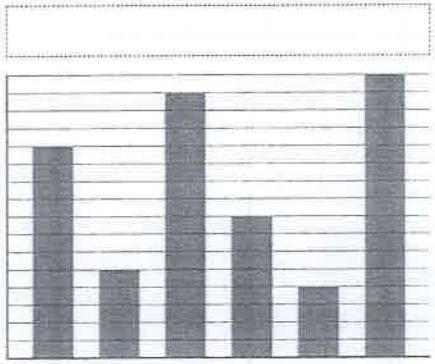
You don't have time to hunt for the culprit. You have to fix this yourself. Fast!

What to do

Look at the graphs below and come up with some believable information that would give each graph meaning and keep the Board happy. Think about which graph would best suit each set of data. They'll need titles, labels and numbers.





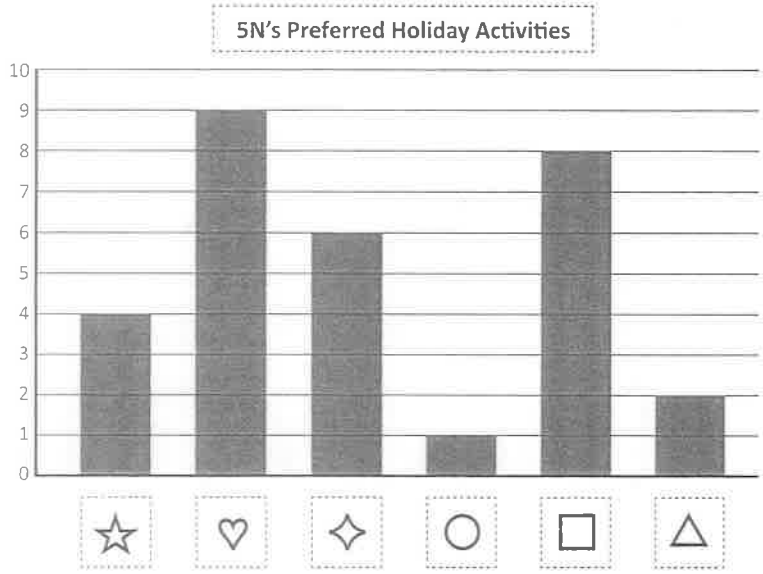


Answers will vary.

Hello, holidays! solve

What to do

Follow the clues to correctly label each column with the appropriate symbol:



☐ Four times as many kids would rather go to the beach than go to an art gallery.

♡ A holiday at Wet 'n' Wild is the most preferred option.

✧ There are 3 times as many shoppers than there are art gallery attenders.

☆ Five fewer people like camping than Wet 'n' Wild.

△ Half the number of people who like camping prefer to visit art galleries.

○ Poor Mr N will be hill walking alone it seems. He'll probably get over it.

Measuring time – time relationships

Connect these time facts:

1 minute	24 hours	1 year	10 years
1 hour	365 days	1 fortnight	100 years
1 day	60 seconds	1 decade	12 months
1 year	60 minutes	1 century	14 days

1 **How many minutes are there in the following hours?**

a 2 hours = 120 minutes
b $\frac{1}{4}$ hour = 15 minutes
c $\frac{1}{2}$ hour = 30 minutes
d $\frac{3}{4}$ hour = 45 minutes
e 4 hours = 240 minutes
f 6 hours = 360 minutes

2 **How many seconds are there in the following times? You may use a calculator.**

I need to remember to change hours to minutes first. Then I can convert to seconds.

a 2 minutes = 120 seconds
b 5 minutes = 300 seconds
c 1 hour = 3600 seconds
d $\frac{1}{2}$ hour = 1800 seconds
e $\frac{1}{2}$ minute = 30 seconds
f $\frac{1}{4}$ hour = 900 seconds

3 **Use the information in the top box to work out these time facts:**

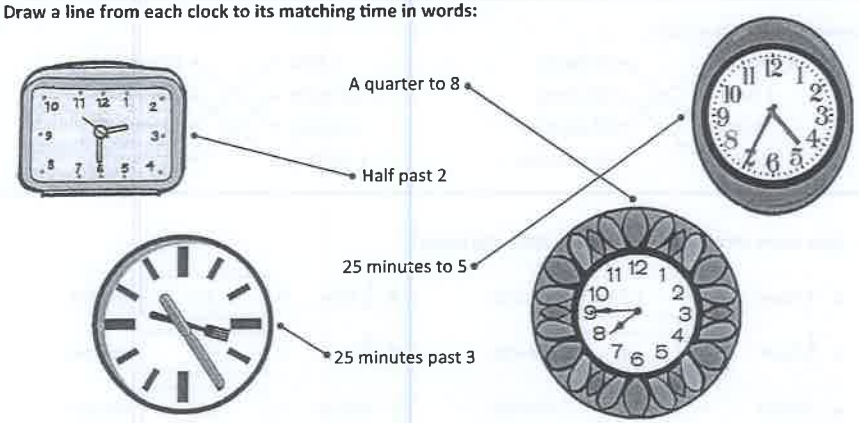
a 1 decade = 120 months
b 1 century = 100 years
c 2 fortnights = 28 days
d $\frac{1}{2}$ century = 50 years
e 1 week = 168 hours
f 2 years = 730 days

4 **What time unit would you use to measure each of the following?**

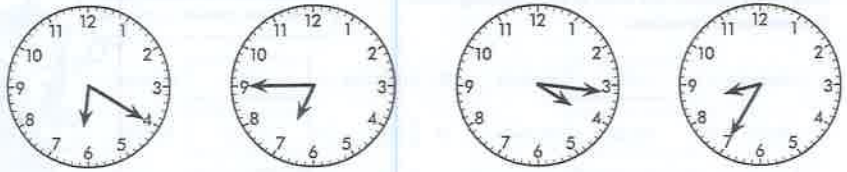
Time to hard boil an egg — minutes
One millennium — years
One leap year — days
Length of a football match — minutes

Measuring time – reading analogue clocks

1 **Draw a line from each clock to its matching time in words:**



2 **Draw the hands on these clocks:**



a 20 past 6 **b** A quarter to 7 **c** 16 minutes past 4 **d** 25 to 9

3 **Using 'to' and 'past', write the time displayed on each clock:**

a 5 to 7

b 23 past 3

c 12 to 11

d 12 past 5

Measuring time – am and pm notation

We use am and pm with digital time.

am ⟶ The part of the day between 12 midnight and 12 noon.

pm ⟶ The part of the day between 12 noon and 12 midnight.

1 **Express these times in digital form using am or pm:**

morning

a 8:00 am

afternoon

b 4:30 pm

evening

c 11:25 pm

morning

d 7:10 am

morning

e 5:00 am

evening

f 10:20 pm

afternoon

g 5:30 pm

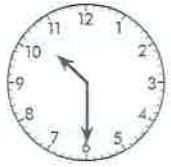
morning

h 9:10 am

2 **Draw hands on these analogue clocks to match the digital times:**

a 8:40 am

b 5:15 pm



c 10:30 am

d 12:20 pm

3 **Put these times in order from earliest to latest. Express the times in digital form:**

am

A quarter past 5 in the evening

11:10 am

pm

1 11:10 am
2 11:40 am
3 3:35 pm
4 5:15 pm

Measuring time – 24 hour time

Time can be measured using 12 hour time, using am/pm, or 24 hour time.

3:00 pm = 1500

1 Complete the table with the correct analogue, digital and 24 hour times.

			
8:35 am	1:00 pm	9:30 pm	*6:15 pm*
0835	*1300*	*2130*	1815
			
2:22 pm	1:18 am	*8:00 pm*	*9:04 pm*
1422	*0118*	2000	2104

2 Convert these 24 hour times to digital times:

a 0400 = 4:00 am | b 1500 = *3:00 pm* | c 1330 = *1:30 pm*

d 1605 = *4:05 pm* | e 0920 = *9:20 am* | f 0825 = *8:25 am*

3 Convert these digital times into 24 hour time:

a 9 am = *0900* | b 10 pm = *2200* | c 7:30 am = *0730*

d 2:15 pm = *1415* | e 5:35 am = *0535* | f 7:25 pm = *1925*

4 It is 1700 and your favourite TV show is due to start in half an hour. Show the starting time in digital form: *5:30 pm*

Measuring time – 24 hour time

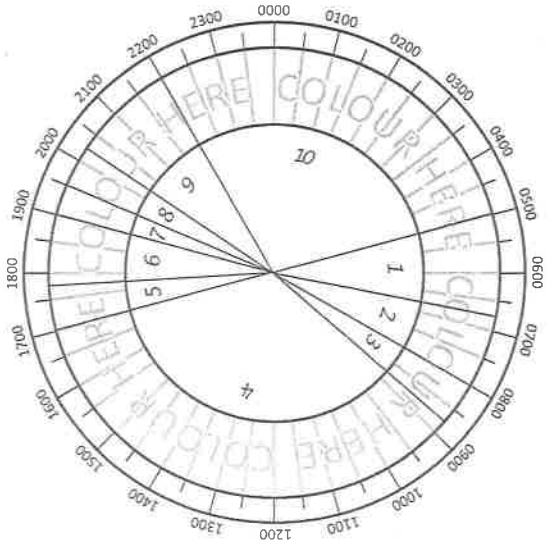
DVD recorders use 24 hour time to record programs.

5 **Minh wants to record some programs on her DVD.**
Enter the start and finish times of each program in 24 hour time. How long is each show?

Channel 4	
9:00 am	Science Show
10:00 am	Behind the News
11:00 am	Weather Report
12:00 pm	Midday News
1:30 pm	My Name is Greg
2:30 pm	Movie: Solaris
4:00 pm	4 pm News
5:00 pm	Smartline
6:00 pm	Current Affairs
8:00 pm	Movie: Chinatown
9:45 pm	Late News

Program	Start	Finish	Length
Science Show	0900	1000	1 hour
Behind the News	*1000*	*1100*	*1 hour*
Movie: Solaris	*1430*	*1600*	*1 $\frac{1}{2}$ hour*
4 pm News	*1600*	*1700*	*1 hour*
Smartline	*1700*	*1800*	*1 hour*
Movie: Chinatown	*2000*	*2145*	*1 $\frac{3}{4}$ hour*

6 **Carla is training for a marathon. Complete the chart below to show how she spends her day. Colour each of the segments in the chart using a different colour to show the duration of each activity below.**



Colour	Time	Activity
1	5:00 am – 6:45 am	Morning run
2	6:45 am – 8:00 am	Breakfast, get ready for work
3	8:00 am – 8:45 am	Drive to work
4	8:45 am – 5:00 pm	Work
5	5:00 pm – 5:45 pm	Drive home
6	5:45 pm – 7:00 pm	Gym session
7	7:00 pm – 7:30 pm	Shower
8	7:30 pm – 8:15 pm	Have dinner
9	8:15 pm – 10:00 pm	Watch TV and read
10	10:00 pm – 5:00 am	Sleep

a How long is Carla's morning run? *1 hour 45 minutes*

b How long is Carla's work day? *8 hours 15 minutes*

c How much time does Carla have between dinner and bed time? *1 hour 45 minutes*

Measuring time – time relationship challenges

1 **How long does it take to make a loaf of bread?**
Read this recipe carefully and work out how long it will take to make the bread.

Method for making a loaf of bread:

1. Make the dough by adding yeast mixture to the flour. This will take 3 minutes.
2. Knead on a lightly floured surface for 10 minutes.
3. Place the dough in a covered bowl and let it rise in a warm place for about $1\frac{1}{4}$ hours.
4. Shape dough into 2 balls, cover and let it rest for 8 minutes.
5. Shape dough into 2 loaves and let rise until doubled in size (1 hour).
6. Preheat oven to 200°C for 15 minutes.
7. Bake in the preheated oven for 35 minutes or until the top is golden.

Total amount of time needed to make the bread: *3 hours 26 minutes*

2 **Use what you know about time relationships to complete this cross number puzzle. You may use a calculator.**

	1 5	0		2 1	5
3 8	0		4 2	4	
4		5 3	0		6 7
	7 4	9		8 1	2
9 7	5		10 4	0	
2		11 9	8		12 7

Across

1. years in half a century
2. minutes in $\frac{1}{4}$ of an hour
3. minutes in 1 hour + 20 minutes
4. hours in 1 day
5. days in April
7. hours in 2 days plus 1 hour
8. hours in half a day
9. minutes in $1\frac{1}{4}$ hours
10. minutes in $\frac{2}{3}$ of an hour
11. hours in 4 days and 2 hours
12. your age minus 4

Down

1. years in 5 decades
2. days in a fortnight
3. hours in $\frac{1}{2}$ a week
4. seconds in $\frac{1}{3}$ of a minute
5. days in September plus 9 days of October
6. hours in 3 days
7. minutes in $\frac{3}{4}$ hour
8. seconds in $\frac{1}{6}$ of a minute
9. months in 6 years
10. hours in 2 days

Camping trip — solve

Getting ready

Last weekend, Akhil and three of his friends went on a camping trip.
Each person brought different snacks.
Each person had different travel times.
Each person had a preferred nickname.

What to do

Read the clues in order to determine each person's nickname, the amount of time that it took each to arrive, and the snacks each person brought.

- The four nicknames are: Bug, Hank, Tops and Haz (the four friends' names are written in the table).
- The four snacks are: chocolate, lollies, soft drink and chips.
- The four travel times are: 15 minutes, 10 minutes, 20 minutes and 5 minutes.

Clues

1. Houman brought the lollies and had the longest drive. His drive was 20 minutes.
2. Akhil, whose nickname is Bug, did not bring soft drink or chocolate.
3. Sean arrived before the person who brought the lollies and after the one who brought the chocolate.
4. Dan only needed to drive for five minutes. His was the shortest drive.
5. The order of arrival is: the one who brought chocolate, the one whose nickname is Tops, Akhil, and the person whose nickname is Haz.

Name	Nickname	Time	Snack
Akhil	*Bug*	*15 minutes*	*Chips*
Houman	*Haz*	*20 minutes*	*Lollies*
Sean	*Tops*	*10 minutes*	*Soft drink*
Dan	*Hank*	*5 minutes*	*Chocolate*

24 hour time dominoes

apply

Getting ready

This is a game for 2 players. You will need a copy of this page, a pencil and some paper.

copy

What to do

Cut out the cards below and choose one player to be the caller. The other 2 players must write down six digital pm times but only o'clock and half past times. The caller must shuffle the cards well and read out the 24 hour times.

The first player to cross out all 6 times is the winner.

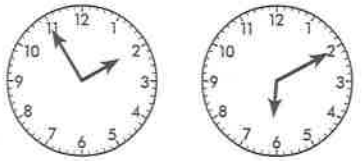
Swap roles and play again until everyone has had a turn at being the caller.

1500	1700	1300	1400
1430	2030	2100	1330
2000	1730	1830	2230
1900	2130	1630	1930
1600	2200	2330	2300

Calculating time – elapsed time

Elapsed time is the difference between 2 different times.
To work out the difference between 2 times, first you count the hours, then you count the minutes.

1:55 to 6:10



1:55 to 5:55 = 4 hours

5:55 to 6:10 = 15 minutes

The total elapsed time is 4 hours and 15 minutes.

1 **How much time is there between:**

a Three in the afternoon and eleven that evening? *8 hours*

b 6 am and 1 pm? *7 hours*

c One in the morning and ten in the same morning? *9 hours*

d Seven in the morning until 12:30 pm? *5 hours 30 minutes*

2 **Work out the time elapsed.**

a Linh arrived at a party at:

She left at:

She was at the party for: 70 minutes

b The bus left at:

It arrived at:

The bus trip took: 13 hours 15 minutes

c The movie started at:

It finished at:

The movie went for: 2 hours 25 minutes

Calculating time – elapsed time

3 **Work out the elapsed time.**

Start	Finish	Elapsed time:
9:15 am	 am	45 minutes
7:30 am	 am	3 hours 30 minutes
4:00 pm	 am	17 hours
2:00 am	 pm	12 hours

4 **Work out the finish time.**

Start	Finish	Elapsed time:
 am	6:10 am	3 hours 10 minutes
 am	8:30 am	2 hours 25 minutes
 am	2:45 pm	6 hours 15 minutes
 pm	1:45 am	4 hours 30 minutes

5 **Being able to count forward in intervals is an important skill.**
Finish each time trail:

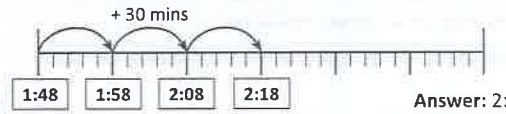
a	Count on in 15 minutes	9:30	9:45	10:00	10:15	10:30	10:45	11:00
b	Count on in 10 minutes	7:42	7:52	8:02	8:12	8:22	8:32	8:42
c	Count on in 15 minutes	6:47	7:02	7:17	7:32	7:47	8:02	8:17
d	Count on in 10 minutes	2:53	3:03	3:13	3:23	3:33	3:43	3:53

Calculating time – elapsed time

A time line can help us with more difficult elapsed time problems.

Question: A party started at 12:48 pm and went for 1 hour and 30 minutes. What time did it finish?

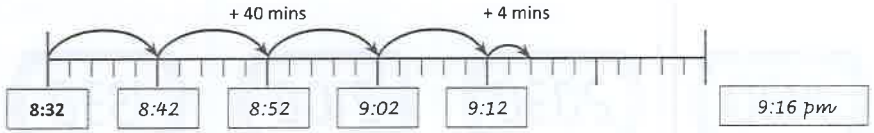
Steps:
1. First count on in hours in your head and write that answer in the first box on the time line.
2. Use the time line to count on in minutes.
   Each small marker represents 2 minutes.
   Each large marker represents 10 minutes.



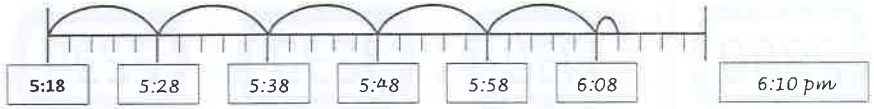
Answer: 2:18 pm

6 **Use the time line for each elapsed time problem:**

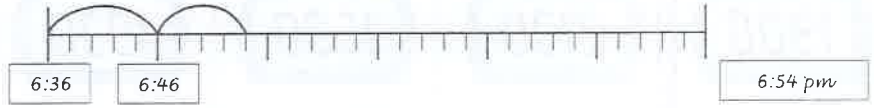
a Abdul played the clarinet from 7:32 pm for 1 hour and 44 minutes. What time did he finish?



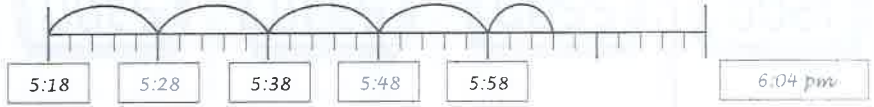
b Ali took 3 hours and 52 minutes to wash 12 cars. If she started at 2:18 pm, what time did she finish?



c Sarah drove to her friend Nick's house. She left her house at 4:36 pm and the drive took 2 hours and 18 minutes. What time did she arrive?



d In order to buy and prepare all the food for the birthday party, Max worked solidly from 2:18 pm for 3 hours and 46 minutes. What time did he stop?



Calculating time – using a stopwatch

The time on this stopwatch is read as:
52 minutes, 38 seconds and 42 hundredths of a second

1 **For these questions you will need a stopwatch.**
Estimate and measure how long it takes to do the following activities down to hundredths of a second.
Write the time as accurately as possible.

Answers will vary.

Activity	Estimate	Time
Run 200 metres		
Recite the 6 times table		
Eat an apple		
Count to 150		
Write the alphabet 3 times		
Walk to the school office		
Write your name neatly 5 times		

2 **What do these times mean on a stopwatch?**

Stopwatch display	Minutes	Seconds	Hundredths of a second
3:51:22	3	51	22
2:45:79	2	45	79
1:58:87	1	58	87
5:45:78	5	45	78

3 **Order these times from fastest to slowest:**

1:38:42 | 1:36:65 | 1:56:89 | 1:56:99

1:36:65 | *1:38:42* | *1:56:89* | *1:56:99*

Lucky numbers — apply

Getting ready

For this game you will need: a group of 6 players, a die, a stopwatch, a block of chocolate, a knife and fork, a pair of rubber gloves and a hat. You will also need a copy of this sheet per group.

C copy

What to do

The aim of this game is to find out which roll of the die gets to the chocolate the fastest. Your first lucky number will be 1, then 2, and so on until all the numbers have been played.

Players sit in a circle. Put the chocolate, gloves, knife and fork and a hat in the centre of the circle. One player stands outside the group timing how long it takes to roll each number on the die with a stopwatch. Start anywhere in the circle, pass the die around until a player rolls the lucky number on the die.

The player who rolls the lucky number puts on the hat and gloves and cuts off one piece of chocolate at a time to eat.

Meanwhile, the die is still passed around with players trying to roll the lucky number.

When the next person rolls the lucky number, the person who was in the centre cutting into the chocolate becomes the timer and the timer joins the circle.

After you have played with all 6 numbers (1–6), order the numbers in the table according to how quickly they came up.

This first row in this table shows how you need to record the times.

Number on die	Minutes	Seconds	Hundredths of a second	Ranking fastest to slowest
1	**1**	**34**	**38**	
2				
3				
4				
5				
6				

What to do next

Compare your table with other groups. Did anyone have a similar ranking of "lucky" numbers?

Mayhem at Max Madness!! — solve

Getting ready

"It's mayhem!" moaned Sergeant Nixon as he fought his way backstage through the angry crowds. 100 000 fans had travelled from far and wide to see their idol Max Madness in concert, and they were growing increasingly restless as time ticked on with no Max in sight.

Little did the fans know that Max Madness might not appear at all – his golden electric maximum voltage guitar had been stolen and Max was storming around his dressing room, cursing and muttering, and refusing to go on stage until it was safely back in his possession.

"I've had it with me all day," he spat. "The only time it was out of my sight was when I was getting a massage between 5:00 and 6:00 pm!"

"We'll get it back, Sir," stated Sergeant Nixon firmly. "No one will get away with that on my watch. This show will go on."

He rounded up 3 likely suspects, all avid fans, who had been found lurking around backstage. All 3 were obsessed with Max. All 3 had caught the train to the stadium. And of course, all 3 swore black and blue that they were innocent.

Tina Sparkles, Max's self-appointed number 1 (and just a bit crazy) fan, protested, "Well it couldn't have been me! I was getting a spray tan and my nails done at 3 pm. That took 2 hours. It takes time to look good, you know. And Max and I might marry tonight so I must look my best ..."

Rod Raver, a wanna be rock star, stated desperately, "I was with my mates rehearsing. We started at 3:55 and jammed for $2\frac{1}{2}$ hours. Once Max hears how good I am, he'll want me in his band."

Paparazzi Pete, who stalked Max regularly, claimed, "Nah, not me, mate. I was on Paris Hilton watch today. I spotted her at 4:15 and kept watch for an hour until it was time to come here."

What to do

One of these suspects arrived at the stadium in time to nick the guitar. Use the train timetable to see whose alibi just doesn't hold up.

- *Tina Sparkles could catch the 5:10 pm train and arrive at 5:40 pm.*
- *Rod Raver was rehearsing from 3:55 pm to 6:25 pm.*
- *Paparazzi Pete was busy from 4.15 pm to 5.15 pm.*

Train Timetable	
Departs City	Arrives Rock and Roll Stadium
3:10 pm	3:40 pm
4:00 pm	4:30 pm
4:40 pm	5:10 pm
5:10 pm	5:40 pm
5:40 pm	6:10 pm
6:00 pm	6:30 pm

Answer: *Tina Sparkles*. Have you and Sergeant Nixon saved the day?

Timetables – reading timetables

Timetables are often used to schedule public transport and can be set up using either digital or 24 hour time.

Burwood to Wynyard								
Burwood	1720	1727	1750	1917	2026	2132	2239	2343
Croydon	---	---	1800	1927	2036	---	2249	---
Ashfield	1735	1742	1805	1932	2041	2146	2254	2358
Summer Hill	---	---	1812	1939	2048	2153	2301	---
Lewisham	1748	1755	1818	1945	2054	2158	2307	0011
Petersham	1753	1800	1823	1948	2057	2101	2310	0009
Stanmore	---	---	1829	1954	2103	2007	2316	---
Newtown	---	---	1836	2000	2110	---	2323	---
Redfern	1811	1818	1841	2005	2114	2017	2327	0024
Central	---	1821	1844	2008	2118	2020	2330	0027
Town Hall	---	---	1848	2012	2122	2024	2334	0031
Wynyard	1823	1830	1853	2017	2126	2028	2338	0036

1 **Use the timetable to answer the questions below:**

a What time does the 7:17 pm train from Burwood arrive at Petersham? *1948*

b What time does the quarter to eight train from Lewisham arrive at Town Hall? *2012*

c Can I catch the 5:35 pm from Ashfield if I want to get off at Stanmore? *No*

d Which stations does the last train from Burwood miss?

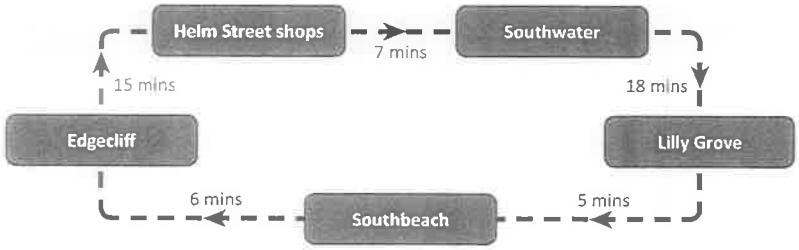
Croydon, Summer Hill, Stanmore and Newtown

e At what time does the 8:36 pm Croydon train leave Newtown? *2110*

f Omar arrives at Redfern station at ten to six in the evening.
How long does he have to wait for the next train? *21* minutes

Timetables – reading timetables

2 This diagram shows the route of a shuttle bus and the length of time between stops.



a If you leave Edgecliff at 7:55 am, what time can you expect to be at Lilly Grove? *8:35 am*

b What time did you get on the bus at Southbeach if it is 5:00 pm when you get off at Helm Street shops? *4:39 pm*

3 The timetable below is from a fitness club.

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8:30 am	Boxing	Yoga	Cardio	Cardio	Squash	Pilates	Pilates
9:30 am	Pilates	Squash	Yoga	Weights	Cardio	Squash	Weights
10:30 am	Cardio	Pilates	Pilates	Squash	Pilates	Cardio	Squash
4:30 pm	Yoga	Boxing	Squash	Pilates	Boxing	Weights	Cardio
5:30 pm	Squash	Weights	Boxing	Boxing	Weights	Yoga	Yoga

Fill in the blank in each person's statement:

a Paula says to her friend:

"I can meet you on Monday but we have to finish by *4 pm* as it takes me 30 minutes to drive to my yoga class."

b Linh says to her friend:

"I can meet you at *11:25 am* after my squash game on Sunday. My game takes 45 minutes and then the drive will take me 10 minutes maximum."

c Michael says to his friend:

"I'll meet you for dinner after my boxing training that goes for $1\frac{1}{2}$ hours on Thursday night. It will take me 10 minutes to shower and 20 minutes to drive there so I will meet you at *7:30 pm*."

Timetables – working out travel time

Quite often when we use public transport we need to be able to work out how we are going to use more than one mode of transport. We do this by working backwards. Look at this question based on the timetables below:

We can see that Carlsford is the connecting point between the train and the bus.
To get to Fisherman's Wharf by 1:30 pm, he needs to catch the 12:20 pm bus from Carlsford.
To catch the 12:20 pm bus at Carlsford, he needs to catch the 12:05 pm train from Trinian Street and change to the bus platform.

Ben is at Trinian Street and wants to meet his friend at Fisherman's Wharf at 1:30.

Train	Bus
Catch the 12:05 pm from Trinian Street. Change at Carlsford and wait 2 minutes.	Catch the 12:20 pm from Carlsford. Arrive at Fisherman's Wharf 1:12 pm.

Train				
Knightscove	10:16 am	11:16 am	12:16 pm	1:16 pm
Fig Tree Park	10:21 am	11:21 am	12:21 pm	1:21 pm
Trinian Street	11:05 am	12:05 pm	1:05 pm	2:05 pm
Carlsford	11:15 am	12:18 pm	1:16 pm	2:17 pm

Bus				
Carlsford	11:20 am	12:20 pm	1:20 pm	2:20 pm
Nottsville	11:50 am	12:50 pm	1:50 pm	2:50 pm
Fisherman's Wharf	12:12 pm	1:12 pm	2:12 pm	3:12 pm
Slamton	12:32 pm	2:32 pm	3:32 pm	4:32 pm

1 **Give each person the travel details they need to arrive at their destination on time. Remember to work backwards and to find the connecting point.**

a Akhil is at Trinian Street and wants to go shopping at Nottsville. He would like to get there at 3 pm.

Train	Bus
Catch the 2:05 pm from Trinian Street. Change at Carlsford and wait 3 minutes.	*Catch the 2:20 pm from Carlsford. Arrive at Nottsville 2:50 pm.*

b Masuka is at Knightscove and needs to get to Fisherman's Wharf for his 12:30 pm shift at the fish and chips shop.

Train	Bus
Catch the 10:16 am from Knightscove. Change at Carlsford and wait 5 minutes.	*Catch the 11:20 am from Carlsford. Arrive at Fisherman's Wharf 12:12 pm.*

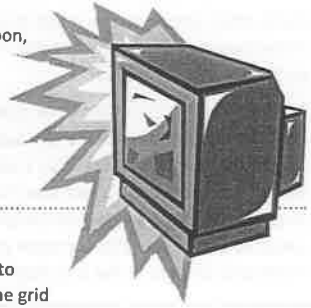
c Mish is at Fig Tree Park and wants to meet her friend at Slamton at 3:40 pm.

Train	Bus
Catch the 12:21 pm from Fig Tree Park. Change at Carlsford and wait 4 minutes.	*Catch the 1:20 pm from Carlsford. Arrive at Slamton 3:32 pm.*

What's on the box? solve

Getting ready

Five friends like five different TV shows: a cartoon, a crime show, a reality show, football and a sitcom. They all screen on different channels (BBC 2, Channel 5, Sky 1, BBC 1 and Channel 4) and on different nights of the week. Your job is to match the friend with their favourite show.



What to do

Read the clues below and use the information to eliminate possibilities. Show your choices on the grid below. You may want to use the grid on the following page to help you arrange your thoughts.

1. Luke's favourite show airs on the weekend. He doesn't watch crime shows and thinks sitcoms are a waste of time.
2. The sitcom screens on Tuesday evening on Channel 4.
3. The cartoon is on BBC 1.
4. Hung's show is on the highest numbered BBC channel on the first day of the school week. He can't stand reality TV.
5. No one's favourite show is on Sunday or Friday.
6. Macey hates sports. Her favourite show is Hung's least favourite show and screens 2 days after Jamie's.
7. The crime show airs on BBC 2.
8. Britt's favourite show screens on Wednesdays on BBC 1.
9. Jamie's show screens on Channel 4, one day before Britt's favourite show.
10. The football screens on Saturday on Channel 5.

Name	Show	Night	Channel
Luke	*Football*	*Saturday*	*5*
Macey	*Reality*	*Thursday*	*Sky 1*
Jamie	*Sitcom*	*Tuesday*	*4*
Hung	*Crime*	*Monday*	*BBC 2*
Britt	*Cartoon*	*Wednesday*	*BBC 1*

Puzzle grid

	Luke	Macey	Jamie	Hung	Britt
Monday	✗	✗	✗	✓	✗
Tuesday	✗	✗	✓	✗	✗
Wednesday	✗	✗	✗	✗	✓
Thursday	✗	✓	✗	✗	✗
Friday	✗	✗	✗	✗	✗
Saturday	✓	✗	✗	✗	✗
Sunday	✗	✗	✗	✗	✗
Sport	✓	✗	✗	✗	✗
Reality	✗	✓	✗	✗	✗
Crime	✗	✗	✗	✓	✗
Cartoon	✗	✗	✗	✗	✓
Sitcom	✗	✗	✓	✗	✗
BBC 2	✗	✗	✗	✓	✗
Channel 5	✓	✗	✗	✗	✗
Sky 1	✗	✓	✗	✗	✗
BBC 1	✗	✗	✗	✗	✓
Channel 4	✗	✗	✓	✗	✗

Circus school — solve

Getting ready

You have been given the task of writing the school holiday program for the Circus School Royale.

What to do

Use trial and error to work out which activities fit within the 8 session times exactly to create a daily program. Start by looking at how much time there is between breaks, then decide on the best way to order the activities.

The time between breaks must equal the combined time of the activities you choose.

Allow 5 minutes after breaks for everyone to get to the next session.

Start times for the sessions after breaks are written in.

The order of activities may vary.

Activity	Duration
Clown school	1 hour
Acrobatics	$1\frac{1}{2}$ hours
Flying trapeze	40 minutes
Balloon animals	45 minutes
Fire juggling	35 minutes
Unicycling	55 minutes
Magic tricks	50 minutes
Face painting	25 minutes

Session	Time	Activity	
1	9:00	*Clown school*	*or reverse*
2	*10:00*	*Acrobatics*	
	11:30–12:10	Break	
3	12:15	*Flying trapeze*	*or reverse*
4	*12:55*	*Fire juggling*	
	1:30–2:30	Lunch	
5	2:35	*Balloon animals*	*interchangeable*
6	*3:20*	*Magic tricks*	
7	*4:10*	*Face painting*	
	4:35–5:00	Break	
8	5:05	*Unicycling*	*must be here*
	6:00	Home	

* *This is one solution*