



St Paul's Way  
Aspiration • Integrity • Community  
PART OF UNIVERSITY SCHOOLS TRUST

# Year 7

# CORE

# PREPARATION

# WORK

Name:

# English



# English

At secondary school, English is a bit different, but you'll still use all the skills you learnt at primary school. We read a wide variety of texts which include fiction and non-fiction, and texts from a range of cultures and time periods. With these amazing texts, we try to understand them a bit better, like understanding the characters and what the author wanted us to think and feel.

English is very important as it teaches you how to communicate your ideas effectively to other people. Also, through improving your reading and listening skills, it means that others can communicate their ideas to you.



# English

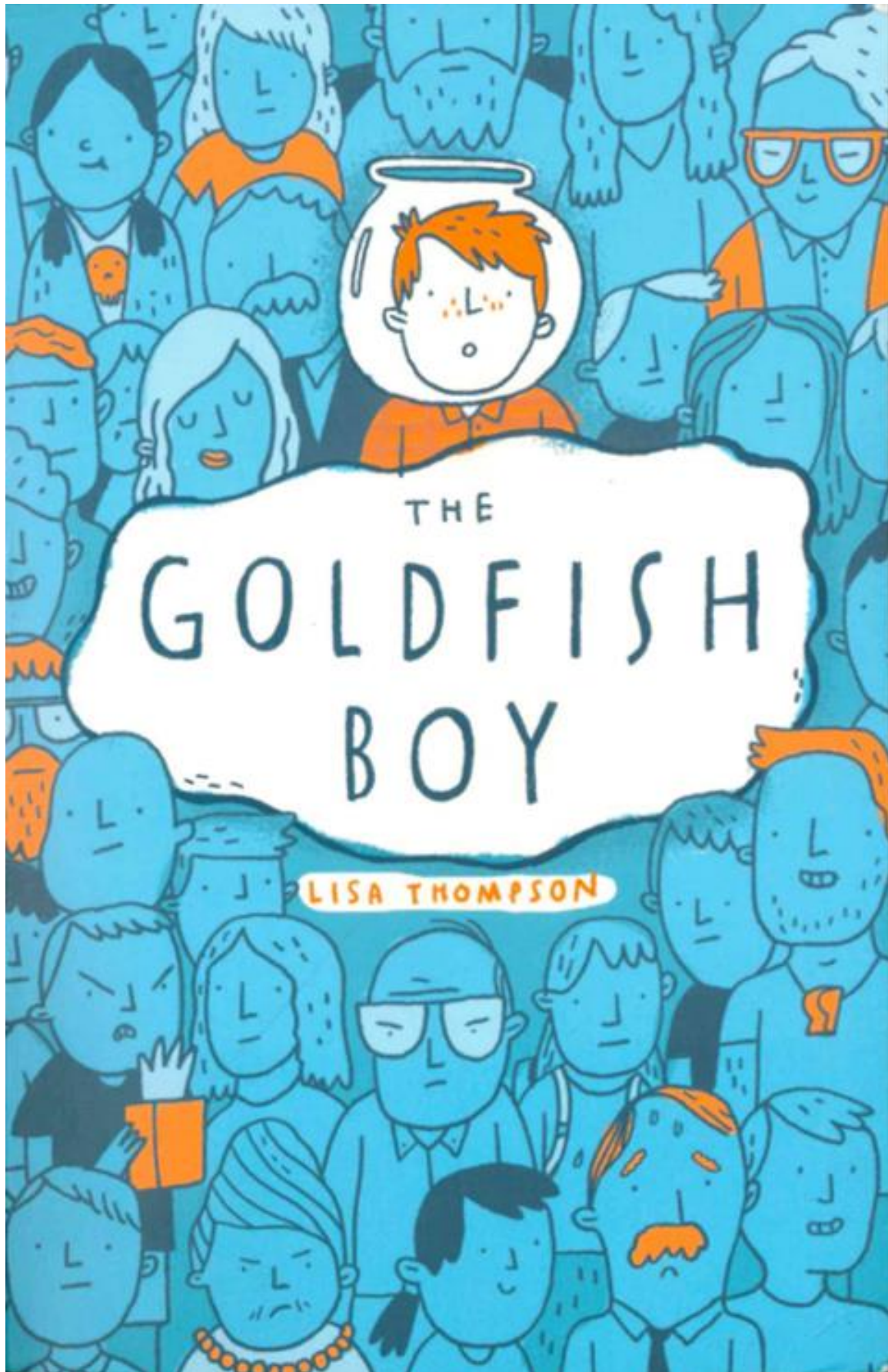
On the following pages, is the first chapter of the book, "*The Goldfish Boy*". Then you will have lots of different ways you can think about the chapter, the characters and the author's intention and predict what will happen in the rest of the book! You can draw, write or even paint if you want to.

You can take the book out of the library if you want to find out what really happens.!

Your new secondary school teachers can't wait to see what you come up with.



# English



## Chapter 1

Mr Charles had sunburn right on the top of his head.

I saw it while he was inspecting his roses. He studied each flower, giving the larger ones a little shake to see if any petals fell off as he edged along the pathway. The big, bald patch on his head was now a bright red, shiny circle surrounded by white, fluffy hair. He should have been wearing a hat in this heat but I guess it's hard to notice if the top of your head is burning when you're busy doing things.

I noticed though.

I noticed a lot of things from the window.

It's not like I was doing anything wrong. I was just watching my neighbours to pass the time, that's all; it's not like I was being nosy. And I didn't think the neighbours minded. Occasionally Jake Bishop from number five would shout things up at me — things like "Weirdo", "Freak" or "Nutter". It had been a long time since he'd actually called me Matthew — but then he was an idiot so I didn't really care what he said.

I lived in a quiet, dead-end street in a town full of people who said how great it was that they didn't live in that big, smelly city of London — and who then spent most of their mornings desperately trying to get there.

There were seven houses in our little cul-de-sac. Six of them looked the same, with square bay windows, uPVC front doors, and whitewashed walls. But the seventh house, stuck between number three and number five, was very different. Built from blood-red bricks, the Rectory looked like a guest at a Halloween party where no one else had bothered to dress up. Its front door was black with two triangular windows at the top that were covered from the inside with some old cardboard. Whether it had been put there to stop the draughts or to stop anyone from peering in, who knew?

Dad told me a developer had tried to flatten the Rectory twenty years before when our houses were being built, but it dug its hundred-year-old foundations in and somehow managed to stay, like a rotten old tooth. The vicar's widow, Old Nina, still lived there though I rarely saw her. There was a lamp in the front room window that she left on day and night; a glowing orange ball behind the grey curtains. Mum said she kept a low profile because she was frightened that someone from the church was going to make her move out, since, with her husband dead, it wasn't really her house any more. On her front step she had three pots of flowers that she watered every morning at ten o'clock.

I watched her and the other neighbours from the spare room at the front of the house. I liked it in there. The lemon walls were still shiny-clean and it had that freshly decorated feel, even though it had been five years since it had happened. Mum and Dad called this room the office since we kept the computer in there, but we all really knew it as the nursery. Hanging in a corner there was a baby's cot mobile made of six padded, stripy elephants, which dangled pointlessly over a tower of unopened boxes and shopping bags. Mum had put the mobile up as soon as she'd got home from her shopping marathon, even though Dad said it was unlucky.

*"Don't be silly, Brian. We need to make sure it works, don't we?"*

She had wound the little key at the top and we'd all watched as the elephants twirled around and around to "Twinkle, Twinkle, Little Star". When the music had stopped I'd clapped — I was only seven then and you do silly stuff like that when you're that age. Mum said she'd unpack the rest of the shopping another time, but she never did. The bags are still where she left them: nappies, bottles, a sterilizer, a monitor, tiny vests. Everything my baby brother would have needed if I hadn't ... well, if he were alive.

The office had a window that looked out on to the street, and I saw my neighbours begin their day:

9:30 a.m. Mr Charles is deadheading his roses again. He's using some new clippers with red handles. The top of his head looks sore with sunburn.

Mr Charles could have been anything from sixty-five to ninety-five — he never seemed to get older. I thought he'd just found an age he quite liked and stopped right there.

9:36 a.m. Gordon and Penny Sullivan appear from number one. Gordon gets into their car as Penny waves to Mr Charles 1 from across the street.

Mr Charles waved back and twirled his garden clippers on his finger like a cowboy, then snipped at the air three times, the silver blades glinting in the sunlight. Penny laughed. Her eyes squinted and she put her hand up to shade them but then her face dropped. She'd spotted something: me. Mr Charles followed her gaze and they both stared at me looking at them from my window. I quickly stepped away and vanished from view, my heart thumping. I waited until I heard Gordon's car reverse out of the driveway and then I looked out on the street again.

9:42 a.m. Penny and Gordon leave to do their weekly supermarket shopping.

9:44 a.m. Melody Bird appears from number three dragging their dachshund, Frankie, behind her.

It was the weekend, which meant it was Melody's turn to walk their dog. Her mum, Claudia, took him out during the week, but I didn't know why they bothered — he never seemed happy about it, and he spent the length of our road trying to turn back. Melody picked at the wool on the sleeve of her black cardigan as she walked along, stopping every three steps for the little dog to catch up with her. She practically lived in that black cardigan, even though it was about thirty degrees out there. They stopped at a lamp post while Frankie had a sniff, before digging his paws in and trying to get home, but Melody dragged him onwards and they disappeared down the alleyway that led to the graveyard at the back of the Rectory.

9:50 a.m. The door to number seven opens and the "newlyweds" appear.

Mr Jenkins and his wife, Hannah, lived next door on the side we're not attached to. They were known on the close as the "newlyweds" even though they'd been married for nearly four years now. Hannah was always smiling even when she didn't realize someone was watching her.

"I'm not sure it's good for you to run in this heat, Rory," she said, grinning away.

Mr Jenkins ignored her as he reached his arm up high and stretched over to one side. He taught PE at my school and, in his opinion, if you didn't exercise then there wasn't really any point in you existing. I was definitely on his list of "nobodies" and tried my best to keep off his radar.

Wearing a tight white top and blue shorts he lunged along their pathway with his hands on his hips.

"Don't be too long," Hannah said. "We've still got to decide on a car seat, remember?"

Mr Jenkins grunted at her. I looked down at the step and flinched when I saw her large, pregnant stomach. She rested her hand on top, patting herself rhythmically, and then she turned and disappeared into the house. I let go of a breath I'd been holding.



Mr Jenkins set off towards the High Street, waving at Mr Charles, who was too busy with his flowers to notice. He studied each rose as they bobbed in the breeze like tight bundles of pink candyfloss on a fairground stall. Any that weren't up to scratch he snipped off and dropped into a plastic pot. When he'd finished he walked back around the side of the house carrying the pot of dead roses.

**10:00 a.m. No sign of Old Nina watering her pots.**

It was no surprise I hadn't seen her yet, considering how busy the close had been so far this morning.

The door of number five opened and a boy my age appeared. He walked down his driveway and looked in one direction only. Straight at me. This time I didn't duck away but stood my ground and stared back. Stopping in front of our house he tipped his head back and made a grotesque, gagging noise before launching a great lump of phlegm on to our path. I gave him a slow handclap through the window, ignoring how sick I felt. He frowned when he saw my hands, and I quickly put them behind me. Giving our wall a good kicking, he turned and headed off along the street.

**10:03 a.m. Jake Bishop - still an idiot.**

Once Jake had gone there wasn't much to see. Mr Jenkins returned from his run, his white T-shirt dark with sweat. Penny and Gordon Sullivan unloaded eleven shopping bags from their car boot. Melody returned from her walk holding Frankie under one arm; the dog looked rather pleased with himself.

And then the cul-de-sac was still.

Until the Rectory door slowly opened.

**10:40 a.m. Old Nina is on her step, looking very nervous. She has her little silver watering can in one hand.**

The elderly lady was dressed in a black skirt, cream blouse and peach cardigan. She trickled water into each pot for a count of five before moving on to the next one. As she did this, her eyes flickered around the close. She'd just begun to water the final pot when a car turned on to the street. Leaving the watering can on the step, she slipped back inside, slamming her heavy front door behind her.

The car driving slowly down the road was one of those that Dad said costs a "small mortgage". It certainly didn't belong to any of the neighbours. It was so shiny our houses were reflected in its black doors as it circled the cul-de-sac, coming to a stop outside number eleven. I grabbed my notebook as I watched, waiting for the doors to open.

10:45 a.m. There is a really posh black car on the close. I've never seen it before and it's parked right next door! Does Mr Charles have a visitor?

This was *very* interesting. I knew my neighbour's schedules inside and out but now it looked like there was someone new visiting the close. I tried to see inside the car but it had heavily tinted windows so I couldn't make anything out. It hummed quietly for a while and then the engine was turned off. The driver's door opened.

A woman, wearing sunglasses that were so big they covered most of her face, got out and looked around the cul-de-sac. She brushed her hair from her face then slammed the door shut. Mr Charles appeared and walked quickly down his path, wiping his hands on the front of his shirt.

"Darling!" he said, stretching his tanned arms towards her.

"Hello, Dad."

She held him at a distance and turned her cheek for him to kiss, then she went to the car and opened the back door. A small girl of around six or seven climbed out carrying a porcelain doll. I stood closer to the window but I could only catch a few words.

". . . must be Casey! And who's this? Is she coming to stay?"

Mr Charles went to stroke the doll's hair but the girl twisted around so it was out of reach. It looked like something from an antique shop, not a kid's toy. The woman in the big sunglasses emerged from the backseat of the car with a blond-haired boy who she plonked on the pavement. Mr Charles held his hand out to the toddler.

"Pleased to meet you, Teddy. I'm your granddad."

The boy cuddled a pale blue blanket, rubbing a corner against his cheek as he stared at the crinkly hand reaching towards him. The hand dangled there awkwardly between them, and then Mr Charles gave up and went to help his daughter with the luggage. They talked for a while but their backs were to me so I couldn't hear what they were saying.

The woman put two black suitcases by the gate and then she held each child's face in her hands, saying something, before giving them each a quick kiss on the forehead. Squeezing Mr Charles on the arm she got back into the car. The engine purred to life and the dark, shiny car drove slowly to the end of the road. The three of them stood watching until it was out of sight.

“Right! Let’s get you two inside, shall we?”

Mr Charles flapped his arms at the kids and herded them like sheep towards the house, his face a mad grin. The little boy stopped, still rubbing the blanket to his cheek as he reached for one of the roses next to the pathway.

“Ah, ah, ah, no touching!” said his grandfather and he waved his arms again, steering them in through the front door.

A minute later he was back, dragging the two black suitcases behind him. He glanced up at me and I quickly stepped away, but not before noticing his wide smile had vanished.

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We hope you enjoyed the first chapter. Here are some things you can do to help you think about what you have read.

*Choose 2 tasks from each set.*

Task set 1:

- Draw a story map the first chapter
- Learn to tell the main events of the first chapter orally (out loud)
- Draw or paint a character from the story
- Draw or paint a setting from the story
- Draw a comic strip of the main events



# English

We hope you enjoyed the first chapter. Here are some things you can do to help you think about what you have read.

Choose 2 tasks from each set.

Task set 2:

- Write a description of the character
- Write a description of the setting
- Write a book review of the first chapter
- Write a diary entry as a character
- What do you think will happen next? Write a prediction of what you think will happen next
- Finish the story yourself! Write your own continuation or ending of the story.
- Write a news article about the events
- Write a conversation between two or more characters that could have happened before or after the chapter













# English

In secondary school, you will think a lot about how the writing affects the reader and why the writer chose to write they way they did.

Have a look at the excerpts and questions below. Can you remember to use the reading skills you learnt in year 6?

1.

*Mr Charles flapped his arms at the kids and herded them like sheep towards the house, his face a mad grin.*

What does this excerpt tell you about Mr Charles' character? Think about the word choices used. Use evidence to support your answer.

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# English

Have a look at the excerpts and questions below. Can you remember to use the reading skills you learnt in year 6?

2.

*Dad told me a developer had tried to flatten the Rectory twenty years before when our houses were being built, but it dug its hundred-year-old foundations in and somehow managed to stay, like a rotten old tooth.*

What language feature is used in the phrase “*like a rotten old tooth*”?

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Why do you think the author chose to use this phrase? What does it make you think of the Rectory?

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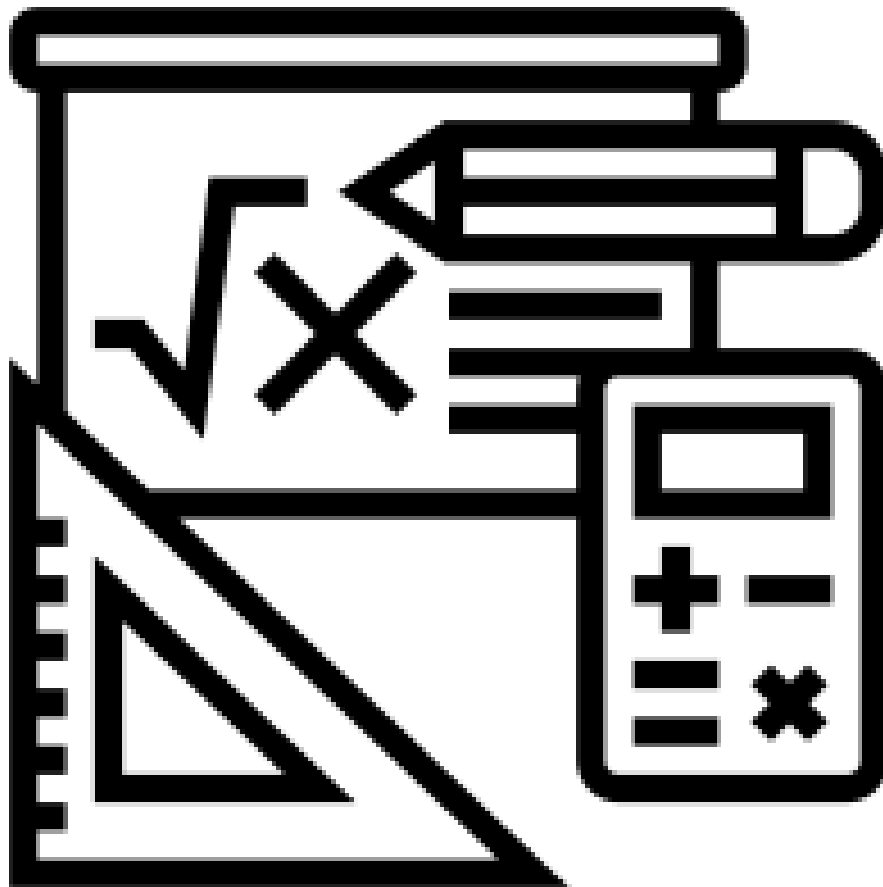
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# Maths



# Maths

Mathematics is fundamental to being human and we can appreciate it within our world in the same way as languages, literature, art or music. The beauty of mathematics is that every human can appreciate it and think mathematically, given support and opportunity. This is what your teachers aim to do!

In primary school, you develop your foundations for maths and when you arrive at secondary school, your new teachers will help you to develop your wider skills to reason, communicate, think systematically, problem solve, and work with others!

One of the best part of learning mathematics, is the journey you take towards your answer. In year 7, you will be asked to work in teams, explore some new mathematical ideas, justify your conjectures and prove them right!



# Maths

In Year 7, you will spend some time refreshing the things you have learnt in primary school and using these skills to move on to more challenging learning. You will also do lots of investigation to train your problem solving brain – this is one of the most important mathematical skills you can have!

First, let's recap on some of our arithmetic skills from Year 6.

- Long division
- Multiplying decimals
- Dividing decimals
- Negative numbers

Then, let's try some problem solving and stretch out brains!



# Maths - Long division

Do you remember how to do long division? Here's a refresher in case you've forgotten:

LI: To divide by 2-digit numbers

$$3264 \div 24$$

1. Put the dividend (first number) in the bus stop
2. Put the divisor (second number) outside the bus stop
3. How many 24s can fit into 3? 0
4. Carry the 3
5. How many 24s can fit into 32? 1
6. What's left over?
7. How many 24s can fit into 86?
8. What's left over?
9. How many 24s can fit into 144?

$$\begin{array}{r}
 0136 \\
 24 \overline{) 3264} \\
 \underline{24} \phantom{00} \\
 8 \phantom{00} \\
 \underline{72} \phantom{0} \\
 14 \phantom{0} \\
 \underline{144} \\
 0
 \end{array}$$


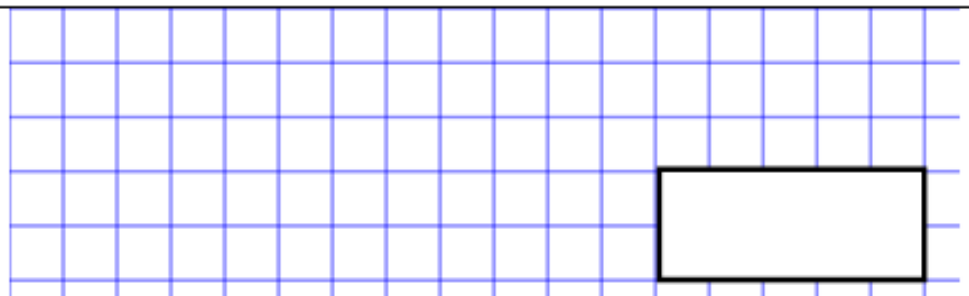
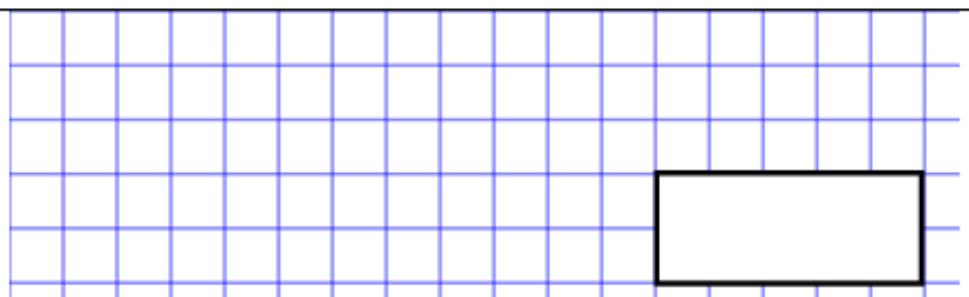
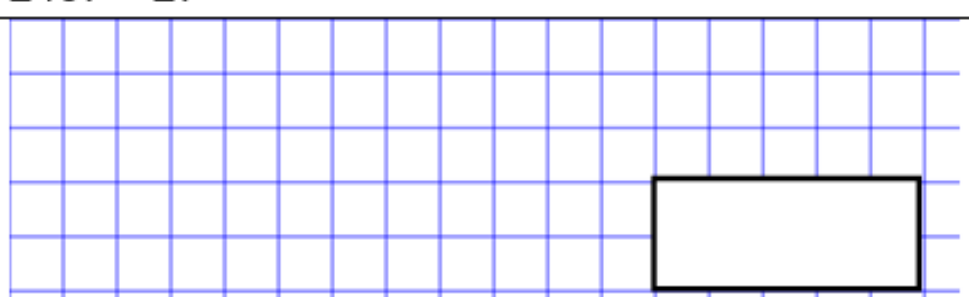
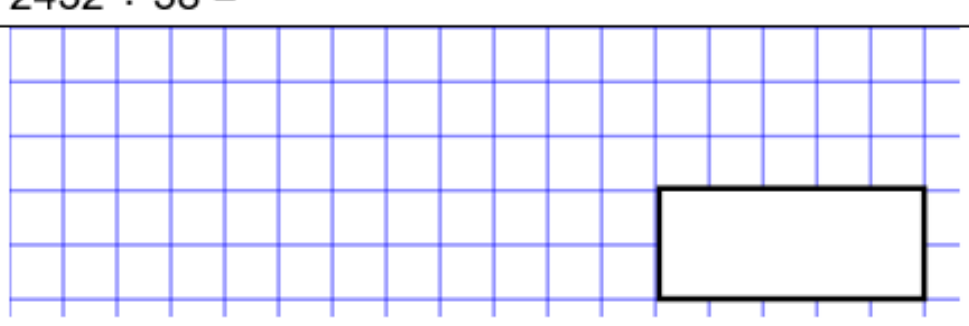
$$\begin{array}{r}
 21 \\
 32 \\
 -24 \\
 \hline
 08
 \end{array}
 \qquad
 \begin{array}{r}
 1 \\
 24 \\
 \times 3 \\
 \hline
 72
 \end{array}$$

$$\begin{array}{r}
 86 \\
 -72 \\
 \hline
 14
 \end{array}
 \qquad
 \begin{array}{r}
 1 \\
 24 \\
 \times 4 \\
 \hline
 96
 \end{array}$$

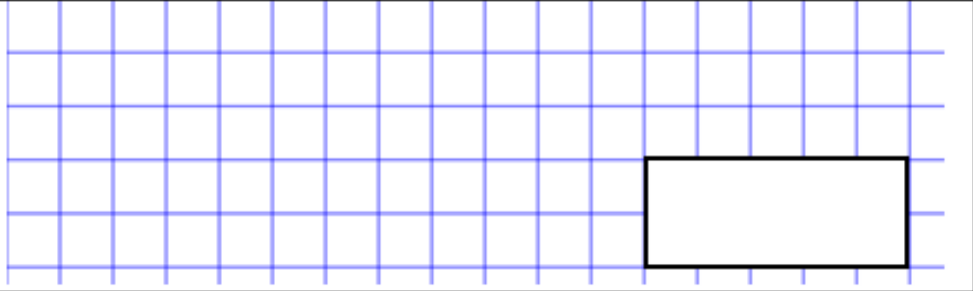

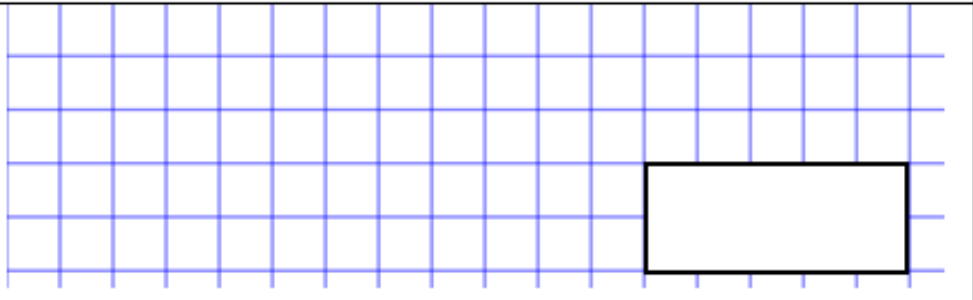
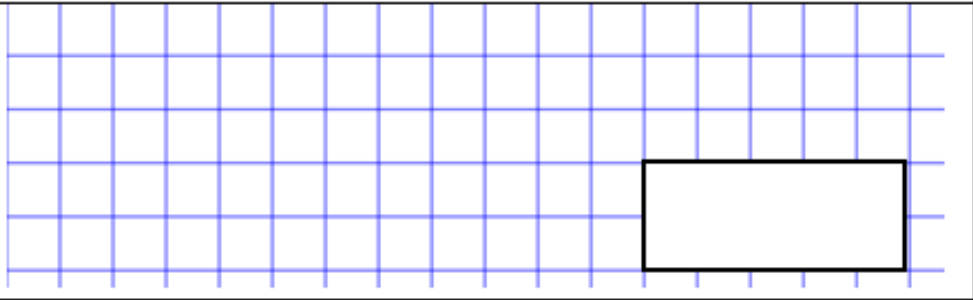
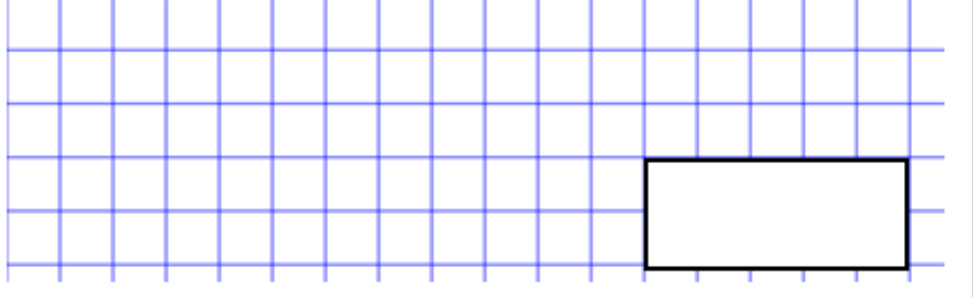
$$\begin{array}{r}
 2 \\
 24 \\
 \times 6 \\
 \hline
 144
 \end{array}
 \qquad
 \begin{array}{r}
 2 \\
 24 \\
 \times 7 \\
 \hline
 168
 \end{array}$$



# Maths - Long division

1.	$345 \div 15 =$ 	<input data-bbox="1310 607 1406 696" type="text"/>
2.	$5194 \div 14 =$ 	<input data-bbox="1310 965 1406 1055" type="text"/>
3.	$1184 \div 16 =$ 	<input data-bbox="1310 1317 1406 1406" type="text"/>
4.	$2457 \div 27 =$ 	<input data-bbox="1310 1682 1406 1771" type="text"/>
5.	$2432 \div 38 =$ 	<input data-bbox="1310 2040 1406 2130" type="text"/>

# Maths - Long division

6.	$1813 \div 49 =$ 	<input type="text"/>
7.	$1862 \div 38 =$ 	<input type="text"/>
8.	$5529 \div 57 =$ 	<input type="text"/>
9.	$6596 \div 68 =$ 	<input type="text"/>
10.	$5846 \div 79 =$ 	<input type="text"/>



# Maths - Multiplying Decimals

Do you remember how to multiply decimals? Here's a refresher in case you've forgotten:

$$2.4 \times 2.3$$

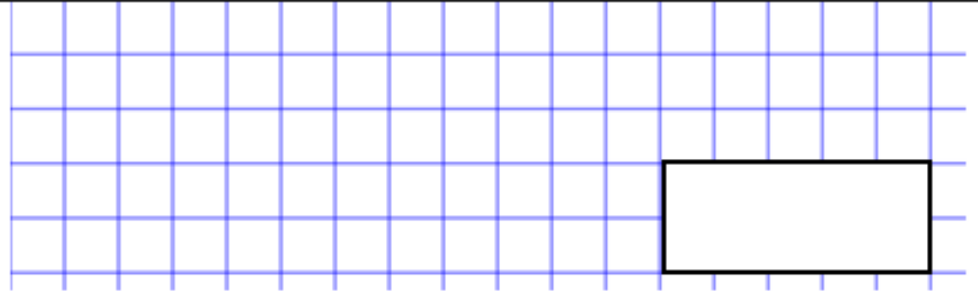

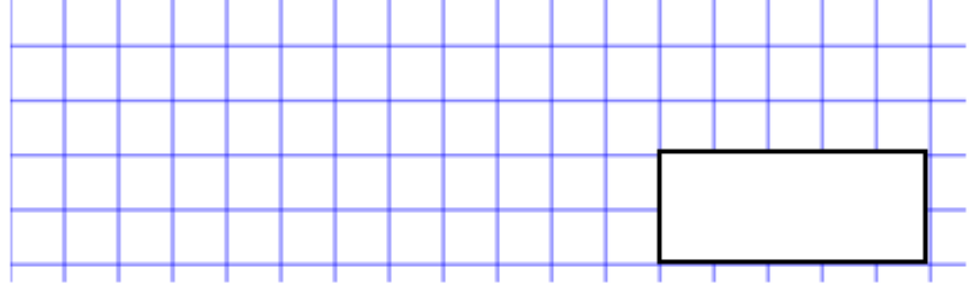
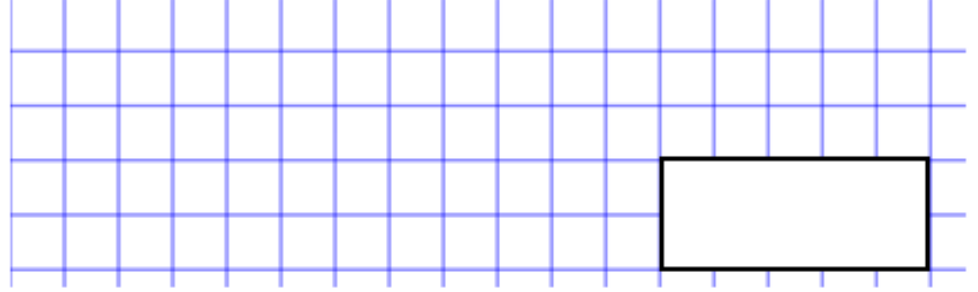
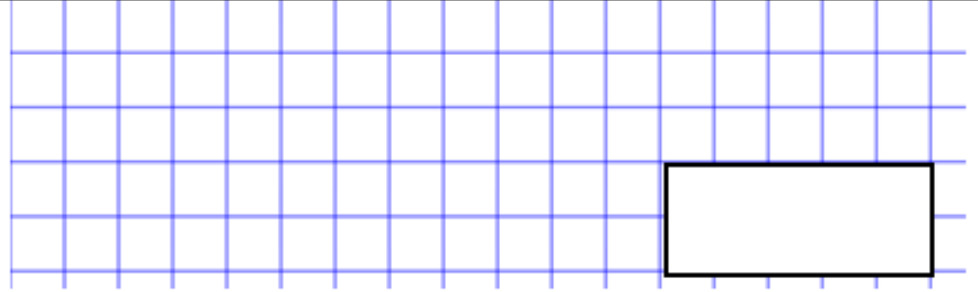
1. Imagine the decimal points aren't there and line up your calculation
2. Multiply like normal
3. Count how many digits are after the decimal point in the original question in both numbers
4. Count the same number of decimal places in your answer
5. Place your decimal point

$$\begin{array}{r} \phantom{2.}4 \\ \times 2.3 \\ \hline 72 \\ 480 \\ \hline 5.52 \end{array}$$

$$\begin{array}{r} 2.4 \\ \underline{\quad} \\ 1 \end{array} \times \begin{array}{r} 2.3 \\ \underline{\quad} \\ 2 \end{array}$$



# Maths - Multiplying Decimals

1.	$0.6 \times 24 =$		<input type="text"/>
2.	$0.09 \times 37 =$		<input type="text"/>
3.	$0.8 \times 38 =$		<input type="text"/>
4.	$0.07 \times 38 =$		<input type="text"/>
5.	$1.25 \times 23 =$		<input type="text"/>

# Maths - Multiplying Decimals

6.	$4.3 \times 12$	<input type="text"/>
7.	$17.8 \times 2.1$	<input type="text"/>
8.	$1.43 \times 1.4$	<input type="text"/>
9.	$2.5 \times 2.3$	<input type="text"/>
10.	$9.7 \times 3.1$	<input type="text"/>

# Maths - Dividing Decimals

Do you remember how to divide decimals? Here's a quick refresher in case you've forgotten:

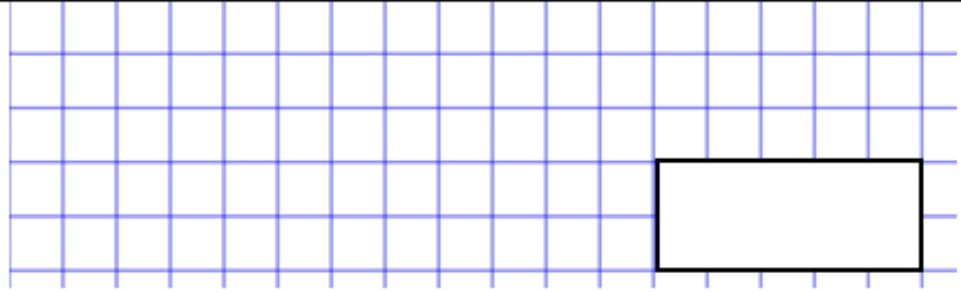
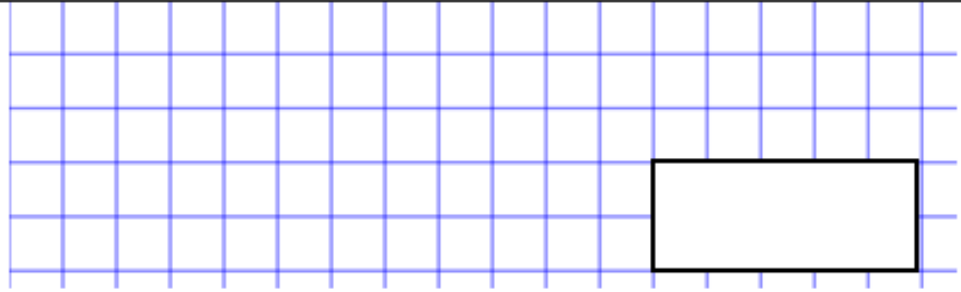
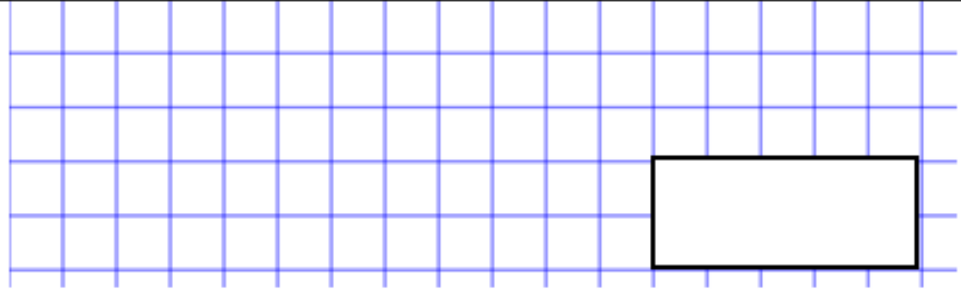
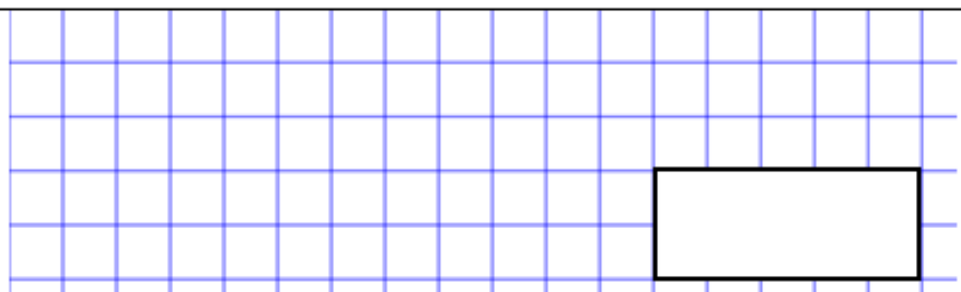

$$2.88 \div 6$$

1. Put the dividend (first number) in the bus stop
2. Put the divisor (second number)
3. Put the decimal point in directly above where it is in the dividend
4. Divide like normal

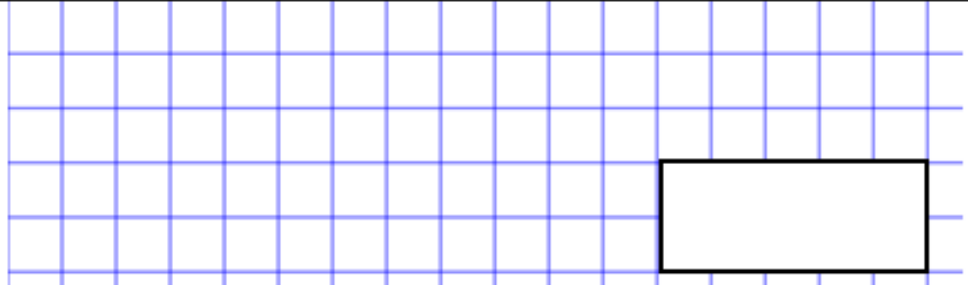
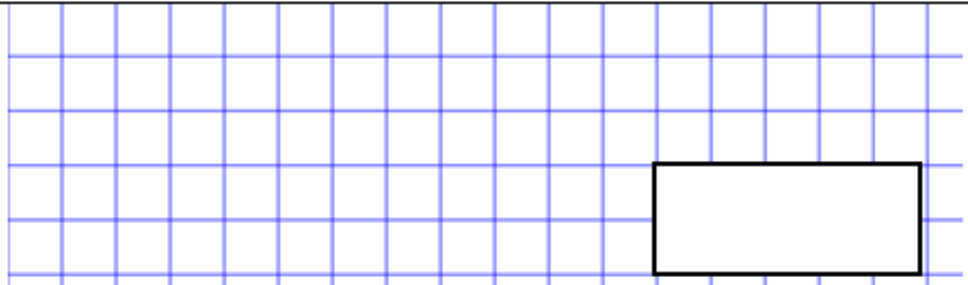
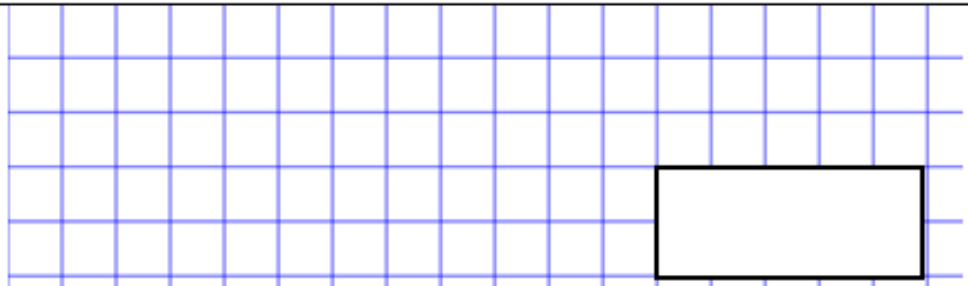
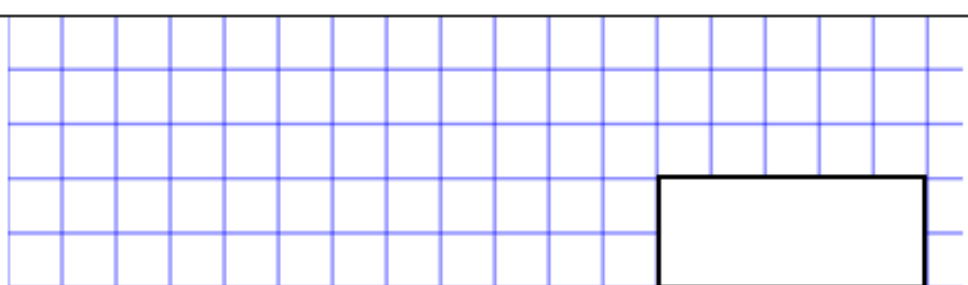
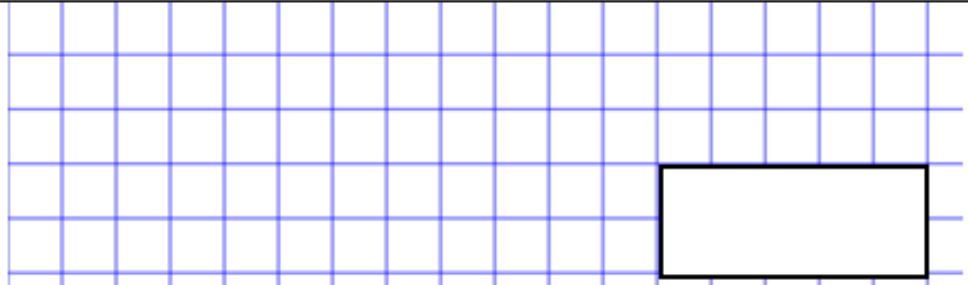
$$\begin{array}{r} 0.48 \\ 6 \overline{) 2.88} \end{array}$$



# Maths - Dividing Decimals

1.	$100.8 \div 3 =$		<input type="text"/>
2.	$1.035 \div 9 =$		<input type="text"/>
3.	$1.001 \div 7 =$		<input type="text"/>
4.	$204.8 \div 8 =$		<input type="text"/>
5.	$65.618 \div 7 =$		<input type="text"/>

# Maths - Dividing Decimals

6.	$111.24 \div 9 =$ 	<input data-bbox="1315 528 1410 618" type="text"/>
7.	$106.8 \div 12 =$ 	<input data-bbox="1315 891 1410 981" type="text"/>
8.	$14.04 \div 26 =$ 	<input data-bbox="1315 1310 1410 1400" type="text"/>
9.	$1.428 \div 17 =$ 	<input data-bbox="1315 1684 1410 1774" type="text"/>
10.	$215.6 \div 22 =$ 	<input data-bbox="1315 1946 1410 2036" type="text"/>

# Maths - Negative Numbers

Do you remember how to solve problems with negative numbers? Here's a refresher in case you've forgotten:

The different symbols tell you whether to add or subtract with the two numbers.

1.  $++$  means  $+$   
 $-+$  means  $-$   
 $--$  means  $+$   
 $-$  means  $-$

2. If the minus is in front of the bigger number, the answer is a minus.

If the minus is in front of the smaller number, the answer is not a minus.

If there are minuses in front of both numbers, the answer is a minus.

Example 1:  $-7 + 12$

$-+$  means  $-$  so,  $12 - 7 = 5$

The minus is in front of the smaller number, so the answer is not a minus.

Answer = 5

Example 2:  $5 - 9$


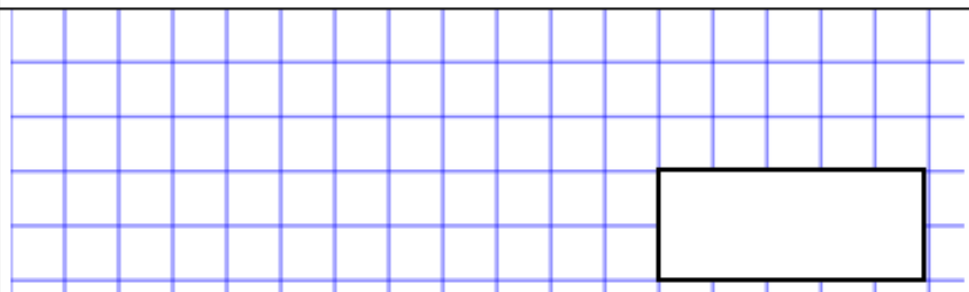

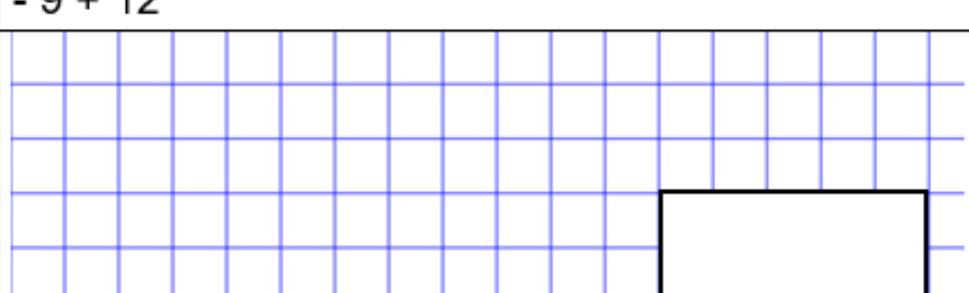
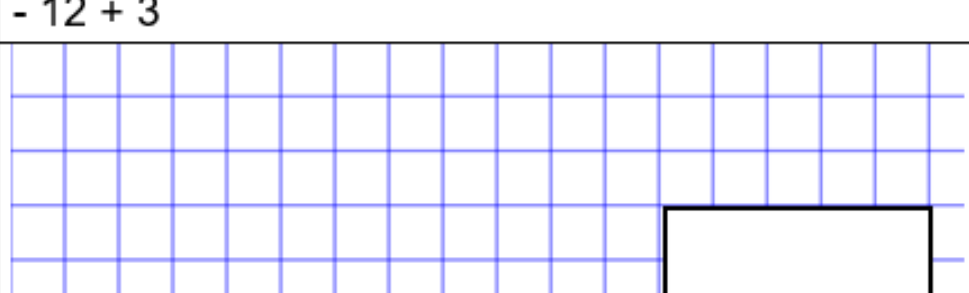
$-$  means  $-$  so,  $9 - 5 = 4$

The minus is in front of the bigger number, so the answer is a minus.

Answer =  $-4$

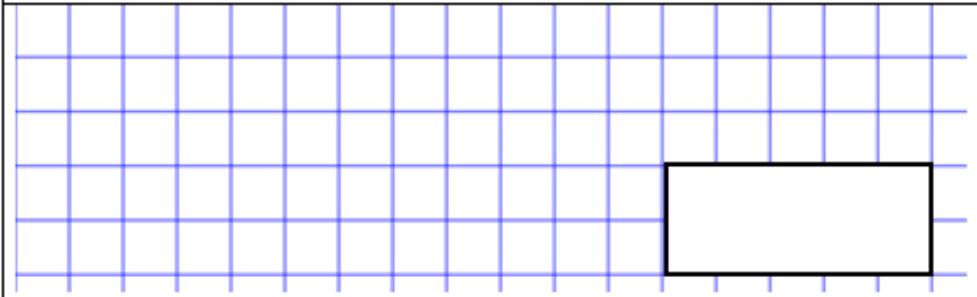
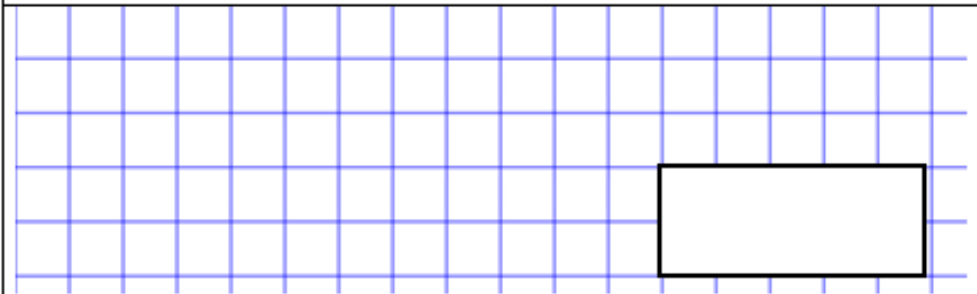
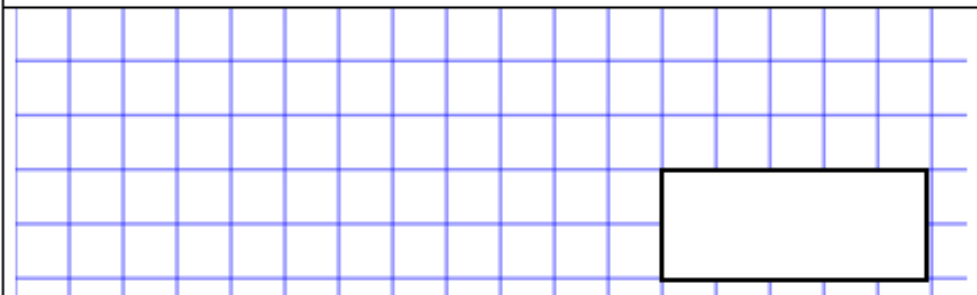
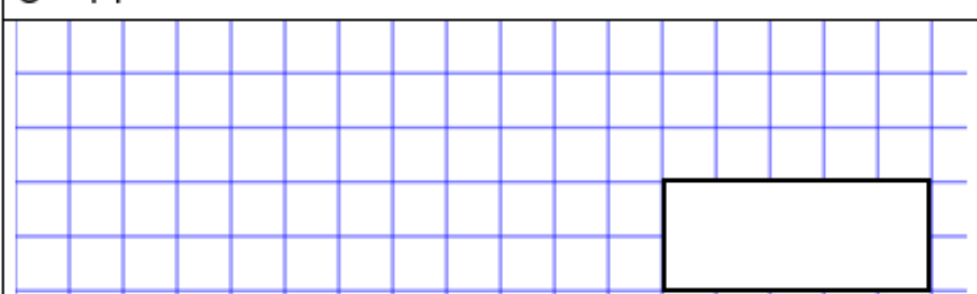
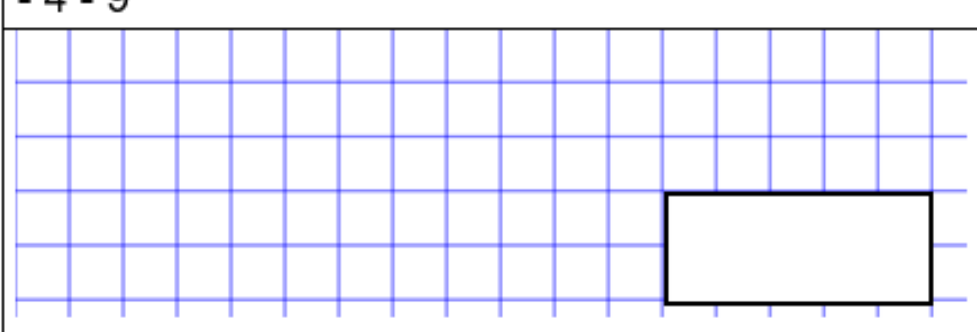


# Maths - Negative Numbers

1.	$5 - 11$		<input type="text"/>
2.	$7 - 14$		<input type="text"/>
3.	$-5 + 13$		<input type="text"/>
4.	$-9 + 12$		<input type="text"/>
5.	$-12 + 3$		<input type="text"/>



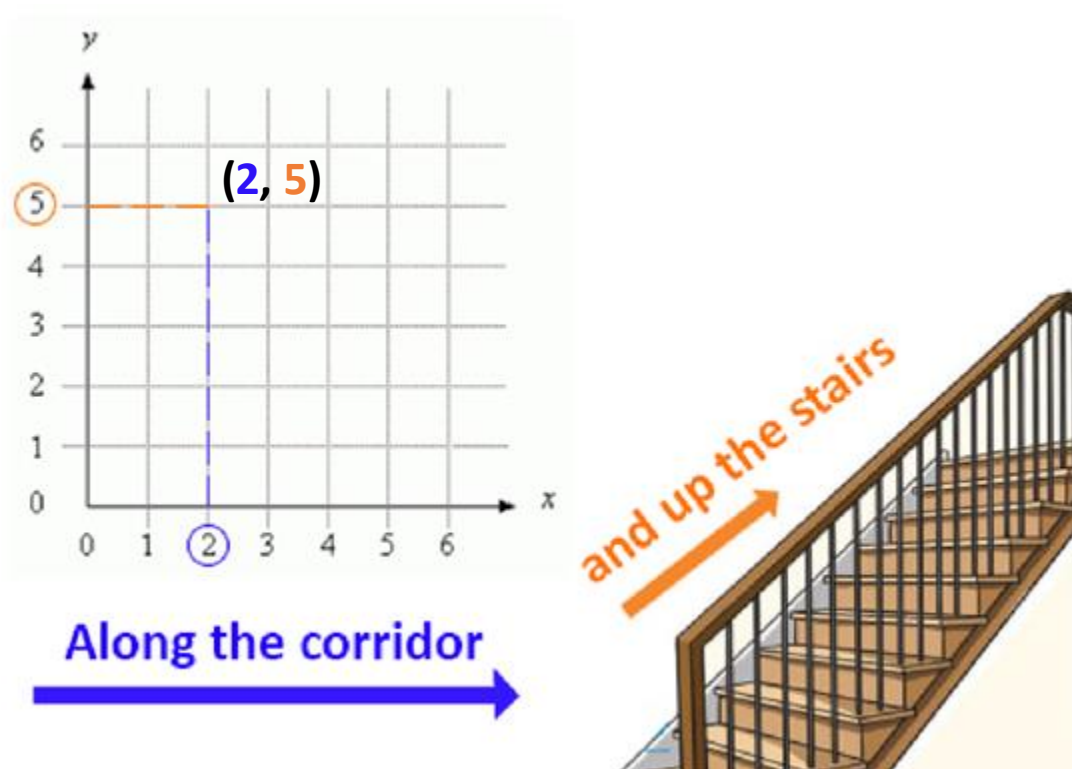
# Maths - Negative Numbers

6.	$-15 + 7$ 	<input data-bbox="1310 517 1406 607" type="text"/>
7.	$-8 - 4$ 	<input data-bbox="1310 880 1406 969" type="text"/>
8.	$-9 - 8$ 	<input data-bbox="1310 1294 1406 1384" type="text"/>
9.	$8 - 11$ 	<input data-bbox="1310 1668 1406 1758" type="text"/>
10.	$-4 - 9$ 	<input data-bbox="1310 1928 1406 2018" type="text"/>

# Maths

Another area your secondary schools would like you to work on is co-ordinates.

Here is a helpful rule to remind you how to plot coordinates:



This means look at the **horizontal** co-ordinate first, then the **vertical** co-ordinate.

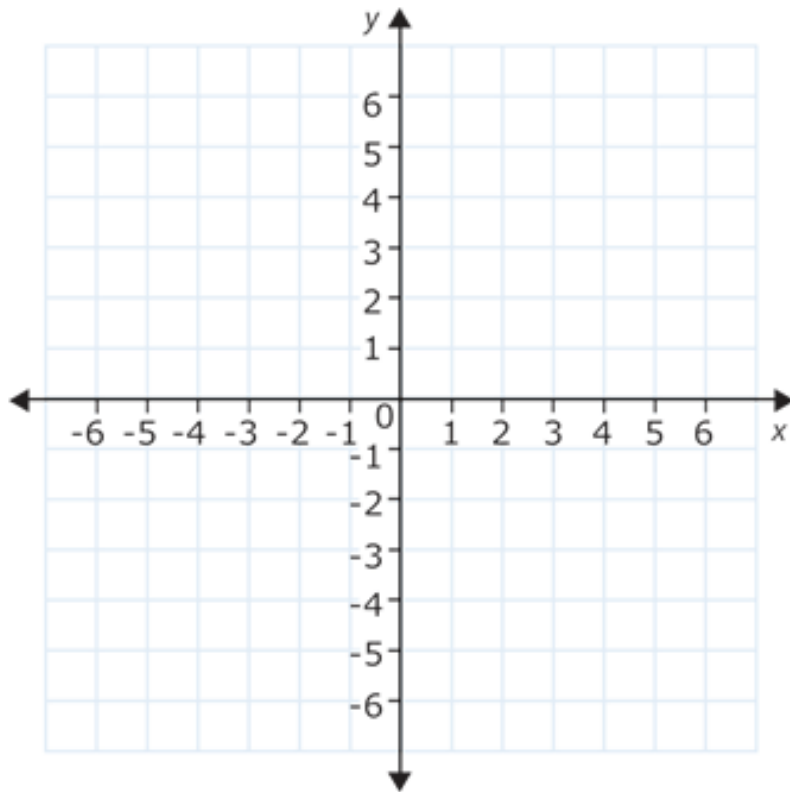
## Key vocabulary

**horizontal** —————

**vertical** |

# Maths

Let's practise!



Plot these coordinates

(3, 2)

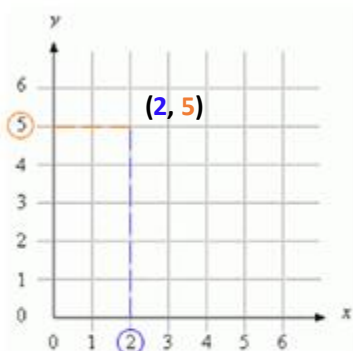
(-3, 2)

(5, -2)

(-5, -2)

What shape have you made?

---

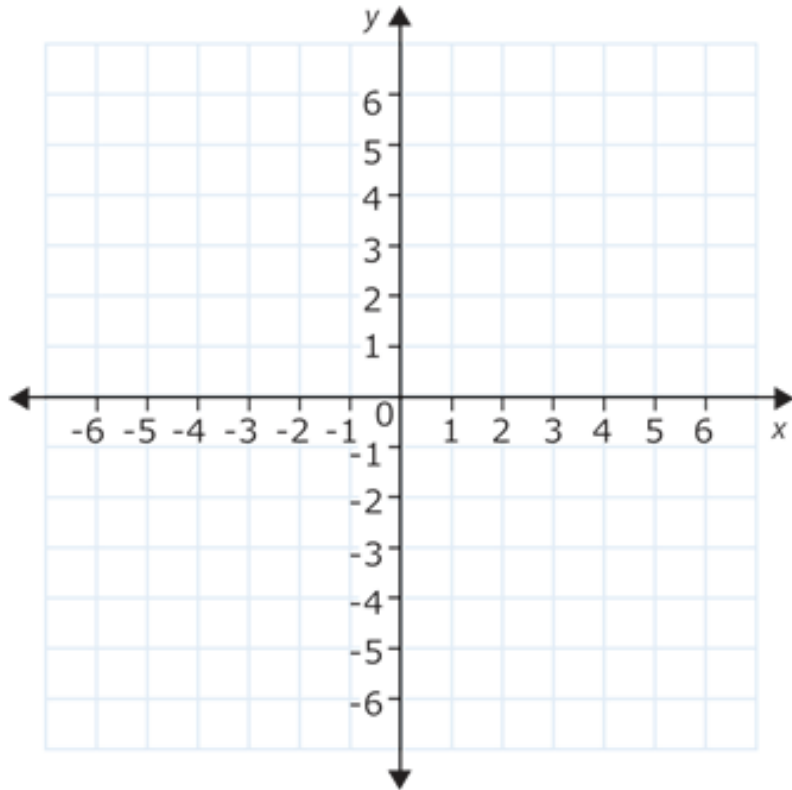


Along the corridor



# Maths

Now, try this!



Plot these coordinates

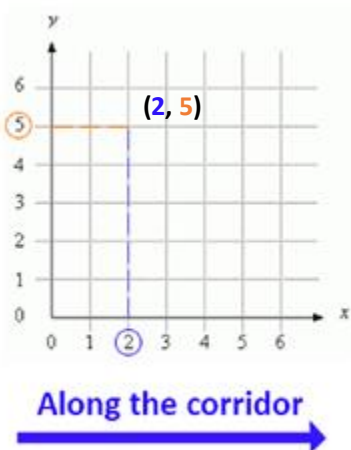
(2, 1)

(-2, 1)

(-4, -2)

This is making the same shape as before, but one co-ordinate is missing!

Can you plot it on? Write the co-ordinate here: ( \_\_ , \_\_ )



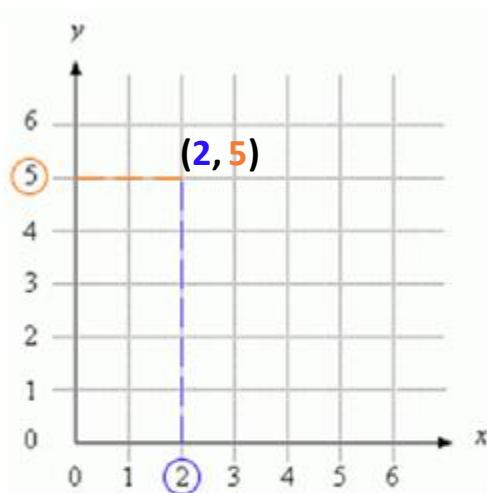
# Maths

On the next pages are coordinate grids.

Each coordinate grid is making a different **quadrilateral** (four-sided shape), but there is one coordinate missing!

For each question:

- Plot the coordinates
- work out what shape it is supposed to be (there might be more than one right answer!)
- plot the missing coordinate
- write the missing coordinate

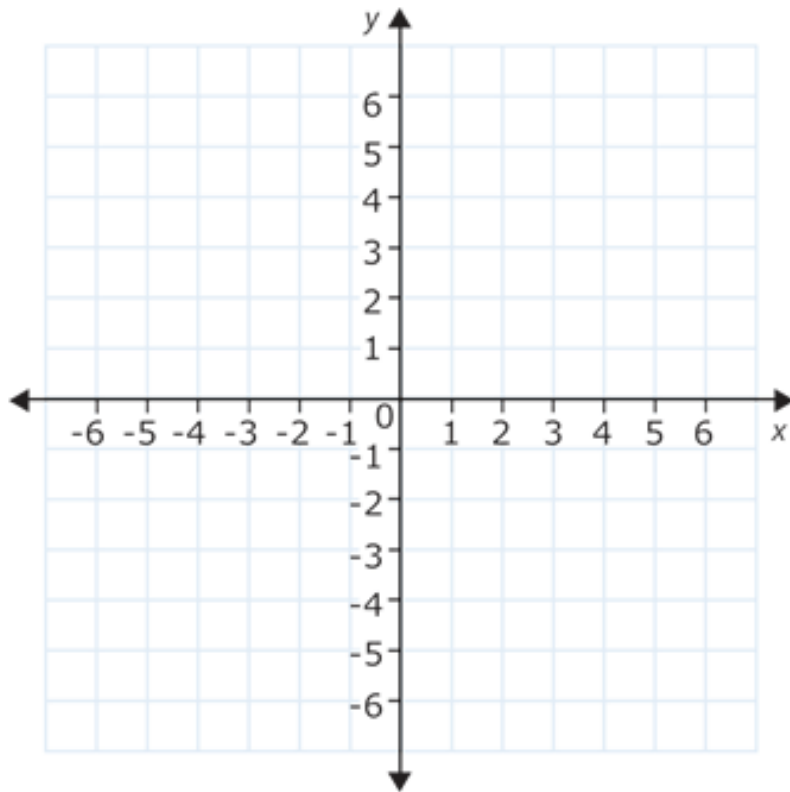


Along the corridor  
→



# Maths

Question 1:



Plot these coordinates

(3, 6)

(3, -2)

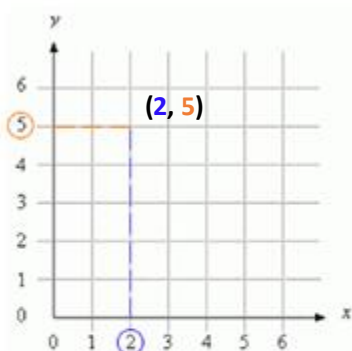
(5, 2)

What shape do you think is being plotted?

\_\_\_\_\_

Plot the missing coordinate on the grid.

Write the missing coordinate here: ( \_\_ , \_\_ )



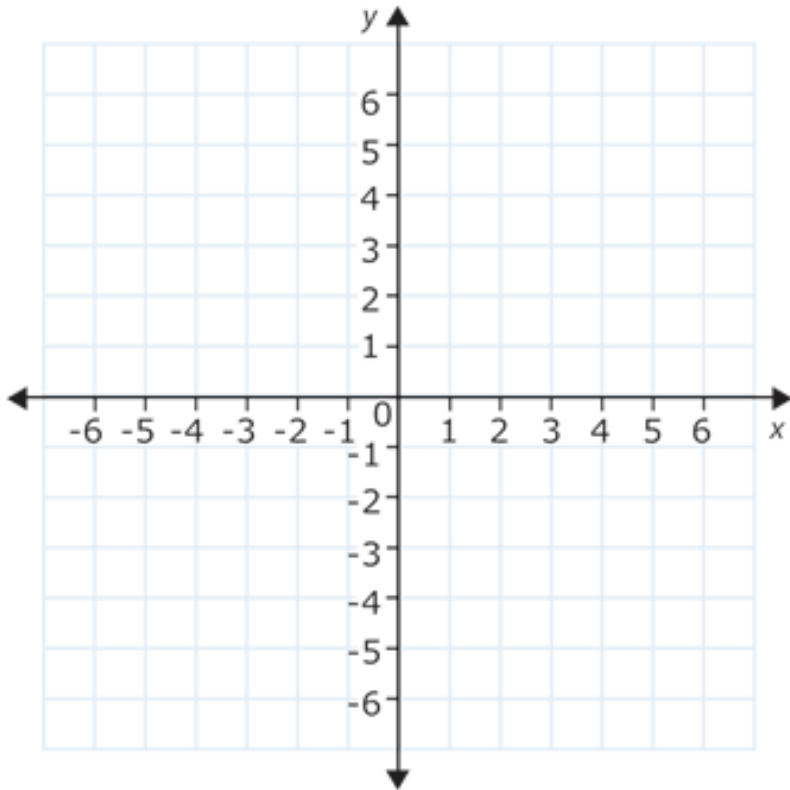
What other shape(s) could it have been? \_\_\_\_\_

Why? \_\_\_\_\_

What other information would you need? \_\_\_\_\_

# Maths

Question 2:



Plot these coordinates

$(-4, 6)$

$(1, 6)$

$(1, -3)$

What shape do you think is being plotted?

Plot the missing coordinate on the grid.

Write the missing coordinate here: ( \_\_ , \_\_ )



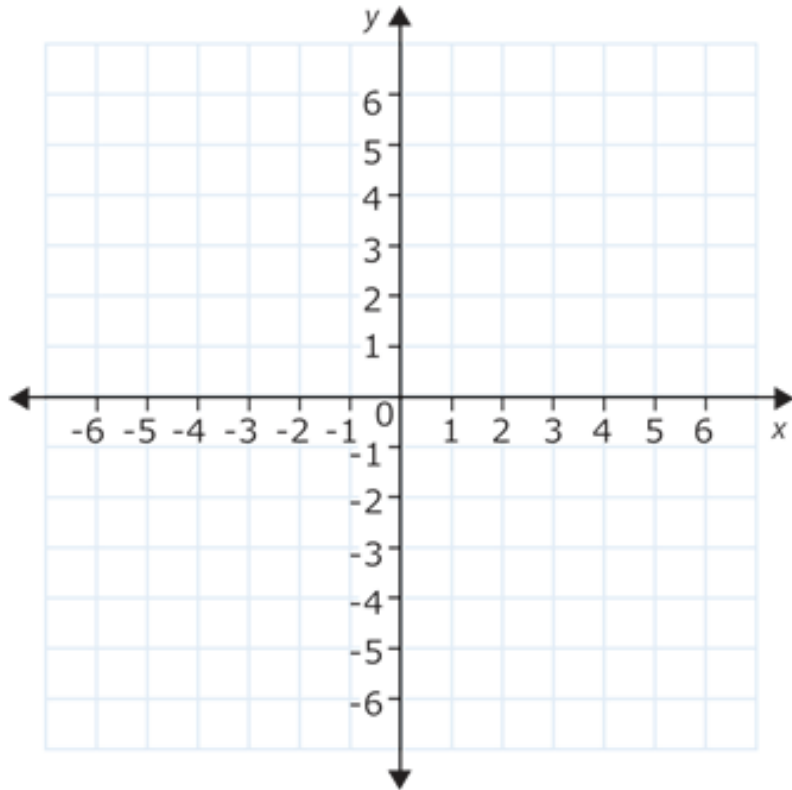
What other shape(s) could it have been? \_\_\_\_\_

Why? \_\_\_\_\_

What other information would you need? \_\_\_\_\_

# Maths

Question 3:



Plot these coordinates

$(-3, -4)$

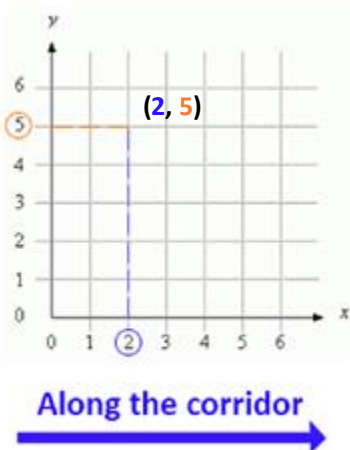
$(-3, 1)$

$(2, -4)$

What shape do you think is being plotted?

Plot the missing coordinate on the grid.

Write the missing coordinate here: ( \_\_ , \_\_ )



What other shape(s) could it have been? \_\_\_\_\_

Why? \_\_\_\_\_

What other information would you need? \_\_\_\_\_



# Maths

In Secondary school, you'll learn a lot more about **algebra**.

Algebra is a bit like solving a puzzle!

In algebra, we use a letter to represent a missing number or a number we don't know.

These are a bit like missing number problems:

$$\square - 2 = 4$$

Except we use a letter to represent the missing number:

$$x - 2 = 4$$

This makes it easier to talk about and easier to solve if we have more than one unknown number.

# Maths

Have a go at solving these simple algebra questions.

1.  $a + 6 = 17$

1.  $b \times 7 = 42$

1.  $19 - c = 4$

1.  $d - 4 = 5$

1.  $9 + e = 21$

# Maths

Let's try something trickier. Each question has two parts. Use the first part to help you solve the second part!

1.  $a + 4 = 6$   
 $a + b = 17$

5.  $i + 9 = 15$   
 $i + j = 18$

2.  $9 - c = 4$   
 $c - d = 8$

6.  $k - 14 = 12$   
 $k \times L = 52$

3.  $14 + e = 19$   
 $e \times f = 20$

7.  $21 \div m = 7$   
 $m \times n = 27$

4.  $3 \times g = 21$   
 $g - h = 1$

8.  $5 + p = 15$   
 $p \times q = 40$

# Maths

Sometimes, there is more than one possible answer to a problem.

Let's have a look at this:

$$3a = b$$

What possible answers could there be for a and b?

Write down a few here:

$a = \underline{\quad} \text{ and } b = \underline{\quad}$

$a = \underline{\quad} \text{ and } b = \underline{\quad}$

$a = \underline{\quad} \text{ and } b = \underline{\quad}$

$a = \underline{\quad} \text{ and } b = \underline{\quad}$

$a = \underline{\quad} \text{ and } b = \underline{\quad}$

$a = \underline{\quad} \text{ and } b = \underline{\quad}$

# Maths

This time, just choose one possible option for each question:

1.  $5c = d$

1.  $9m = n$

1.  $5p = 2q$

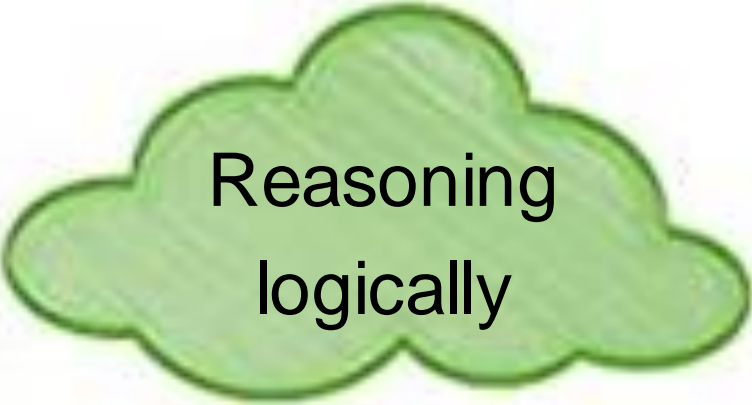
1.  $8a = 4b$

1.  $9q = 4m$

# Maths

Now, it's time for some investigations and problem solving.

There are 6 main problem solving strategies that you can use to help yourself with these problems:



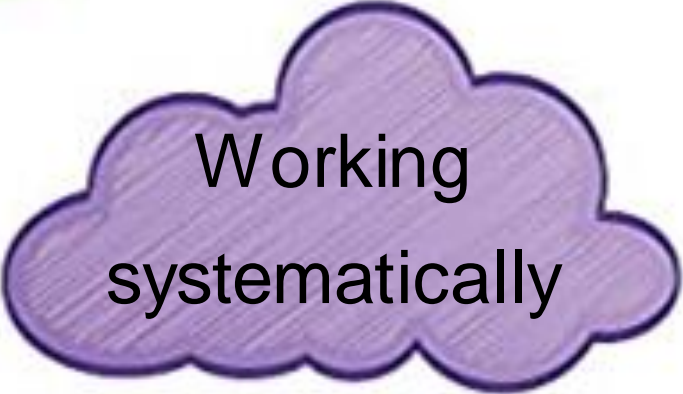
Reasoning  
logically



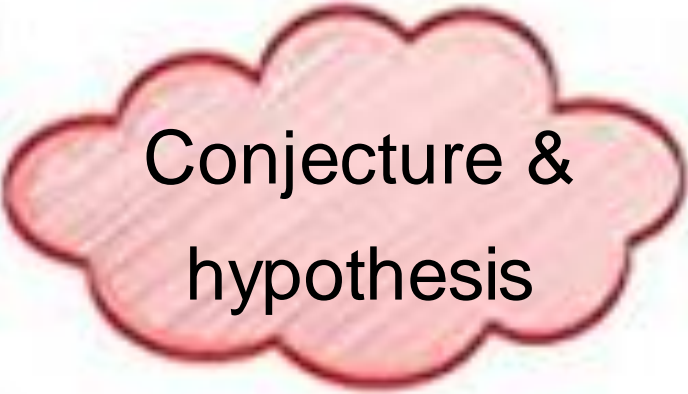
Visualising




Trial &  
improvement



Working  
systematically



Conjecture &  
hypothesis



Pattern spotting

# Maths

*Here's a warm up!*

## Starfish Spotting!



I can see 28 'arms' on the beach.

How many children could there be?

How many starfish could there be?

# Maths



Use this paper to have a go!





# Maths

Ready for the next challenge?

## Two-digit targets

You have a set of the digits from 0-9.

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

Can you arrange these digits in the five boxes below to make two-digit numbers as close to the targets as possible. You can use each digit only once.

largest even number

--	--

largest odd number

--	--

smallest odd number

--	--

largest multiple of 5

--	--

number closest to 50

--	--

How will you know your solution is the closest you can get to the targets?

# Maths

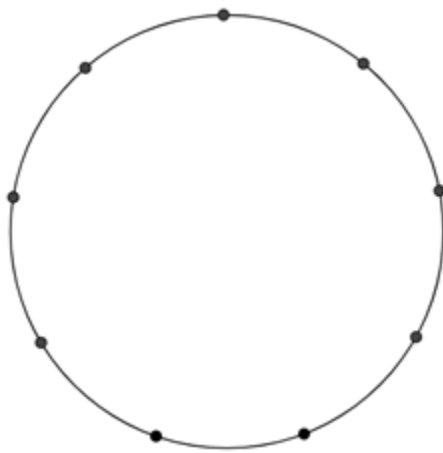
Use this paper to have a go!

# Maths

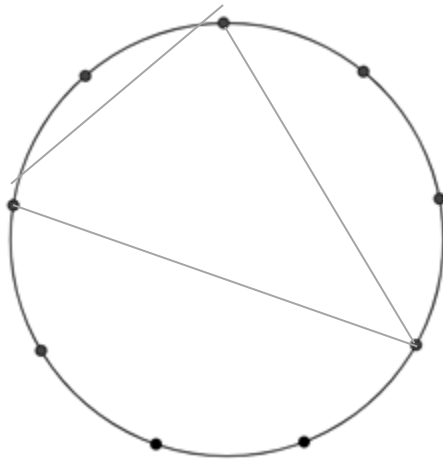
Ready for the next challenge?

## Nine-pin triangles

You have a circle with nine points evenly spaced around it.



How many different triangles can you make by joining the points together? The first one has been done for you.



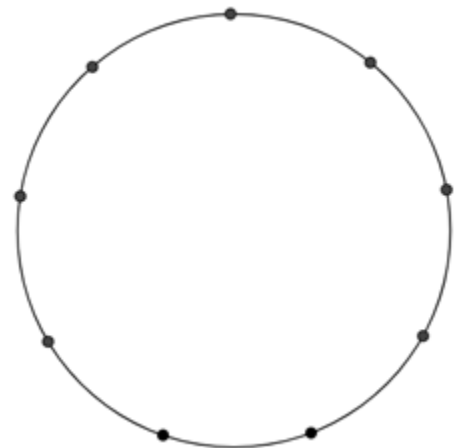
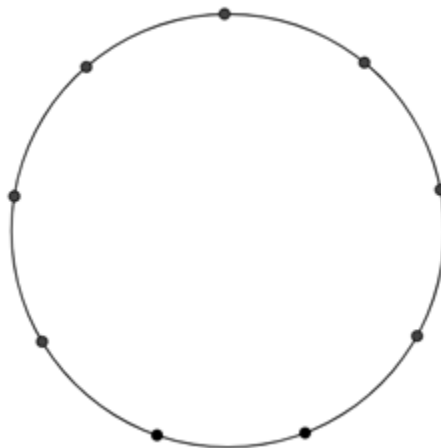
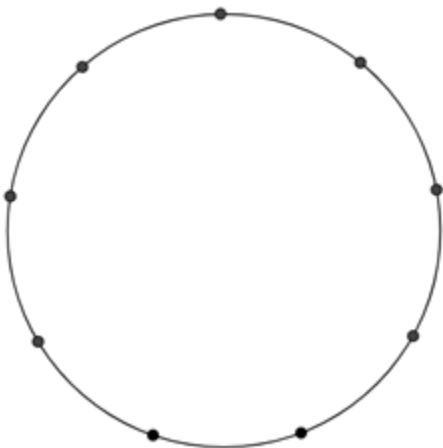
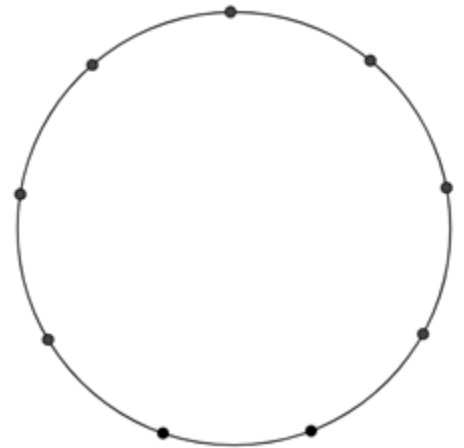
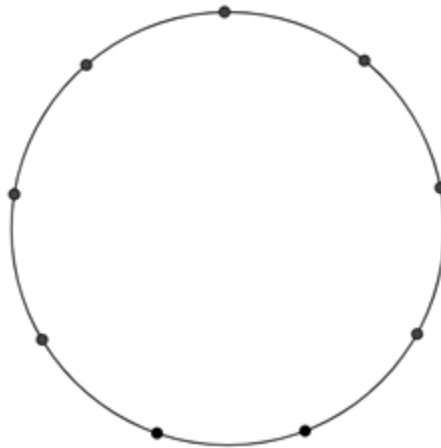
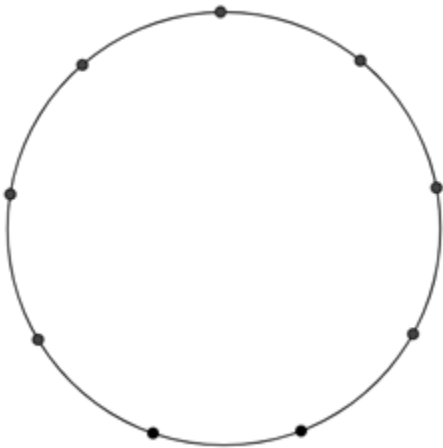
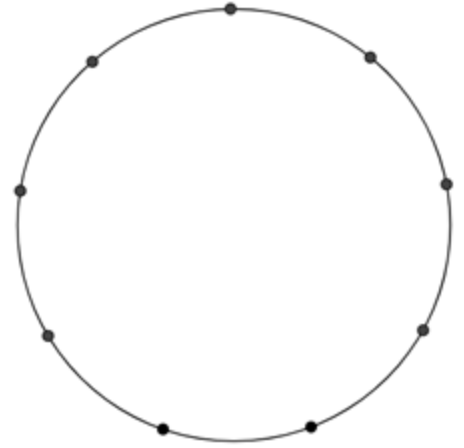
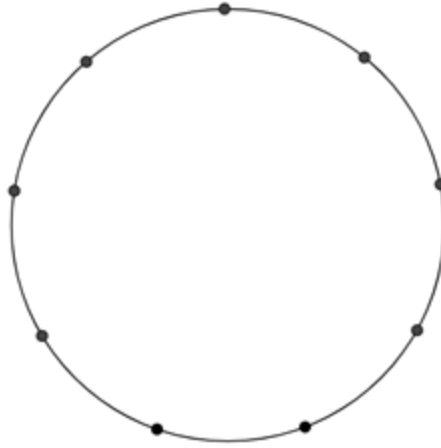
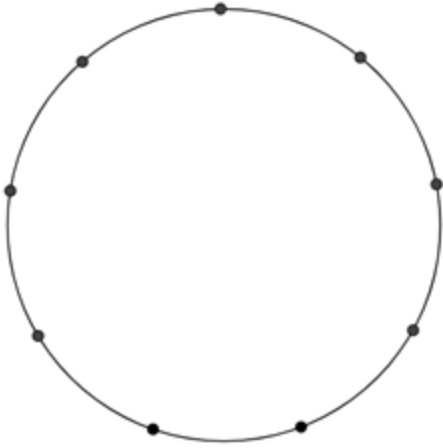
How do you know you've found them all?

Are you sure they're all different?

What does different mean?

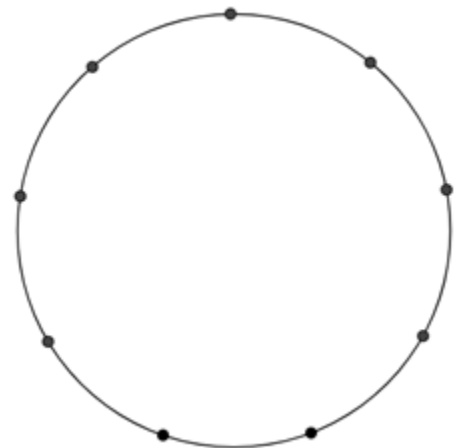
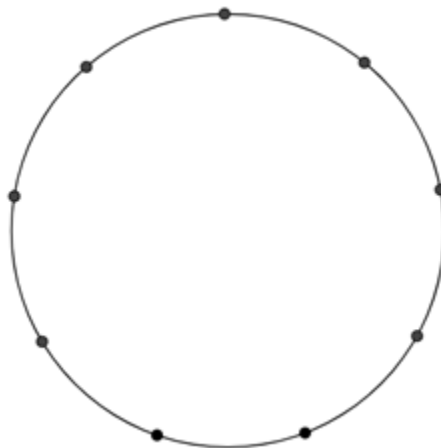
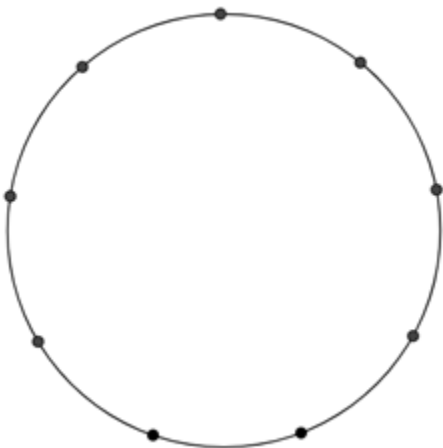
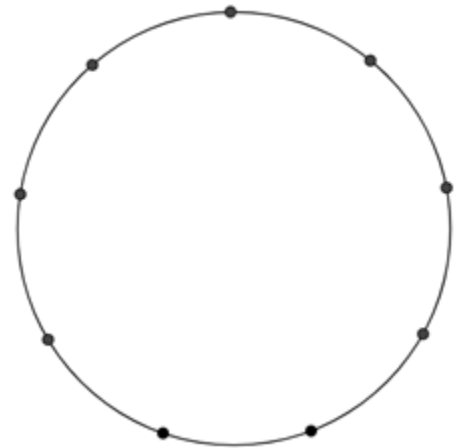
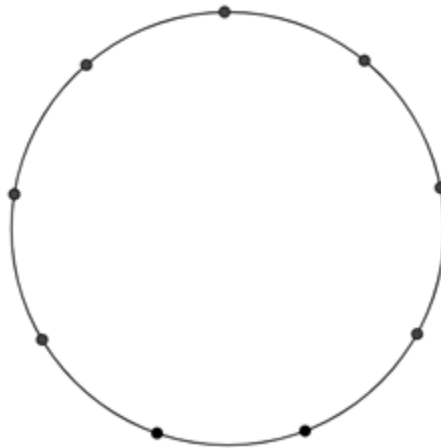
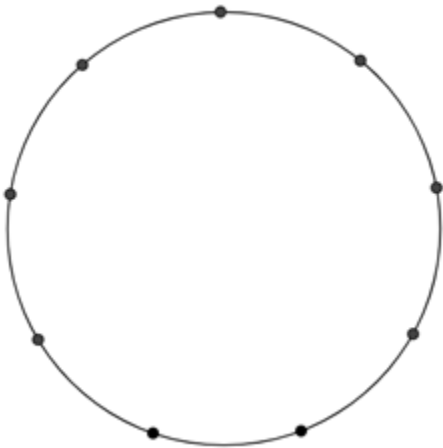
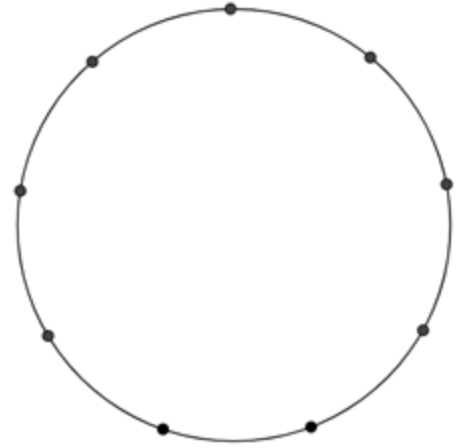
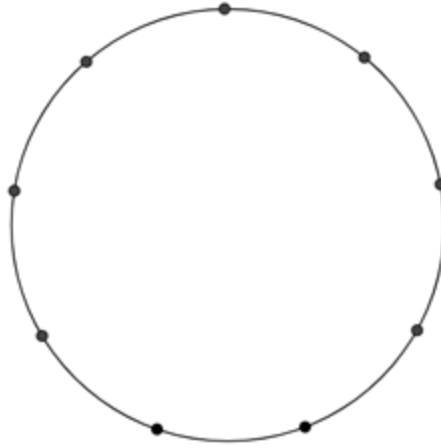
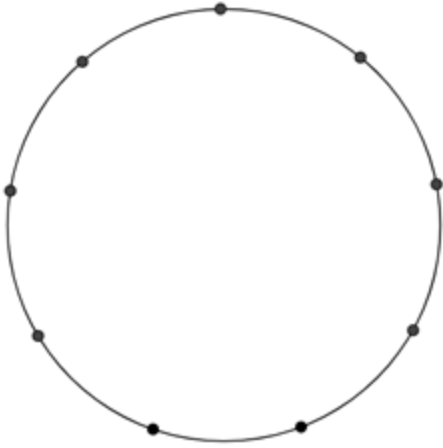
# Maths

Use this paper to have a go!



# Maths

Use this paper to have a go!



# Maths

Ready for the next challenge?

## Trebling

$$\begin{array}{r} \mathbf{x} \quad \mathbf{1 \ a \ b \ c \ d \ e} \\ \hline \mathbf{a \ b \ c \ d \ e \ 1} \end{array}$$

$$\begin{array}{r} \mathbf{x} \quad \mathbf{2 \ f \ g \ h \ i \ j} \\ \hline \mathbf{f \ g \ h \ i \ j \ 2} \end{array}$$

Can you replace all the letters with numbers?  
Each letter represents a different number.

Is there only one solution to each problem?

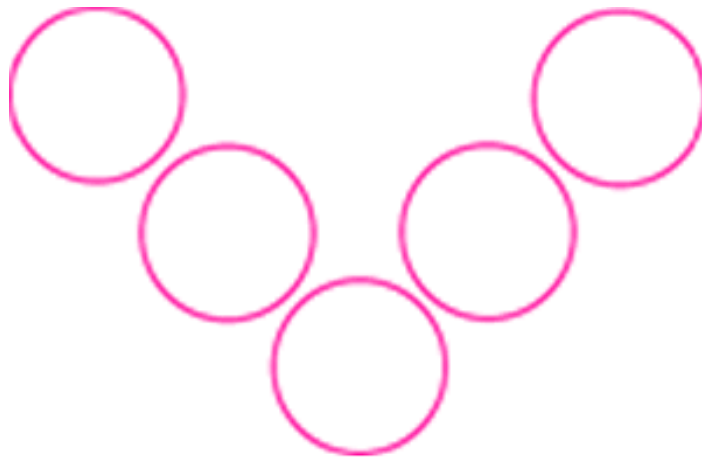
# Maths

Use this paper to have a go!

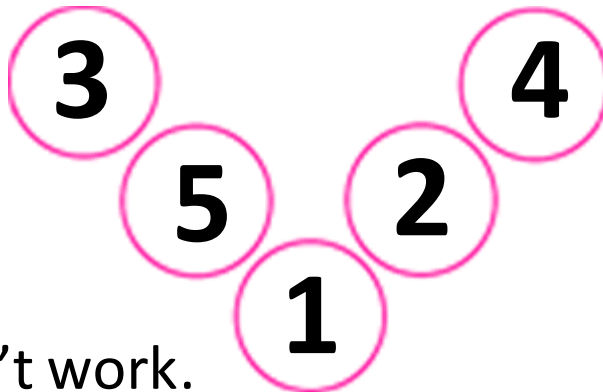
# Maths

Ready for the next challenge?

## Magic Vs



Place each of the numbers 1 to 5 in the V shape below, so that the two arms of the V have the same total.



$$3 + 5 + 1 = 9$$

$$4 + 2 + 1 = 7$$

So this V doesn't work.

Can you find one that does?

How many different possibilities are there?



# Maths

Use this paper to have a go!

# Maths

There's also going to be lots of new mathematical language that you will learn at secondary school.

How many of these words do you already know?

- |                  |                     |                |
|------------------|---------------------|----------------|
| a) prime number  | d) factor           | g) consecutive |
| b) square number | e) integer          | h) commutative |
| c) multiple      | f) triangle numbers | i) variable    |

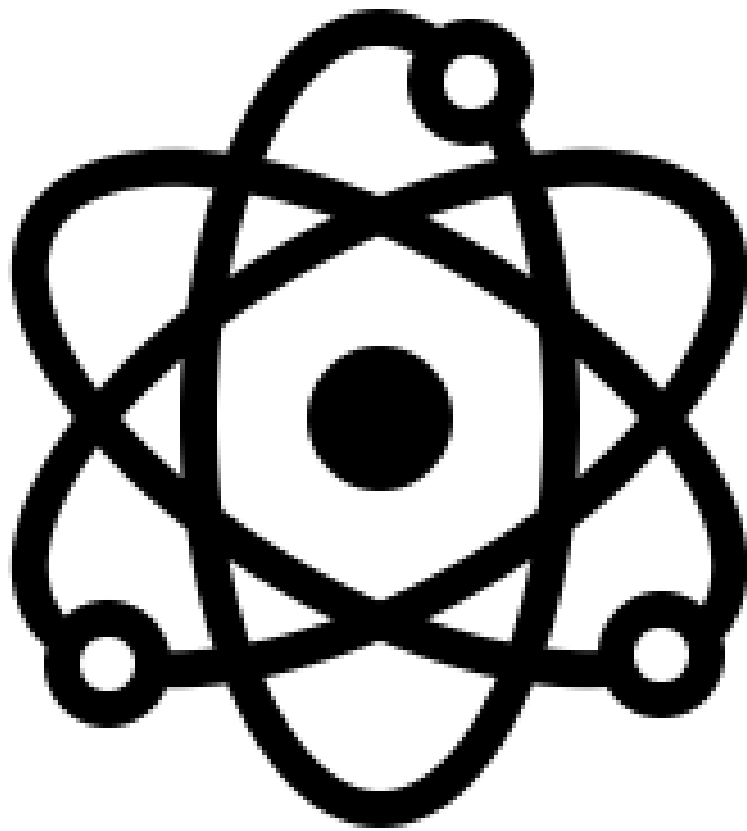
Can you research the ones you don't know and find a definition or an example for them?

This will give you a head start in Year 7!

# Maths

Use this paper to write down your research!

*Science*



# Science

Science is one of the most important subjects you'll ever learn, as it can teach you to understand the world around you. At secondary school you will build on your knowledge of **the scientific method**, where you will learn to draw evidence to make conclusions.

At secondary school, Science is separated in to three main areas:

- Biology
- Chemistry
- Physics



# Science

**Biology** is the study of **life** and **living things**. This includes subjects such as the cells, genes, inheritance, plants, microorganisms, animals and the human body.

**Chemistry** is the study of what everything is made of and how it works. It studies the properties of **matter**, which is what everything is made of! Cooking, making ice, medicines and paint are all examples of chemistry!

**Physics** is the study of **energy** and **forces**. This includes electricity, astronomy, motion, waves, sound and light!



# Science - Investigations

Here are some investigations for you to try at home!

Think about:

- What area of science do you think they are using: Biology, Chemistry or Physics?
- Do they use more than one area?
- Can you explain what happens scientifically?
- Do you have any other questions about the investigations?
- Is there anything else you could try if you were to do the investigation again?

Make sure you follow the **method** carefully!



# Science

## Investigation 1

### Dissolving

Which solids dissolve in water?

#### You Will Need

- Water (hot and cold)
- Transparent Containers
- Substances to try and dissolve; sand, sugar, salt, coffee etc



#### Method

- 1 Add a teaspoon of whichever solid you are testing to a glass of cold water and a glass of hot water, stir and observe the difference.
- 2 Look to see if the solid dissolves in the hot water and cold water and if one is better than the other.

#### The Science Bit

Things like salt, sugar and coffee dissolve in water. They are soluble. They usually dissolve faster and better in hot water. Pepper and sand are insoluble, they will not dissolve even in hot water.

Everything is made of particles which are always moving. When a soluble solid (solute) is mixed with the right liquid (solvent), it forms a solution. This process is called dissolving.

Two things that affect the speed at which the solid dissolves are temperature and the size of the grains of the solid. Caster sugar which is made of fine particles will dissolve quickly, but bigger sugar particles will take longer.

Solids dissolve faster in hot water as in hot water the water molecules are moving faster, so bump into the solid more often which increases the rate of reaction.



# Science

## Investigation 1

What happened in your investigation?

---

---

---

---

What did you learn?

---

---

What area or areas of science do you think this investigation used: Biology, Chemistry or Physics?

---

Why do you think that?

---

---



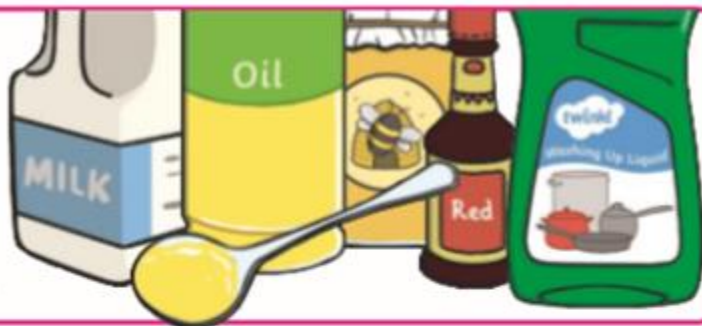
# Science

## Investigation 2

### Fun with Density

#### You Will Need

- Honey
- Milk
- Water
- A Glass
- Vegetable oil\*
- Food colourings
- Golden syrup
- Washing up liquid



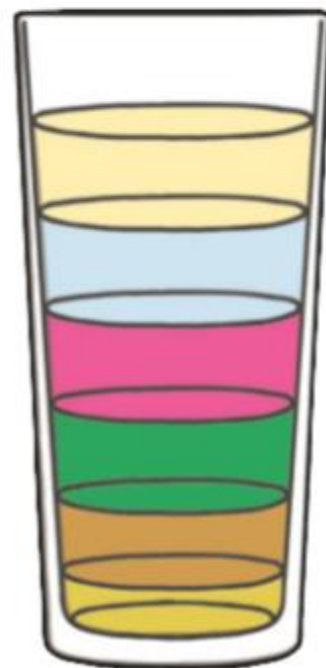
\* Please dispose of oil safely and responsibly.

**Density** is a really tough concept to grasp. We confuse ourselves by referring to our weight all the time when we really mean our **mass**. **Mass** is effectively 'how much stuff' is there. **Density** is how much mass is in a volume (or space).

One way to illustrate density is to pour different liquids (which have different densities) on top of each other. The liquids with the greatest density sink to the bottom.

#### Method

- 1 Measure out the same volume of each of the liquids. Colour the water and the milk if you wish.
- 2 Starting from the bottom, pour in the honey. Make sure it goes into the middle of the glass and that you don't get any honey on the sides.
- 3 Slowly pour the golden syrup on top, followed by the washing up liquid.
- 4 Then add the milk, followed by the water.
- 5 Finally top with vegetable oil and admire your rainbow glass!



#### The Science Bit

Each of the liquids have a different mass of molecules or different numbers of parts squashed into the same volume of liquid, this makes them have different densities and therefore one can sit on top of the other – the more dense a liquid is the heavier it is.

Do you think you could float small objects on each of the different levels? We'd love to see a photo if you can.

# Science

## Investigation 2

What happened in your investigation?

---

---

---

---

What did you learn?

---

---

What area or areas of science do you think this investigation used: Biology, Chemistry or Physics?

---

Why do you think that?

---

---



# Science

## Investigation 3

### Egg White and Yolk

#### Science Experiment

Sometimes when you are cooking, you need either just the white or just the yolk (the yellow bit) of an egg. This experiment gives you an easy way to separate the parts.

#### You will need:

- two bowls
- an egg
- an empty plastic drinks bottle



#### TOP TIP!

Squeeze the bottle tightly so lots of air gets squeezed out. Make sure you don't let go.

When you put the bottle on the yolk, make sure it is touching the egg, like a lid. This will seal it to make sure no air gets back in.

#### Method:

1. Crack the egg and put it in the bowl. You might need a grown-up to help you with this.
2. Squeeze the bottle and keep it squeezed tight.
3. Put the opening of the bottle on top of the egg yolk.
4. Release the pressure on the bottle so it's no longer squeezed.
5. The yolk will pop up into the bottle.
6. Put the bottle over the other bowl.
7. Squeeze the bottle so the yolk empties into the bowl.

#### The science:

When you squeeze the bottle, air comes out of it. When you release the squeeze, air rushes back into the bottle to fill the space. If the yolk is at the opening of the bottle, it will rush into the bottle instead of air. The reason why only the yolk will be sucked up is because the yolk is thicker than the egg white.

# Science

## Investigation 3

What happened in your investigation?

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What did you learn?

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What area or areas of science do you think this investigation used: Biology, Chemistry or Physics?

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Why do you think that?

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# Science

## Investigation 4

### Picking Up an Ice Cube

#### Science Experiment

Ice cubes are a great thing to add to your drink on a sunny day. Using only a length of thread, can you pick up the ice cube?

#### You will need:

- ice cube
- thread
- salt
- glass of water



#### Method:

1. Try different ways of picking up the ice cube using only the thread. You might try tying it around the cube, making a loop or some other way.
2. Now put the ice cube in the glass of water.
3. Lay the thread on top of the ice cubes with the ends hanging over the side of the glass.
4. Sprinkle salt on top of the ice cube and thread. Leave it for a few minutes.
5. Take both ends of the thread and pick them up.
6. Lift up the ends of the thread and hold them up high. See what happens to the ice cube.

#### The science:

Saltwater freezes at a lower temperature than normal water (this is why the sea doesn't freeze over). The salt melts some of the ice so the thread goes slightly inside the ice cube. The water over the thread freezes again slightly (because the air by the cube is cold), trapping the thread inside the cube. So when you lift the thread, the cube comes with it.

# Science

## Investigation 4

### Science Experiment

### Picking Up an Ice Cube

Why is it difficult to tie the thread in a loop around the ice cube to pick it up?

Watch carefully. What happens when you put the salt on the ice cube?

When the roads are icy and slippery, salt is sometimes put on them. Why do you think this is?



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# Science

## Investigation 4

What happened in your investigation?

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What did you learn?

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What area or areas of science do you think this investigation used: Biology, Chemistry or Physics?

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Why do you think that?

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# Science

## Investigation 5



### What You Need:

## Mouldy Bread Experiment

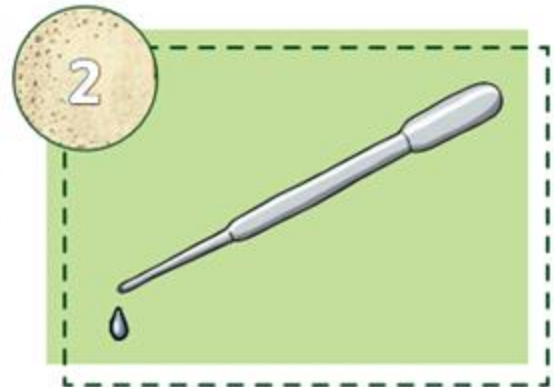
- Three ziplock bags
- Three sticky labels
- Cup of water
- Three slices of white bread
- Pipette
- Camera (optional)

In this experiment, you are going to find out what conditions speed up mould growth on bread.

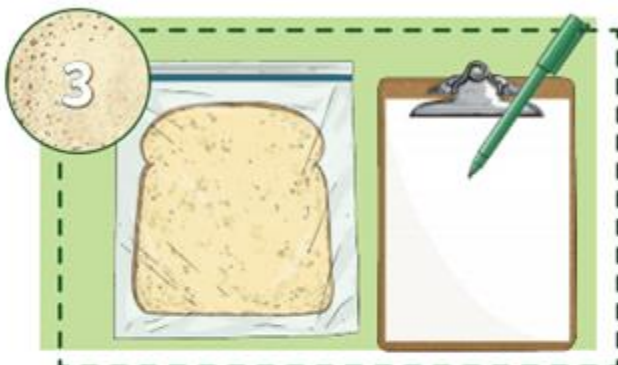
First, you need to decide which variable you are going to change. This could be the amount of water or the temperature of the location of your bread. Once you have decided what to change, you need to keep everything else the same.



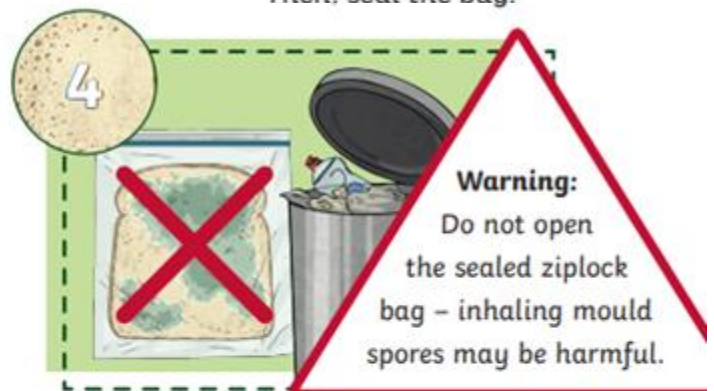
- Put each slice of bread in a separate ziplock bag. Label each bag so you don't forget which is which.



- Add water to each slice. Then, seal the bag.



- Decide where you are going to place each bag. Observe the bread every few days for a total of ten days and record your observations on the record sheet.



- Once you have finished your experiment, throw the bread away without opening the bags.

### Top Tip

Use a camera to take photos of your bread each time you record your observations.

# Science

## Investigation 5

What happened in your investigation?

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What did you learn?

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What area or areas of science do you think this investigation used: Biology, Chemistry or Physics?

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Why do you think that?

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# Science

*Plan your own investigation!*

Now, you're going to plan your own investigation!

On the next page is a planning format you can use to plan your own investigation.

Remember:

- What are you trying to find out?
- How can you keep your investigation a **fair (valid) test**?
- How will you record your investigation?
  - Draw
  - Write
  - Take photos
  - All of the above!
- How will you record your results?
  - Draw
  - Write
  - Take photos
  - All of the above!



# Science

*Plan your own investigation!*

My question: _____	
I will change: _____ _____	I will observe: _____ _____
I will keep the same: • _____ • _____ • _____ • _____ • _____	Equipment I will need: • _____ • _____ • _____ • _____ • _____
What it will look like: (draw a diagram of your investigation set up)	What we will do: (write your <b>method</b> in numbered steps)
My prediction: _____ _____	







# Science

*Record your Investigation!*

# Science

*Record your Investigation!*



# Science

*Record your Investigation!*

What happened in your investigation?

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What did you learn?

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What area or areas of science do you think this investigation used: Biology, Chemistry or Physics?

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Why do you think that?

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# Science

## Scientific terminology

What Scientific terminology have you used before in primary school or at home?

Do you know the meaning of this terminology? Can you give a short explanation of each? Do some research to help you!

Working scientifically		
Fair test		
Control		
Variable	Dependent variable	
	Independent variable	
Hypothesis (prediction)		
Apparatus		
Accuracy		
Correlation		
Anomaly		
Evaluation		