Summer Scheme of Learning

Year 4

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

2020 will go down in history. The world has changed for all of us.

We want to do as much as we can to support children, teachers, parents and carers in these very uncertain times.

We have amended our schemes for 2020/21 to:

- ★ highlight key teaching points
- ★ recap essential content that children may have forgotten
- ★ flag any content that you might not have covered during the school closures period.

We hope these changes will add further value to the schemes and save you time.


Year 3 | Autumn Term | Week 1 to 3 – Number: Place Value

Overview

Small Steps

- Represent numbers to 100
- Tens and ones using addition
- Hundreds
- Represent numbers to 1,000
- 100s, 10s and 1s (1)
- 100s, 10s and 1s (2)
- Number line to 1,000
- Find 1, 10, 100 more or less than a given number
- Compare objects to 1,000
- Compare numbers to 1,000
- Order numbers
- Count in 50s

Notes for 2020/21

Children should already have some understanding of tens and ones from Y2, however it may be useful to recap this content before exploring hundreds.

You may want to ensure that you use plenty of examples of numbers within 100 including number lines to 100 before moving on to the number line to 1,000

Lesson-by-lesson overviews

We've always been reluctant to produce lesson-by-lesson overviews as every class is individual and has different needs. However, many of you have said that if blended learning becomes a key feature of school life next year, a weekly plan with linked content and videos could be really useful.

As always, we've listened! We've now produced a complete lesson-by-lesson overview for Y1 to Y9 that schools can use or adapt as they choose. Each lesson will be linked to a free-to-use home learning video, and for premium subscribers, a worksheet. This means that you can easily assign work to your class, whether they are working at home or in school.

Inevitably, this lesson-by-lesson structure won't suit everyone, but if it works for you, then please do make use of this resource as much as you wish.

Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole group
- provide plenty of opportunities to build reasoning and problem solving elements into the curriculum.

For more guidance on teaching for mastery, visit the NCETM website:

https://www.ncetm.org.uk/resources/47230

Concrete - Pictorial - Abstract

We believe that all children, when introduced to a new concept, should have the opportunity to build competency by taking this approach.

Concrete – children should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – alongside this children should use pictorial representations. These representations can then be used to help reason and solve problems.

Abstract – both concrete and pictorial representations should support children's understanding of abstract methods.

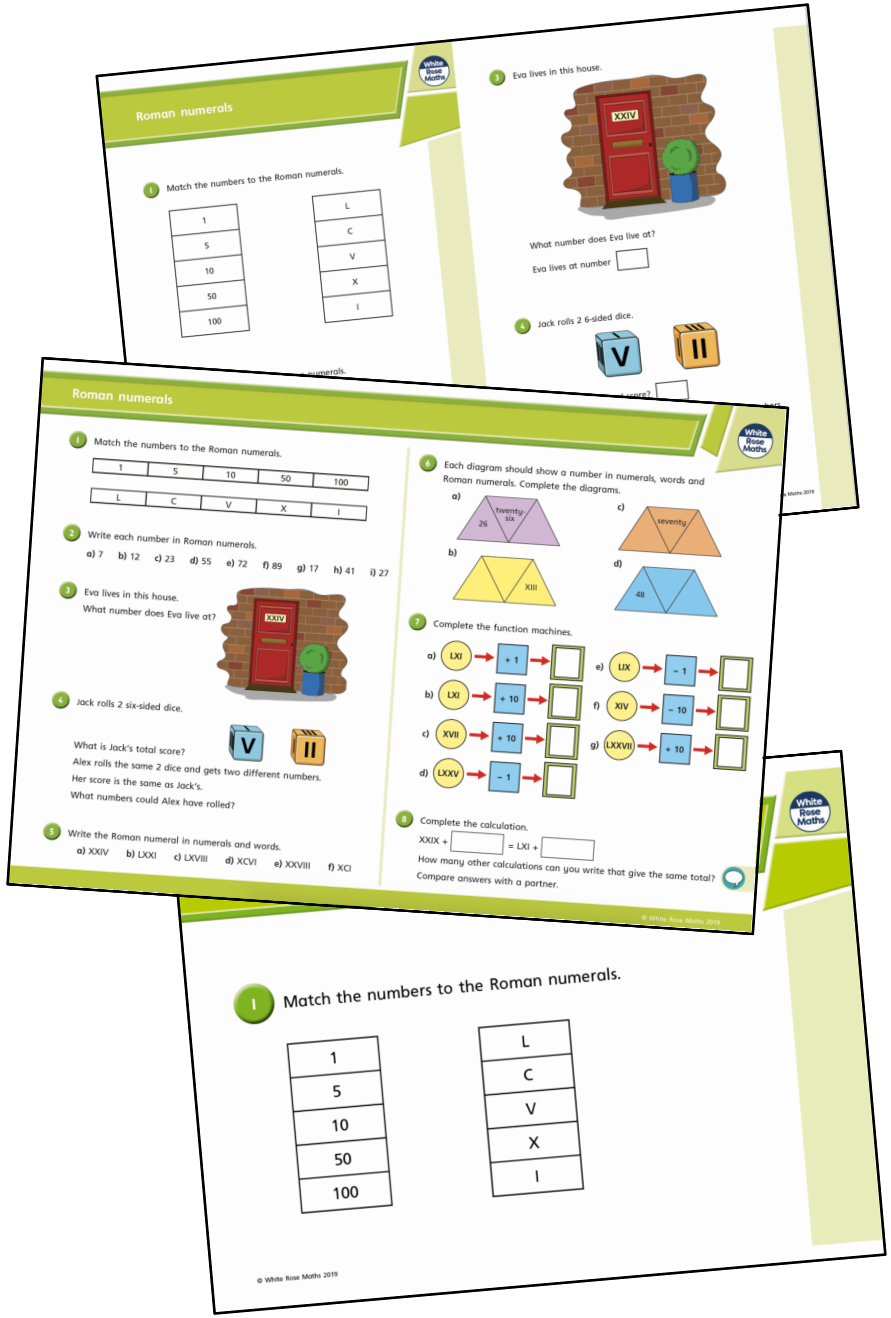
Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Supporting resources

We have produced supporting resources for every small step from Year 1 to Year 11.

The worksheets are provided in three different formats:

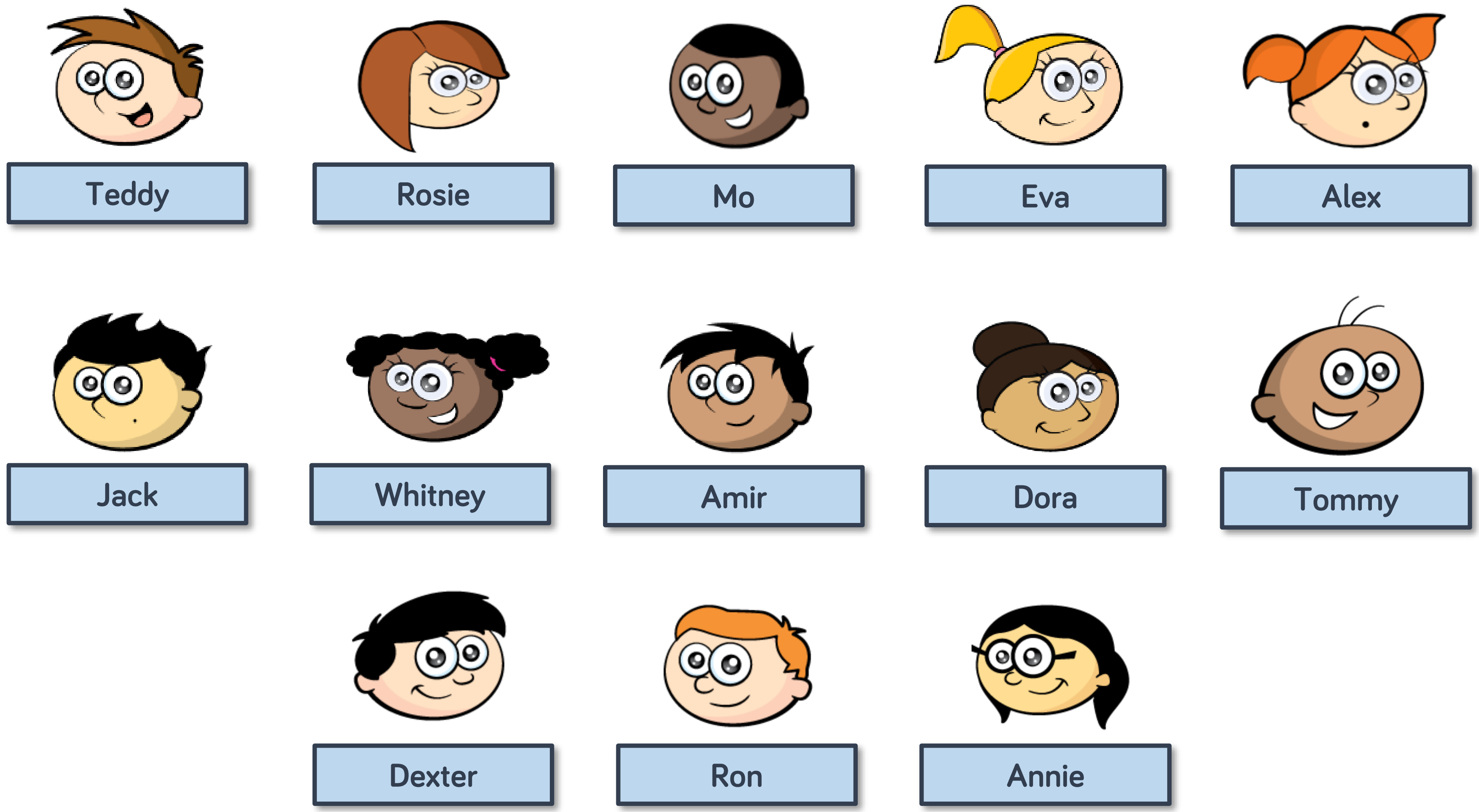
- Write on worksheet – ideal for children to use the ready made models, images and stem sentences.
- Display version – great for schools who want to cut down on photocopying.
- PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.



For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



<table>
<tr><th></th><th>Week 1</th><th>Week 2</th><th>Week 3</th><th>Week 4</th><th>Week 5</th><th>Week 6</th><th>Week 7</th><th>Week 8</th><th>Week 9</th><th>Week 10</th><th>Week 11</th><th>Week 12</th></tr>
<tr><th>Autumn</th><td colspan="4">Number: Place Value</td><td colspan="3">Number: Addition and Subtraction</td><td colspan="2">Measurement: Length and Perimeter</td><td colspan="3">Number: Multiplication and Division</td></tr>
<tr><th>Spring</th><td colspan="3">Number: Multiplication and Division</td><td>Measurement: Area</td><td colspan="4">Number: Fractions</td><td colspan="3">Number: Decimals</td><td>Consolidation</td></tr>
<tr><th>Summer</th><td colspan="2">Number: Decimals</td><td colspan="2">Measurement: Money</td><td colspan="2">Measurement: Time</td><td>Statistics</td><td colspan="2">Geometry: Properties of Shape</td><td colspan="2">Geometry: Position and Direction</td><td>Consolidation</td></tr>
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Summer - Block 1

Decimals

White Rose Maths

Overview

Small Steps

- Bonds to 10 and 100 R
- Make a whole
- Write decimals
- Compare decimals
- Order decimals
- Round decimals
- Halves and quarters

Notes for 2020/21

Whilst the majority of learning in this block will be new for all children, fluency in number bonds to both 10 and 100 will support children with their understanding of decimals so time should be spent recapping these.

Bonds to 100 (Tens)

Notes and Guidance

Teachers should focus at this stage on multiples of 10 up to and within 100

Links should be made again between single digit bonds and tens bonds.

Using a 10 frame to represent 100 would be a useful resource to make this link.

Mathematical Talk

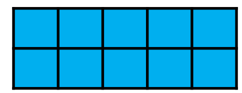
What does this represent?

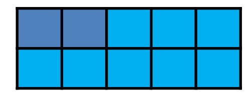
Why is it different to a normal 10 frame?

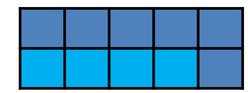
Varied Fluency

R

- Match the 10 frames to the sentences below:







One hundred equals eighty plus twenty

$100 = 100 + 0$

$40 + 60 = 100$

- Fill in the missing numbers

$2 + 6 = 8$

$20 + 60 =$ ____

2___ $+$ ___$0 = 80$

$80 =$ ___$0 + 6$___

- Continue the pattern

$90 = 100 - 10$

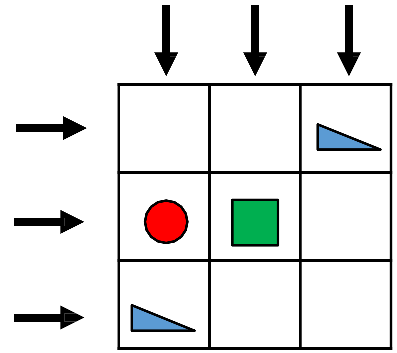
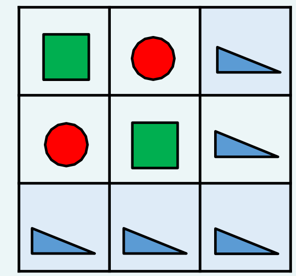
$80 = 100 - 20$

Can you make up a similar pattern starting with the numbers 60, 30 and 90?

Bonds to 100 (Tens)

Reasoning and Problem Solving

Sara thinks there are 10 different number bonds to 90 using multiples of 10 Beth thinks there are only 5 Who is correct? Can you help the person who is wrong to understand their mistake?	Beth because 0 + 90 is the same as 90 + 0 Sara has repeated her answers the other way round.
Using multiples of 10, how many number bonds are there for the following numbers? 20 30 40 50 What do you notice about the amount of bonds for each number? If 80 has 5 bonds, predict how many 90 would have.	20 and 30 both have 2. 40 and 50 both have 3. When the tens digit is odd it has the same number of bonds as the previous tens number. 90 would also have 5.

 Squares are worth 10 Triangles are worth 20 Circles are worth 30 Can you complete the grid above so that all horizontal and vertical lines equal 60? Can children create another pattern on an empty grid where each line equals 60? How many possible ways are there to solve this?	Solution  Lots of possible solutions available.

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Bonds to 100 (Tens and Ones)

Notes and Guidance

Here children build on their earlier work of number bonds to 100 with tens and number bonds to 10 and 20

They use their new knowledge of exchange to find number bonds to 100 with tens and ones.

Mathematical Talk

How many more do we need to make 100?

How many tens are in 100?

If I have 35, do I need 7 tens and 5 ones to make 100? Explain why.

Can you make the number using Base 10?
Can you add more Base 10 to the number to make 100?

Varied Fluency

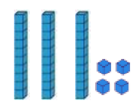
R

Use a 100 square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- 40 squares are shaded, how many are not shaded?
- 45 squares are shaded, how many are not shaded?
- 54 squares are shaded, how many are not shaded?

Hamza is making 100 with Base 10
How much more does he need if he has:

- 
- 5 tens and 3 ones
- 37

Children could place their Base 10 on top of a 100 piece to help them calculate.

$25 + \_\_\_ = 100$

$100 - 84 = \_\_\_$

$\_\_\_ + 69 = 100$

$100 - \_\_\_ = 11$

Bonds to 100 (Tens and Ones)

Reasoning and Problem Solving

Chris has completed the missing number sentence.

46 + 64 = 100

Is Chris correct?
Explain your answer.

Chris is incorrect. He has seen number bonds to 10 but forgotten that he would need to exchange ten ones for one ten.

Complete the pattern.

15 + 85 = 100
20 + 80 = 100
25 + 75 = 100
30 + ___ = 100
___ + ___ = 100

Can you explain the pattern?

30 + 70 = 100
35 + 65 = 100
The first numbers are going up in fives and the second numbers are going down in fives. All of the number sentences are number bonds to 100

Each row and column adds up to 100.

Complete the grid.

45	45	
	35	
15		65

45	45	10
40	35	25
15	20	65

Make a Whole

Notes and Guidance

Children make a whole from any number of tenths and hundredths.
They use their number bonds to ten and one hundred to support their calculations. Children use pictorial and concrete representations to support their understanding.

Mathematical Talk

How many tenths make one whole?

How many hundredths make one tenth?

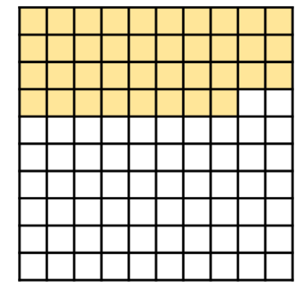
How many hundredths make one whole?

If I have ___ hundredths, how many more do I need to make one whole?

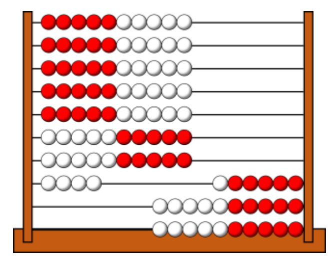
Varied Fluency

- Here is a hundred square.
  How many hundredths are shaded?
  How many more hundredths do you need to shade so the whole hundred square is shaded?

  ___ hundredths + ___ hundredths = 1 whole



- Here is a rekenrek with 100 beads.
  Each bead is one hundredth of the whole.

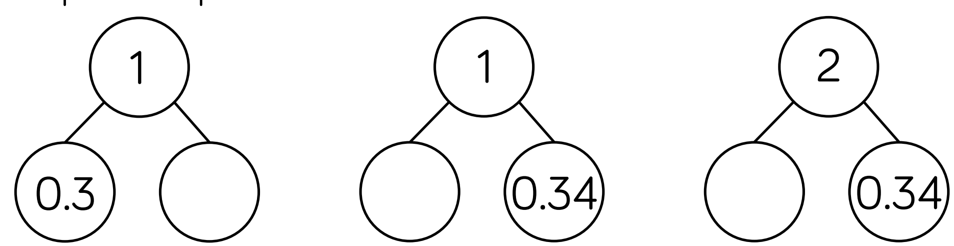


____ hundredths are on the left.

____ hundredths are on the right.

0.____ + 0.____ = 1

- Complete the part-whole models.



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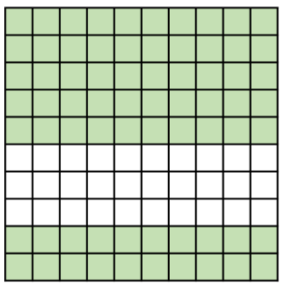
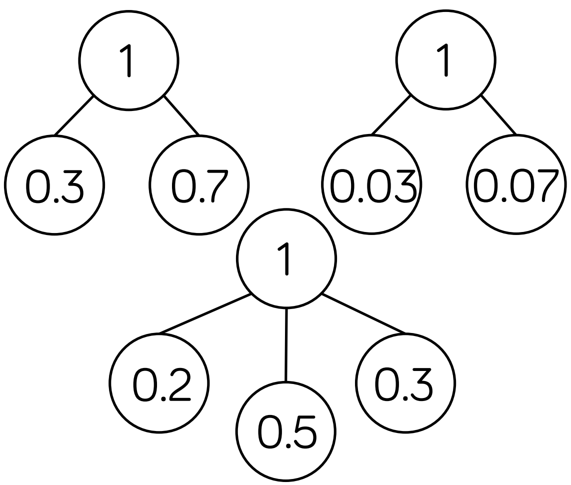
Make a Whole

Reasoning and Problem Solving

Which part-whole model does not match the hundred square?





Explain your answer.

0.03 + 0.07 does not equal one whole so this one does not match.

Three bead strings are 0.84 m long altogether.

Would four bead strings be longer or shorter than a metre?

Explain how you know.

Longer because each bead string is 28 cm (0.28 m) long, and 0.84 + 0.28 = 1.12 which is greater than 1 metre.

White Rose Maths

Write Decimals

Notes and Guidance

Children use place value counters and a place value grid to make numbers with up to two decimal places.
They read and write numbers with decimals and understand the value of each digit.
They show their understanding of place value by partitioning numbers with decimals in different ways.

Mathematical Talk

How many ones/tenths/hundredths are in the number?
How do we write this as a decimal? Why?
What is the value of the ____ in the number _____?
When do we need to use zero as a place holder?
How can we partition decimal numbers in different ways?

Varied Fluency

What number is represented on the place value grid?

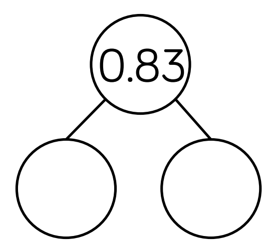
Ones	Tenths	Hundredths
0	1	3

There are ____ ones, ____ tenths and ____ hundredths.
The number is ____

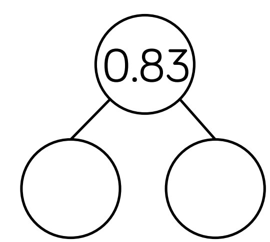
Make the numbers on a place value chart and write down the value of the underlined digit.

$3.\underline{4}7$ $2.1\underline{5}$ $0.\underline{6}$ $\underline{2}5.03$

Complete the part-whole model in two different ways and write a number sentence to go with each.



$0.83 =$ ____ $+ 0.03$

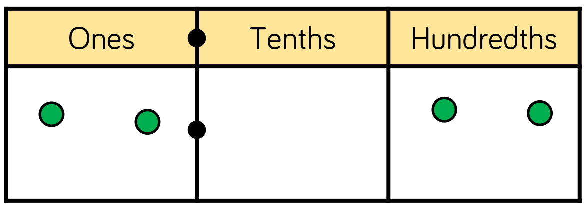


$0.83 = 0.7 +$ ____

Write Decimals

Reasoning and Problem Solving

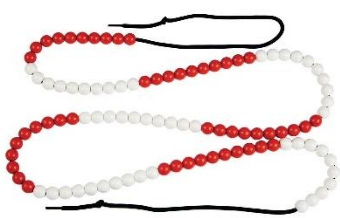
Annie thinks the number shown is 2.2



Do you agree with Annie?
Explain your answer.

No because Annie has not included the place holder. The number shown is 2.02

Mo is told that this bead string represents one whole.



He thinks that each individual bead represents one tenth.
Do you agree with Mo?
Explain your answer.

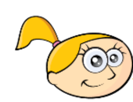
Mo is incorrect because there are 100 beads altogether on the bead string. Each individual bead is worth one hundredth.

Match each description to the correct number.

Teddy: My number has the same amount of tens as tenths.

Amir: My number has one decimal place.

Rosie: My number has two hundredths.



Eva: My number has six tenths.

46.2 | 2.64 | 46.02 | 40.46

Teddy: 40.46

Amir: 46.2

Rosie: 46.02

Eva: 2.64

Compare Decimals

Notes and Guidance

Children apply their understanding of place value to compare numbers with decimals with up to two decimal places.
They will consolidate and deepen their understanding of 0 as a place holder when making a comparison.

Mathematical Talk

How many tenths does it have?

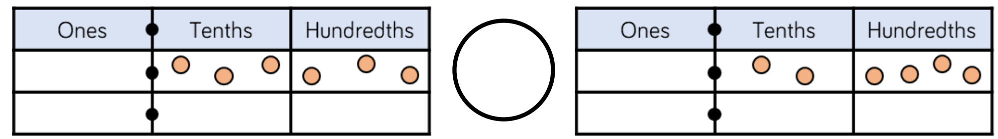
There are ___ tenths and ___ hundredths.

The number is ___ . ___ ___

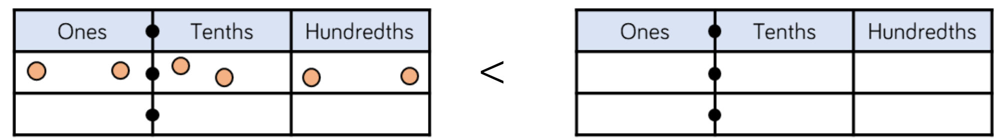
___ . ___ ___ is greater/less than ___ . ___ ___ because …

Varied Fluency

Write the numbers shown and compare using < or >



Draw counters in the place value chart to make the statement correct.



Complete.

5.5	◯	5.7	0.37	<	0.__7
0.14	◯	0.29	2.22	>	2.__2
1	◯	0.64	1.__1	>	1.__1
3.32	◯	3.23	9.9__	<	9.9__

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Compare Decimals

Reasoning and Problem Solving

Use each digit card **once** to make the statement correct.

0 1 2 4 5

3 . _ _ > _ . _ _

Can you find eight different possible solutions?

Some possible solutions:

3.12 > 0.45
3.24 > 1.05
3.45 > 1.02
3.01 > 2.45
3.42 > 2.01
3.45 > 0.12
3.02 > 1.45
3.24 > 1.05

5 7 0 4

Use three digit cards to make the greatest possible number.

_ . _ _

Use three digit cards to make the smallest possible number.

_ . _ _

The greatest:

7.54

The smallest:

0.45

Order Decimals

Notes and Guidance

Children apply their understanding of place value to order numbers with decimals with up to two decimal places.
They will consolidate and deepen their understanding of 0 as a place holder, the inequality symbols and language such as ascending and descending.

Mathematical Talk

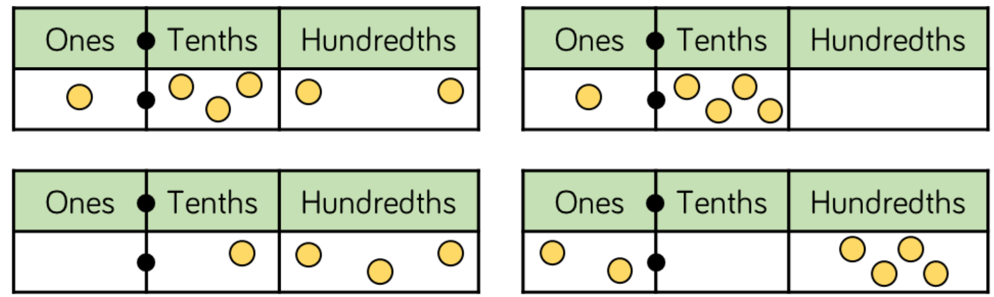
Which digit can we use to compare these decimals? Will this always be the case?

Do we always use the digit furthest left to compare decimals?

___ . ___ ___ is ________ than ___ . ___ ___ because …

Varied Fluency

- Write down the decimals represented in the place value grid and then place them in ascending order.



- Place the numbers in descending order.

46.2	9.64	46.02	40.46

- Complete.

1.11 ◯ 1.12 ◯ 1.13

3.32 ◯ 3.23 ◯ 2.32

4.44 ◯ 4.34 ◯ 4.04

0.1__ < 0.1__ < 0.15

1.9__ < 1.9__ < 2.01

6.67 > 6.__7 > 6.37

Order Decimals

Reasoning and Problem Solving

Spot the Mistake

Rosie is ordering some numbers in ascending order:

$0.09 < 0.99 < 10.01 < 1.35 < 9.09$

Can you explain her mistake?

Rosie hasn't considered the place value of the digits in the numbers and has just ordered by comparing individual digits left to right.

Some children have planted sunflowers and have measured their heights.

Child	Height
Beth	1.23 m
Tony	0.95 m
Rachel	1.02 m
Kate	1.2 m
Faye	99 cm
Emma	0.97 m

Order the children based on the heights of their sunflowers in both ascending and descending order.

Ascending:
Tony, Emma, Faye, Rachel, Kate, Beth

Descending:
Beth, Kate, Rachel, Faye, Emma, Tony

Round Decimals

Notes and Guidance

Children round numbers with 1 decimal place to the nearest whole number. They look at the digit in the tenths column to understand whether to round a number up or not. It is best to avoid the phrase 'round down' as this can sometimes lead to misconceptions. Children need to be taught that if a number is exactly half-way, then by convention we round up to the next integer.

Mathematical Talk

Which whole numbers does the decimal lie between?

Which whole number is the decimal closer to on the number line?

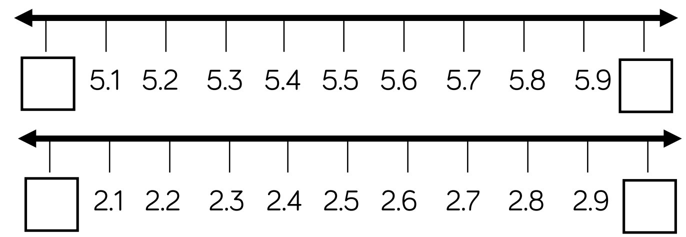
Which column do we focus on when rounding to the nearest whole number?

Which digits in the tenths column do not round up to the nearest whole number?

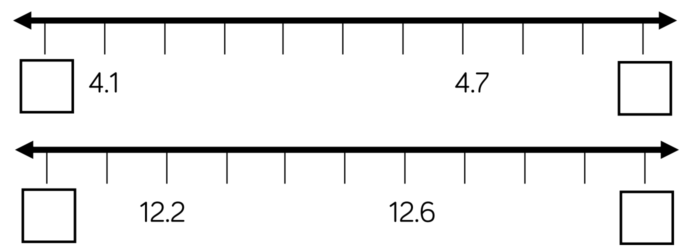
Which digits in the tenths column round up to the nearest whole number?

Varied Fluency

- Which integers do the decimals lie between?



- Complete the sentences to describe each decimal.



____ is closer to ____ than ____

____ rounds to ____ to the nearest whole number.

- Circle the numbers that round up to the nearest whole number.

4.5 3.7 2.3 4.2 16.8 1.9

Round Decimals

Reasoning and Problem Solving

Mo says 0.4 rounded to the nearest whole number is zero. Whitney says 0.4 rounded to the nearest whole number is one. Who is correct? Why?	Mo is correct. 0.4 lies between 0 and 1, as there are only four tenths, the number rounds to zero.	A number with one decimal place rounded to the nearest whole number is 45 What could the number be?	The number could be: 44.5, 44.6, 44.7, 44.8, 44.9, 45.1, 45.2, 45.3 or 45.4

Halves and Quarters

Notes and Guidance

Children write $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{3}{4}$ as decimals. They use concrete and pictorial representations to support the conversion.
Children use their knowledge of equivalent fractions to write fractions as hundredths and then write the fractions as halves or quarters.

Mathematical Talk

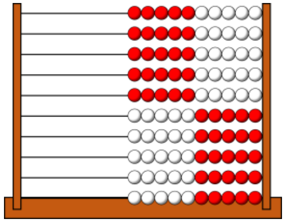
How would you write your answer as a decimal and a fraction?

Can you represent one quarter using decimal place value counters?

Can you represent three quarters using counters on a place value grid?

Varied Fluency

- Here is a rekenrek with 100 beads.



____ out of 100 beads are red.

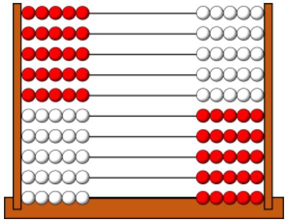
____ out of 100 beads are white.

$\frac{\square}{100}$ are red, and $\frac{\square}{100}$ are white.

Half of the beads are red, and half of the beads are white.

$\frac{1}{2} = \frac{50}{100} = \frac{5}{10}$, so $\frac{1}{2}$ is ______ as a decimal.

- The beads are split equally on each side of the rekenrek.



There are 4 equal groups.

1 out of 4 equal groups = ____ beads.

1 out of 4 equal groups = $\frac{\square}{100}$

$\frac{1}{4} = \frac{\square}{100} =$ ______

What fraction is represented by 3 out of the 4 groups?
Can you write this as a decimal?

$\frac{3}{4} = \frac{\square}{100} =$ ______

Halves and Quarters

Reasoning and Problem Solving

Alex says: If I know $\frac{1}{2}$ is 0.5 as a decimal, I also know $\frac{3}{6}$, $\frac{4}{8}$ and $\frac{6}{12}$ are equivalent to 0.5 as a decimal. Explain Alex's thinking.	Alex has used her knowledge of equivalent fractions to find other fractions that are equivalent to 0.5
Dexter has made a mistake when converting his fractions to decimals. $\frac{1}{2} = 1.2$, $\frac{1}{4} = 1.4$ and $\frac{3}{4} = 3.4$ What mistake has Dexter made?	Dexter has incorrectly placed the numerator in the ones column and the denominator in the tenths column. He should have used equivalent fractions with tenths and or hundredths to convert the fractions to decimals.

Summer - Block 2

Money

Overview

Small Steps

- Pounds and pence
- Ordering money
- Estimating money
- Convert pounds and pence R
- Add money R
- Subtract money R
- Find change R
- Four operations

Notes for 2020/21

This step provides further consolidation on the previous block of learning as children write money using decimal notation. Time is allowed to recap basic calculations with money from year 3 before looking at more complex examples.

Pounds and Pence

Notes and Guidance

Children develop their understanding of pounds and pence. This is the first time they are introduced to decimal notation for money. Once children are confident with this, they can move on to convert between different units of money.

Children can use models, such as the part-whole model, to recognise the total of an amount being partitioned in pounds and pence.

Mathematical Talk

How many pence make a pound?

Why do we write a decimal point between the pounds and pence?

How would we write 343 p using a pound sign?

How can the amounts be partitioned in to pounds and pence?

Is there only one way to complete the part-whole model?

How can these amounts be converted into pounds and pence?

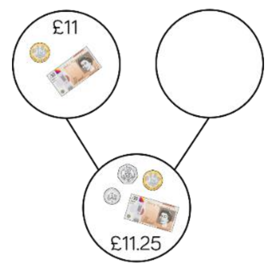
Varied Fluency

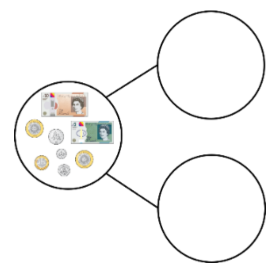
- How much money is in each purse?

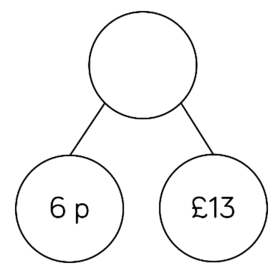
There is ____ pence.
There is ____ pounds.
There is £____ and ____ p
There is £___.____

There is ____ pence.
There is ____ pounds.
There is £____ and ____ p
There is £___.____

- Complete the part-whole models to show how many pounds and pence there are.







- Convert these amounts to pounds and pence:

357 p　307 p　57 p　370 p

Pounds and Pence

Reasoning and Problem Solving

Some children are converting 1206 p into pounds.

Who is correct?

Whitney

Rosie

Teddy

What have the others done wrong?

Rosie is correct.
Whitney has not written the 6 p in the correct column.
Teddy has not understood how many pence there are in a pound, therefore his place value is incorrect.

Eva has these coins:

She picks three coins at a time.
Decide whether the statements will be always, sometimes or never true.

- She can make a total which ends in 2
- She can make an odd amount.
- She can make an amount greater than £6
- She can make a total which is a multiple of 5 pence

Can you think of your own always, sometimes, never statements?

- Never
- Sometimes e.g. £3.05
- Never – she can only choose three coins so the largest amount she can make is £5
- Always, because every coin is a multiple of 5 pence

Ordering Money

Notes and Guidance

Children use their knowledge of £1 = 100 p to compare amounts. Children begin by ordering amounts represented in the same format e.g. 4,562 p and 4,652 p, or £45.62 and £46.52 and relate this to their place value knowledge. Once children understand this, they look at totals that include mixed pounds and pence and also totals represented in decimal notation. Using real notes and coins could support some children.

Mathematical Talk

What does the digit ___ represent?

What place value column is the digit in? How many pounds/pence is it equivalent to?

How can this help us decide which amount is larger/smaller?

Can we think of an amount which could go in between these amounts?

What does ascending/descending mean?

What's the same? What's different?

Varied Fluency

- Two classes save their pennies for a year.

  Class A saves 3,589 pennies.
  Class B saves 3,859 pennies.

  Which class saves the most money?

- Write the amounts as pence, then compare using <, > or =

  6,209 p ◯ £60.09 | £0.54 ◯ 54 p

  Write the amounts as pounds, then compare using <, > or =

  62 p ◯ £6.02 | £5,010 ◯ 5,010 p

- Order the amounts in ascending order.

  130 p | £0.32 | 132 p | £13.20

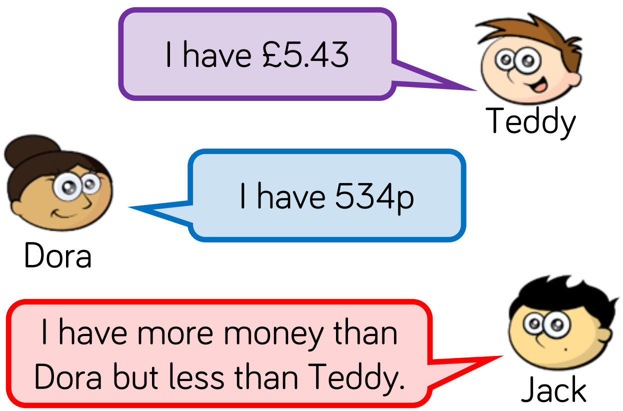
  Order the amounts in descending order.

  257 p | £2.50 | 2,057 p | £25.07

Ordering Money

Reasoning and Problem Solving

Teddy, Dora and Jack are buying toys.



How much money could Jack have?
Is there only one answer?

Jack could have anything from £5.35 to £5.42
Children may record this as 535 p to 542 p

What would you rather have, five 50p coins or twelve 20p coins?
Explain your answer fully.

I would rather have five 50 p coins because
$50 \times 5 = 250$p
but
$20 \times 12 = 240$p

Amir has these digits cards.

4 6 3 2

He uses them to fill the frame below:

£ ☐ . ☐ ☐

He makes a total that is more than three pounds but less than six pounds.

How many amounts can he make?

Order your amounts in ascending order.

£3.24, £3.26
£3.42, £3.46
£3.62, £3.64
£4.23, £4.26
£4.32, £4.36
£4.62, £4.63

Estimating Money

Notes and Guidance

Children round amounts of money written in decimal notation to the nearest pound. They estimate the total of two amounts and move on to estimating with more than two amounts.

Children discuss underestimating and overestimating and link this to rounding down or up and apply it to real life scenarios such as buying food in the supermarket.

Mathematical Talk

If we have ____ , what whole numbers/pounds does this come in between? Where will it go on the number line? Which pound is it nearer to?

What does estimate mean? What does approximately mean?

Where would be a sensible place to start labelling the number line?

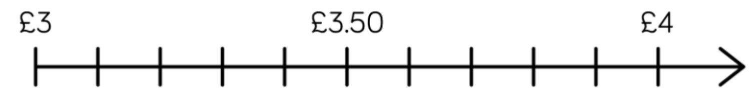
What will each amount round to? How much will they total altogether?

If you had ___ , would you have enough to buy the items?

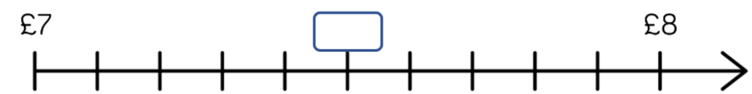
Varied Fluency

Place the amounts on the number line and round to the nearest pound.

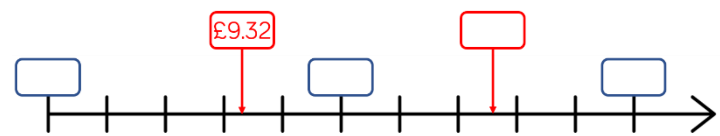
- £3.67
- £3.21
- £3.87



- £7.54
- £7.45
- 701 p



Complete this number line.



Complete the table by rounding each amount and finding the total.

Item 1	Item 2	Approximate Total
£5.63	£1.76	
£3.05	£11.54	

Annie has £15 to spend at the theme park.
She rides on the roller coaster which costs £4.34
Then she rides on the big wheel which costs £3.85
Approximately how much money will she have left?

Estimating Money

Reasoning and Problem Solving

Three children buy toys.
Can you work out who buys what?
Tommy buys a toy which rounds to £5 but gets change from £5
Amir buys two toys which total approximately £25
Eva's toy costs 5 p more than the number the cost rounds to.

Tommy – car
Amira – computer game and rugby ball
Eve – panda

If you had £30, what combinations could you buy and what change would you approximately get?

Various answers

Mo buys some socks and gloves.
He estimates how much he'll spend.

£4 + £5 = £9

What could the actual price of the socks and gloves have been?

The socks could cost between £3.50 and £4.49
The gloves could cost between £4.50 and £5.49

Mo has £12
He says he has enough money to buy three pairs of socks.

Do you agree?
Explain why.

It depends. If the socks costs £3.50 to £4, he will.
If the socks cost £4.01 to £4.49, he will not.

Convert Pounds and Pence

Notes and Guidance

Children convert between pounds and pence using the knowledge that £1 is 100 pence.
They group 100 pennies into pounds when counting money.
They apply their place value knowledge and use their number bonds to 100

Mathematical Talk

How many pennies are there in £1?

How can this fact help us to convert between pounds and pence?

How could you convert 600p into pounds?
How could you convert 620p into pounds?

Varied Fluency

R

- What is the total of the coins shown?

Can you group any of the coins to make 100 pence?
How many whole pounds do you have?
How many pence are left over?
So there is £____ and ____ p.

- Write the amounts in pounds and pence.

- Write each amount in pounds and pence.

165p 234p 199p 112p 516p

Convert Pounds and Pence

Reasoning and Problem Solving

Dexter has 202 pence.

He has **one** pound coin.

Show five possible combinations of other coins he may have.

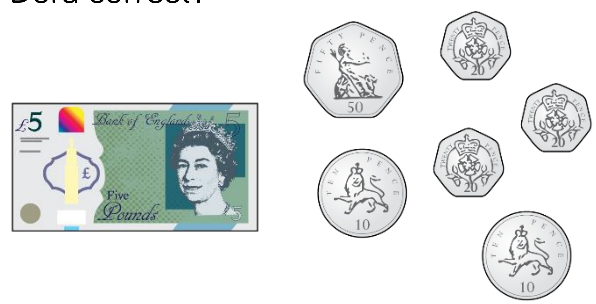
Children may work systematically and look at combinations of coins that make £1 to help them.

Whitney thinks that she has £10 and 3p.
Is she correct?

Explain your answer.

Whitney is wrong, she has £12 and 1p. Whitney has not considered the value of the coins she has.

Dora thinks there is more than £5 but less than £6
Is Dora correct?



Convince me.

Dora is incorrect. There is £6 and 30p.

This is greater than £6

Add Money

Notes and Guidance

Children add two amounts of money using pictorial representations to support them.

They are encouraged to add the pounds first and then add the pence. Children then exchange the pence for pounds to complete their calculations.

Mathematical Talk

Can you group any of the coins to make a pound?

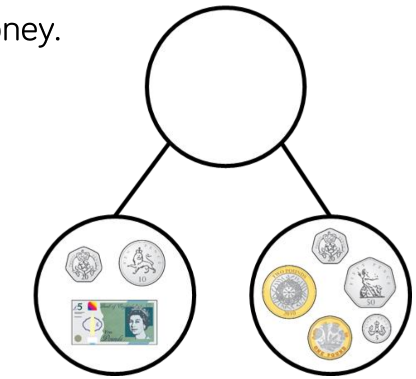
Can you use estimation to support your calculation?

Why is adding 99p the same as adding £1 and taking away 1p?

Varied Fluency

R

- Mo uses a part-whole model to add money.

  £____ and ____ p + £____ and ____ p
  There is £____ and 105p.
  105p= £_____ and _____p
  Altogether there is £_____ and ____p.

  Use Mo's method to find the total of:

  £10 and 35p and £4 and 25p   £10 and 65p and £9 and 45p

- What calculation does the bar model show?
  Find the total amount of money.

- A book costs £5 and 99p.
  A magazine costs £1 and 75p.
  How much do the book and magazine cost altogether?

White Rose Maths

Add Money

Reasoning and Problem Solving

R

Dora bought these muffins.

Muffins cost 35p each.
How much did Dora spend?

Tommy bought three times as many muffins as Dora.
How many muffins did Tommy buy?
How much money did Tommy spend on muffins?

How much more money did Tommy spend than Dora?

Dora spent 105p or £1 and 5p.

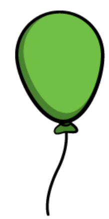
Tommy bought 9 muffins.
He spent 315p or £3 and 15p.

Tommy spent 210p or £2 and 10p more than Dora.

Rosie has £5
Has she got enough money to buy a car and two apples?

£3 and 35p

£2 and 55p



85p

75p

What combinations of items could Rosie buy with £5?

£3 and 35p + 85p + 85p = £5 and 5p

She does not have enough money.

Rosie could buy

1 car and 2 balloons
1 car, 1 apple and 1 balloon
1 magazine and 2 apples

Subtract Money

Notes and Guidance

Children use different methods to subtract money.
They will see examples where they can physically remove the coins, and examples where they will need to use their knowledge of converting money to exchange £1 for 100 pence.
Children also use number lines to count on or back to calculate the difference between two amounts.

Mathematical Talk

Can we make 50p in a different way to make it easier to subtract 10p physically?
Which number should I place on the number line first?
Could I count backwards on the number line?
Does this change the difference?
Do we need to exchange any pounds for pence?

Varied Fluency

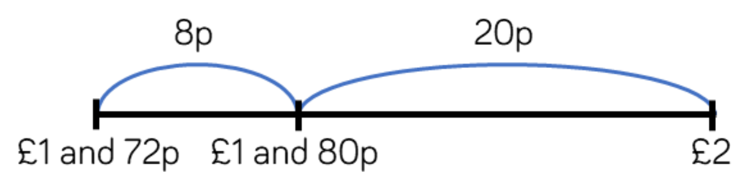
R

- Alex has £3 and 50p.
  She gives £2 and 10p to her sister.
  How much money does she have left?

£3 – £2 = £____   50p – 10p = ____ p

Alex has £____ and ____ p remaining.

- Tommy has £1 and 72p. Rosie has £2
  How much more money does Rosie have than Tommy?



Rosie has ____ p more than Tommy.

- A T-shirt costs £7 and 20p.
  In a sale, the T-shirt costs £5 and 40p.

  How much has the cost of the T-shirt been reduced by?

Subtract Money

Reasoning and Problem Solving

R

Jack has £2 and 90p.
Teddy has three times as much money as Jack.

How much more money does Teddy have than Jack?

Rosie has twice as much money as Teddy.

How much more money does Rosie have than Jack?

Jack: £2 & 90p
Teddy: £8 & 70p
Rosie: £17 & 40p

Teddy has £5 and 80p more than Jack.

Rosie has £14 and 50p more than Jack.

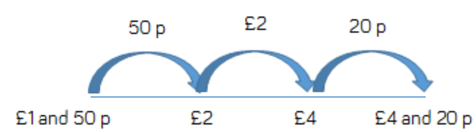
Use coins to support children in calculating.

Three children are calculating £4 and 20p subtract £1 and 50p.

£4 – £1 = £2
20p – 50p = 30p
£1 + 30p = £1 and 30p

Annie

Teddy



The difference is £2 and 70p.

£4 and 20p – £2 = £2 and 20p
£2 and 20p + 50p = £2 and 70p

Eva

Who is correct? Who is incorrect?
Which method do you prefer?

Annie's second step of calculation is incorrect.
Teddy and Eva both got the correct answer using different methods. Children may choose which method they prefer or discuss pros and cons of each.

Give Change

Notes and Guidance

Children use a number line and a part-whole model to subtract to find change.
Teachers use coins to practically model giving change.
Encourage role-play to give children a context of giving and receiving change.

Mathematical Talk

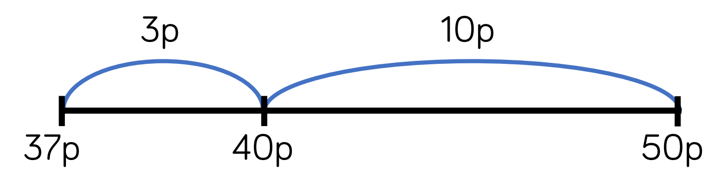
What do we mean by 'change' in the context of money?

Which method do you find most effective?

How does the part-whole model help to solve the problem?

Varied Fluency

Mo buys a chocolate bar for 37p. He pays with a 50p coin. How much change will he receive?

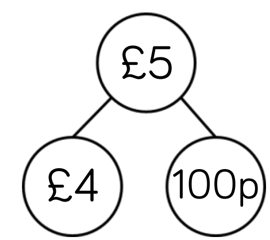


Mo will receive ____ p change.

Use a number line to solve the problems.

- Ron has £1. He buys a lollipop for 55p. How much change will he receive?
- Whitney has £5. She spends £3 and 60p. How much change will she receive?

Tommy buys a comic for £3 and 25p.
He pays with a £5 note.
How much change will he receive?
Use the part-whole model to help you.



Use a part-whole model to solve the problem.

- Eva buys a train for £6 and 55p. She pays with a £10 note. How much change will she receive?

Give Change

Reasoning and Problem Solving

R

Dora spends £7 and 76p on a birthday cake.

She pays with a £10 note.
How much change does she get?

The shopkeeper gives her six coins for her change.
What coins could they be?

She receives £2 and 24p change.

There are various answers for which coins it could be, e.g. £1, £1, 10p, 10p, 2p, 2p.

Amir has £4
He buys a pencil for £1 and 20p and a book for £1 and 45p.

Which bar model represents the question?
Explain how you know.

£4

£1 and 20p	£1 and 45p	?

?

£4	£1 and 20p	£1 and 45p

Use the correct bar model to help you calculate how much change Amir receives.

The first bar model is correct as the whole is £4 and we are calculating a part as Amir has spent money.
Amir receives £1 and 35p change.

Four Operations

Notes and Guidance

Children solve simple problems with money, involving all four operations. Children are not expected to formally add with decimals in Year 4 but could explore other methods, such as partitioning and recombining to add money. They could use prior knowledge of converting, as well as number bonds, to help them.
Bar modelling could also be used as a strategy when solving problems.

Mathematical Talk

How can we label the bar model?

What other questions could we ask?

What operation will we use?

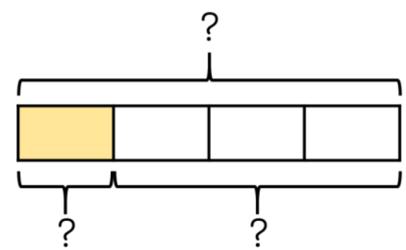
How can we partition pounds and pence to help add two amounts?

Is there an alternative way to answer this question?

Varied Fluency

Ron has £48. He spends one quarter of his money.

How much does he have left?
Use the bar model to help.



A family is going bowling.
How much does it cost for 1 child and 1 adult at peak time?
How much does it cost for 1 adult and 2 children off peak?

Tickets	Peak	Off Peak
Adult	£8	£6
Child	£4.20	£5.30

Amir buys some clothes in a half price sale.
- Jumper £14
- Scarf £7
- Hat £2.50
- T-shirt £6.50

What would the full price of each item be?
How much would he have paid altogether if they were full price?
How much does he pay in the sale?
How much does he save?

Four Operations

Reasoning and Problem Solving

A class has £100 to spend on books. **Book Prices** Hardback = £8 Paperback = £4 How many books could they buy for £100? How many different ways can this be done?	Children may explore this systematically e.g. $8 \times 12 = 96$ (12 hardbacks) $4 \times 1 = 4$ (1 paperback) etc. Or they may start with paperback $4 \times 25 = 100$ (25 paperbacks) etc.
Dexter buys a teddy bear for £6.00, a board game for £4.00, a CD for £5.50 and a box of chocolates for £2.50 He has some discount vouchers. He can either get £10.00 off or pay half price for his items. Which voucher would save him more? Explain your thinking.	Total = £18 $18 - 10 = 8$ $\frac{1}{2}$ of $18 = 9$ $18 - 9 = 9$ The £10 voucher would save more.

Here is Dora's receipt.

Receipt	
Sandwich	
Orange juice	
Crisps	60 p
Banana	
TOTAL	

Use the information to complete the receipt:

- The sandwich costs £2.15 more than the crisps.
- The orange juice is the same price as the crisps and banana together.
- The banana is half the price of the crisps.

Receipt	
Sandwich	£2.75
Orange juice	90 p
Crisps	60 p
Banana	30 p
TOTAL	£4.55

White Rose Maths

Summer - Block 3

Time

Overview

Small Steps

- Telling the time to 5 minutes R
- Telling the time to the minute R
- Using a.m. and p.m. R
- 24-hour clock R
- Hours, minutes and seconds
- Years, months, weeks and days
- Analogue to digital – 12 hour
- Analogue to digital – 24 hour

Notes for 2020/21

Children should first recap telling the time to different degrees of accuracy from year 3 before moving on to new learning focused around converting between different units of time.

Telling the Time (1)

Notes and Guidance

Children tell the time to the nearest 5 minutes on an analogue clock. They focus on the language of "past" and "to", and will recognise and use Roman numerals on a clock face.

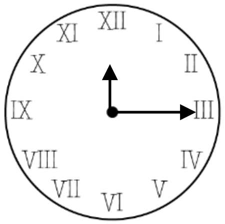
Attention should be drawn to the differences between the minute hand and the hour hand. This is especially important for times that are close to the next hour, for example, 5 minutes to 12

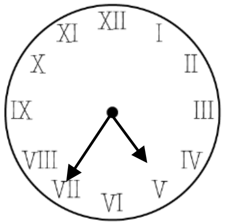
Mathematical Talk

Which of the hands is the minute hand and which is the hour hand?
Is the minute hand past or to the hour?
How many minutes past/to the hour is the minute hand?
If the minute hand is pointing at the 6, how many minutes have passed in this hour?
What do you notice about the clocks?
Which Roman numeral represents the number ____?
Do we ever say "45 minutes to" the hour?

Varied Fluency

- Give each child a clock with moveable hands.
Children represent different times to the nearest 5 minutes on their own clock.
Discuss whether the minute hand is past or to the hour in different times.

- 

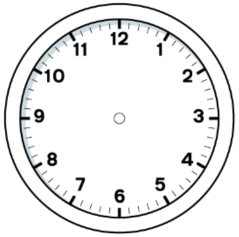


What time is shown on each clock?

_____ minutes past _____ _____ minutes to _____

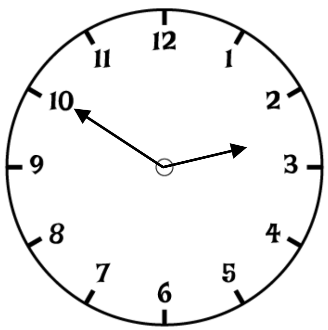
- Draw the hands on the clock to show the time:

25 minutes to 6



Telling the Time (1)

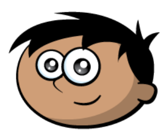
Reasoning and Problem Solving



The clock shows ten minutes to 3

Dora

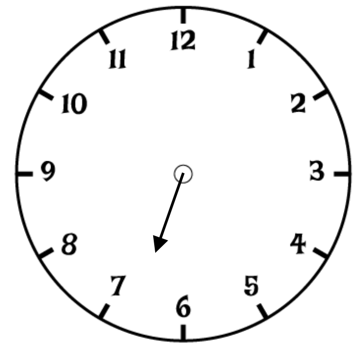
The hour hand is not quite pointing to the 3, so it must be ten to 2



Amir

Who do you agree with?
Explain your thinking.

Dora is correct because it is not 3 o'clock yet, the hour hand will not be exactly on the 3



This clock has lost its minute hand.

What time could it be?
Justify your answer.

The time is around half past six. Children may suggest it could be between twenty five to and quarter to seven.

Telling the Time (2)

Notes and Guidance

Children tell time to the nearest minute using an analogue clock. They use the terms ‘past’ and ‘to’.

When telling time ‘to’ the next hour, children may need to count on to find how many minutes are left in the hour.

Mathematical Talk

Which hand is the minute hand? Which hand is the hour hand?

How many minutes is it past the hour?

How many minutes is it to the next hour?

When are the minutes to an hour and the minutes past an hour the same?

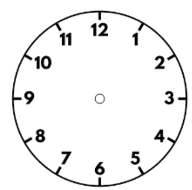
If the hour hand is between ____ and ____, which hour is the time referring to?

Varied Fluency

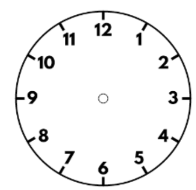
R

- Show children various times to the nearest minute for them to read.
  Give each child a clock with moveable hands.
  Children represent different times to the nearest minute on their own clock.
  Discuss whether the minute hand is past or to the hour in different times.

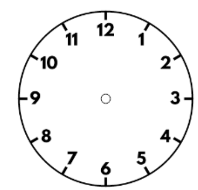
- Draw the hands on the clock from the following times.



Four minutes to 4



24 minutes to 8



24 minutes past 8

- Dora is telling the time from an analogue clock.

The hour hand is pointing to XI
the minute hand is pointing to XII

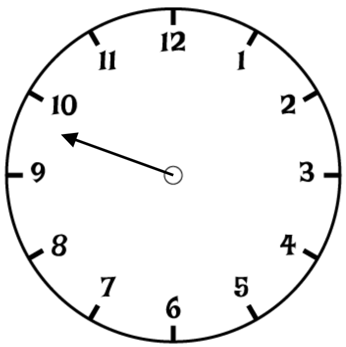
What time is it?

Telling the Time (2)

Reasoning and Problem Solving

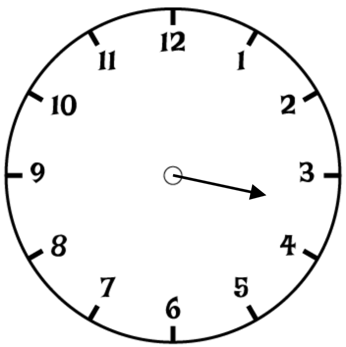
R

This clock has lost its hour hand.
What time could it be?



The minute hand is at about 12 minutes to the hour. The time could be 12 minutes to any hour.

This clock has lost its minute hand.
What time could it be?



The hour hand is past the 3 and has not yet reached the 4
The hand is closer to the three and therefore the children should recognise that the time has not passed half past 3
You could accept any answers between quarter past to half past 3

Using a.m. and p.m.

Notes and Guidance

Children use 'morning', 'afternoon', 'a.m.' and 'p.m.' to describe the time of day.

Children continue using analogue clocks and will be introduced to digital time for the first time.

Mathematical Talk

What time of the day does ____ happen?
Is _____ earlier or later than _______?
How do you know whether a time is in the morning or afternoon?
What times could be a.m.?
What times could be p.m.?
What is the difference between analogue and digital?
What would the time look like on an analogue clock?
How can we change analogue to digital?

Varied Fluency

R

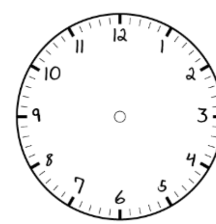
Using a visual timetable, sort the events into morning and afternoon.
Create sentences to describe when events take place.
For example: Maths is in the morning. Guided Reading is in the afternoon.

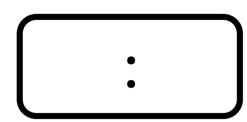
Sort the times from latest to earliest.

5:30 p.m.	9:45 a.m.	9:45 p.m.	10:23 a.m.
7:31 a.m.	10:13 p.m.	8:30 a.m.	6:32 a.m.
12:24 a.m.	8:55 p.m.	2:11 a.m.	7:40 a.m.

Show the times on both analogue and digital clocks.

- Guided reading at 10:00 a.m.
- Home time at 3:30 p.m.
- Lunchtime at 12:00 p.m.





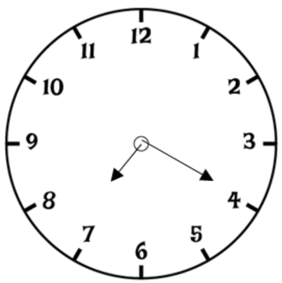
Using a.m. and p.m.

Reasoning and Problem Solving

The board shows the times of trains arriving and leaving the train station.

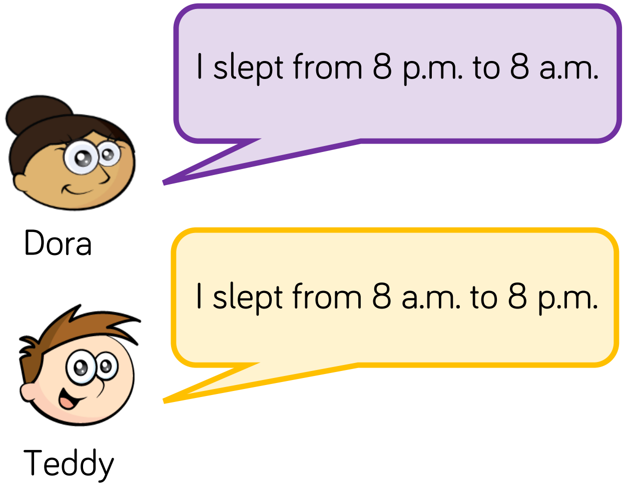
	Arrives	Leaves
London	5:50 a.m.	6:00 a.m.
Edinburgh	8:00 a.m.	8:20 a.m.
Manchester	2:33 p.m.	2:45 p.m.
Leeds	7:31 p.m.	7:35 p.m.

Ron's watch shows the time he arrives at the station.



Which train could he be catching?
Explain how you know.

Ron could be catching the train to Edinburgh or Leeds.
Children should explain that analogue clocks give no indication to a.m. or p.m. and since it is 20 past 7, Ron could be catching the 8:20 a.m. train or the 7:35 p.m. train.



Who is more likely to be correct?
Explain how you know.

Dora is more likely to be correct, because if she sleeps 8 p.m. to 8 a.m., she would be sleeping through the night, and wake up in the morning.
Teddy is likely to be incorrect, because he would be sleeping all day and waking up at 8 p.m. (in the evening)

24-hour Clock

Notes and Guidance

Children are introduced to telling the time on a 24-hour digital clock for the first time.

Children spend time looking at analogue and digital clocks at various times throughout the day, in order to compare what is the same and what is different.

Mathematical Talk

Using the 12-hour clock, is the time an a.m. or a p.m. time?

What will the number representing the hour be in 24-hour clock time? How do you know if it will be less than 12 or more than 12?

What will the minutes be in 24-hour time? Where can you count from? When does the number of minutes become 0 again on a 24-hour clock display?

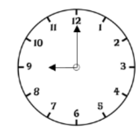
Varied Fluency

R

- Create a diary using pictures to show your day from waking up to going to bed. Label these events using both 12-hour clock and 24-hour clock times.

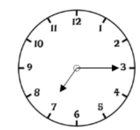
- Match the times to the clocks showing the same time.

9 o'clock in the morning



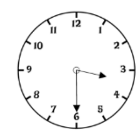
19 : 15

Half past 3 in the afternoon



09 : 00

Quarter past 7 in the evening



15 : 30

- Complete the times.

13 : 45	Quarter to two in the ____________	__ : 45	Quarter past three in the afternoon
11 : 20	Twenty past eleven in the ________	17 : __	Twenty-five to six in the evening
15 : 50	Ten to four in the ____________	__ : __	Twenty to 9 in the morning

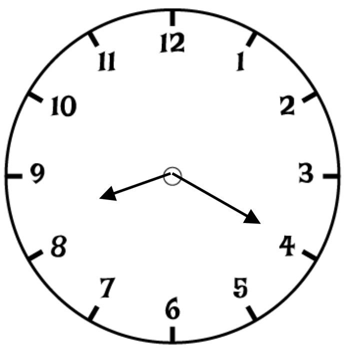
24-hour Clock

Reasoning and Problem Solving

Eva says the clocks are showing the same time of day.

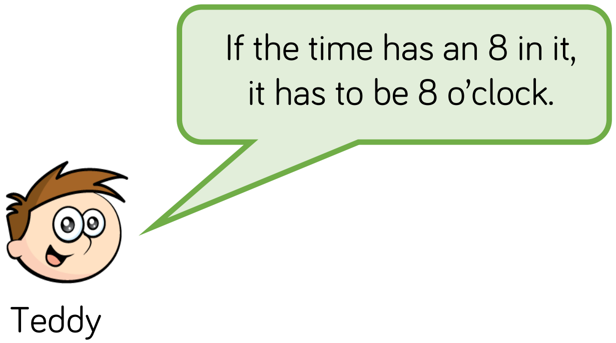
Is she correct?
Explain how you know.

8:20



Eva could be correct. The clocks are both showing twenty past 8. However, children should recognise that the analogue clock does not show whether the time is a.m. or p.m., so this could be showing 8.20 a.m. or 8.20 p.m.

Is Teddy correct?
Prove it.



Teddy is not correct.
Children should give examples to show this is incorrect. For example: 18:00, 8:30, 10:38 etc.

Hours, Minutes & Seconds

Notes and Guidance

Children recap the number of minutes in an hour and seconds in a minute from Year 3

They use this knowledge, along with their knowledge of multiplication and division to convert between different units of time.

Mathematical Talk

What activity might last one hour/minute/second?
How many minutes are there in an hour?
How can we use a clock face to check? How could we count the minutes?
How many seconds are there in one minute? What could we use to check?
How many minutes in _____ hours? How many seconds in ____ minutes?

Varied Fluency

Sort the activities under the headings depending on the approximate length of time they take to complete.

One hour	One minute	One second
Clap	Run around the playground	Blink
Swimming lesson	PE lesson	Tie your shoe laces

One hour = ____ minutes
Two hours = ____ minutes
Half an hour = ____ minutes

One minute = ____ seconds.
Three minutes = ____ seconds.
____ minutes = 240 seconds

Josh reads a chapter of his book in 5 minutes and 28 seconds.
Tom reads a chapter of his book in 300 seconds.
Who reads their chapter the quickest?

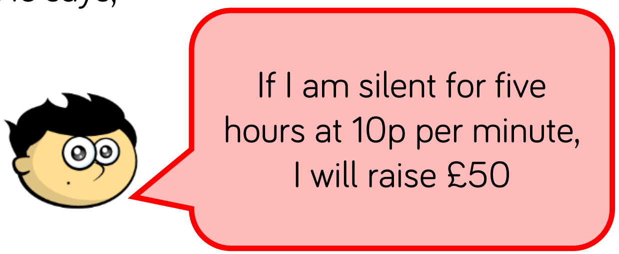
White Rose Maths

Hours, Minutes & Seconds

Reasoning and Problem Solving

Jack takes part in a sponsored silence.

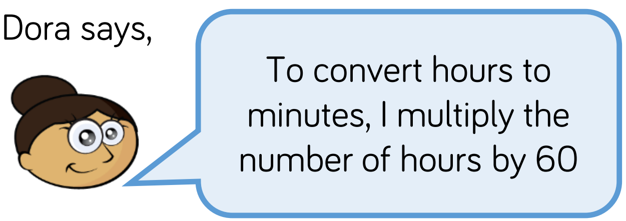
He says,



Do you agree with Jack?
Explain why you agree or disagree.

Jack is incorrect. There are 60 minutes in an hour so
60 × 10p = 600p or £6
£6 × 5 = £30

Dora says,



Is she correct? Can you explain why?

Dora is correct. For example
1 hour = 60 minutes
1 × 60 = 60
2 hours = 120 minutes
2 × 60 = 120

Five friends run a race.
Their times are shown in the table.

Name	Time
Eva	114 seconds
Dexter	199 seconds
Teddy	100 seconds
Whitney	202 seconds
Ron	119 seconds

Which child finished the race the closest to two minutes?

What was the difference between the fastest time and the slowest time?
Give your answer in minutes and seconds.

Ron was the closest to two minutes, as he is one second quicker than 2 minutes (120 seconds).

Fastest time 100 seconds, slowest time 202 seconds.

The difference between the fastest and slowest time is 1 minute and 42 seconds.

Years, Months, Weeks & Days

Notes and Guidance

Children recap the concept of a year, month, week and day from Year 3

They use this knowledge, along with their knowledge of addition, subtraction, multiplication and division to convert between the different units of time.

Mathematical Talk

How many days are there in a week? How many days are there in each month?
How many weeks in a year?
How many days are there in _____ weeks? What calculation do we need to do to convert days to weeks/weeks to days?
How many months/weeks/days are there in ______years?

Varied Fluency

- Use a calendar to help you complete the sentences.

  There are ____ months in a year.

  There are ____ days in February.

  ____ months have 30 days, and ____ months have 31 days.

  There are ____ days in a year and ____ days in a leap year.

- Complete the table.

Number of days	Number of weeks
	5
49	
	12

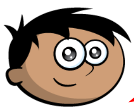
- Sally is 7 years and 2 months old.
  Macey is 85 months old.
  Who is the oldest?
  Explain your answer.

Years, Months, Weeks & Days

Reasoning and Problem Solving

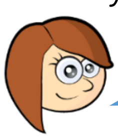
Amir, Rosie and Jack describe when their birthdays are.

Amir says,



My birthday is in exactly two weeks.

Rosie says,



My birthday is in exactly 2 months.

Jack says,

My birthday is in 35 days.

Use the clues to work out when their birthdays are if today is the 8th June.

Amir – 2 weeks is equal to 14 days so his birthday is 22nd June.

Rosie – 8th August

Jack – there are another 22 days left in June plus 13 in July, so his birthday is 13th July.

Always, sometimes, never?

There are 730 days in two years.

Sometimes – if both of the years are not leap years this is true. If one is a leap year then there will be 731 days in the 2 years.

True or false?

- 3 days > 72 hours.
- $2\frac{1}{2}$ years = 29 months
- 11 weeks 4 days < 10 weeks 14 days

False – 3 days is equal to 72 hours

False - $2\frac{1}{2}$ years is greater than 29 months

True

Analogue to Digital – 12 hour

Notes and Guidance

Children convert between analogue and digital times using a format up to 12 hours. They use a.m. and p.m. to distinguish between times in the morning and afternoon.
They understand that how many minutes past the hour determines the digital time.
It is important for children to recognise that digital time need to be written in 4-digit format. For example, 09:30 a.m. not 9:30

Mathematical Talk

What time is the analogue clock showing?
How many minutes is it past the hour? How can you count the minutes efficiently?
How do we record each time in digital format?
What does a.m./p.m. mean?
Can you order the activities starting with the earliest?
What would the time look like on Alfie's digital watch when he left home?

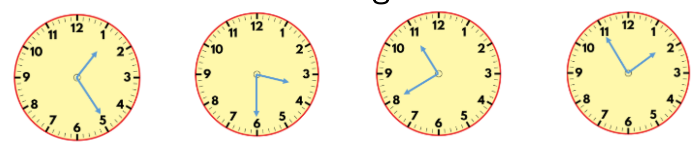
Varied Fluency

The time is _______ past 10

This can also be written as ____ minutes past 10

The digital time is ____ : ____

Write each of these times in the digital format.



Record the time of each activity in digital format.

Netball	 p.m.	
Football	 a.m.	
Rock climbing	 p.m.	
Roller disco	 a.m.	

Alfie looks at his digital watch and sees this time. What could he be doing at this time?

01:00 p.m.

Analogue to Digital – 12 hour

Reasoning and Problem Solving

Annie converts the analogue time to digital format.
Here is her answer.

22 : 02

Explain what Annie has done wrong.
What should the digital time be?

Annie has recorded the minutes past the hour first instead of the hour.
The time should be 02 : 22

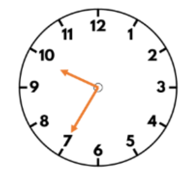
12 : 21

On a 12 hour digital clock, how many times will the time be read the same forwards and backwards?

Children can work systematically to work this out. For example, 12:21, 01:10, 02:20, 03:30 etc.

Jack arrives at the train station at the time shown in the morning.

Which trains could he catch?



Destination	Departs
York	07 : 10 a.m.
New Pudsey	09 : 25 a.m.
Bramley	09 : 42 a.m.
Leeds	10 : 03 a.m.

How long will Jack have to wait for each train?

Jack could catch the train to Bramley or Leeds.

He would have to wait 7 minutes to go to Bramley and 28 minutes to go to Leeds.

Analogue to Digital – 24 hour

Notes and Guidance

Children now move on to convert between analogue and digital times using a 24 hour clock

They use 12 and 24 hour digital clocks, and a number line, to explore what happens after midday.

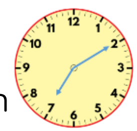
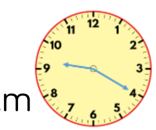
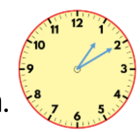
Mathematical Talk

What do you notice about the time 1 o'clock in the afternoon on a 24 hour digital clock?
How will the time be shown for 3 o'clock in the morning/afternoon? How do you know?
What time is the analogue clock showing?
Why is it important to know if it is a.m. or p.m.?
What time does she leave school on a 24 digital clock?

Varied Fluency

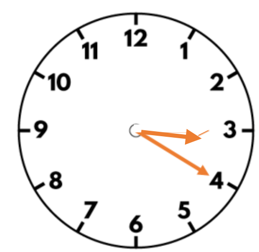
- Explore an interactive 12 and 24 hour digital clock with the children. Compare what happens when the time reaches 1 o'clock in the afternoon. Move the 24 hour clock on to 2 o'clock.
  Plot the times above a 0-24 number line.
  What do you notice?
  Record these times using 24 hour digital format.
  4 pm 8 pm 11 pm

- Match the analogue and digital times.

a.m  p.m  p.m.  a.m. 

13 : 10	07 : 10	00 : 45	21 : 20

- Sally leaves school at the time shown.
  She arrives home 1 hour later.
  What will the time be on a 24 hour digital clock?

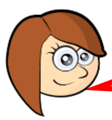


Analogue to Digital – 24 hour

Reasoning and Problem Solving

Three children are meeting in the park.

Rosie says,

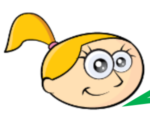


We are meeting at 14:10.

Teddy says,

We are meeting at 02:10 p.m.

Eva says,



We are meeting at ten to two.

Will all the children meet at the same time?
Explain your answer.

Annie has recorded the minutes past the hour first instead of the hour.
The time should be 02 : 22 a.m.

Children can work systematically to work this out. For example, 12:21, 01:10, 02:20, 03:30 etc.

Jack says,

To change any time after midday from 12 hours to 24 hours digital time just add 12 to the hours

Will this always be true? Are there any examples where this isn't the case?

Sometimes true

You need to add 12 to the hour, but not if it is 12 in the hours e.g. 12:04 p.m.

Can you match the time dominoes together so that the touching times are the same?

20:55 / Ten to two	13:50 / Five to ten	09:55 / Ten to three
15:05 / Ten past 4	02:50 / Five past 3	16:10 / Five to nine

Can you create your own version for your partner?

Children may find more than one way to solve this.

White Rose Maths

Summer - Block 4

Statistics

Overview

Small Steps

- Interpret charts
- Comparison, sum and difference
- Introducing line graphs
- Line graphs

Notes for 2020/21

Less time is allowed for this block than there has been in previous years to ensure more time can be spent on number. Science is a good opportunity to consolidate statistics if needed.

Interpret Charts

Notes and Guidance

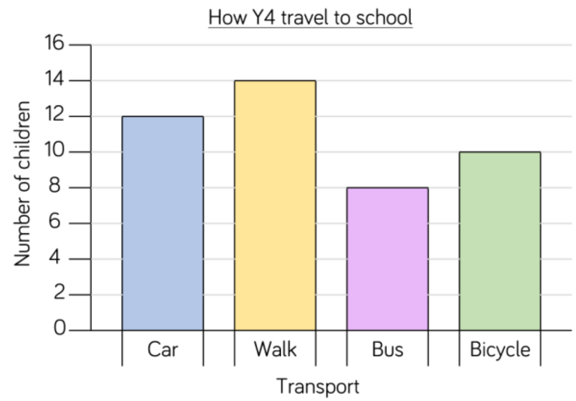
Children revisit how to use bar charts, pictograms and tables to interpret and present discrete data.
They decide which scale will be the most appropriate when drawing their own bar charts.
Children gather their own data using tally charts and then present the information in a bar chart. Questions about the data they have gathered should also be explored so the focus is on interpreting rather than drawing.

Mathematical Talk

What are the different ways to present data?
What do you notice about the different axes?
What do you notice about the scale of the bar chart?
What other way could you present the data shown in the bar chart?
What else does the data tell us?
What is the same and what is different about the way in which the data is presented?
What scale will you use for your own bar chart? Why?

Varied Fluency

- Complete the table using the information in the bar chart.

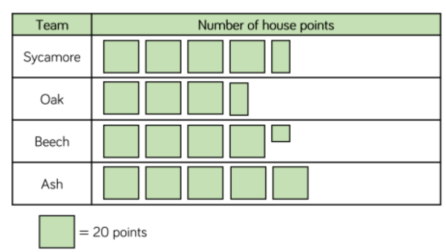


Transport	Number of children
Car	
Walk	
Bus	
Bicycle	

What is the most/least popular way to get to school?
How many children walk to school?

- Produce your own table, bar chart or pictogram showing how the children in your class travel to school.

- Represent the data in each table as a bar chart.



Day	Number of tickets sold
Monday	55
Tuesday	30
Wednesday	45
Thursday	75
Friday	85

Interpret Charts

Reasoning and Problem Solving

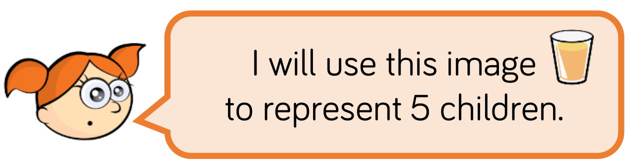
Halifax City Football Club sold the following number of season tickets:

- Male adults – 6,382
- Female adults – 5,850
- Boys – 3,209
- Girls – 5,057

Would you use a bar chart, table or pictogram to represent this data? Explain why.

Possible answer:
I would represent the data in a table because it would be difficult to show the exact numbers accurately in a pictogram or bar chart.

Alex wants to use a pictogram to represent the favourite drinks of everyone in her class.



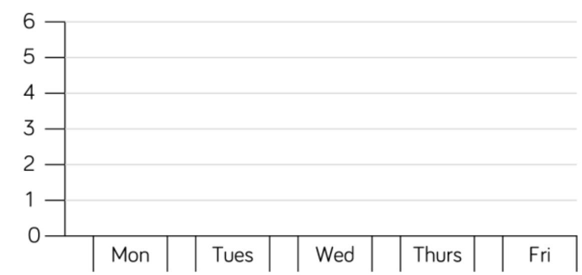
Explain why this is not a good idea.

It is not a good idea, because it would be difficult to show amounts which are not multiples of 5

Here is some information about the number of tickets sold for a concert.

Day	Number of tickets sold
Monday	55
Tuesday	30
Wednesday	45
Thursday	75
Friday	85

Jack starts to create a bar chart to represent the number of concert tickets sold during the week.



What advice would you give Jack about the scale he has chosen?
What would be a better scale to use?
Is there anything else missing from the bar chart?

Possible response:
I would tell Jack to use a different scale for his bar chart because the numbers in the table are quite large.
The scale could go up in 5s because the numbers are all multiples of 5
Jack needs to record the title and he needs to label the axes.

Comparison, Sum & Difference

Notes and Guidance

Children solve comparison, sum and difference problems using discrete data with a range of scales.
They use addition and subtraction to answer questions accurately and ask their own questions about the data in pictograms, bar charts and tables.
Although examples of data are given, children should have the opportunity to ask and answer questions relating to data they have collected themselves.

Mathematical Talk

What does a full circle represent in the pictogram?

What does a half/quarter/three quarters of the circle represent?

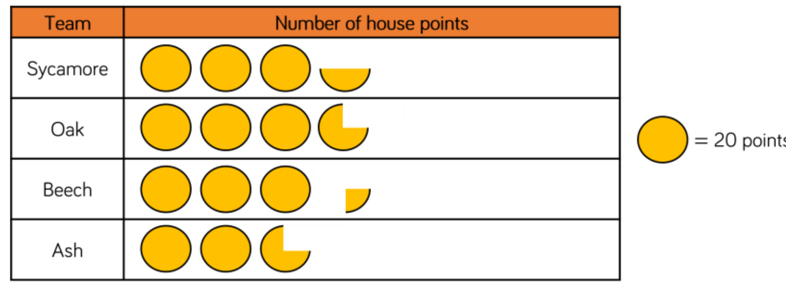
What other questions could we ask about the pictogram?

What other questions could we ask about the table?

What data could we collect as a class?

What questions could we ask about the data?

Varied Fluency



How many more points does the Sycamore team have than the Ash team?
How many points do Beech and Oak teams have altogether?
How many more points do Ash need to be equal to Oak?

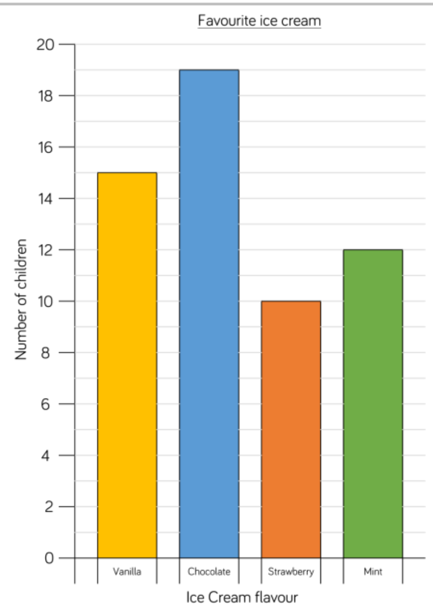
Activity	Number of votes
Bowling	9
Cinema	10
Swimming	7
Ice-skating	14

How many people voted in total?
$\frac{1}{4}$ of the votes were for ________.
7 more people voted for ________ than ________.

As a class, decide on some data that you would like to collect, for example: favourite books, films, food.
Collect and record the data in a table.
Choose a pictogram or a bar chart to represent your data, giving reasons for your choices.
What questions can you ask about the data?

Comparison, Sum & Difference

Reasoning and Problem Solving



Rosie says,

We asked 54 people altogether.

Can you spot Rosie's mistake?
How many people were asked altogether?

Rosie has read the bar chart incorrectly.
15 people chose vanilla, 19 people chose chocolate, 10 chose strawberry and 12 chose mint.
That means 56 people were asked altogether.

Attraction	Number of visitors on Saturday	Number of visitors on Sunday
Animal World Zoo	1,282	2,564
Maltings Castle	2,045	1,820
Primrose Park	1,952	1,325
Film Land Cinema	2,054	1,595

True or false?

- The same number of people visited Maltings Castle as Film Land Cinema on Saturday.
- Double the number of people visited Animal World Zoo on Sunday than Saturday.
- The least popular attraction of the weekend was Primrose Park.

- False
  The Film Land Cinema had 9 more visitors that Maltings Castle
- True
  1,282 doubled is 2,564
- True
  Animal World Zoo - 3,846
  Maltings Castle - 3,865
  Primrose Park - 3,277
  Film Land Cinema - 3,649

Introducing Line Graphs

Notes and Guidance

Children are introduced to line graphs in the context of time. They use their knowledge of scales to read a time graph accurately and create their own graphs to represent continuous data.
It is important that children understand that continuous data can be measured (for example time, temperature and height) but as values are changing all the time, the values we read off between actual measurements are only estimates.

Mathematical Talk

How is the line graph different to a bar chart?

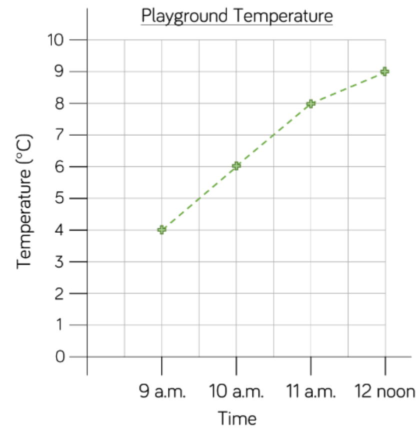
Which is the x and y axis? What do they represent?

How would you estimate the temperature at 9:30 a.m.?

How would you estimate the time it was when the temperature was 7 degrees?

Varied Fluency

The graph shows the temperature in the playground during a morning in April.



The temperature at 9 a.m. is _______ degrees.

The warmest time of the morning is _________.

Class 4 grew a plant. They measured the height of the plant every week for 6 weeks.
The table shows the height of the plant each week.

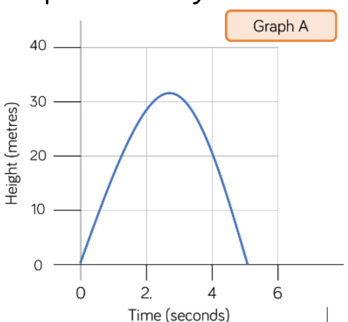
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
4 cm	7 cm	9 cm	12 cm	14 cm	17 cm

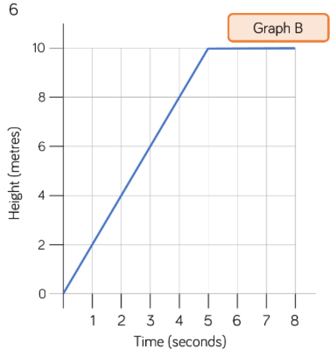
Create a line graph to represent this information.
What scale would you use on the x and y axes?
Between which two weeks did the plant reach a height of 10 cm?

Introducing Line Graphs

Reasoning and Problem Solving

Jack launched a toy rocket into the sky. After 5 seconds the rocket fell to the ground.
Which graph shows this?
Explain how you know.



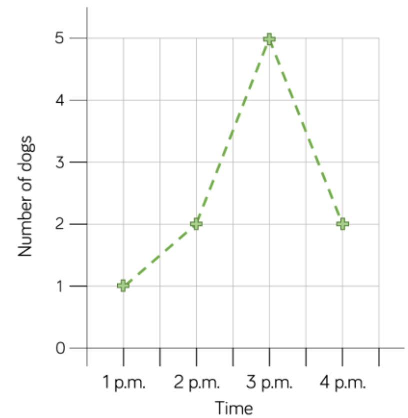


Make up your own story for the other graph.

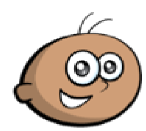
Graph A
The height of the rocket increases then decreases quickly again, returning to a height of 0 at 5 seconds.

Example story:
A bird flew up from the ground. It continued to fly upwards for 5 seconds then flew at the same height for another 3 seconds.

Tommy created a line graph to show the number of dogs walking in the park one afternoon.



Tommy says,



At half past one there are 1.5 dogs in the park.

Why is Tommy incorrect?

What would be a better way of presenting this data?

Tommy is incorrect because you cannot have 1.5 dogs.

A better way of presenting this data would be using a bar chart, pictogram or table because the data is discrete.

Line Graphs

Notes and Guidance

Building from the last step, children continue to solve comparison, sum and difference problems using continuous data with a range of scales.
They use addition and subtraction to answer questions accurately and ask their own questions about the data in line graphs. Although examples of data are given, children need to have the opportunity to ask and answer questions relating to data they have collected themselves.

Mathematical Talk

Is this discrete or continuous data? How do you know?

What do you notice about the scale of the graph?

How could you make sure you read the graph accurately?

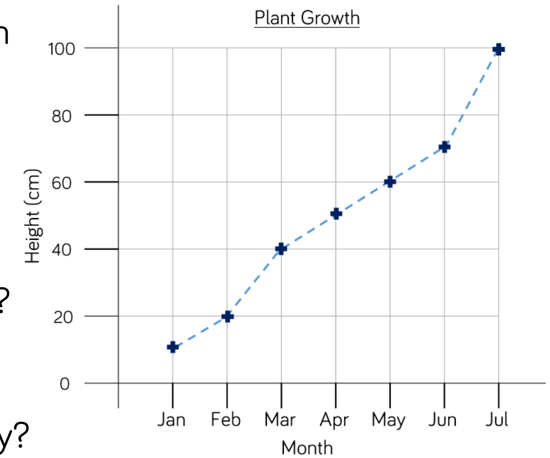
What other questions could you ask about the graph?

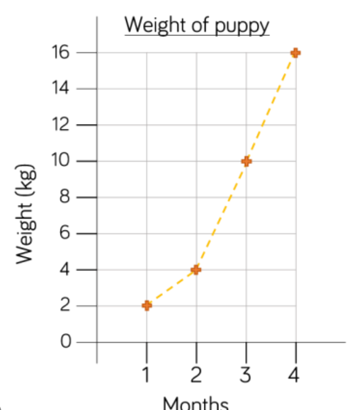
How many different ways can you fill in the stem sentences?

Varied Fluency

The graph shows the growth of a plant over 6 months.

- How tall was the plant when it was measured in May?
- In what month did the plant first reach 50 cm?
- How many centimetres did the plant grow between March and July?
- What was the difference between the height of the plant in February and the height of the plant in April?



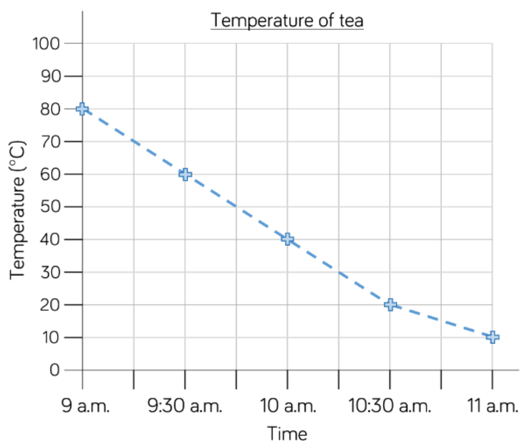


The graph shows the weight of a puppy as it grows.
When the puppy is ____ months old the weight is ____kg
Between month ____ and month ____ the puppy increased by ____ kg

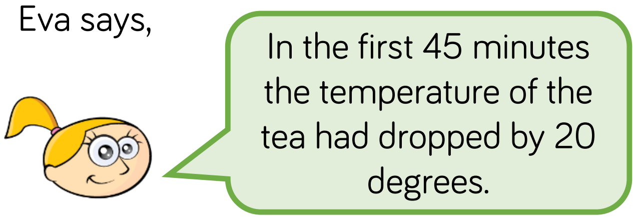
Line Graphs

Reasoning and Problem Solving

Eva measured the temperature of a cup of tea every 30 minutes for 2 hours. The graph shows Eva's results.



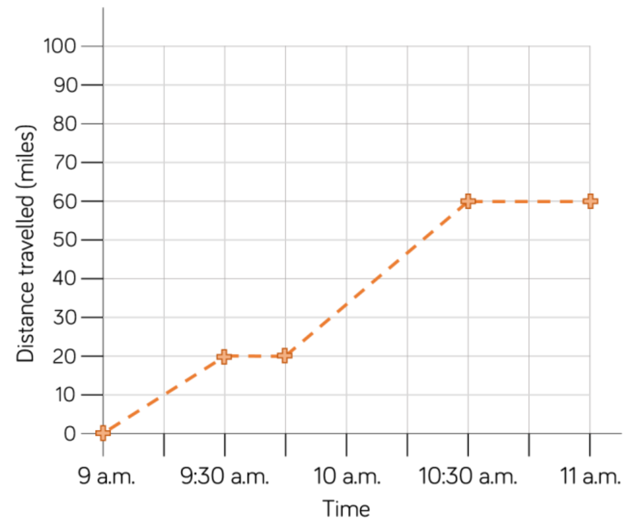
Eva says,



Do you agree with Eva?
Explain why.

I do not agree with Eva. At 9 a.m. the temperature was 80 degrees and at 9.45 a.m. the temperature was 50 degrees, so it had dropped 30 degrees not 20 degrees.

Write a story to match the graph.



Example story:
Mo drove 20 miles in his lorry. At half past 9 he had a 15 minute rest then drove for another 30 miles until he reached his destination at 10:30 a.m.

Summer - Block 5

Properties of Shape

Overview
Small Steps

Turns and angles	R
Right angles in shapes	R
Compare angles	R
Identify angles	
Compare and order angles	
Recognise and describe 2-D shapes	R
Triangles	
Quadrilaterals	
Horizontal and vertical	R
Lines of symmetry	
Complete a symmetric figure	

Notes for 2020/21

The new learning in this block requires students to be confident in the prerequisite steps from year 3

These are included here for recap as they are likely to have been taught remotely during the last academic year.

Turns and Angles

Notes and Guidance

Children recognise angles as a measure of a turn. They practice making $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$ and whole turns from different starting points in both clockwise and anti-clockwise directions in practical contexts. They should listen to/follow instructions and also give instructions using the correct mathematical language in different contexts. Children understand that an angle is created when 2 straight lines meet at a point.

Mathematical Talk

If we start by facing _______ and make a ______ turn, what direction will we be facing?

If we face _______ and turn to face ______, what turn have we made?

If we face north and make a quarter turn clockwise, which direction will we be facing? What if we turn anti-clockwise?

What would the time be if the minute hand started at 1, then made a quarter of a turn?

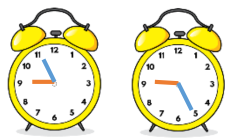
Can you see any angles around the classroom?

Varied Fluency

R

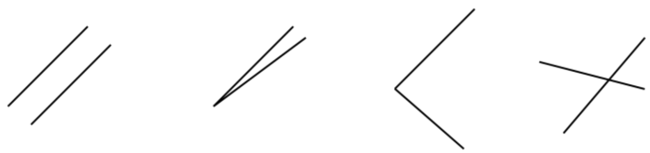
- Take children outside or into the hall where they can practice moving in turns themselves. Label 4 walls/points (for example: North, South, East, West).
  Give children instructions to encourage them to make $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$ and whole turns from different starting points. Allow children the opportunity to give instructions too.

- Look at the hands of the clock.
  Turn the minute hand one quarter of a turn clockwise.
  Where is the large hand pointing?
  What is the new time?



What turn has the minute hand made?

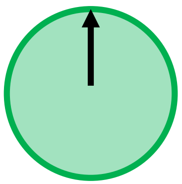
- Tick the images where you can see an angle.
  Explain your choices.



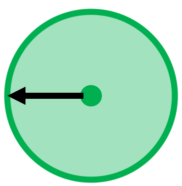
Turns and Angles

Reasoning and Problem Solving

The arrow on a spinner started in this position.



After making a turn it ended in this position.



Jack says,

The arrow has moved a quarter turn anti-clockwise.

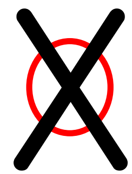
Alex says,

The arrow has moved a three-quarter turn clockwise.

Who do you agree with?

Both children are correct.

The letter 'X' has four angles.



Write your name in capital letters.
How many angles can you see in each letter?
How many angles are there in your full name?

Answers will vary depending on the children's names.

Right Angles in Shapes

Notes and Guidance

Children recognise that a right angle is a quarter turn, 2 right angles make a half-turn, 3 right angles make three-quarters of a turn and 4 right angles make a complete turn.

Children need to see examples in different orientations so that they understand that a right angle does not have to be made up of a horizontal and vertical line.

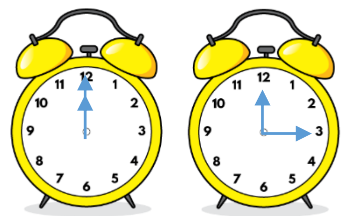
Mathematical Talk

How many right angles make a half turn/three-quarter turn/ full turn?
Where can you see a right angle in the classroom/ around school/ outside?
Which shapes contain right angles?
Can you think of a shape which doesn't have any right angles?
How many right angles does a _________ have?
Can you draw a shape with _____ right angles?
What headings would we place in our table?

Varied Fluency

R

- Give children a clock each so they can practice making turns. Start with the hands showing 12 o'clock, move the minute hand one quarter of a turn.

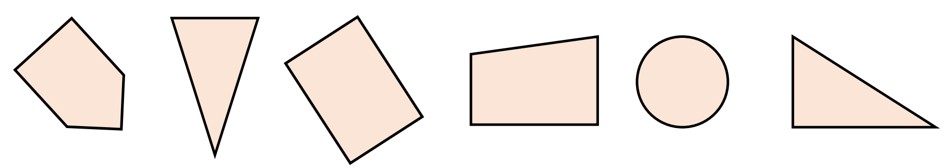


The angle between the hands is called a ________ angle.
One quarter turn is equal to a ________ angle.

- Children can create a 'Right Angle Tester' E.g.

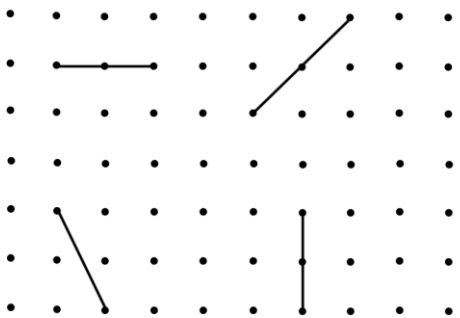
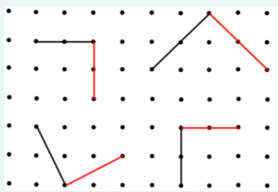
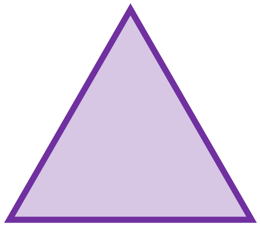
They can then go on a right angle hunt around school. Find and draw at least 3 right angles you have seen around your school.

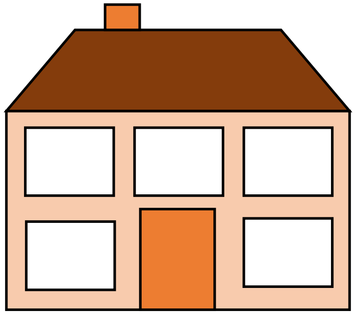
- Sort the shapes based on the number of right angles they have. Record your answer in a table.



Right Angles in Shapes

Reasoning and Problem Solving

Draw a line along the dots to make a right-angle with each of these lines: 	For example (see red lines): 
True or False? This shape has two right-angles.  Explain your answer.	False. Children could show this by using the corner of a page to show there aren't any right angles.

How many right angles can you see in this image?  Can you create your own image with the same number of right angles?	There are 34 right angles.

Compare Angles

Notes and Guidance

Children identify whether an angle is greater than or less than a right angle in shapes and turns, by measuring, comparing and reasoning in practical contexts.

Children are introduced to the words 'acute' and 'obtuse' as a way of describing angles.

Mathematical Talk

What is an acute? (Give 3 examples of acute angles and ask them to identify what's the same about them. Draw out that they are all smaller than a right-angle).

What's an obtuse angle? (Repeat activity by giving 3 examples of obtuse angles).

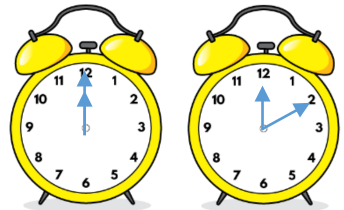
Can you give me a time where the hands on the clock make an acute/obtuse angle?

Can you see an acute/obtuse angle around the classroom?

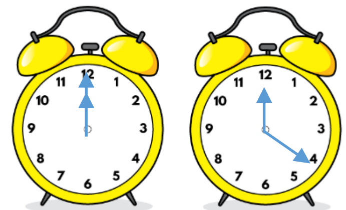
Can you draw me a shape that contains acute/obtuse angles?

Varied Fluency

R



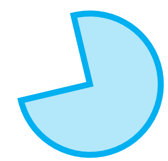
The angle between the hands is ________ than a right angle.
This is called an ________ angle.



The angle between the hands is ________ than a right angle.
This is called an ________ angle.

Explore other times where the hands make an acute/obtuse angle.

Find 3 acute angles and 3 obtuse angles in your classroom.
Use your 'Right Angle Tester' to check.

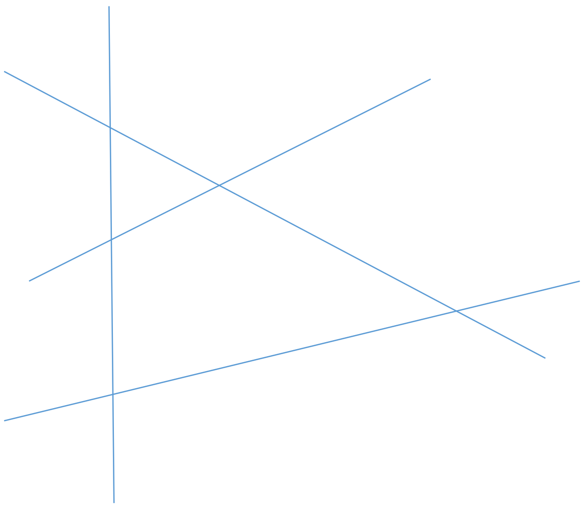


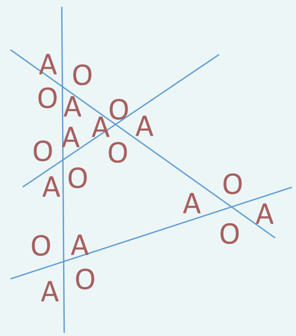
Label any acute or obtuse angles in these images.

Compare Angles

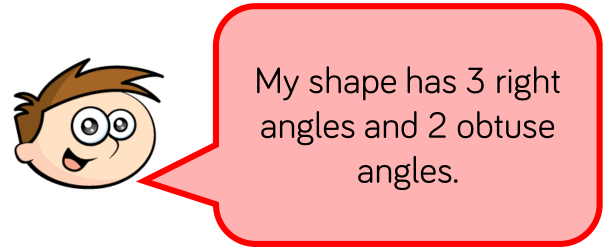
Reasoning and Problem Solving

Label the acute angles (A) and obtuse angles (O) on the diagram below





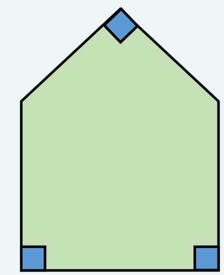
Teddy describes a shape.



What could Jack's shape look like?

Describe a shape in terms of it's angles for a friend to draw.

Possible answer:



Identify Angles

Notes and Guidance

Children develop their understanding of obtuse and acute angles by comparing with a right angle. They use an angle tester to check whether angles are larger or smaller than a right angle.
Children learn that an acute angle is more than 0 degrees and less than 90 degrees, a right angle is exactly 90 degrees and an obtuse angle is more than 90 degrees but less than 180 degrees.

Mathematical Talk

How many degrees are there in a right angle?

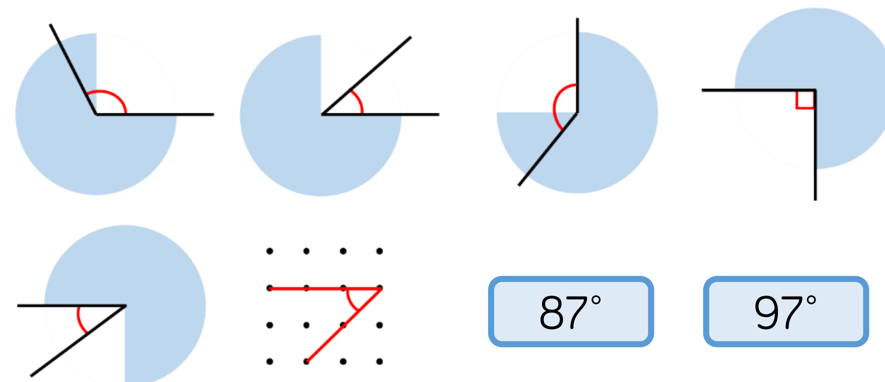
Draw an acute/obtuse angle.

Estimate the size of the angle.

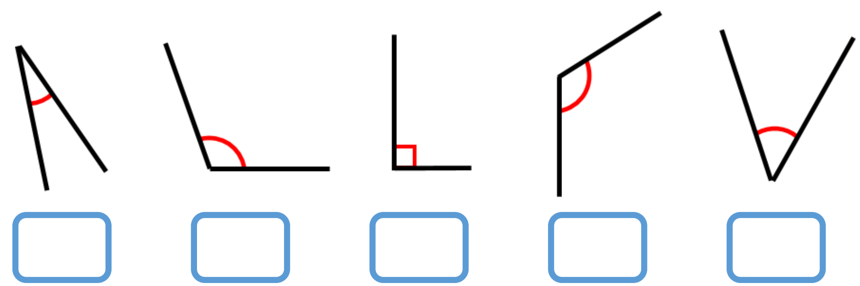
Varied Fluency

- A right angle is _____ degrees.
  Acute angles are _____ than a right angle.
  Obtuse angles are _____ than a right angle.

- Sort the angles into acute, obtuse and right angles.

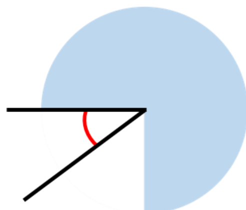


- Label the angles. O for obtuse, A for acute and R for right angle.

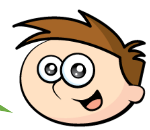


Identify Angles

Reasoning and Problem Solving



I know the angle is not obtuse.



Teddy

Alex

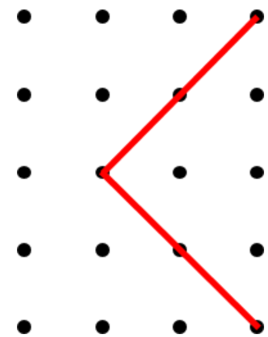
I know the angle is acute.

I think the angle is roughly 45°.

Whitney

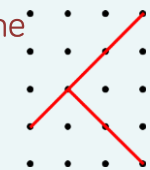
Who is correct?
Explain your reasons.

All are correct.
Children may reason about how Whitney has come to her answer and discuss that the angle is about half a right angle. Half of 90 degrees is 45 degrees.



Is the angle acute, obtuse or a right angle?
Can you explain why?

The angle is a right angle.
Children may use an angle tester to demonstrate it, or children may extend the line to show that it is a quarter turn which is the same as a right angle.



Find the sum of the largest acute angle and the smallest obtuse angle in this list:

12° 98° 87° 179° 90° 5°

$87° + 98° = 185°$

Compare & Order Angles

Notes and Guidance

Children compare and order angles in ascending and descending order.

They use an angle tester to continue to help them to decide if angles are acute or obtuse.

Children identify and order angles in different representations including in shapes and on a grid.

Mathematical Talk

How can you use an angle tester to help you order the angles?

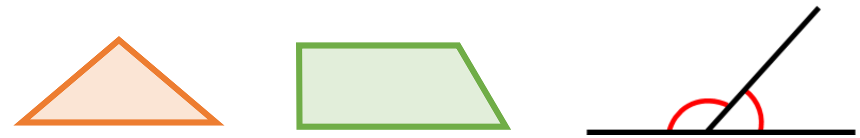
How many obtuse/acute/right angles are there in the diagrams?

Compare the angles to a right angle. Does it help you to start to order them?

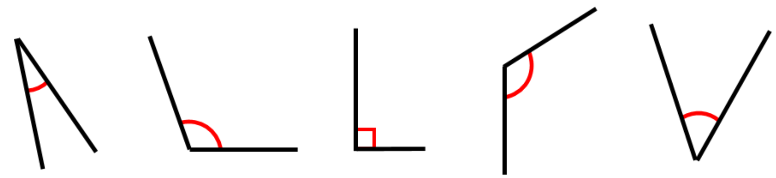
Rotate the angles so one of the lines is horizontal. Does this help you to compare them more efficiently?

Varied Fluency

- Circle the largest angle in each shape or diagram.

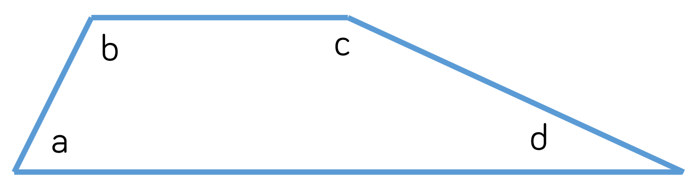


- Order the angles from largest to smallest.



Can you draw a larger obtuse angle?
Can you draw a smaller acute angle?

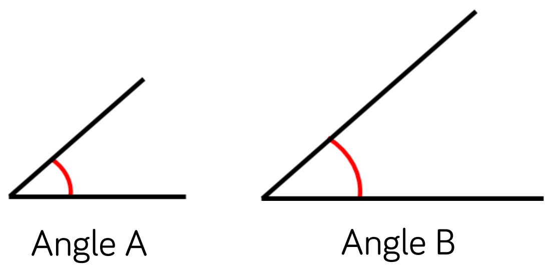
- Order the angles in the shape from smallest to largest. Complete the sentences.

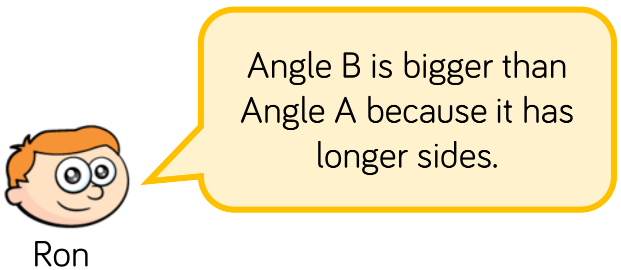


Angle _____ is smaller than angle _____.
Angle _____ is larger than angle _____.

Compare & Order Angles

Reasoning and Problem Solving

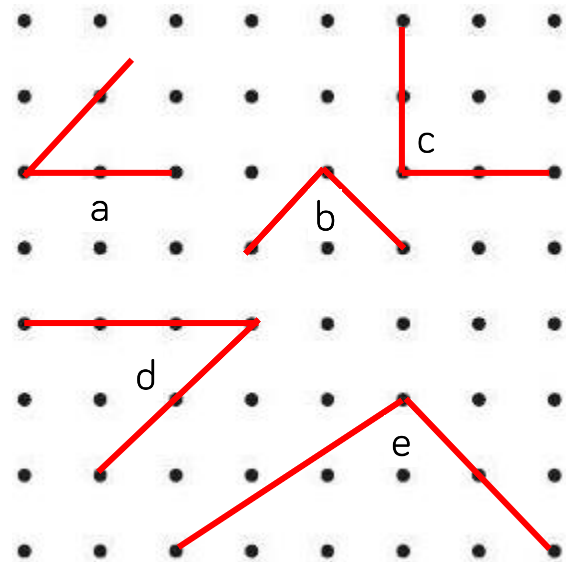




Do you agree with Ron? Explain your thinking.

Angle A and Angle B are the same size. Ron has mixed up the lengths of the lines with the size of the angles.

Here are five angles.
There are two pairs of identically sized angles and one odd one out.
Which angle is the odd one out?
Explain your reason.



Angle e is the odd one out.

Angle b and c are both right angles.

Angle a and d are both half of a right angle or 45 degrees.

Angle e is an obtuse angle.

2-D Shapes

Notes and Guidance

Children recognise, describe and draw 2-D shapes accurately. They use properties including types of angles, lines, symmetry and lengths of sides to describe the shape.
They could be given opportunities to identify/draw a hidden shape from a description given and also describe a shape for a friend to identify/draw.

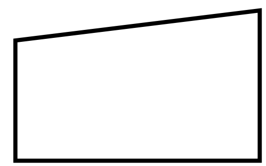
Mathematical Talk

How many angles does a ______ have?
What types of angles does a ________ have?
How many lines of symmetry does a ______ have?
What kind of lines of symmetry does a _____ have? (vertical/horizontal)
What types of lines can you spot in a _______?
(perpendicular/parallel)
Can you guess the shape from the description given?
Can you draw a shape from the description given?

Varied Fluency

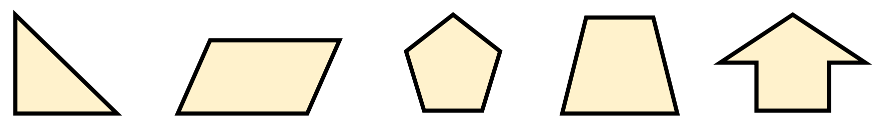
R

Describe this quadrilateral.



It has _____ angles.
It has _____ right angles.
It has _____ obtuse angle.
It has _____ acute angle.
It has _____ lines of symmetry.

Choose one of these 2-D shapes and describe it to a friend thinking about the angles, types of lines it is made up of and whether it has any lines of symmetry. Can your friend identify the shape from your description?



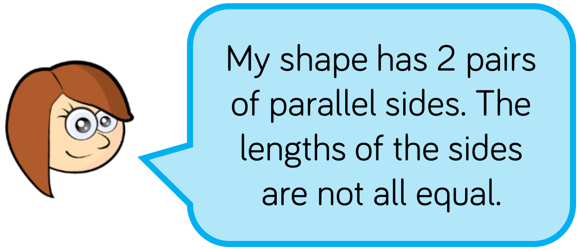
Draw the following shapes.

- A square with sides measuring 2 cm
- A square that is larger the one you have just drawn
- A rectangle with sides measuring 4 cm and 6 cm
- A triangle with two sides of equal length

2-D Shapes

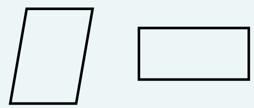
Reasoning and Problem Solving

Rosie describes a 2-D shape.

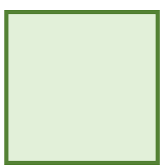


Draw the shape that Rosie is describing.

Children could draw:



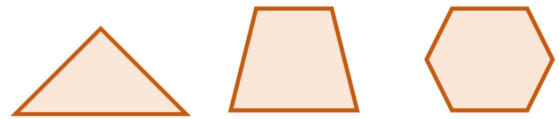
Could this square be Rosie's shape?



Explain why.

No this can't be Rosie's shape, because the lengths of the sides are equal.

What is the same and what is different about these shapes?



Possible answers:
All have at least 1 line of symmetry.
They have different number of sides/angles.
Only the triangle has a pair of perpendicular sides.

Draw at least one shape in each section of the diagram.

	At least one right angle	No right angles
4 sided		
Not 4 sided		

Many possible answers.

Triangles

Notes and Guidance

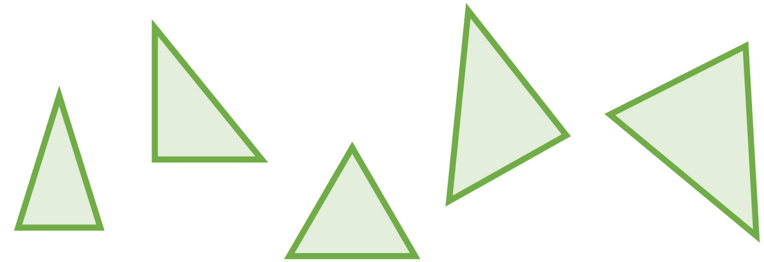
Teachers might start this small step by recapping the definition of a polygon. An activity might be to sort shapes into examples and non-examples of polygons.
Children will classify triangles for the first time using the names 'isosceles', 'scalene' and 'equilateral'. Children will use rulers to measure the sides in order to classify them correctly.
Children will compare the similarities and differences between triangles and use these to help them identify, sort and draw.

Mathematical Talk

What is a polygon? What isn't a polygon?
What are the names of the different types of triangles?
What are the properties of an isosceles triangles?
What are the properties of a scalene triangle?
What are the properties of an equilateral triangle?
Which types of triangle can also be right-angled?
How are the triangles different?
Do any of the sides need to be the same length?

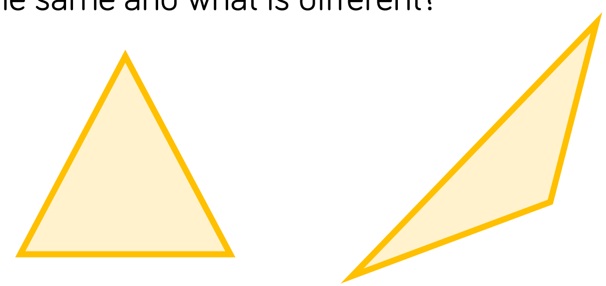
Varied Fluency

Label each of these triangles: isosceles, scalene or equilateral.



Are any of these triangles also right-angled?

Look at these triangles.
What is the same and what is different?

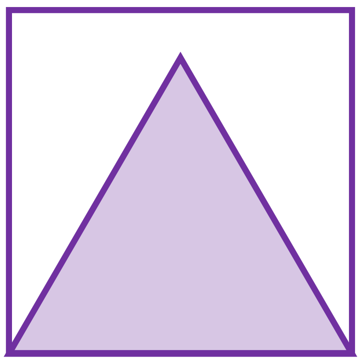


Using a ruler, draw:
- An isosceles triangle
- A scalene triangle

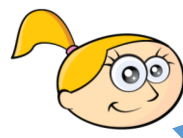
Triangles

Reasoning and Problem Solving

Here is a square.
Inside the square is an equilateral triangle.
The perimeter of the square is 60 cm.
Find the perimeter of the triangle.



The perimeter of the triangle is 45 cm.



Eva

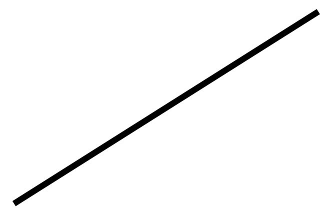
If I use 6 straws to make a triangle, I can only make an equilateral triangle.

Investigate whether Eva is correct.

Eva is correct.
2, 2, 2 is the only possible construction. 1, 1, 4 and 1, 2, 3 are not possible.

Draw two more sides to create:

- An equilateral triangle
- A scalene triangle
- An isosceles triangle



Which is the hardest to draw?

Children will draw a range of triangles. Get them to use a ruler to check their answers.
Equilateral will be difficult to draw accurately because the angle between the first two sides drawn, must be 60°

Quadrilaterals

Notes and Guidance

Children name quadrilaterals including a square, rectangle, rhombus, parallelogram and trapezium. They describe their properties and highlight the similarities and differences between different quadrilaterals.
Children draw quadrilaterals accurately using knowledge of their properties.
Teachers could use a Frayer Model with the children to explore the concept of quadrilaterals further.

Mathematical Talk

What's the same about the quadrilaterals?

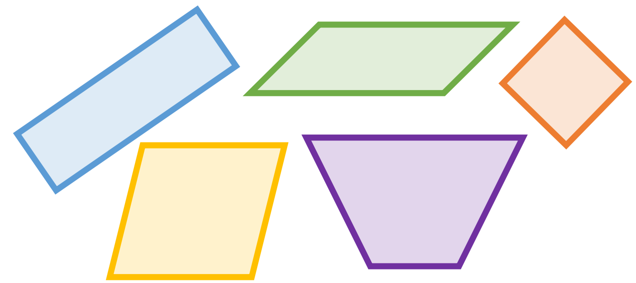
What's different about the quadrilaterals?

Why is a square a special type of rectangle?

Why is a rhombus a special type of parallelogram?

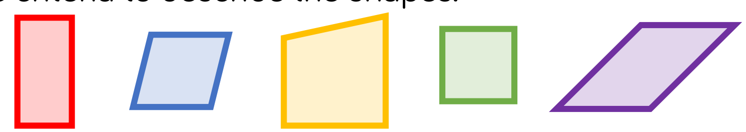
Varied Fluency

Label the quadrilaterals using the word bank.



trapezium
square
rhombus
rectangle
parallelogram

Use the criteria to describe the shapes.



four sides	2 pairs of parallel sides	four equal sides
polygon	1 pair of parallel sides	4 right angles

Which criteria can be used more than once?
Which shapes share the same criteria?

Draw and label:
- a rhombus.
- a parallelogram.
- 3 different trapeziums

Quadrilaterals

Reasoning and Problem Solving

Complete each of the boxes in the table with a different quadrilateral.

	4 equal sides	2 pairs of equal sides	1 pair of parallel sides
4 right angles			
No right angles			

Which box cannot be completed? Explain why.

	4 equal sides	2 pairs of equal sides	1 pair of parallel sides
4 right angles			
No right angles			

Children can discuss if there are any shapes that can go in the top right corner. Some children may justify it could be a square or a rectangle however these have 2 pairs of parallel sides.

You will need:

Some 4 centimetre straws
Some 6 centimetre straws

How many different quadrilaterals can you make using the straws?

Calculate the perimeter of each shape.

Square: Four 4 cm - perimeter is 16 cm or four 6 cm- perimeter is 24 cm
Rectangle: Two 4 cm and two 6 cm- perimeter is 20 cm
Rhombus: Four 4 cm - perimeter is 16 cm
Four 6 cm straws- perimeter is 24 cm
Parallelogram: Two 4 cm and two 6 cm - perimeter is 20 cm
Trapezium: Three 4 cm and one 6 cm- perimeter is 18 cm

Horizontal & Vertical

Notes and Guidance

Children identify and find horizontal and vertical lines in a range of contexts.

They identify horizontal and vertical lines of symmetry in shapes and symbols.

Mathematical Talk

What can you use to help you remember what a horizontal line looks like? (The horizon)

Can you see horizontal and vertical lines around the classroom?

What do we call a line that is not horizontal or vertical?

Which shapes/symbols/letters have a horizontal/vertical line of symmetry?

Which have both?

Can you draw your own shape that has a horizontal and vertical line of symmetry?

Varied Fluency

R

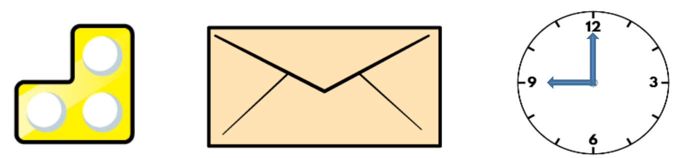
-

  A line that runs from left to right across the page is called a ________________ line.

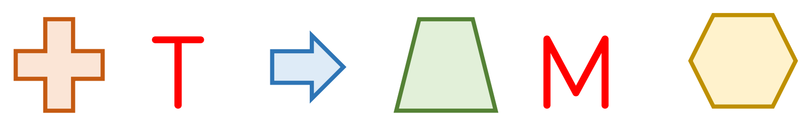
  A line that runs straight up and down the page is called a ________________ line.

  Find 3 horizontal and 3 vertical lines in the classroom.

- Label the horizontal and vertical lines in each of these images.

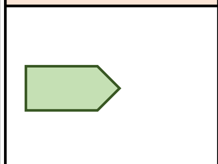
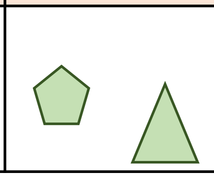
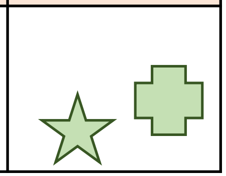
- Sort the shapes/symbols/letters depending on whether they have a horizontal line of symmetry, a vertical line of symmetry or both.

Horizontal & Vertical

Reasoning and Problem Solving

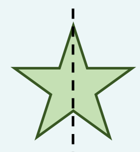
R

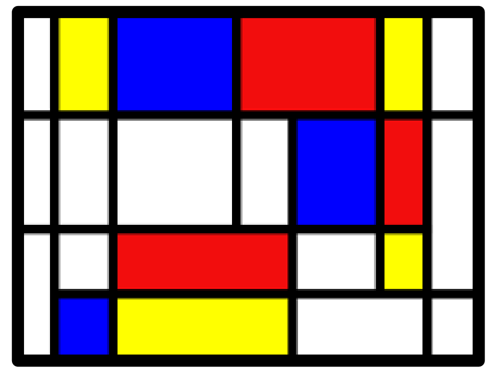
Horizontal line of symmetry	Vertical line of symmetry	Horizontal and vertical lines of symmetry
		

Eva completes the table by drawing shapes.

Can you spot and correct her mistake?

Eva thinks the star has both lines of symmetry, but it only has a vertical line of symmetry.





How many horizontal and vertical lines can you spot in this image by Mondrian?

Create your own piece of art work using only horizontal and vertical lines.

There are 5 horizontal lines and 8 vertical lines.

Lines of Symmetry

Notes and Guidance

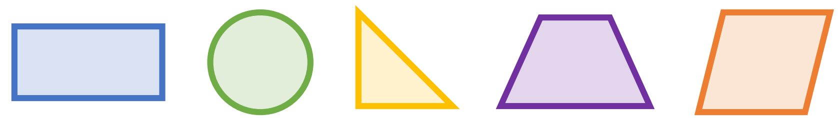
Children find and identify lines of symmetry within 2-D shapes. Children explore symmetry in shapes of different sizes and orientations. To help find lines of symmetry children may use mirrors and tracing paper.
The key aspect of symmetry can be taught through paper folding activities. It is important for children to understand that a shape may be symmetrical, but if the pattern on the shape isn't symmetrical, then the diagram isn't symmetrical.

Mathematical Talk

Explain what you understand by the term 'symmetrical'.
Can you give any real-life examples?
How can you tell if something is symmetrical?
Are lines of symmetry always vertical?
Does the orientation of the shape affect the lines of symmetry?
What equipment could you use to help you find and identify lines of symmetry?
What would the rest of the shape look like?

Varied Fluency

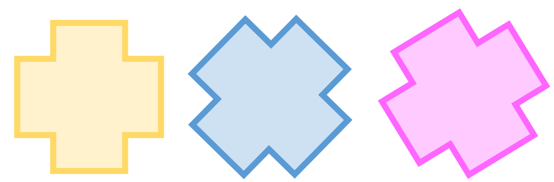
- Using folding, find the lines of symmetry in these shapes.



- Sort the shapes into the table.

	1 line of symmetry	More than 1 line of symmetry
Up to 4 sides		
More than 4 sides		

- Draw the lines of symmetry in these shapes (you could use folding to help you).

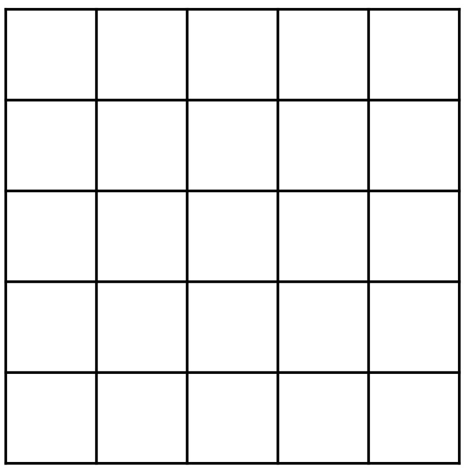


What do you notice?

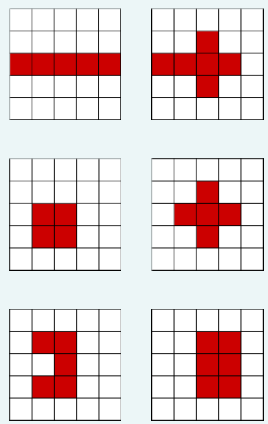
Lines of Symmetry

Reasoning and Problem Solving

How many symmetrical shapes can you make by colouring in a maximum of 6 squares?



There are a variety of options. Some examples include:



Jack

A triangle has 1 line of symmetry unless you change the orientation.

Is Jack correct? Prove it.

Jack is incorrect. Changing the orientation does not change the lines of symmetry. Children should prove this by drawing shapes in different orientations and identifying the same number of lines of symmetry.

Always, Sometimes, Never.

A four-sided shape has four lines of symmetry.

Sometimes, provided the shape is a square.

Symmetric Figures

Notes and Guidance

Children use their knowledge of symmetry to complete 2-D shapes and patterns.

Children could use squared paper, mirrors or tracing paper to help them accurately complete figures.

Mathematical Talk

What will the rest of the shape look like?

How can you check?

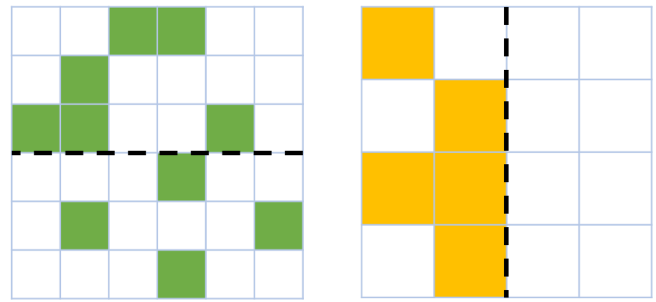
How can you use the squares to help you?

Does each side need to be the same or different?

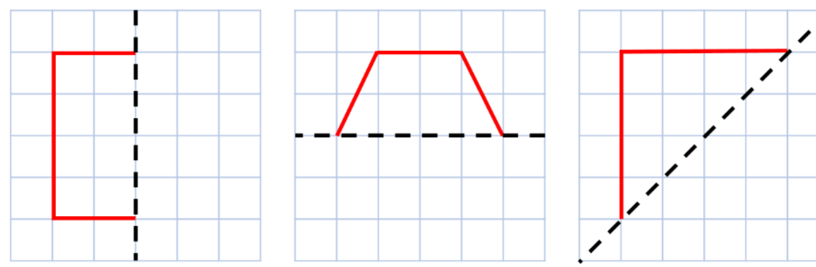
Which lines need to be extended?

Varied Fluency

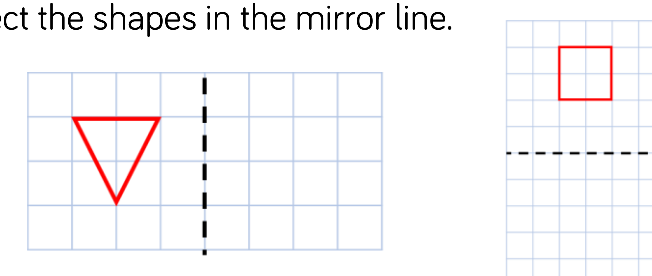
- Colour the squares to make the patterns symmetrical.



- Complete the shapes according to the line of symmetry.



- Reflect the shapes in the mirror line.



Symmetric Figures

Reasoning and Problem Solving

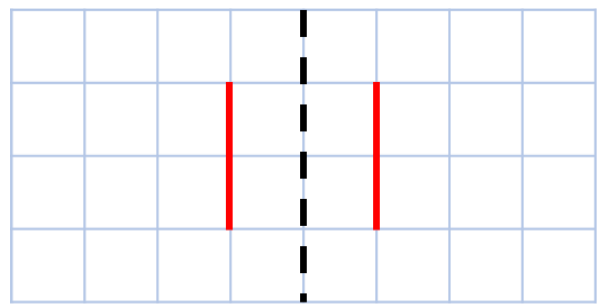
Dora

When given half of a symmetrical shape I know the original shape will have double the amount of sides.

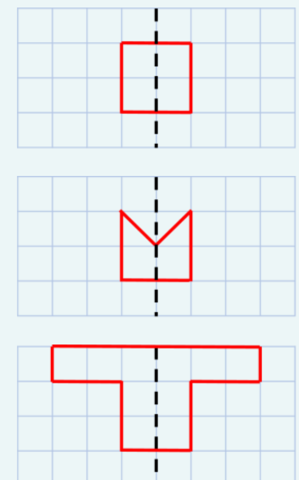
Do you agree with Dora?
Convince me.

Dora is sometimes correct. This depends on where the mirror line is. Encourage children to draw examples of times where Dora is correct, and to draw examples of times when Dora isn't correct.

How many different symmetrical shapes can you create using the given sides?



Children will find a variety of shapes. For example:



White Rose Maths

Summer - Block 6

Position & Direction

Overview

Small Steps

- Describe position
- Draw on a grid
- Move on a grid
- Describe movement on a grid

Notes for 2020/21

This is the first time children are introduced to position and direction on a coordinate grid. They may need reminding of key words related to this topic such as left, right, forwards and backwards.

Describe Position

Notes and Guidance

Children are introduced to coordinates for the first time and they describe positions in the first quadrant.

They read, write and use pairs of coordinates. Children need to be taught the order in which to read the axes, x-axis first, then y-axis next. They become familiar with notation within brackets.

Mathematical Talk

Which is the x-axis?

Which is the y-axis?

In which order do we read the axes?

Does it matter in which order we read the axes?

How do we know where to mark on the point?

What are the coordinates for ______?

Where would (__ , __) be?

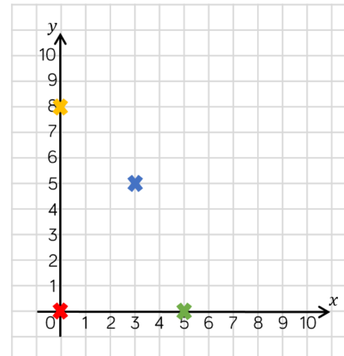
Varied Fluency

- Create a large grid using chalk or masking tape. Give the children coordinates to stand at. Encourage the children to move along the axis in the order they read them.

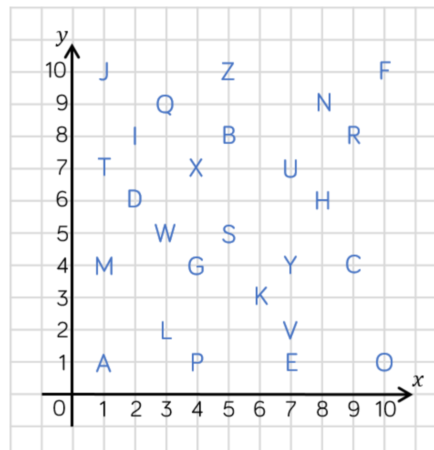
- Write the coordinates for the points shown.

  (__ , __) (__ , __)

  (__ , __) (__ , __)

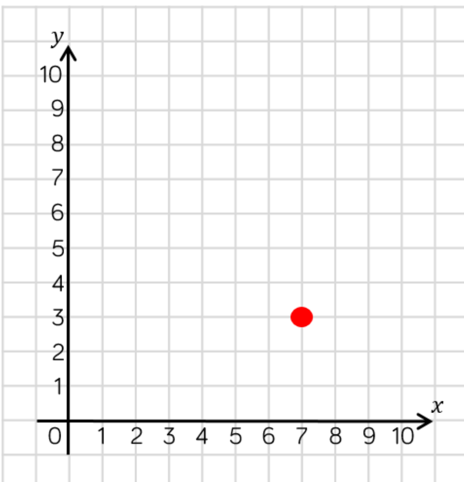


- Write out the coordinates that spell your name.



Describe Position

Reasoning and Problem Solving



The point is plotted at (7, 3)

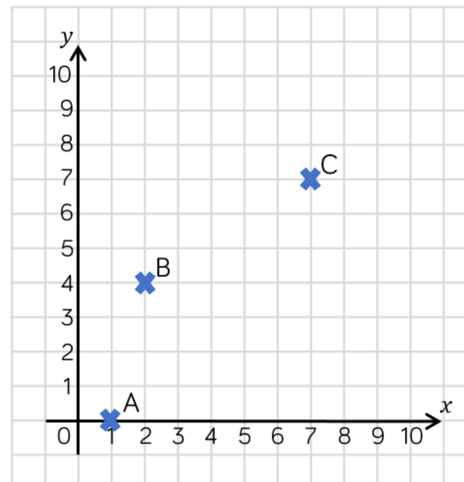
Teddy

Rosie

The point is plotted at (3, 7)

Who is correct?
What mistake has one of the children made?

Teddy is correct.
Rosie has read the y-axis before the x-axis.



Which clue matches which coordinate?

Clue 1: My x coordinate is half of my y coordinate.

Clue 2: My y coordinate is less than my x coordinate.

Clue 3: Both my coordinates are prime numbers.

Clue 1 - B
Clue 2 - A
Clue 3 - C

Draw on a Grid

Notes and Guidance

Children develop their understanding of coordinates by plotting given points on a 2-D grid.

Teachers should be aware that children need to accurately plot points on the grid lines (not between them).

They read, write and use pairs of coordinates.

Mathematical Talk

Do we plot our point on the line, or next to the line?

How could we use a ruler to help plot points?

In which order do we read and plot the coordinates?

Does it matter which way we plot the numbers on the axis?

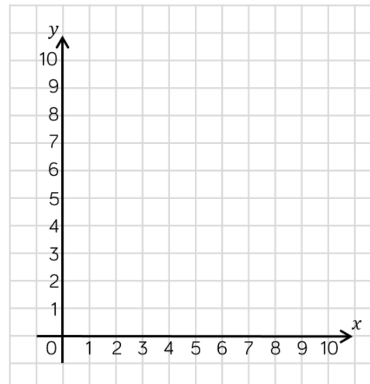
What are the coordinates of ______?

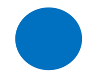
Where would (__, __) be?

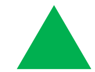
Can you show _____ on the grid?

Varied Fluency

Draw the shapes at the correct points on the grid.



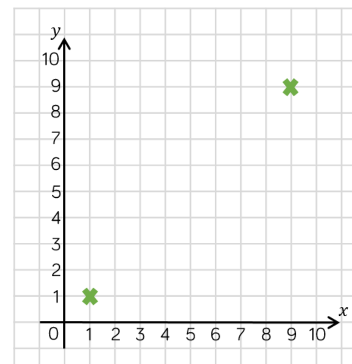
 (7, 8)

 (4, 6)

 (9, 1)

 (10, 0)

Plot two more points to create a square.



Plot these points on a grid.

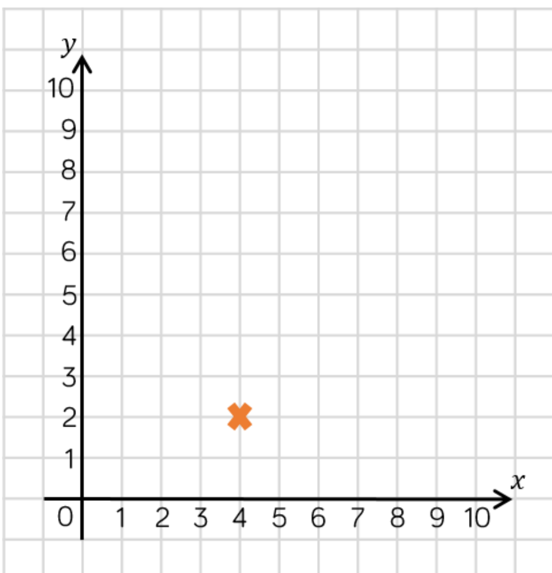
(2, 4) (4, 2) (5, 8) (7, 6)

What shape has been created?

Draw on a Grid

Reasoning and Problem Solving

What shapes could be made by plotting three more points?



The children could make a range of quadrilaterals dependent on where they plot the points.
If children plot some of the points in a line they could make a triangle.

When you are plotting a point on a grid it does not matter whether you go up or across first as long as you do one number on each axis.

Amir

Do you agree with Amir?
Convince me.

Amir is incorrect. The x-axis must be plotted before the y-axis.
Children prove this by plotting a pair of coordinates both ways and showing the difference.

Always, Sometimes, Never.

The number of points is equal to the number of vertices when they are joined together.

Sometimes.
If points are plotted in a straight line they will not create a vertex.

Move on a Grid

Notes and Guidance

Children move shapes and points on a coordinate grid following specific directions using language such as: left/right and up/down.
Teachers might want to use a small 'object' (e.g. a small cube) to demonstrate the idea of moving a point on a grid.
They apply their understanding of coordinates when translating by starting with the left/right translation followed by up/down.

Mathematical Talk

Can you describe the translation?

Can you describe the translation in reverse?

Why do we go left and right first when describing translations.

What are the coordinates for point _____?

Write a translation for D for your partner to complete.

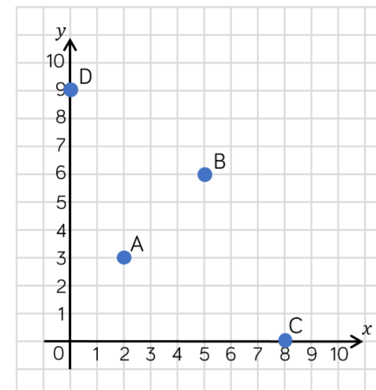
What do you notice about the new and original points?

What is the same and what is different about the new and original points?

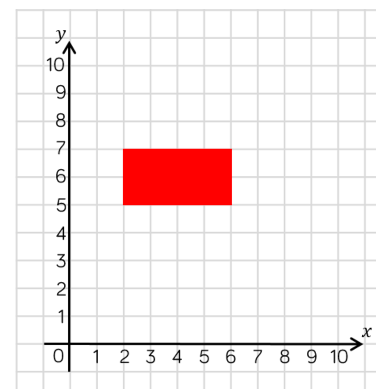
Varied Fluency

- Place a small cube on the grid at coordinate (1, 1).
Move your cube 1 up. Move your cube 1 down. What do you notice?
Now move your cube 3 to the right. Move your cube 3 to the left.
What do you notice?

- Translate A 6 right and 3 down.
Record the coordinates before (__ , __)
and after (__ , __)
Translate B and C 4 left and 3 up.
Record the coordinates before (__ , __)
and after (__ , __)

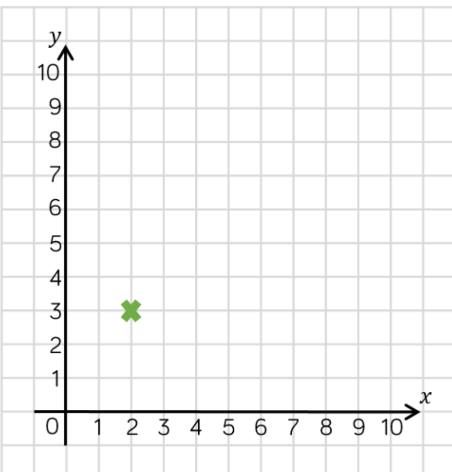


- Translate the rectangle 2 left and 3 up.
Write down the coordinates of each vertex of the rectangle before and after the translation.



Move on a Grid

Reasoning and Problem Solving



Ron translates the point (2, 3), but realises that it has returned to the same position.

What translation did he do?

Is there more than one answer?

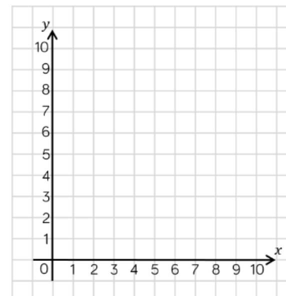
There could be a range of answers, for example:

Translate 1 left and 1 right

Translate 1 left, l right, 2 up and 2 down

Here is a game to play in pairs:

Each player needs:



1 small cube

One barrier (e.g. a mini whiteboard)

The first player places a cube on their grid. They describe the original position and perform a translation.

The second player listens to the instructions and performs the same translation.

They check to see if they have placed their cube at the same coordinate.

Swap roles and repeat several times.

The teacher could make this more competitive (points awarded when correct).

White Rose Maths

Describe Movement

Notes and Guidance

Children describe the movement of shapes and points on a coordinate grid using specific language such as: left/right and up/down. Sentence stems might be useful. They start with the left/right translation followed by up/down.

Teachers should check that children understand the idea of 'corresponding vertices' when describing translation of shapes (e.g. vertex A on the object translates to vertex A on the image).

Mathematical Talk

Can you describe the translation?

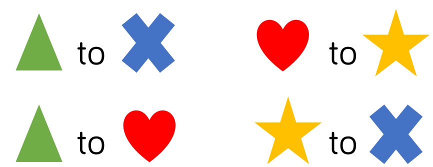
Can you describe the translation in reverse?

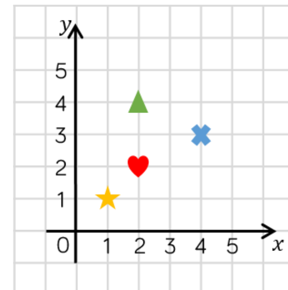
Can you complete the following stem sentence:

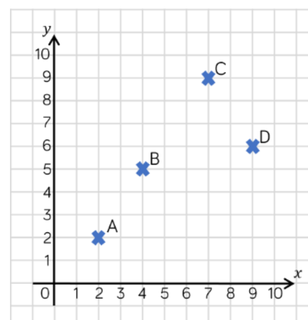
Shape A is translated ___ left/right and _____up/down to shape B

Varied Fluency

Describe the translation from:







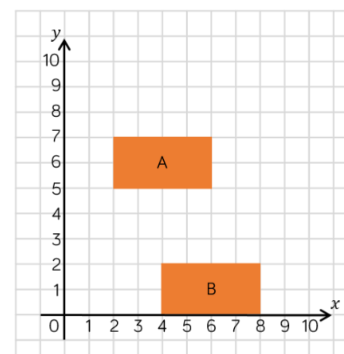
Describe the translation from:
A to B B to C C to D D to A

Plot two new points and describe the translations from A to your new points.

Describe the translation of shape A to shape B.

Describe the translation of shape B to shape A.

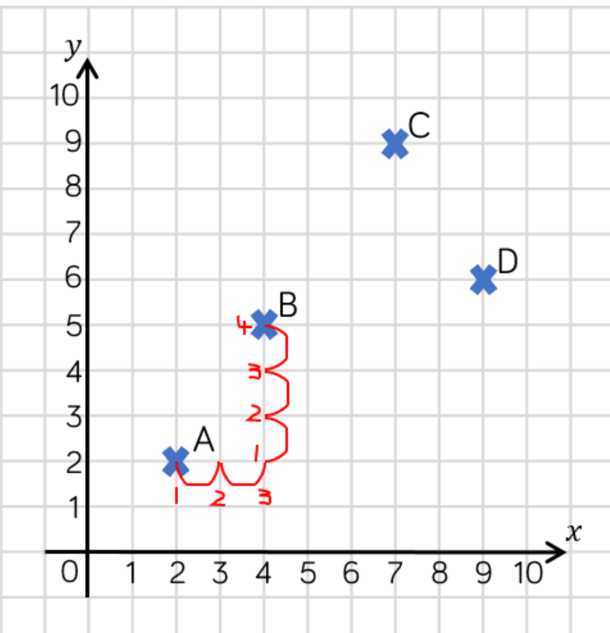
What do you notice?



Describe Movement

Reasoning and Problem Solving

Tommy has described the translation from A to B as 3 right and 4 up.

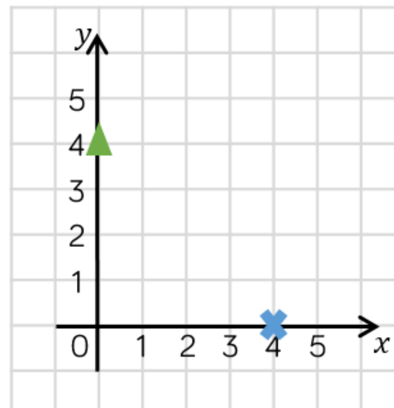


Can you explain his mistake?

Tommy has counted one move to the right when he has not moved anywhere yet. He has done the same for one move up when he has not moved up one space yet.

▲ to ✖ is 4 right and 4 down.

✖ to ▲ is 4 left and 4 up.



Can you plot other pairs of points where to move between them, you travel the same to left or right as you travel up or down?

What do you notice about the coordinates of these points?

Possible answers include:
(0,1) (1,0)
(0,2) (2,0)
(0,3) (3,0)
(0,5) (5,0)
(1,1) (3,3)
(0,0) (4,4)