Summer Scheme of Learning

Year 3

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

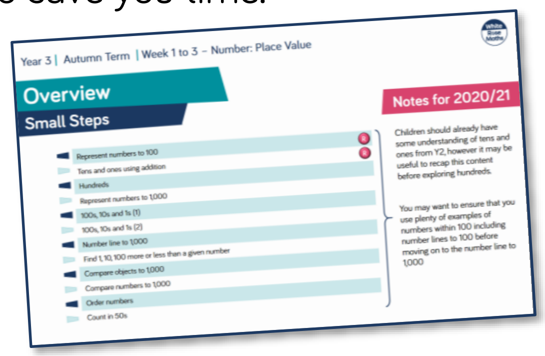
2020 will go down in history. The world has changed for all of us.

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.



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

NEW for 2019-20!

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

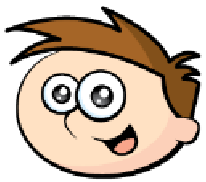
The worksheets are provided in three different formats:

- 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

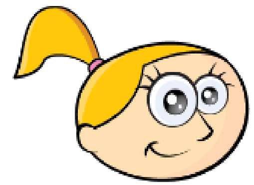
Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



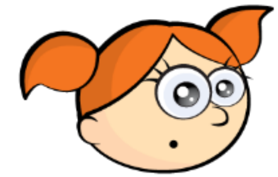
Teddy

Rosie

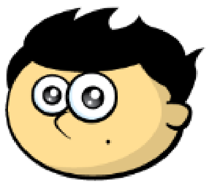
Mo



Eva

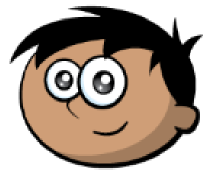


Alex

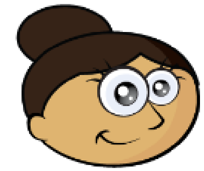


Jack

Whitney



Amir



Dora

Tommy

Dexter

Ron

Annie

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value			Number: Addition and Subtraction					Number: Multiplication and Division			
Spring	Number: Multiplication and Division			Measurement: Money	Statistics		Measurement: Length and Perimeter		Number: Fractions			Consolidation
Summer	Number: Fractions			Measurement: Time			Geometry: Properties of Shape		Measurement: Mass and Capacity			Consolidation

White Rose Maths

Summer - Block 1

Fractions

Overview

Small Steps

- Making the whole
- Tenths
- Count in tenths
- Tenths as decimals
- Fractions on a number line
- Fractions of a set of objects (1)
- Fractions of a set of objects (2)
- Fractions of a set of objects (3)
- Equivalent fractions (1)
- Equivalent fractions (2)
- Equivalent fractions (3)
- Compare fractions
- Order fractions
- Add fractions
- Subtract fractions

Notes for 2020/21

The time that was allocated for fractions in the Spring term was dedicated to recapping the fractions content from year 2.

Children should now have a secure understanding of what a fraction is that can be built upon throughout this block of learning.

You might notice the small step on unit and non-unit fractions does not appear, this is because the two concepts were covered explicitly at the end of the Spring term. Ensure the terminology is used appropriately throughout to reinforce the concept.

Making the Whole

Notes and Guidance

Children look at whole shapes and quantities and see that when a fraction is equivalent to a whole, the numerator and denominator are the same.

Building on using part-whole model with whole numbers, children use the models to partition the whole into fractional parts.

Mathematical Talk

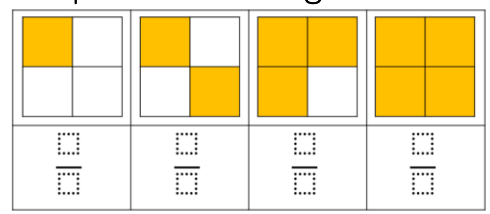
Is a fraction always less than one?

When the fraction is equivalent to one, what do you notice about the numerator and denominator?

In the counter activity, what's the same about the part-whole models? What's different?

Varied Fluency

- Complete the missing information.



1 whole is the same as $\frac{\square}{\square}$

- Complete the sentences to describe the apples.

$\frac{\square}{\square}$ of the apples are red.

$\frac{\square}{\square}$ of the apples are green.

$\frac{\square}{\square}$ and $\frac{\square}{\square}$ make one whole

- Use 8 double sided counters.
Drop the counters on to the table, what fraction of the counters are red? What fraction of the counters are yellow? What fraction represents the whole group of counters?
Complete part-whole models to show your findings.

Making the Whole

Reasoning and Problem Solving

Teddy says,

I have one pizza cut into 6 equal pieces. I have eaten $\frac{6}{6}$ of the pizza.

Does Teddy have any pizza left?
Explain your answer.

No because $\frac{6}{6}$ is equal to one whole, so Ted has eaten all of his pizza.

Complete the sentence.

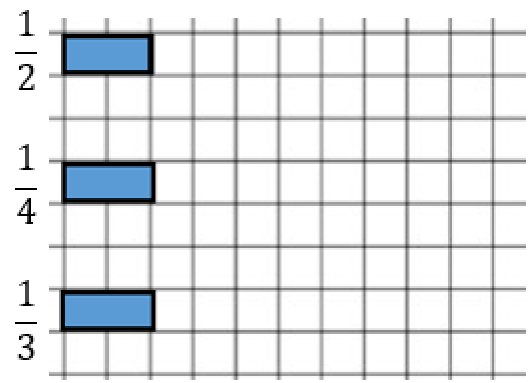
When a fraction is equal to a whole, the numerator and the denominator are ______________

Use pictures to prove your answer.

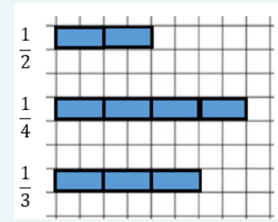
The same/equal

Children may draw a range of pictures to prove this statement.

Rosie is drawing bar models to represent a whole.
She has drawn a fraction of each of her bars.



Can you complete Rosie's bar models?



Tenths

Notes and Guidance

Children explore what a tenth is. They recognise that tenths arise from dividing one whole into 10 equal parts.

Children represent tenths in different ways and use words and fractions to describe them. For example, one tenth and $\frac{1}{10}$

Mathematical Talk

How many tenths make the whole?

How many tenths are shaded?

How many more tenths do I need to make a whole?

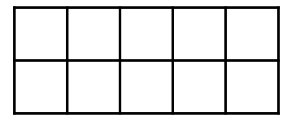
When I am writing tenths, the ___________ is always 10

How are fractions linked to division?

Varied Fluency

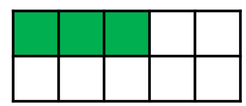
If the frame represents 1 whole, what does each box represent?
Use counters to represent:

- One tenth
- Two tenths
- Three tenths
- One tenth less than eight tenths

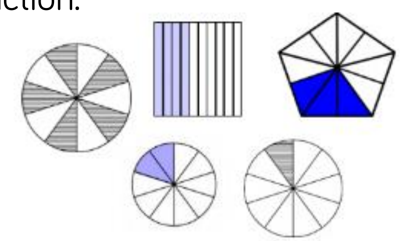


Identify what fraction of each shape is shaded.
Give your answer in words and as a fraction.

e.g.



Three tenths $\frac{3}{10}$



Annie has 2 cakes. She wants to share them equally between 10 people. What fraction of the cakes will each person get?

There are ____ cakes.
They are shared equally between ___ people.
Each person has $\frac{\square}{\square}$ of the cake.

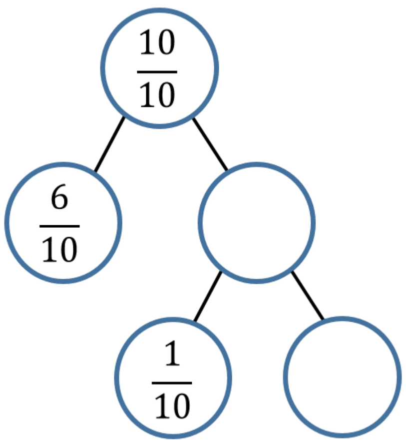
___ ÷ ____ = _____

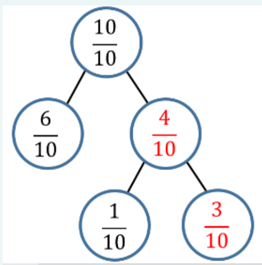
What fraction would they get if Annie had 4 cakes?

Tenths

Reasoning and Problem Solving

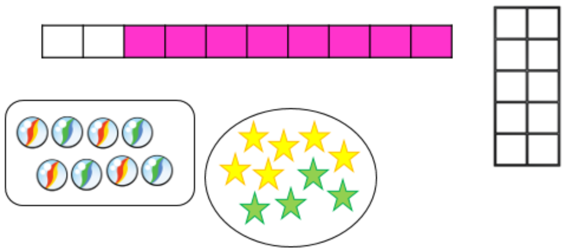
Fill in the missing values.
Explain how you got your answers.





Children could use practical equipment to explain why and how, and relate back to the counting stick.

Odd One Out



Which is the odd one out?
Explain your answer.

The marbles are the odd one out because they represent 8 or eighths. All of the other images have a whole which has been split into ten equal parts.

Count in Tenths

Notes and Guidance

Children count up and down in tenths using different representations.

Children also explore what happens when counting past $\frac{10}{10}$. They are not required to write mixed numbers, however children may see the $\frac{11}{10}$ as $1\frac{1}{10}$ due to their understanding of 1 whole.

Mathematical Talk

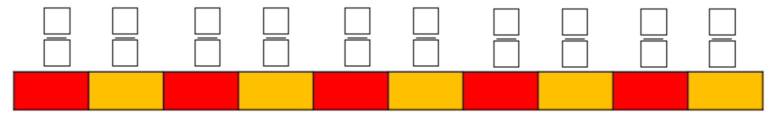
Let's count in tenths. What comes next? Explain how you know.

If I start at ___ tenths, what will be next?

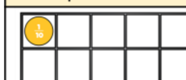
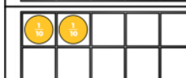
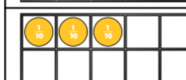
When we get to $\frac{10}{10}$ what else can we say? What happens next?

Varied Fluency

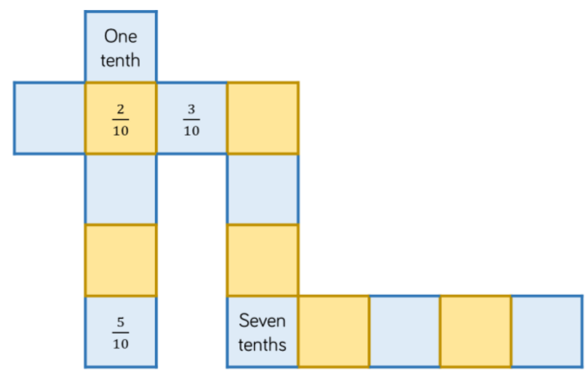
- The counting stick is worth 1 whole. Label each part of the counting stick. Can you count forwards and backwards along the counting stick?



- Continue the pattern in the table.
  - What comes between $\frac{4}{10}$ and $\frac{6}{10}$?
  - What is one more than $\frac{10}{10}$?
  - If I start at $\frac{8}{10}$ and count back $\frac{4}{10}$, where will I stop?

Representation	Words	Fraction
	One tenth	$\frac{1}{10}$
		
		

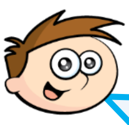
- Complete the sequences.



Count in Tenths

Reasoning and Problem Solving

Teddy is counting in tenths.



Seven tenths, eight tenths, nine tenths, ten tenths, one eleventh, two elevenths, three elevenths…

Can you spot his mistake?

Teddy thinks that after ten tenths you start counting in elevenths. He does not realise that ten tenths is the whole, and so the next number in the sequence after ten tenths is eleven tenths or one and one tenth.

True or False?

Five tenths is $\frac{2}{10}$ smaller than 7 tenths.

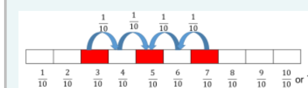
Five tenths is $\frac{2}{10}$ larger than three tenths.

Do you agree?

Explain why.

This is correct. Children could show it using pictures, ten frames, number lines etc.

For example:



Tenths as Decimals

Notes and Guidance

Children are introduced to tenths as decimals for the first time. They compare fractions and decimals written as words, in fraction form and as decimals and link them to pictorial representations.

Children learn that the number system extends to the right of the decimal point into the tenths column.

Mathematical Talk

What is a tenth?

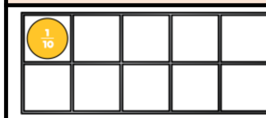
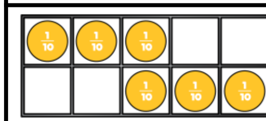
How many different ways can we write a tenth?

What does equivalent mean?

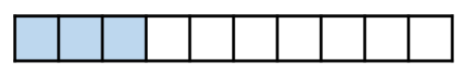
What is the same and what is different about decimals and fractions?

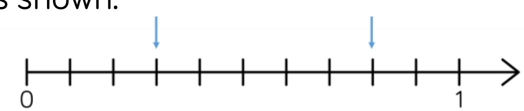
Varied Fluency

Complete the table.

Image	Words	Fraction	Decimal
	One tenth	$\frac{1}{10}$	0.1
			
	Nine tenths		

Write the fractions and decimals shown.





Here is a decimal written in a place value grid.

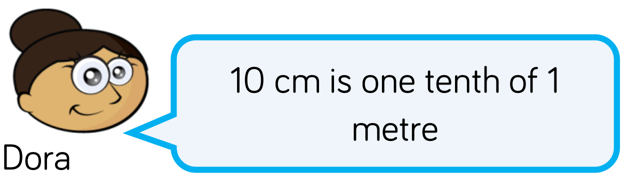
Ones	Tenths
0	8

Can you represent this decimal pictorially?
Can you write the decimal as a fraction?

Tenths as Decimals

Reasoning and Problem Solving

True or False?



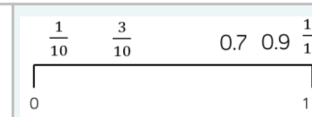
Explain your answer.

They are both correct.

10 cm = $\frac{1}{10}$ m = 0.1 m

Place the decimals and fractions on the number line.

$0.7 \quad \frac{3}{10} \quad \frac{1}{10} \quad 0.9 \quad \frac{10}{10}$



Fractions on a Number Line

Notes and Guidance

Children use a number line to represent fractions beyond one whole. They count forwards and backwards in fractions.

Children need to know how to divide a number line into specific fractions i.e. when dividing into quarters, we need to ensure our number line is divided into four equal parts.

Mathematical Talk

How many equal parts has the number line been divided into?

What does each interval represent?

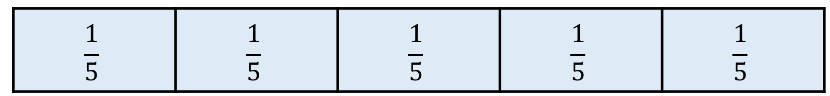
How are the bar model and the number line the same? How are they different?

How do we know where to place $\frac{1}{5}$ on the number line?

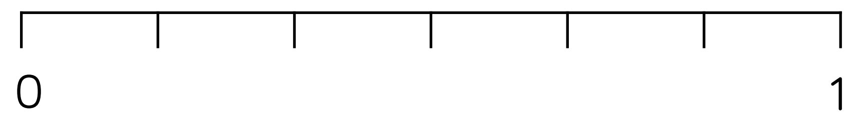
How do we label fractions larger than one.

Varied Fluency

- Show $\frac{1}{5}$ on the number line. Use the bar model to help you.



- The number line has been divided into equal parts. Label each part correctly.

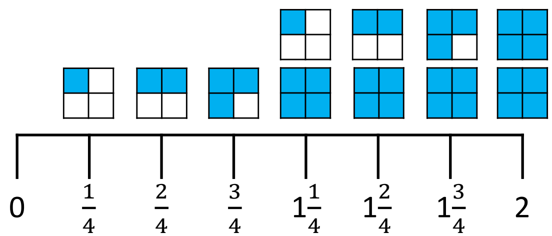


- Divide the number line into eighths. Can you continue the number line up to 2?

Fractions on a Number Line

Reasoning and Problem Solving

Eva has drawn a number line.



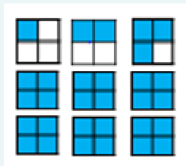
Tommy says it is incorrect.

Do you agree with Tommy?

Explain why.

Can you draw the next three fractions?

Tommy is correct because Eva has missed 1 whole out.



Alex and Jack are counting up and down in thirds.

Alex starts at $5\frac{1}{3}$ and counts backwards.

Jack starts at $3\frac{1}{3}$ and counts forwards.

What fraction will they get to at the same time?

They will reach $4\frac{1}{3}$

Fraction of an Amount (1)

Notes and Guidance

Children find a unit fraction of an amount by dividing an amount into equal groups.

They build on their understanding of division by using place value counters to find fractions of larger quantities including where they need to exchange tens for ones.

Mathematical Talk

Which operation do we use to find a fraction of an amount?

How many equal groups do we need?

Which part of the fraction tells us this?

How does the bar model help us?

Varied Fluency

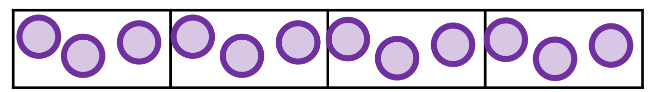
- Find $\frac{1}{5}$ of Eva's marbles.

I have divided the marbles into ☐ equal groups.

There are ☐ marbles in each group.

$\frac{1}{5}$ of Eva's marbles is ☐ marbles.

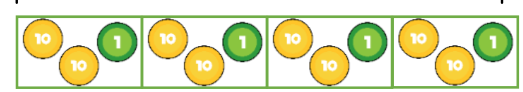
- Dexter has used a bar model and counters to find $\frac{1}{4}$ of 12



Use Dexter's method to calculate:

$\frac{1}{6}$ of 12 $\frac{1}{3}$ of 12 $\frac{1}{3}$ of 18 $\frac{1}{9}$ of 18

- Amir uses a bar model and place value counters to find one quarter of 84



Use Amir's method to find:

$\frac{1}{3}$ of 36 $\frac{1}{3}$ of 45 $\frac{1}{5}$ of 65

Fraction of an Amount (1)

Reasoning and Problem Solving

Whitney has 12 chocolates.

On Friday, she ate $\frac{1}{4}$ of her chocolates and gave one to her mum.

On Saturday, she ate $\frac{1}{2}$ of her remaining chocolates, and gave one to her brother.

On Sunday, she ate $\frac{1}{3}$ of her remaining chocolates.

How many chocolates does Whitney have left?

Whitney has two chocolates left.

Fill in the Blanks

$\frac{1}{3}$ of 60 = $\frac{1}{4}$ of $\square$

$\frac{1}{\square}$ of 50 = $\frac{1}{5}$ of 25

80

10

Fraction of an Amount (2)

Notes and Guidance

Children need to understand that the denominator of the fraction tells us how many equal parts the whole will be divided into. E.g. $\frac{1}{3}$ means dividing the whole into 3 equal parts.

They need to understand that the numerator tells them how many parts of the whole there are. E.g. $\frac{2}{3}$ means dividing the whole into 3 equal parts, then counting the amount in 2 of these parts.

Mathematical Talk

What does the denominator tell us?

What does the numerator tell us?

What is the same and what is different about two thirds and two fifths?

How many parts is the whole divided into and why?

Varied Fluency

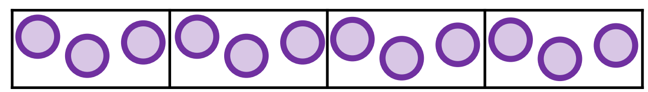
- Find $\frac{2}{5}$ of Eva's marbles.

I have divided the marbles into ☐ equal groups.

There are ☐ marbles in each group.

$\frac{2}{5}$ of Eva's marbles is ☐ marbles.

- Dexter has used a bar model and counters to find $\frac{3}{4}$ of 12



Use Dexter's method to calculate:

$\frac{5}{6}$ of 12 $\frac{2}{3}$ of 12 $\frac{2}{3}$ of 18 $\frac{7}{9}$ of 18

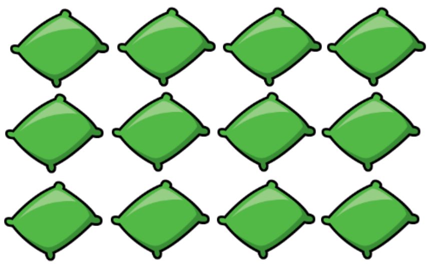
- Amir uses a bar model and place value counters to find three quarters of 84

Use Amir's method to find:

$\frac{2}{3}$ of 36 $\frac{2}{3}$ of 45 $\frac{3}{5}$ of 65

Fraction of an Amount (2)

Reasoning and Problem Solving

This is $\frac{3}{4}$ of a set of beanbags.  How many were in the whole set?	16
Ron has £28 On Friday, he spent $\frac{1}{4}$ of his money. On Saturday, he spent $\frac{2}{3}$ of his remaining money and gave £2 to his sister. On Sunday, he spent $\frac{1}{5}$ of his remaining money. How much money does Ron have left? What fraction of his original amount is this?	Ron has £4 left. This is $\frac{1}{7}$ of his original amount.

Fraction of an Amount (3)

Notes and Guidance

Children will apply their knowledge and understanding of fractions to solve problems in various contexts.

They recap and build their understanding of different measures.

Mathematical Talk

Do we need to make an exchange?

Can we represent the problem in a bar model?

When finding $\frac{5}{6}$, what will we need to do and why?

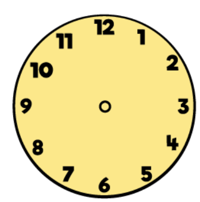
What is the whole? How can we represent this problem?

Varied Fluency

- Ron has £3 and 50p
  He wants to give half of his money to his brother.
  How much would his brother receive?

- A bag of sweets weighs 240 g
  There are 4 children going to the cinema, each receives $\frac{1}{4}$ of the bag.
  What weight of sweets will each child receive?

- Find $\frac{2}{3}$ of 1 hour.
  Use the clock face to help you.



1 hour = □ minutes

$\frac{1}{3}$ of □ minutes = □

$\frac{2}{3}$ of □ minutes = □

Fraction of an Amount (3)

Reasoning and Problem Solving

Mo makes 3 rugby shirts.

Each rugby shirt uses 150 cm of material.

He has a 600 cm roll of material.

How much material is left after making the 3 shirts?

What fraction of the original roll is left over?

150 cm

This is $\frac{1}{4}$ of his original roll of material.

Alex and Eva share a bottle of juice.

Alex drinks $\frac{3}{5}$ of the juice.

Eva drinks 200 ml of the juice.

One fifth of the juice is left in the bottle.

How much did Alex drink?

What fraction of the bottle did Eva drink?

What fraction of the drink is left?

Alex drank 600 ml of the juice.

Eva drank one fifth of the juice.

The fraction of juice left is $\frac{1}{5}$ of the bottle.

Equivalent Fractions (1)

Notes and Guidance

Children begin by using Cuisenaire or number rods to investigate and record equivalent fractions. Children then move on to exploring equivalent fractions through bar models.

Children explore equivalent fractions in pairs and can start to spot patterns.

Mathematical Talk

If the ___ rod is worth 1, can you show me $\frac{1}{2}$? How about $\frac{1}{4}$? Can you find other rods that are the same? What fraction would they represent?

How can you fold a strip of paper into equal parts?
What do you notice about the numerators and denominators?
Do you see any patterns?

Can a fraction have more than one equivalent fraction?

Varied Fluency

- The pink Cuisenaire rod is worth 1 whole.

  Which rod would be worth $\frac{1}{4}$?
  Which rods would be worth $\frac{2}{4}$?
  Which rod would be worth $\frac{1}{2}$?
  Use Cuisenaire to find rods to investigate other equivalent fractions.

- Use two strips of equal sized paper. Fold one strip into quarters and the other into eighths. Place the quarters on top of the eighths and lift up one quarter, how many eighths can you see? How many eighths are equivalent to one quarter? Which other equivalent fractions can you find?

- Using squared paper, investigate equivalent fractions using equal parts. e.g. $\frac{\square}{4} = \frac{\square}{8}$
  Start by drawing a bar 8 squares along. Label each square $\frac{1}{8}$
  Underneath compare the same length bar split into four equal parts. What fraction is each part now?

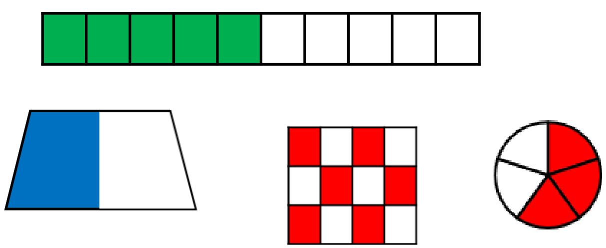
Equivalent Fractions (1)

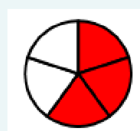
Reasoning and Problem Solving

Explain how the diagram shows both $\frac{2}{3}$ and $\frac{4}{6}$

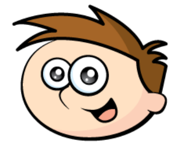
The diagram is divided in to six equal parts and four out of the six are yellow. You can also see three **columns** and two columns are yellow.

Which is the odd one out? Explain why





This is the odd one out because the other fractions are all equivalent to $\frac{1}{2}$



Teddy makes this fraction:

Mo says he can make an equivalent fraction with a denominator of 9

Dora disagrees. She says it can't have a denominator of 9 because the denominator would need to be double 3

Who is correct? Who is incorrect? Explain why.

Mo is correct. He could make three ninths which is equivalent to one third.

Dora is incorrect. She has a misconception that you can only double to find equivalent fractions.

White Rose Maths

Equivalent Fractions (2)

Notes and Guidance

Children use Cuisenaire rods and paper strips alongside number lines to deepen their understanding of equivalent fractions.
Encourage children to focus on how the number line can be divided into different amounts of equal parts and how this helps to find equivalent fractions e.g. a number line divided into twelfths can also represent halves, thirds, quarters and sixths.

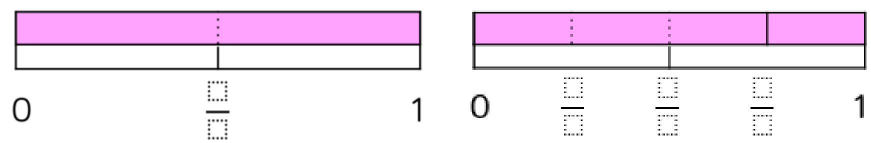
Mathematical Talk

The number line represents 1 whole, where can we see the fraction $\frac{\square}{\square}$? Can we see any equivalent fractions?

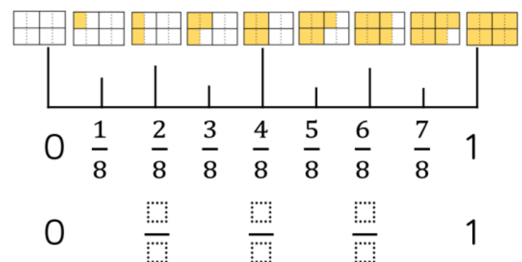
Look at the number line divided into twelfths. Which unit fractions can you place on the number line as equivalent fractions? e.g. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ etc. Which unit fractions are not equivalent to twelfths?

Varied Fluency

- Use the models on the number line to identify the missing fractions. Which fractions are equivalent?



- Complete the missing equivalent fractions.



- Place these equivalent fractions on the number line.

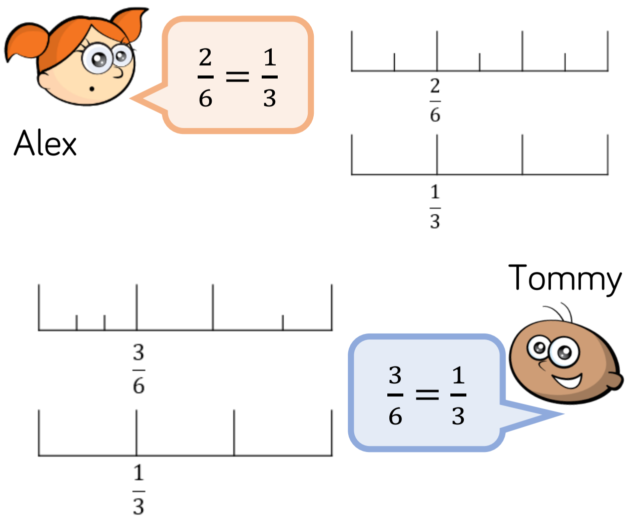
$\frac{1}{4}$ $\frac{3}{4}$ $\frac{1}{6}$ $\frac{1}{3}$ $\frac{2}{3}$

Are there any other equivalent fractions you can identify on the number line?

Equivalent Fractions (2)

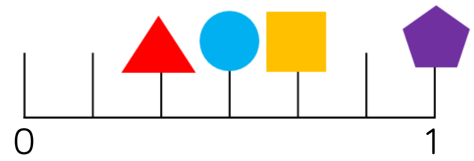
Reasoning and Problem Solving

Alex and Tommy are using number lines to explore equivalent fractions.



Who do you agree with? Explain why.

Alex is correct. Tommy's top number line isn't split into equal parts which means he cannot find the correct equivalent fraction.

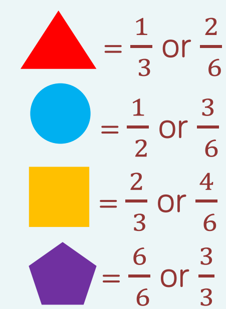


Use the clues to work out which fraction is being described for each shape.

- My denominator is 6 and my numerator is half of my denominator.
- I am equivalent to $\frac{4}{12}$
- I am equivalent to one whole
- I am equivalent to $\frac{2}{3}$

Can you write what fraction each shape is worth? Can you record an equivalent fraction for each one?

- Circle
- Triangle
- Square
- Pentagon



Accept other correct equivalences

White Rose Maths

Equivalent Fractions (3)

Notes and Guidance

Children use proportional reasoning to link pictorial images with abstract methods to find equivalent fractions. They look at the links between equivalent fractions to find missing numerators and denominators.
Children look for patterns between the numerators and denominators to support their understanding of why fractions are equivalent e.g. fractions equivalent to a half have a numerator that is half the denominator.

Mathematical Talk

Why do our times tables help us find equivalent fractions?

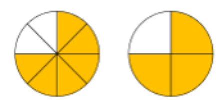
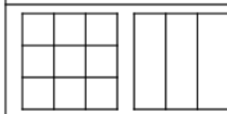
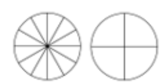
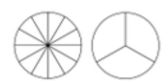
Can we see a pattern between the fractions?

Look at the relationship between the numerator and denominator, what do you notice? Does an equivalent fraction have the same relationship?

If we add the same number to the numerator and denominator, do we find an equivalent fraction? Why?

Varied Fluency

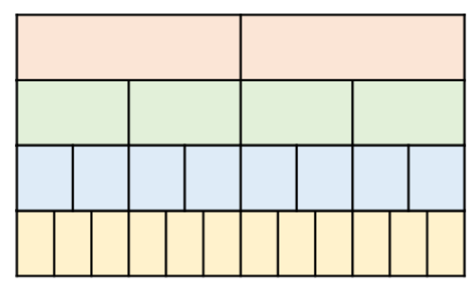
Complete the table. Can you spot any patterns?

Pictorial representation	Fraction	Words
	$\frac{6}{8} = \frac{3}{4}$	Six eighths is equivalent to three quarters
	$\frac{1}{3} = \frac{\square}{9}$	_______is equivalent to ______
	$\frac{\square}{4} = \frac{\square}{12}$	Three twelfths is equivalent to _____ quarters
	$\frac{4}{12} = \frac{\square}{\square}$	_______is equivalent to ______

Use the fraction wall to complete the equivalent fractions.

$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{8} = \frac{6}{\square}$

$\frac{1}{4} = \frac{2}{\square} = \frac{3}{\square}$



Equivalent Fractions (3)

Reasoning and Problem Solving

Always, sometimes, never.

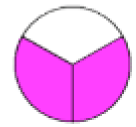
If a fraction is equivalent to one half, the denominator is double the numerator.

Prove it.

Can you find any relationships between the numerator and denominator for other equivalent fractions?

Always, children could also think of the numerator as being half of the denominator.

Dora has shaded a fraction.



She says,

I am thinking of an equivalent fraction to the shaded fraction where the numerator is 9

Is this possible?
Explain why.

This is impossible. Dora may have mistaken the numerator for the denominator and be thinking of $\frac{6}{9}$ which is equivalent to $\frac{2}{3}$

Compare Fractions

Notes and Guidance

Children compare unit fractions or fractions with the same denominator.

For unit fractions, children's natural tendency might be to say that $\frac{1}{2}$ is smaller than $\frac{1}{4}$, as 2 is smaller than 4. Discuss how dividing something into more equal parts makes each part smaller.

Mathematical Talk

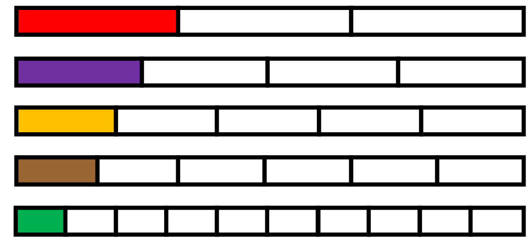
What fraction of the strip is shaded? What fraction of the strip is not shaded?

Why is it important that the strips are the same length and are lined up underneath each other?

Can you think of a unit fraction that is smaller than $\frac{1}{10}$? Can you think of a unit fraction that is larger than $\frac{1}{3}$?

Varied Fluency

- Use >, < or = to compare the fractions.



$\frac{1}{10}$ ◯ $\frac{1}{4}$ $\frac{1}{3}$ ◯ $\frac{1}{6}$ $\frac{1}{5}$ ◯ $\frac{1}{4}$

When the numerators are the same, the ______ the denominator, the ______ the fraction.

- Use paper strips to compare the fractions using >, < or =

$\frac{3}{4}$ ◯ $\frac{1}{4}$ $\frac{1}{6}$ ◯ $\frac{5}{6}$ $\frac{3}{8}$ ◯ $\frac{5}{8}$

When the denominators are the same, the ______ the numerator, the ______ the fraction.

Compare Fractions

Reasoning and Problem Solving

I know that $\frac{1}{3}$ is larger than $\frac{1}{2}$ because 3 is larger than 2

Do you agree with Dora?
Explain how you know.

$\frac{1}{3}$ is smaller because it is split into 3 equal parts, rather than 2 equal parts. Children could draw a bar model to show this.

Complete the missing denominator.
How many different options can you find?

$$\frac{1}{2} > \frac{1}{\square} > \frac{1}{10}$$

Examples could include $\frac{1}{3}$, $\frac{1}{4}$ etc.

Here are three fractions.

$$\frac{3}{8} \quad \frac{3}{5} \quad \frac{1}{8}$$

Which fraction is the largest? How do you know?

Which fraction is the smallest? How do you know?

$\frac{3}{5}$ is the largest- when the numerators are the same, the smaller the denominator the larger the fraction. Children could also explain that $\frac{3}{5}$ is the only fraction larger than a half.
$\frac{1}{8}$ is the smallest- when the denominators are the same, the smaller the numerator, the smaller the fraction.

Order Fractions

Notes and Guidance

Children order unit fractions and fractions with the same denominator. They use bar models and number lines to order the fractions and write them in ascending and descending order.

Continue to encourage children to use stem sentences to explain why they can compare fractions when the numerators or the denominators are the same.

Mathematical Talk

How many equal parts has the whole been divided in to?

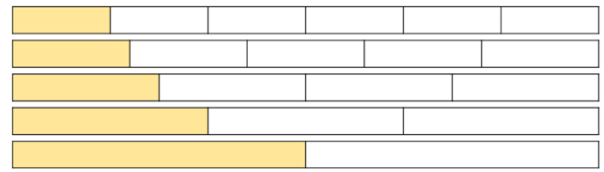
How many equal parts need shading?

Which is the largest fraction? Which is the smallest fraction?

Which fractions are the hardest to make as paper strips? Why do you think they are harder to make?

Varied Fluency

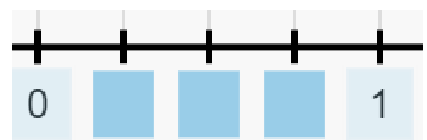
- Divide strips of paper into halves, thirds, quarters, fifths and sixths and colour in one part of each strip.
  Now order the strips from the smallest to the largest fraction.



When the numerators are the same, the _______ the denominator, the _____ the fraction.

- Place the fractions on the number line.

$\frac{2}{4}$ $\frac{3}{4}$ $\frac{1}{4}$

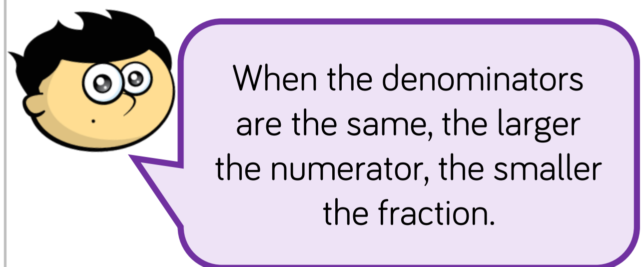


- Order the fractions in descending order.

$\frac{3}{8}$ $\frac{5}{8}$ $\frac{1}{8}$ $\frac{8}{8}$ $\frac{7}{8}$

Order Fractions

Reasoning and Problem Solving

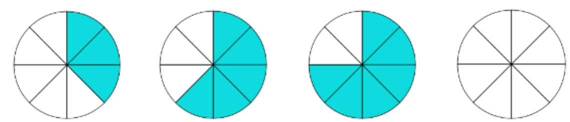


Is Jack correct?
Prove it.

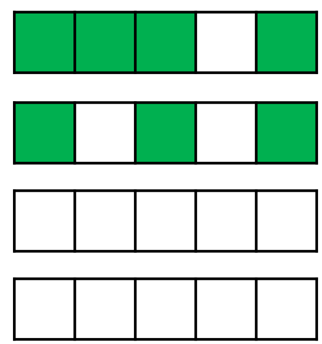
Jack is incorrect. When the denominators are the same, the larger the numerator the larger the fraction. Children could prove this using bar models or strips of paper etc.

Shade the blank diagrams so the fractions are ordered correctly.

Fractions in ascending order



Fractions in descending order



Either 7 or 8 parts shaded.

Either 2 and 1 parts shaded or 1 and 0 parts shaded.

Add Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to add two or more fractions with the same denominator where the total is less than 1

They understand that we only add the numerators and the denominators stay the same.

Mathematical Talk

Using your paper circles, show me what $\frac{\square}{4} + \frac{\square}{4}$ is equal to.

How many quarters in total do I have?

How many parts is the whole divided into?
How many parts am I adding?
What do you notice about the numerators?
What do you notice about the denominators?

Varied Fluency

- Take a paper circle. Fold your circle to split it into 4 equal parts. Colour one part red and two parts blue. Use your model to complete the sentences.
  ______ quarter is red.
  ______ quarters are blue.
  ______ quarters are coloured in.
  Show this as a number sentence. $\frac{\square}{4} + \frac{\square}{4} = \frac{\square}{4}$

- 

  We can use this model to calculate $\frac{3}{8} + \frac{1}{8} = \frac{4}{8}$
  Draw your own models to calculate

  $\frac{1}{5} + \frac{2}{5} = \frac{\square}{5}$ $\quad$ $\frac{2}{7} + \frac{3}{7} + \frac{1}{7} = \frac{\square}{\square}$ $\quad$ $\frac{7}{10} + \frac{\square}{\square} = \frac{9}{10}$

- Eva eats $\frac{5}{12}$ of a pizza and Annie eats $\frac{1}{12}$ of a pizza.
  What fraction of the pizza do they eat altogether?

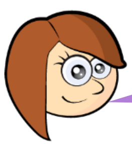
Add Fractions

Reasoning and Problem Solving

Rosie and Whitney are solving:

$$\frac{4}{7} + \frac{2}{7}$$

Rosie says,



The answer is $\frac{6}{7}$

Whitney says,

The answer is $\frac{6}{14}$

Who do you agree with?
Explain why.

Rosie is correct. Whitney has made the mistake of also adding the denominators. Children could prove why Whitney is wrong using a bar model or strip diagram.

Mo and Teddy share these chocolates.

They both eat an odd number of chocolates.
Complete this number sentence to show what fraction of the chocolates they each could have eaten.

$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{12}{12}$$

Possible answers:

$\frac{1}{12} + \frac{11}{12}$

$\frac{3}{12} + \frac{9}{12}$

$\frac{5}{12} + \frac{7}{12}$

(In either order)

Subtract Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to subtract fractions with the same denominator within one whole.

They understand that we only subtract the numerators and the denominators stay the same.

Mathematical Talk

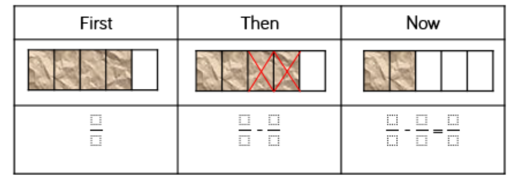
What fraction is shown first? Then what happens? Now what is left? Can we represent this in a number story?

Which models show take away? Which models show finding the difference? What's the same? What's different?
Can we represent these models in a number story?

Can you partition $\frac{9}{11}$ in a different way?

Varied Fluency

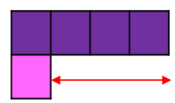
- Eva is eating a chocolate bar. Fill in the missing information.



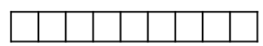
Can you write a number story using 'first', 'then' and 'now' to describe your calculation?

- Use the models to help you subtract the fractions.

$\frac{5}{7} - \frac{\square}{7} = \frac{\square}{7}$

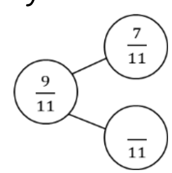


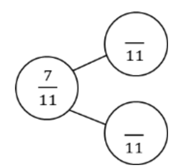
$\frac{4}{8} - \frac{\square}{8} = \frac{\square}{8}$

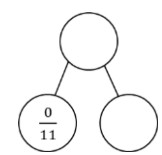


$\frac{\square}{9} - \frac{\square}{9} = \frac{4}{9}$

- Complete the part whole models. Use equipment if needed. Can you write fact families for each model?







Subtract Fractions

Reasoning and Problem Solving

Find the missing fractions:

$\frac{7}{7} - \frac{3}{7} = \frac{2}{7} + \frac{\square}{7}$

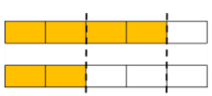
$\frac{\square}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$

$\frac{7}{7} - \frac{3}{7} = \frac{2}{7} + \frac{2}{7}$

$\frac{7}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$

Jack and Annie are solving $\frac{4}{5} - \frac{2}{5}$

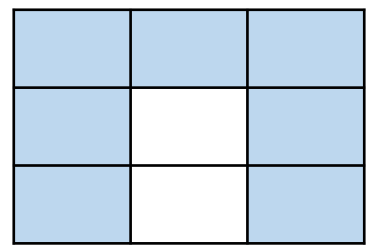
Jack's method: 

Annie's method: 

They both say the answer is two fifths. Can you explain how they have found their answers?

Jack has taken two fifths away. Annie has found the difference between four fifths and two fifths.

How many fraction addition and subtractions can you make from this model?



There are lots of calculations children could record. Children may even record calculations where there are more than 2 fractions e.g. $\frac{3}{9} + \frac{1}{9} + \frac{3}{9} = \frac{7}{9}$ Children may possibly see the red representing one fraction and the white another also.

White Rose Maths

Summer - Block 2

Time

Overview

Small Steps

- O'clock and half past (R)
- Quarter past and quarter to (R)
- Months and years
- Hours in a day
- Telling the time to 5 minutes
- Telling the time to the minute
- Using a.m. and p.m.
- 24-hour clock
- Finding the duration
- Comparing durations
- Start and end times
- Measuring time in seconds

Notes for 2020/21

Children should be able to tell the time to the hour, half hour and quarter of an hour before moving on to tell the time to the nearest 5 minutes and then the nearest minute.

You may choose to cover these steps daily across the year to save time for some of the earlier concepts such as place value, addition and subtraction and multiplication and division.

O'clock and Half Past

Notes and Guidance

Children recap the Year one objective of telling the time to the hour and half past the hour.

Children should be given the opportunity to create times using individual clocks with moveable hands.

Children read and write times from clocks.

Mathematical Talk

What do the numbers represent on the clock face?
Which is the hour hand? Which is the minute hand?

Where will the hour hand be at ____ ?
Where will the minute hand be at ____?
What do you notice about the minute hand at half past?

Can you show me _______?

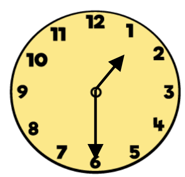
Varied Fluency

R

Match the events to the approximate times they happen.
Can you show the time on your clock?

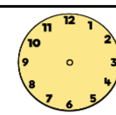
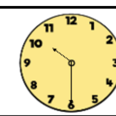
9 o’clock	Lunchtime
Half past 10	Go to school
12 o’clock	Home time
Half past 3	Playtime

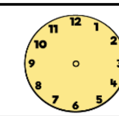
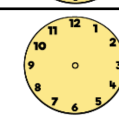
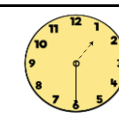
What time is it?



It is [ ] past [ ]

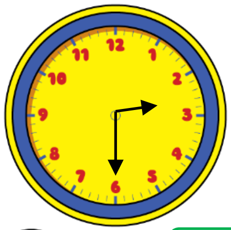
Complete the tables.

5 o’clock	
	

Half past 4	
1 o’clock	
	

O'clock and Half Past

Reasoning and Problem Solving

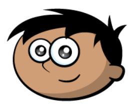


Who is telling the time correctly?

The time is half past 6

Dora

The time is half past 3



Amir

The time is half past 2

Alex

Can you spot the mistakes they've made?

Alex is correct.
Dora has confused the minute hand with the hour hand.
Amir has not noticed that the hour hand has not gone past 3 yet.

It is half past 11 so the hour hand should be on the 11

Is Alex correct?
Explain your reasoning.

Alex is incorrect. If the time is half past 11 the hour hand should be half way between the 11 and 12

Oh no! The minute hand has fallen off the classroom clock!

Lunchtime is at 12:00

Have the children missed their lunchtime?

Unfortunately, the children have missed their lunch. The hour hand is halfway between 12 and 1 so the time is 12:30

Quarter Past & Quarter To

Notes and Guidance

Children read and draw the times ‘quarter to’ and ‘quarter past’. They use their knowledge of fractions and turns to identify quarter past and quarter to.

Children should recognise that the hour hand moves along with the minute hand. Therefore when the time is quarter past the hour, the hour hand will be just past the hour and when the time is quarter to, the hour hand will be just before the hour.

Mathematical Talk

Where are the hands pointing to?

Can we divide the clock face into four equal parts? Can we link this to fractions?

If the minute hand is pointing at 3, how many minutes have passed the hour?

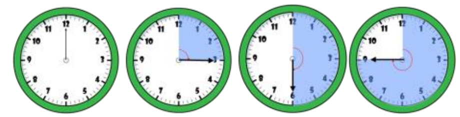
If the minute hand is pointing at 9, how many minutes until the next hour?

Show me quarter past/to….

Varied Fluency

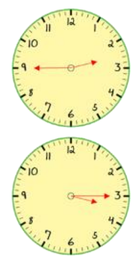
R

- Look at the clocks.

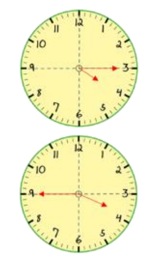


Discuss how the minute hand has travelled. Identify when the time is quarter past the hour and quarter to the hour. Give the children individual clocks with moveable hands and ask them to make quarter to/past times.

- Match the clocks to the correct time.



Quarter to four
Quarter past four
Quarter to three
Quarter past three

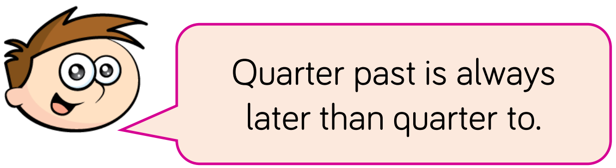


- Complete the table.

The minute hand is pointing to ____ The hour hand is just after ____ The time is *quarter ____ seven*		The minute hand is pointing to three. The hour hand is just after six. The time is *quarter past six.*	
The minute hand is pointing to ____ The hour hand is just before ____. The time is *quarter ____ two.*		The minute hand is pointing to nine. The hour hand is just ____ twelve. The time is *quarter to twelve.*	

Quarter Past & Quarter To

Reasoning and Problem Solving



Do you agree with Teddy?
Explain why.

It depends on the hour of the times given. For example: quarter to 12 is later than quarter past 11
If the hour remains the same than Teddy is correct.

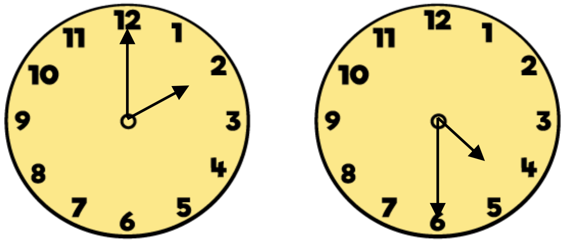
How many quarters of an hour are between 7 o'clock and 9 o'clock.

Explain how you found the answer.

There are 8 quarters of an hour between 7 o'clock and 9 o'clock.

The train to Blackpool leaves at quarter past and quarter to every hour.

Make a list of the times of the trains Oliver can catch if he gets to the train station between 2 o'clock and half past 4



Oliver could catch the following trains:
Quarter past 2
Quarter to 3
Quarter past 3
Quarter to 4
Quarter past 4

Months and Years

Notes and Guidance

Children look at the concept of years and months. They are introduced to leap years and how they are different from a non-leap year.

Children should explore years using calendars to investigate the number of days in each month. Rhymes and songs are helpful for children to remember the number of days in each month.

Mathematical Talk

When is your birthday? What other significant dates are there during the year? Are they the same every year?

Which month comes before _______?
Which month comes after ______?

Which month changes when there is a leap year? Are there any other months that change length? Is this year a leap year? When will the next one be? When was the last one?

Varied Fluency

- Children should spend time exploring a real calendar. They sort the months into groups, by the number of days in each month, for both a year and a leap year. Children can use the groups to compare - what is the same and what is different?

- Use the numbers to fill in the gaps in the sentences.

  There are _______ days in a year.
  There are _______ months in a year.
  There are _______ days in a leap year.
  There are _______ days in a week.
  Leap years happen every _____ years.

  7 | 365 | 4 | 366 | 12

- Put these dates in order from earliest to latest in a year.

  3rd March | 2nd March | January 31st | 1st December

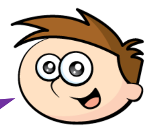
  Earliest ———————————— Latest

Months and Years

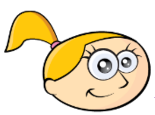
Reasoning and Problem Solving

4 children describe their birthdays.

Mo: My birthday is the first day of the second month.



Teddy: I was born on the 15th of June.



Eva: I was born on the last day of the year!

Dora: I was born two days before Mo.

Can you work out their birthdays and order them from earliest to latest in the year?

Dora – 30th Jan
Mo - 1st Feb
Teddy - 15th June
Eva - 31st Dec

Whitney asks Rosie and Jack a question.

Whitney: Some months have 31 days, some months have 30 days. How many months have 28 days?

Rosie: Only February has 28 days.

Jack: Every month has 28 days.

Who do you agree with? Explain your thinking.

They are correct for different reasons. Rosie is correct because only February has exactly 28 days, but Jack is correct because every month has at least 28 days.

Hours in a Day

Notes and Guidance

Children recap the number of hours in a day and are introduced to language such as 'noon', 'midday', 'midnight'. They do not need to know the difference between a.m. or p.m. at this point.

Other facts such as days in a week/month are also reviewed. Attention should be drawn to the difference between a school week and a calendar week and between day-time and a day.

Mathematical Talk

What time does the day start? How many hours are there in a day?

How many hours do you spend at school in a day? When does school start and finish?

Why does a clock show 11 o'clock twice in a day?

Does the weekend and the school week split a whole week in half?

Varied Fluency

- Fill in the gaps in the sentence stems.
  There are _____ days in a whole week.
  There are _____ days in a school week.
  There are _____ hours in a day.
  There are _____ hours in a school day.

- Put the times/events into the correct place on the diagram.

Morning	Afternoon	Evening	Night

Breakfast	Midnight	Midday	Go to school
Supper	Bedtime	Assembly	Brushing teeth

- Complete the statements.

1 day	=	24 hours	____ days	=	120 hours
2 days	=	____ hours	____ days	=	60 hours
____ days	=	240 hours	20 days	=	____ hours

Hours in a Day

Reasoning and Problem Solving

Mo

I get up at 7 o'clock in the morning and go to bed at 7 o'clock at night. This means I have been awake for a full day.

Do you agree with Mo?
Explain your answer.

Children should state that they do not agree with Mo because there are 24 hours in a full day.
Mo has only been up for 12 hours which is half a day.
A full day would be 7am to 7am.

Su	Mo	Tu	We	Th	Fr	Sa
	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			

In this month, there are no school holidays.

In this month we have to come to school for 31 days.

Teddy

Do you agree with Teddy?
Explain your thinking.
Which month could it be?

Teddy is not correct, as the children only have to come to school for 23 days if there are no holidays. Children should discuss the fact they do not come to school on a Saturday or Sunday.
It is most likely to be March if there are no holidays at all. It is a good opportunity to look at your school calendar with the children.

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.

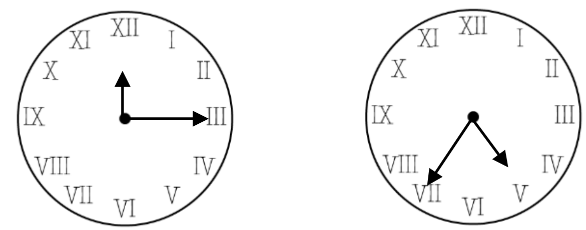
Attention should be drawn to the differences between the minute hand and the hour hand. This is especially important for times that are close to the next hour, for example, 5 minutes to 12

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.

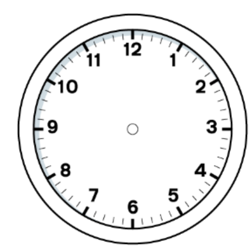
- 

  What time is shown on each clock?

  _____ minutes past _____ _____ minutes to _____

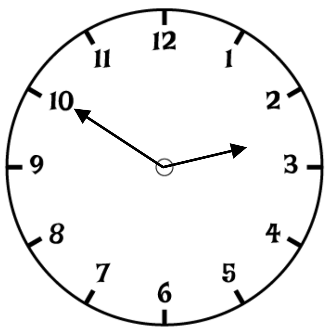
- Draw the hands on the clock to show the time:

  25 minutes to 6

Telling the Time (1)

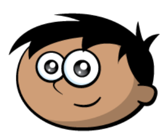
Reasoning and Problem Solving



Dora

The clock shows ten minutes to 3

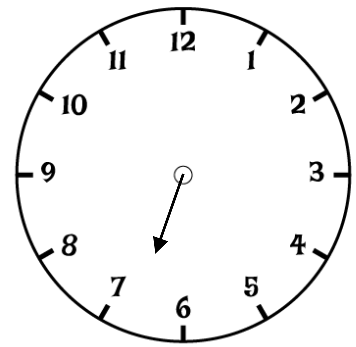
The hour hand is not quite pointing to the 3, so it must be ten to 2



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?

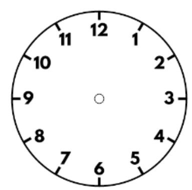
When are the minutes to an hour and the minutes past an hour the same?

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

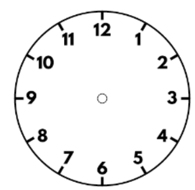
Varied Fluency

- 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.

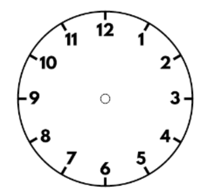
- Draw the hands on the clock from the following times.



Four minutes to 4



24 minutes to 8



24 minutes past 8

- Dora is telling the time from an analogue clock.

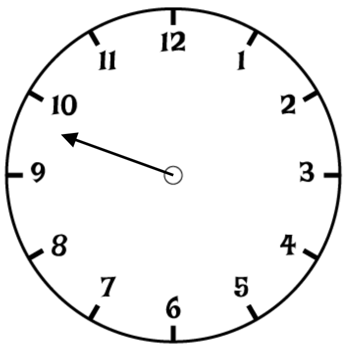
> The hour hand is pointing to XI
> the minute hand is pointing to XII

What time is it?

Telling the Time (2)

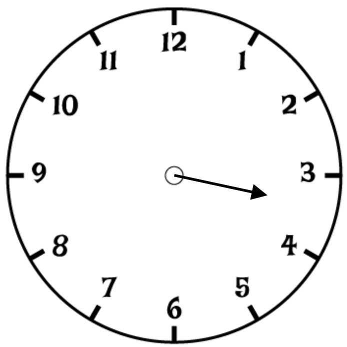
Reasoning and Problem Solving

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

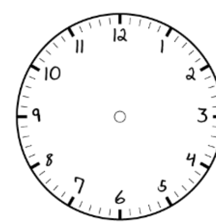
Using a visual timetable, sort the events into morning and afternoon.
Create sentences to describe when events take place.
For example: Maths is in the morning. Guided Reading is in the afternoon.

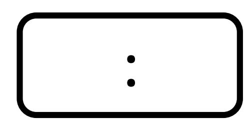
Sort the times from latest to earliest.

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.





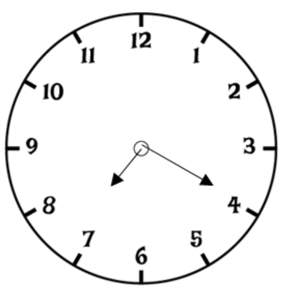
Using a.m. and p.m.

Reasoning and Problem Solving

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

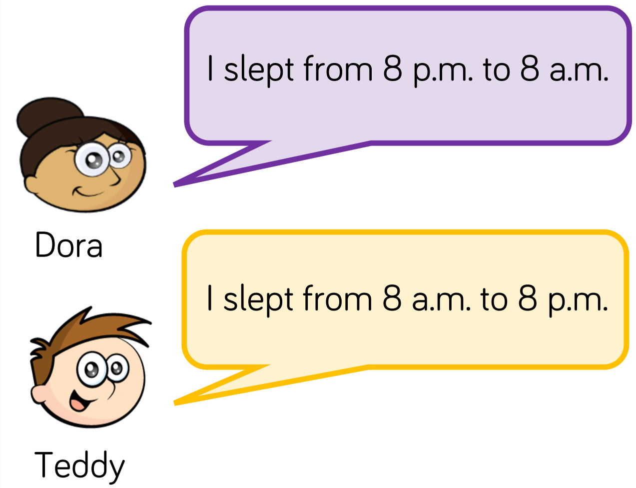
	Arrives	Leaves
London	5:50 a.m.	6:00 a.m.
Edinburgh	8:00 a.m.	8:20 a.m.
Manchester	2:33 p.m.	2:45 p.m.
Leeds	7:31 p.m.	7:35 p.m.

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?

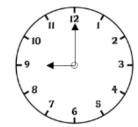
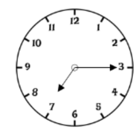
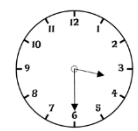
What will the number representing the hour be in 24-hour clock time? How do you know if it will be less than 12 or more than 12?

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

- 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

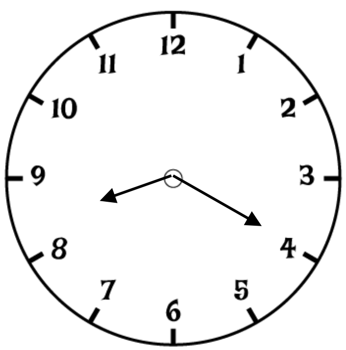
24-hour Clock

Reasoning and Problem Solving

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

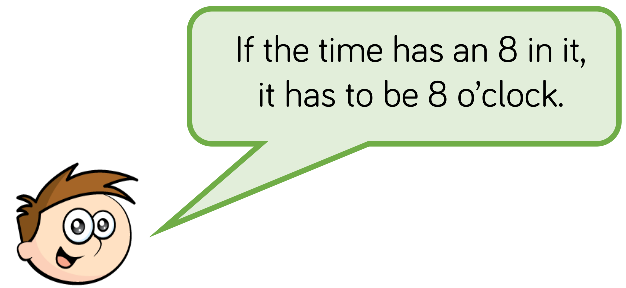
Is she correct?
Explain how you know.

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

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

Finding the Duration

Notes and Guidance

Children find the durations of events using both analogue and digital clocks. They should be given opportunities to practically work out durations of time using clocks with moveable hands. Number lines are also a useful model.

Children explore the most efficient ways of breaking the time down in order to work out the duration. For example: half hours, quarter of an hour and five minutes.

Mathematical Talk

When did ____ start, and when did it finish?

How many hours/minutes is a full turn of the minute hand around the clock?

Do we need to count each individual minute?

How else could you break down the duration to make it easier to count?

Varied Fluency

- Calculate the duration of the TV programmes.

TV Programme	Start Time	Finish Time	Duration
Pals	06:30	07:30	
Dennis the explorer	15:15	18:15	
The football show	12:00	14:00	
An adventure	10:40	12:40	

- Use an individual clock to work out the time spent running then complete the sentences.
  Rosie started running at 7:20 a.m. and stopped at 8:45 a.m.
  Rosie ran for _____ minutes.
  Tommy started running at 09:10 and stopped at 09:55
  Tommy ran for ______ minutes.

- Amir gets on a bus at 15:23
  It arrives at 16:22
  How long was the bus journey?
  How many ways can you find to work out the answer?

Finding the Duration

Reasoning and Problem Solving

Eva starts playing her piano at 11:30

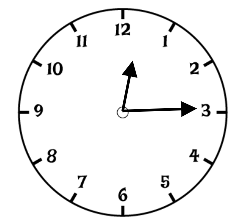
She plays for 45 minutes before having a half an hour break.

She then plays for another 15 minutes.

What time did she finish?

Eva finishes at 13:00 or 1 o'clock

Lunchtime begins at:



Lunchtime ends at:

1:10

Teddy and Rosie are working out how long lunchtime lasts for.

Teddy: I did three quarters of an hour then added 10

Rosie: I did 1 hour take away 5 minutes

Whose method is correct?

Both children's methods are correct.

Teddy has found the duration by 15 + 15 + 15 + 10 = 55 minutes.

Rosie has found the duration by noticing that one hour after the start of lunch it will be 1:15, so she needs to take 5 minutes from 1 hour to also give 55 minutes.

White Rose Maths

Comparing the Duration

Notes and Guidance

Children compare durations of time using analogue and digital clocks. They could use empty number lines to model the situations as these will assist with bridging over hours.

They use their knowledge of addition and subtraction, and that there are 60 minutes in an hour, to compare the length of time taken by particular events or tasks.

Mathematical Talk

Which is the longest amount of time?

Which is the shortest amount of time?

Is _______ longer or shorter than _____?

How much longer was ______?

How much shorter was ______?

Varied Fluency

- Use your class daily timetable to answer these questions.
  Which is the longest lesson?
  Which is the shortest lesson?
  How much longer is ______ than ______?

- Use the symbols < , > and = to compare the following durations.

  2:00 p.m. – 6:00 p.m. ◯ 08:00 a.m. – 12:00 p.m.

  07:30 a.m. – 09:30 a.m. ◯ 11:40 a.m. – 02:40 p.m.

  03:30 a.m. – 05:00 p.m. ◯ 03:30 p.m. – 05:00 a.m.

- Complete the sentence about the duration of the train journeys.

Destination	Train departs	Train arrives
London	08:45	11:35
Leeds	10:05	10:33
Manchester	13:10	14:20

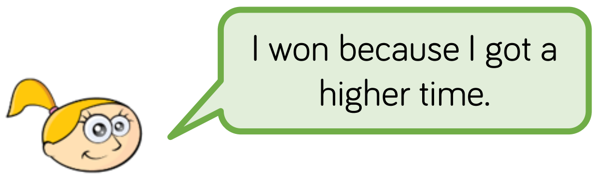
The journey to London is ____________ than the journey to Manchester.

Which journey takes the least amount of time?

Comparing the Duration

Reasoning and Problem Solving

Eva and Mo are having a race.
It takes Eva 3 and a half minutes to complete the race.
It takes Mo 3 minutes and 15 seconds.

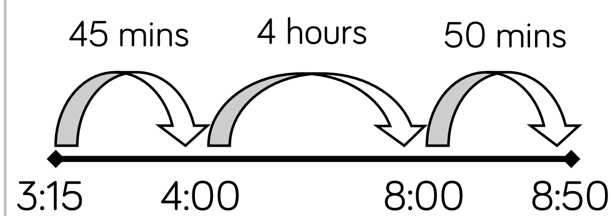


Is Eva correct?
Explain how you know.

Eva is incorrect. Eva took longer to finish the race therefore she finished after Mo. The winner of a race is the person who finishes in the shortest amount of time.

Jack's school starts at ten to 9 and finishes at quarter past 3

He uses the number line to calculate how long the school day is.



Jack works out the school day is 5 hours and 35 minutes long.
Jack is incorrect.

Explain his mistake.

Jack has worked out the time from 3:15 p.m. until ten to 9 in the evening. He should start at 8:50 a.m. and work through noon to 3:15 p.m.

Start and End Times

Notes and Guidance

Children find start and end times to the nearest minute using both analogue and digital times.

They could use real clocks with moveable hands whilst learning how to add and subtract times, and then move to number lines to help calculate start and end times.

Part-whole models could also be used to split longer intervals.

Mathematical Talk

Which hand do you need to move?

Do you need to move the hand clockwise or anti-clockwise?

What time should the number line start at?

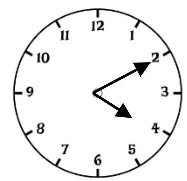
Will you jump forwards or backwards?

How many intervals will you break the duration into?

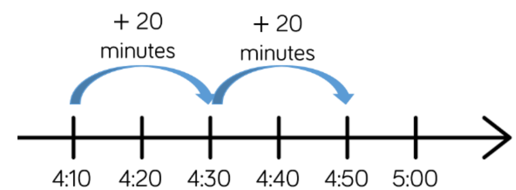
Would a part-whole model help?

Varied Fluency

- Practice finding start/end times by moving hands on a clock. For example, If playtime starts at five past ten and lasts for 20 minutes, what time will playtime end?
  A fifty minute maths lesson finishes at 10.15. What time does the lesson start?

- 
  A 40 minute TV programme starts at the time shown. What time does it finish?

  We can use a number line to work out the end time.
  Use this method to work out:

  - The end time of a 25 minute lesson starting at 2.15 p.m.
  - The start time if a 1 hour 10 minute journey ended at 4 o'clock.

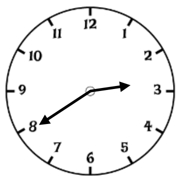
- Which activity ends the latest?

  Gymnastics starts at 15:30 and lasts 1 hour 15 minutes.

  Football starts at 16:05 and lasts 45 minutes.

Start and End Times

Reasoning and Problem Solving



School ends in 45 minutes. What time will it be?

Amir says,

It's 20 minutes to 3 o'clock, so school finishes at 3:25 p.m.

Whitney says,

School ends at 2:85

Who do you agree with?
Explain why.

I agree with Amir, because Whitney has not remembered that there are 60 minutes in an hour and has added 45 minutes to 2:40
Children may use a number line to prove Amir is correct.

Tommy is halfway through watching his favourite TV programme. He looks at his watch and it shows this time.

15:45

The show is less than 1 hour long.

What could the start and end time be?

How many different start and end times can you find?

Possible answers include:

Start at 15.20 and end at 16.10
Start at 15.25 and end at 16.05
Start at 15.30 and end at 16.00
Start at 15.35 and end at 15.55
Start at 15.40 and end at 15.50

Measuring Time in Seconds

Notes and Guidance

Children measure and compare durations of time in seconds. It is important for children to have a realistic sense of what time in seconds feels like, as they often count in seconds too quickly. They could use a stopwatch to compare, for example, counting to 10 seconds in their heads with the actual timed duration. They recognise that there are 60 seconds in one minute and use this to write durations of time in different ways e.g. 80 seconds is the same as 1 minute and 20 seconds.

Mathematical Talk

What can we use to measure time in seconds accurately?

Can you suggest a task that lasts _____ seconds?

Which task took the longest/shortest time to complete?

How many seconds are there in 1 minute?

If a task takes longer than 60 seconds, how else could we record the duration of time?

How could we work out how many seconds there are in _____ minutes?

Varied Fluency

- Children use a stopwatch to find the length of time it takes, in seconds, to complete different tasks. For example, run across the hall/playground, do 10 star jumps, write their name. How long did each task take?
  Order the tasks based on the time they took to complete.

- Match the times in words to the times shown on the stopwatches.

Two minutes five seconds	00:01:50
10 seconds less than 2 minutes	00:02:30
Two minutes 50 seconds	00:02:05
150 seconds	00:02:50

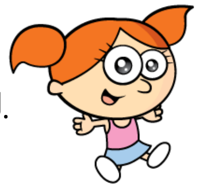
- Complete the table.

Time in minutes	Time in seconds
2 minutes	
	100 seconds
3 minutes 20 seconds	

Measuring Time in Seconds

Reasoning and Problem Solving

Alex takes 153 seconds to skip around the playground.



Jack takes 2 minutes 23 seconds.

Who is the quickest?
Explain how you know.

Jack is quickest.
If we convert 2 minutes 23 seconds into seconds it is $120 + 23 = 143$ seconds.
So Jack was 10 seconds quicker than Alex.

True or False?

- 3 minutes 5 seconds < 190 seconds
- 4 minutes = 204 seconds
- 170 seconds > 2 minutes 50 seconds

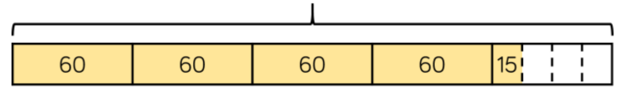
- TRUE
- FALSE
4 minutes is equal to 240 seconds
- FALSE
170 seconds is equal to 2 minutes 50 seconds

Dora works out how many seconds there are in 4 minutes 15 seconds.

She says,

That's easy, it is 415 seconds.

Dexter uses a bar model to help him.



Each minute has 60 seconds. So it's 4 lots of 60 plus 15.

Who is correct?

Dora thinks there are 100 seconds in 1 minute, but there are 60.
Dexter is correct
$60 \times 4 = 240$
$240 + 15 = 255$ seconds.

Summer - Block 3

Properties of Shape

Overview

Small Steps

- Turns and angles
- Right angles in shapes
- Compare angles
- Draw accurately
- Horizontal and vertical
- Parallel and perpendicular
- Recognise and describe 2-D shapes
- Recognise and describe 3-D shapes
- Make 3-D shapes

Notes for 2020/21

This content is brand new for all children and so no recap steps are required.

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?

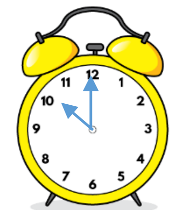
Can you see any angles around the classroom?

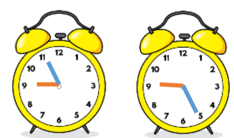
Varied Fluency

- 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?





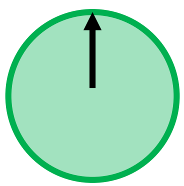
What turn has the minute hand made?

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

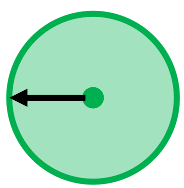
Turns and Angles

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.

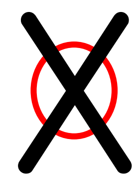
Alex says,

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.

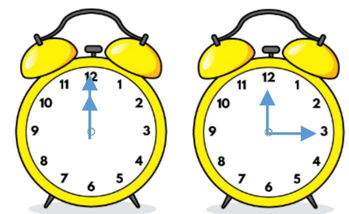
Children need to see examples in different orientations so that they understand that a right angle does not have to be made up of a horizontal and vertical line.

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

- 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.

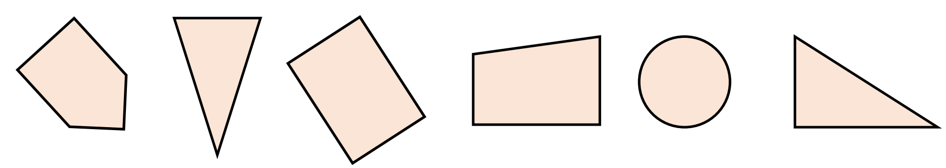


The angle between the hands is called a _________ angle.
One quarter turn is equal to a _________ angle.

- 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.

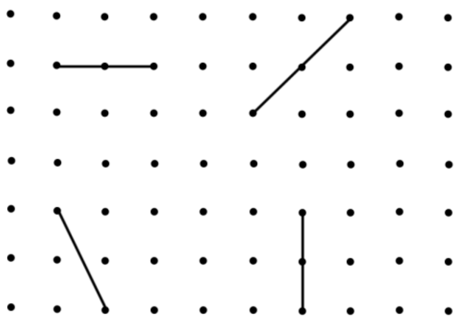
- Sort the shapes based on the number of right angles they have. Record your answer in a table.



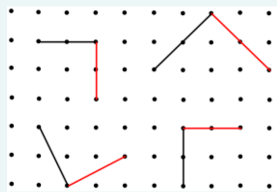
Right Angles in Shapes

Reasoning and Problem Solving

Draw a line along the dots to make a right-angle with each of these lines:

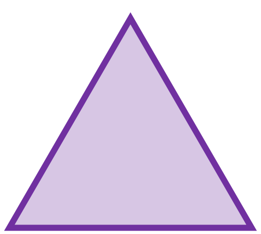


For example (see red lines):



True or False?

This shape has two right-angles.

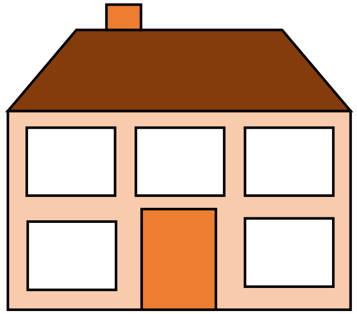


Explain your answer.

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

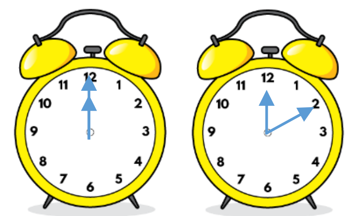
Children identify whether an angle is greater than or less than a right angle in shapes and turns, by measuring, comparing and reasoning in practical contexts.

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

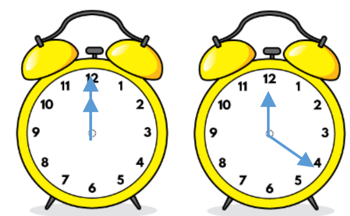
Mathematical Talk

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

- 

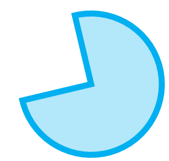
  The angle between the hands is _________ than a right angle.
  This is called an _________ angle.

  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.

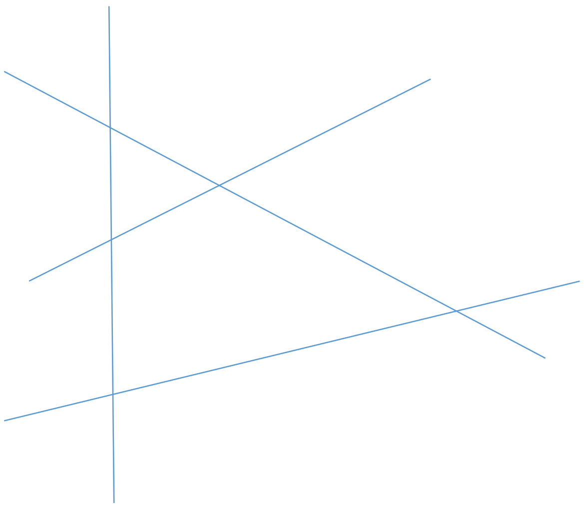
- Label any acute or obtuse angles in these images.

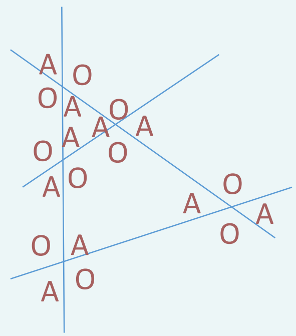
  
  
  

Compare Angles

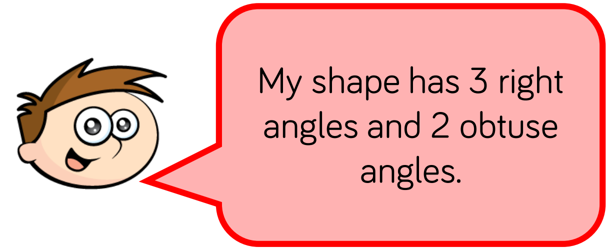
Reasoning and Problem Solving

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





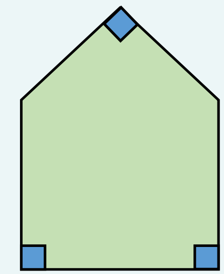
Teddy describes a shape.



What could Jack's shape look like?

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

Possible answer:



Draw Accurately

Notes and Guidance

Children measure and draw straight lines accurately in centimetres and millimetres. They also practice rounding measurements to the nearest centimetre.
Make sure the children correctly position the ruler when measuring/drawing the line, by lining up the 0 with the start of the line.

Mathematical Talk

Where should we position the ruler when measuring each line? Why?

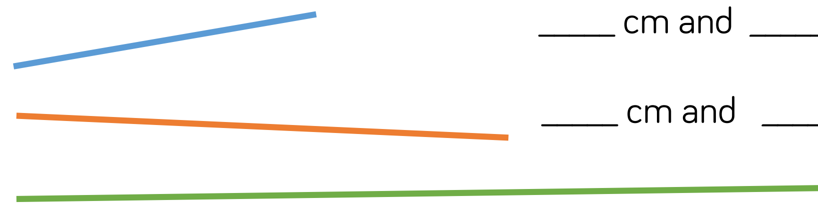
How long is each line in millimetres?

Why does 9 cm and 9 mm round to 10 cm and not 9 cm? Look at the ruler/number line to explain your answer.

Do we round 10 cm and 5 mm to 10 cm or 11 cm? Why?

Varied Fluency

- Measure these lines. Record your measurements in cm and mm.



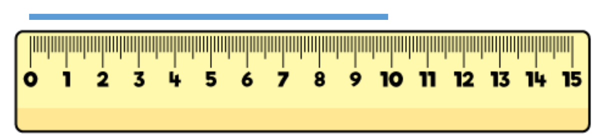
_____ cm and _____ mm

_____ cm and _____ mm

_____ cm and _____ mm

- Draw straight lines that measure exactly:

12 cm	8 cm and 5 mm
9 cm and 8 mm	14 cm and 2 mm

- 

This line measures 9 cm and 9 mm

It measures ____ cm to the nearest centimetre.
Draw a line for each of the measurements.

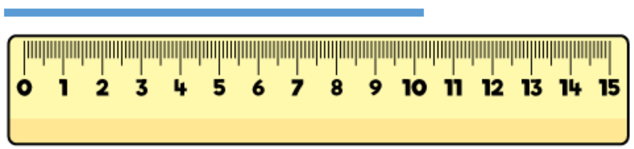
5 cm and 2 mm	13 cm and 8 mm
0 cm and 9 mm	10 cm and 3 mm

What would each line measure to the nearest centimetre?

Draw Accurately

Reasoning and Problem Solving

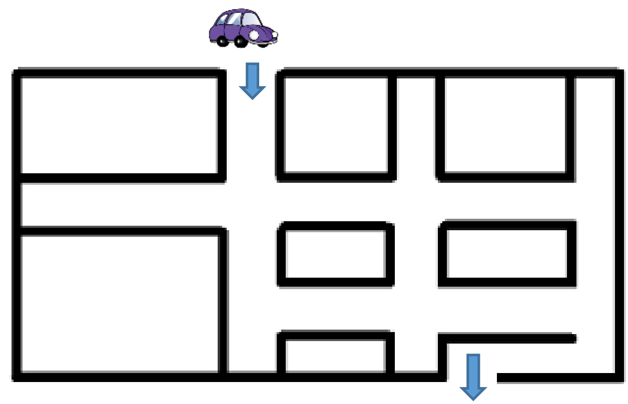
Alex measures the line.



She says it is 10 cm 4 mm

Is Alex correct?
Explain why.

Alex is not correct because she has started measuring the line from the end of the ruler instead of from '0'

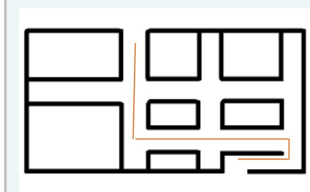


Use straight lines to show the route the car could take to get out of the maze.

Work out the length of the route to the nearest cm

Is this the shortest route?

Possible answer:



The length of the route will depend on the size of the maze used.

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?

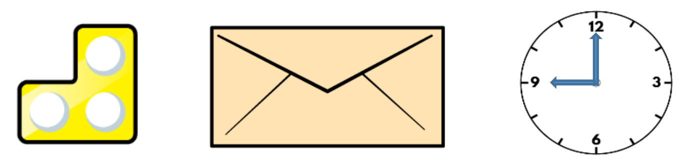
Varied Fluency

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

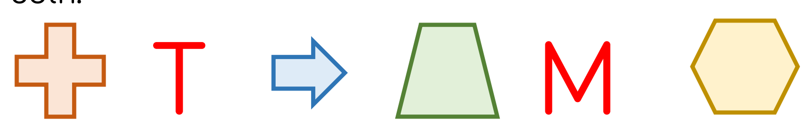
  A line that runs straight up and down the page is called a ________________ line.

  Find 3 horizontal and 3 vertical lines in the classroom.

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

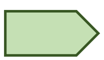
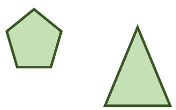
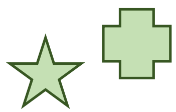


- Sort the shapes/symbols/letters depending on whether they have a horizontal line of symmetry, a vertical line of symmetry or both.



Horizontal & Vertical

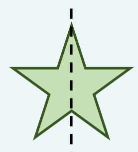
Reasoning and Problem Solving

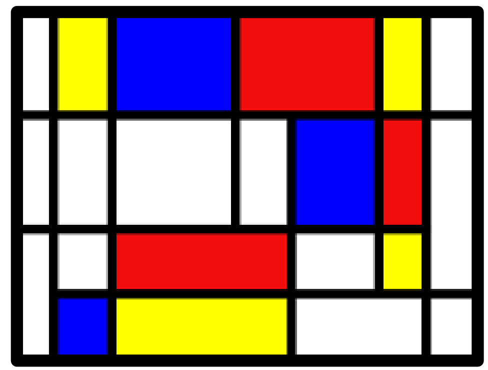
Horizontal line of symmetry	Vertical line of symmetry	Horizontal and vertical lines of symmetry
		

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.

Parallel & Perpendicular

Notes and Guidance

Children identify and find parallel and perpendicular lines in a range of practical contexts.
They use the arrow notation to represent parallel lines and the right angle notation for perpendicular lines.
Ensure that children are presented with lines that are not horizontal and vertical.
Children may need to use their right-angle tester to help them check that lines are perpendicular.

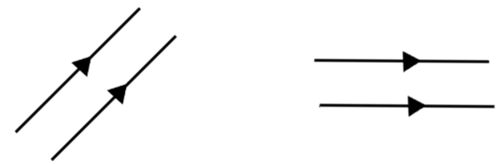
Mathematical Talk

Where might you see sets of parallel lines in the environment?

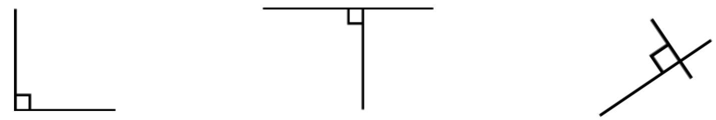
Can you see sets of parallel and perpendicular lines around the classroom?

Which shapes have only parallel lines?
Which shapes have perpendicular lines?
Which shapes have both parallel and perpendicular lines?

Varied Fluency



Lines that never meet are called ______________ lines.



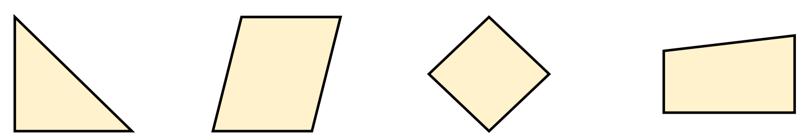
Straight lines that meet at a right angle are called ______________ lines.

Find 3 sets of parallel and perpendicular lines in the classroom.

Draw a line that is parallel to this one.

Draw a line that is perpendicular to this one.

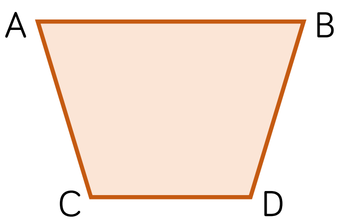
Use arrows to show the parallel lines in these shapes.
Use the right angle notation to show the perpendicular lines.



Parallel & Perpendicular

Reasoning and Problem Solving

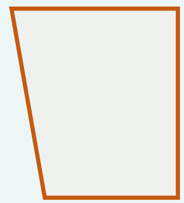
True or False?



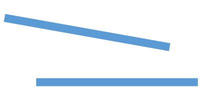
Line AB is parallel to line CD.
Line AC is parallel to line BD.
Line AC is perpendicular to line CD.

Redraw the shape so that line BD is perpendicular to line CD.

True
False
False



These lines are NOT parallel.



Convince me.

Children can draw and continue the lines to show that they will eventually meet so are not parallel.

Mark 3 sets of parallel lines and 3 sets of perpendicular lines in this flag.

Design your own flag containing parallel and perpendicular lines.

For example.

2-D Shapes

Notes and Guidance

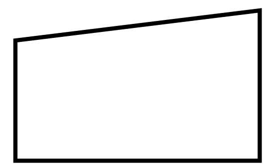
Children recognise, describe and draw 2-D shapes accurately. They use properties including types of angles, lines, symmetry and lengths of sides to describe the shape.
They could be given opportunities to identify/draw a hidden shape from a description given and also describe a shape for a friend to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

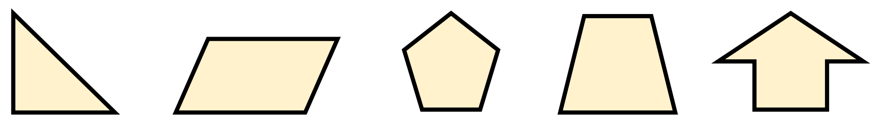
Varied Fluency

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?



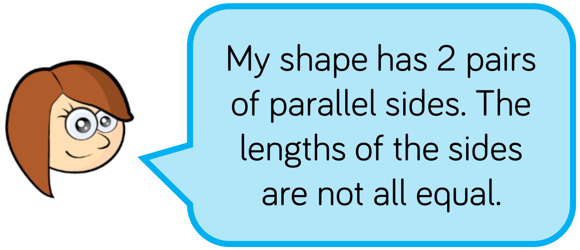
Draw the following shapes.

- 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

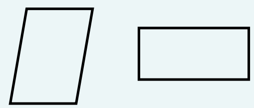
Reasoning and Problem Solving

Rosie describes a 2-D shape.

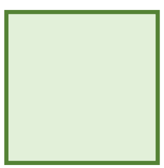


Draw the shape that Rosie is describing.

Children could draw:



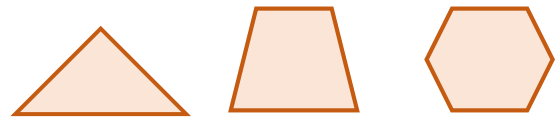
Could this square be Rosie's shape?



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.

3-D Shapes

Notes and Guidance

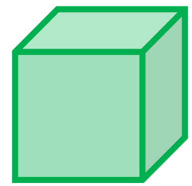
Children recognise and describe 3-D shapes in different orientations. They use properties including the number of faces, edges and vertices to describe the shape. Where a shape has a curved surface, children should know that this is not called a face. e.g. a cylinder has 2 circular faces and a curved surface. Teachers should explore the difference between a prism, which has the same shape all the way through, and a pyramid, which tapers to a point.

Mathematical Talk

How many faces/edges/vertices/curved surfaces does a _______ have?
What shape are the faces of a _______?
What types of lines can you see on a _______?
Can you spot objects around the classroom that are cubes/cuboids etc.?
Can you guess the shape from the description given?

Varied Fluency

- Describe this 3-D shape.



This shape is a ________.
It has _____ faces.
It has _____ edges.
It has _____ vertices.

- Choose one of these 3-D shapes and describe it to a friend thinking about the number and shape of faces it has and the number of edges and vertices. Can your friend identify the shape from your description?

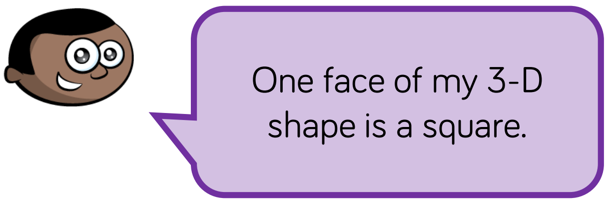
- What is the same and what is different about these two shapes?

Choose two other shapes and say what is the same and what is different about them.

3-D Shapes

Reasoning and Problem Solving

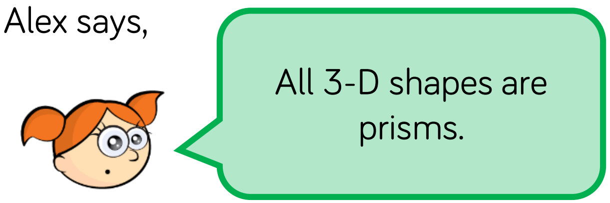
Mo has a 3-D shape, he says,



What could Mo's shape be?

Possible answers:
Cube
Cuboid
Square based pyramid

Alex says,



Do you agree with Alex?
Explain why.

I do not agree with Alex e.g. cones pyramids, spheres are not prisms.

Sort a selection of 3-D shapes using the criteria in the table.

	At least one triangular face	No triangular faces
Prism		
Not a prism		

Change the headings of the table and re-sort your shapes.

Various possibilities depending on the shapes used.

Construct 3-D Shapes

Notes and Guidance

Children make 3-D shapes (cubes, cuboids, prisms, cylinders, pyramids, cones, spheres) using construction materials.

They use correct mathematical language to describe the shapes they have made (edges, faces, vertices, curved surfaces).

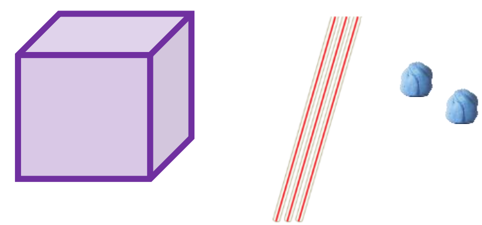
Mathematical Talk

Can you describe your shape using edges, faces, vertices, curved surfaces?
What is the same and what is different about your shape compared to your partner's?
What do the straws represent?
What does the Play-Doh represent?
How many straws/balls of Play-Doh do you need to create a __________?
Why can't you create a sphere or cylinder using this technique?

Varied Fluency

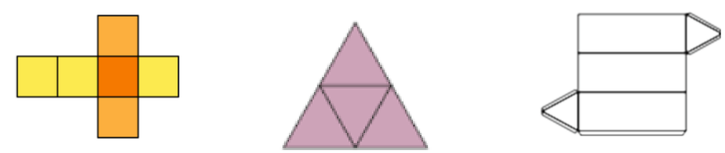
- Children make a 3-D shape using Play-Doh/clay/plasticine/polydron.
  Ask them to make a different one to their partner.
  Write down the similarities and differences between them.
  Discuss what the properties of each shape are.

- Use straws and Play-Doh to create a model of a cube.

  What other 3-D shapes can you create?

- Cut and fold these into 3-D shapes.

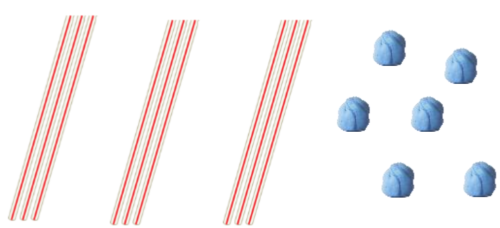
  

  What shapes have you created?

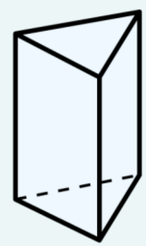
Construct 3-D Shapes

Reasoning and Problem Solving

I have 9 straws and 6 balls of Play-Doh.



What 3-D shape can I create using all of the straws and Play-Doh? Have a go at making it.



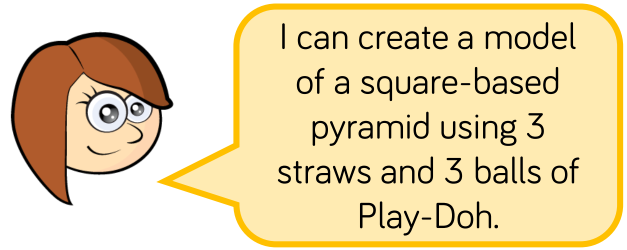
True or false?

- You can cut out lots of equal squares and make a 3-D shape from them.
- You can cut out some circles and rectangles and make a 3-D shape from them.

True – for example a cube.

True – a cylinder.

Rosie says,



Explain the mistake Rosie has made.

How many straws and balls of Play-Doh would you need to create a pyramid?

Rosie thinks that because a pyramid has some triangular faces she will only need 3 straws/balls of Play-Doh.

You would need 8 straws and 5 balls of Play-Doh to make a square-based pyramid, and 6 straws and 4 balls of Play-Doh to make a triangle based pyramid.

White Rose Maths

Summer - Block 4

Mass & Capacity

Overview

Small Steps

- Compare mass (R)
- Measure mass (1)
- Measure mass (2)
- Compare mass
- Add and subtract mass
- Compare volume (R)
- Measure capacity (1)
- Measure capacity (2)
- Compare capacity
- Add and subtract capacity
- Temperature (R)

Notes for 2020/21

Recap steps are included to provide the opportunity for children to revisit what is meant by mass, capacity and volume before building on this knowledge.

This is also a good place to revisit the concept of temperature so this has been added in to the steps.

Compare Mass

Notes and Guidance

Children recap on Year 1 learning by comparing the mass of different objects. They will initially use balance scales to compare the mass of two or more objects.

Children compare mass using < and > and order objects based on their masses.

Mathematical Talk

Look at the scale, which side is lower?
What does this tell us about the objects?

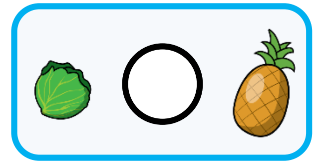
Which object is heavier? Which object is lighter?

Can you hold the objects and predict which is heavier?
Is a largest object always the heaviest?

Varied Fluency

R

- Using the words 'more' and 'less' and the > or < symbols, describe the mass.



The lettuce weighs _____ than the pineapple.

- Choose three objects. Use the balance scales to order them from heaviest to lightest?

The ______ is heavier than the ______ but lighter than the _____.
The ______ is lighter than the ______ but heavier than the _____.

- Complete the sentences:

4 bananas weigh the same as ___ doughnuts.
2 bananas weigh the same as ___ doughnuts

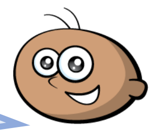
Can you write sentences using 'more' or 'less' using the image?

Compare Mass

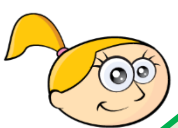
Reasoning and Problem Solving

R

Apples weigh more than bananas.



Tommy

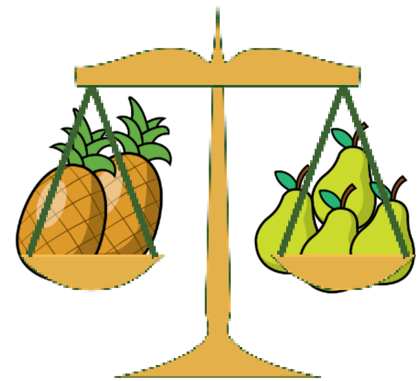


Eva

Two doughnuts weigh the same as two bananas.

Do you agree?
Explain why.

3 bananas weigh the same as two apples, so Tommy is correct - an apple must weigh more than a banana.
1 banana weighs the same as 2 doughnuts so Eva is incorrect.



One pear weighs 10 cubes.
How many cubes will balance one pineapple?
Explain how you know.

1 pineapple weighs 20 cubes.

Always, sometimes or never true?

The larger the box, the heavier it is.

Sometimes. Children can explore this using different sized boxes.

Measure Mass (1)

Notes and Guidance

Children learn how to read a range of scales to measure mass, including scales with missing intervals. In this step, children read scales in either kilograms or grams.

Use kilogram and gram weights to reinforce the difference in the units. Represent the intervals on the scale on a straight number line to highlight the link back to place value.

Mathematical Talk

How can we measure the mass of an object?

When would we use kilograms or grams to measure the mass of something?

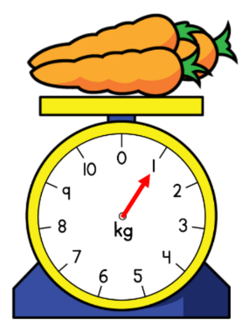
What's the same, what's different about the scales?

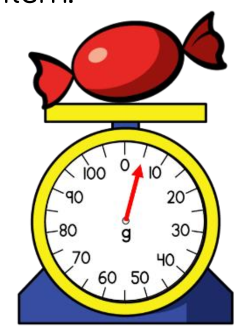
How do we know what each interval is worth?

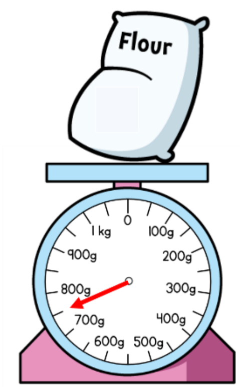
Varied Fluency

- Use balance scales to measure the mass of a range of objects. Decide whether to use gram or kilogram weights to balance the scales. Can you estimate the mass of each object before you weigh them?

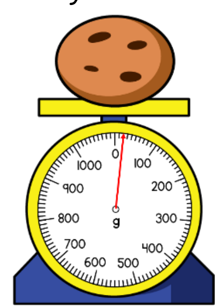
- Find the mass of each item.

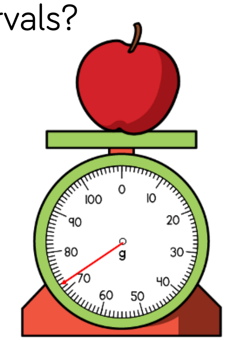






- Draw each scale as a straight number line. Can you identify the missing intervals?

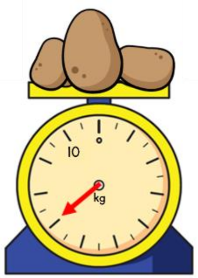




White Rose Maths

Measure Mass (1)

Reasoning and Problem Solving



Who do you agree with? Explain why.

Amir: The potatoes weigh 13 kg

Jack: We don't know how much the potatoes weigh because the number is hidden.

Rosie: The potatoes weigh more than half of 10 kg

Can you calculate the weight of the potatoes? Explain how you did it.

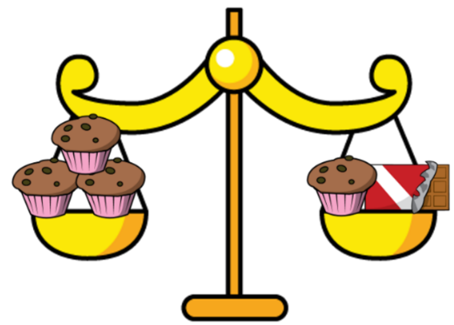
Amir is wrong – he has counted on 3 from 10 kg when he should have counted back 3 kg.

Jack is wrong because we can work out the scale by using the 10 kg and counting back. They weigh 7 kg.

Rosie is correct because half of 10 is 5 and the arrow is past where 5 kg would be.

The weight of the potatoes is 7 kg

The chocolate bar weighs 100 g.
How much does one muffin weigh?



How much does each side weigh?

Children could use a bar model to work this out. They would see the chocolate bar must weigh the same as two muffins so one muffin must weigh 50 g.
Each side weighs 150 g.

Using only 3 objects and a weighing scale, try to get as close to 2 kg as possible.
Explain why you chose those objects.
Work out how much more or how much less is needed to make it 2 kg.

Measure Mass (2)

Notes and Guidance

Children measure the mass of objects and record them as a mixed measurement in kilograms and grams. When given a mixed measurement, children can record the mass on scales by calculating the intervals and identifying where the arrow will go.

Recap counting in different multiples to support children's reading of scales with different intervals.

Mathematical Talk

Which is heavier, 7 kilograms or 8 grams?

How is a scale like a number line?

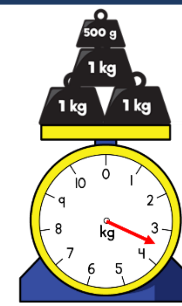
Does drawing a number line help you to find the intervals?

Where do we use measuring mass on a daily basis?

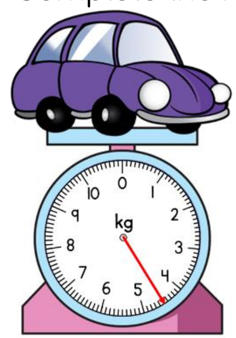
Varied Fluency

- What weight is on the scales?

  How do the scales show this?

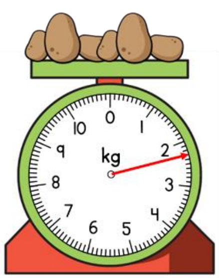


- Complete the missing information.



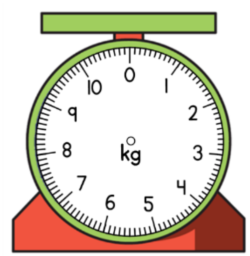
The toy car weighs 4 kg and _____ g

The potatoes weigh 2 kg and _____ g

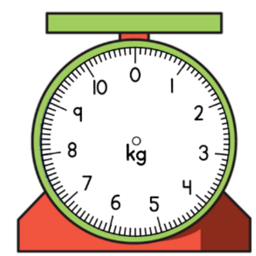


Use your own scales to measure how much objects weigh and record the mass in kg and g.

- Draw an arrow on the scales to show the mass of each object.



= 1 kg and 700 g

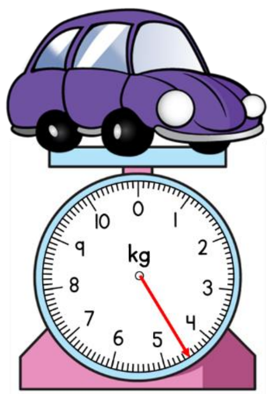


= 2 kg and 100 g

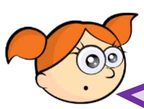
Measure Mass (2)

Reasoning and Problem Solving

Tommy is weighing a toy car.



Use this to work out what the other children's cars weigh.



Alex

My car weighs 1 kg more than Mo's.

Mo

My car weighs 200 g less than Tommy's.

Dexter

My car weighs 1 kg and 300 g less than Alex's.

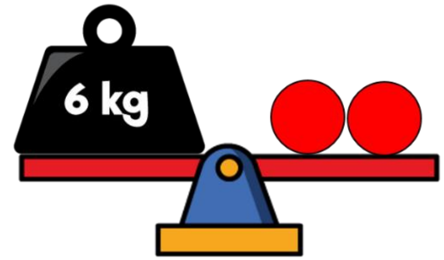
Tommy's car weighs 4 kg and 500 g.

Alex's car weighs 5 kg and 300 g.

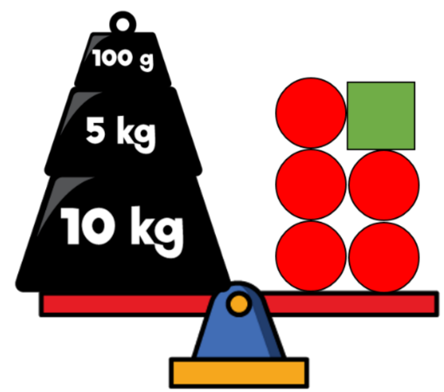
Mo's car weighs 4 kg and 300 g.

Dexter's car weighs 4 kg.

Here is a balance.



Here is another.



Work out the value of 

Can you create your own version for a partner?

One circle weighs 3 kg.
The square weighs 100 g.

Compare Mass

Notes and Guidance

Children build on Year 2 knowledge and use 'lighter' and 'heavier' to compare mass.
They use their understanding that kilograms are used for heavier objects and will use this to help them compare mass. For example 500 g is less than 500 kg.
Children compare mixed measurements using the inequality symbols. For example, 1 kg and 500 g < 2 kg.

Mathematical Talk

Which item is heavier or lighter? How do you know?

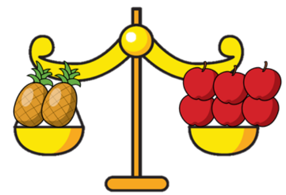
Using the symbols $<$, $>$ or $=$, what can you tell me about each of the scales?

If I added an extra item, what would happen?

Can I work out how much one item weighs? Would this be more or less than the other item?

Varied Fluency

- Complete the sentences.

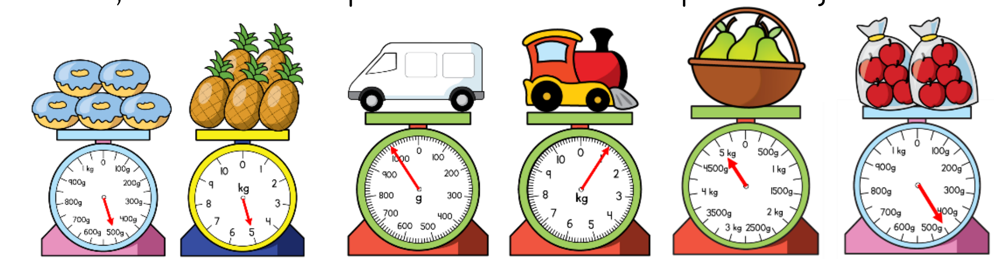


☐ pineapples are equal to ☐ apples.

1 pineapple is equal to ☐ apples.

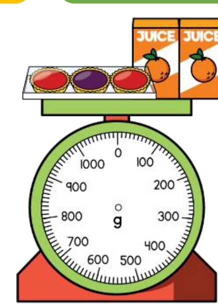
Can you write sentences using 'heavier' or 'lighter' about the image?

- Use $<$, $>$ or $=$ to compare the mass of each pair of objects.



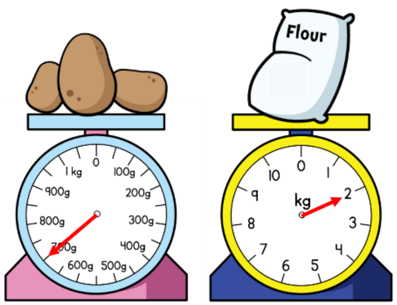
500 g ○ 5 kg | 1,000 g ○ 1 kg | ☐ ○ ☐

- A pack of tarts weighs 220 g.
Two cartons of orange juice weigh 140 g.
Draw an arrow to show the weight of the 3 items.



Compare Mass

Reasoning and Problem Solving



Three children are weighing potatoes and flour.


Whitney

The potatoes weigh more because the arrow is further than the arrow on the flour scale.

The flour weighs less because 2 is less than 700


Amir


Alex

The flour weighs more because 2 kg is more than 700 g.

Who do you agree with?
Explain your answer.

Whitney is wrong because the scales are different.
Mo is wrong because he hasn't noticed the flour is weighed in kg and the potatoes are weighed in g.
Alex is correct because 2 kg is the same as 2,000 g which is more than 700 g.

Here are three masses.

20 kg and 600 g

20 kg

18 kg and 500 g

Match each mass to the correct child.

Dora

My mass weighs more than $\frac{1}{2}$ of 40 kg.

My mass is more than Eva's mass.

Mo

Eva

My mass weighs more than 18 kg but less than 20 kg.

Eva: 18 kg and 500 g

Mo: 20 kg

Dora: 20 kg and 600 g

Add & Subtract Mass

Notes and Guidance

Children add and subtract mass. They use a range of mental and written methods, choosing the most efficient one for each question.

Children may use concrete resources to represent kilograms and grams. Children could also use bar models to support them to represent calculations.

Mathematical Talk

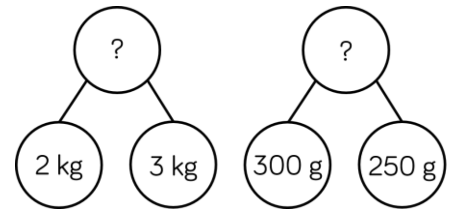
How many grams are in a kilogram? How could I represent this using concrete resources?

What do you know about kilograms or grams that can help you solve this question?

How can you represent this problem with a bar model?

Varied Fluency

- Amir uses a part-whole model to add 2 kg and 300 g to 3 kg and 250 g. He partitions each mass into kilograms and grams and calculates them separately.



  Use Amir's method to calculate:

  3 kg and 450 g + 4 kg and 200 g
  4 kg and 105 g + 2 kg and 300 g
  4 kg and 400 g – 2 kg and 100 g
  8 kg and 600 g – 1 kg and 550 g

- 

  The jar of cookies has a mass of 800 g.
  The empty jar has a mass of 350 g.
  How much do the cookies weigh?

- Choose an appropriate approach to solve:
  - 7 kg – ☐ = $5\frac{1}{2}$ kg
  - 3 kg and 200 g + ☐ = $4\frac{1}{2}$ kg
  - 4 kg + ☐ – $1\frac{1}{2}$ kg = 3 kg

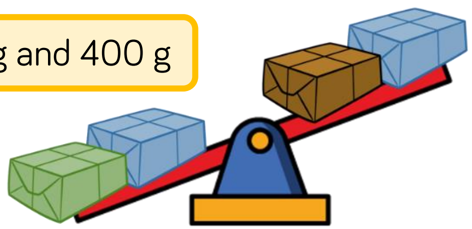
Add & Subtract Mass

Reasoning and Problem Solving

The green parcel weighs 5 kg.
Can you work out what the blue and brown parcel weigh?

7 kg and 250 g

9 kg and 400 g



How much would the green and brown parcel weigh altogether?

Blue parcel = 4 kg and 400 g

Brown parcel = 2 kg and 850 g

Green and brown parcel = 7 kg and 850 g

Dora buys two peaches and three pears.

One peach weighs 75 g.

Three pears weigh the same as two peaches.

How much does one pear weigh?

50 g

Compare Volume

Notes and Guidance

Children compare the volume of containers using < , > and = They build on their understanding of the difference between capacity and volume from Year 1. Capacity is the amount a container can hold. Volume is the amount it is actually holding.

Children use the language ‘quarter’, ‘half’ and ‘three-quarters full’ to describe and compare volume. Make sure children have the opportunity to practically investigate volume and capacity.

Mathematical Talk

Which container has the largest/smallest capacity? How do you know? Can we order them from largest to smallest?

Which container has the most or least liquid in?

How many <u>mugs</u> does it take to fill the <u>bottle?</u>
Is this more or less than the <u>pot</u>? Can we find the difference?
Does the tallest container always hold the most?

Varied Fluency

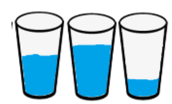
R

- Show three different containers. Which container has the largest capacity? Using water or rice, make each container: one quarter full, half full, three-quarters full.

- Complete the sentences using the words ‘less’, ‘more’ or equal’.

A B

Container A has ________ than container B.



A B C

Container C has ________ than container B.

Container A has ________ than container C but ______ than container B.

- Complete the sentences:

The bottle can fill _____ mugs.

The pot can fill _____ mugs.

Use other containers to investigate how many mugs of rice they take to fill.

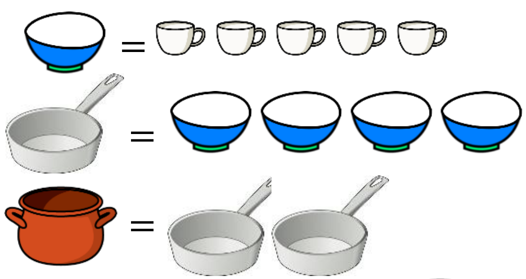
Compare Volume

Reasoning and Problem Solving

Whitney had two full bottles of juice.
She poured some juice into two glasses.

Which glass has the most juice in?
Which has the least juice in?
Explain how you know.

Glass A has the least juice in and Glass B has more juice in. Bottle A has more juice left over which means it has less juice poured out.



How many  does the  hold?

The pot holds 40 cups of water.

Choose a selection of different sized containers.
Decide how you will measure how much liquid each container can hold.
Order your containers from smallest to largest.
Compare the containers using <, > or =

White Rose Maths

Measure Capacity (1)

Notes and Guidance

Children use litres, millilitres and standard scales to explore capacity. In this step, children focus on the capacity in either litres or millilitres and not as a mixed measurement, for example 5 l and 500 ml.
Children continue to use place value skills to explore scales.
Children build on their knowledge from KS1, recognising the capacity is the amount of liquid a container can hold and the volume is how much liquid is in the container.

Mathematical Talk

What's the same and what's different about capacity and volume?

What does capacity mean? What does volume mean?

What do we measure capacity and volume in?

What unit of measure (ml or l) would we use to measure ____ ?

How much liquid is in the container?

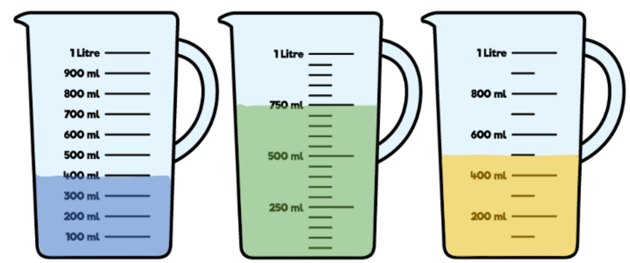
What is the scale going up in?

Varied Fluency

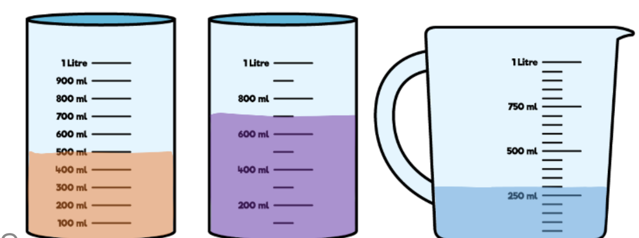
- Use a variety of scales, discuss what's the same, what's different about the scales. Using different containers explore which measurement (litres or millilitres) would be used to measure the liquid inside. Discuss what things would be measured in litres and in millilitres.

- Use the sentence stem to describe the capacity and volume of each container.

The volume of liquid is ____.
The capacity of the container is ______.



- Identify what the scale is going up in to find out the volume in each container. Use the stem sentence.



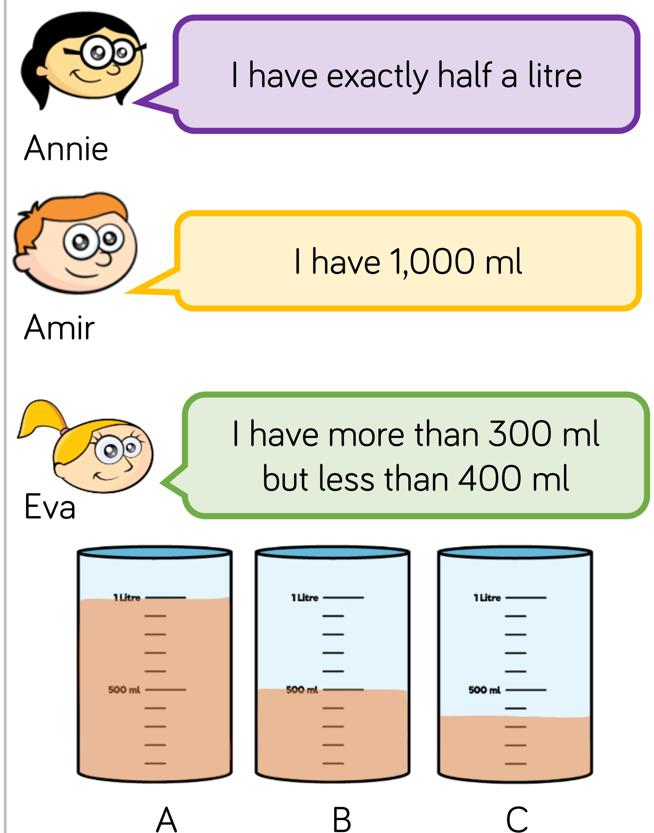
The increments are in ____.
The volume is _____.

Measure Capacity (1)

Reasoning and Problem Solving

Use a variety of containers. Can you estimate how much liquid they hold? Check your estimates using measuring jugs and cylinders to see how accurate you were.	Children will use a variety of containers and gather a range of measurements. Encourage children to record their results in a table.

Use the clues to work out who has which container.



Annie has container B

Ron has container A

Eva has container C

Measure Capacity (2)

Notes and Guidance

Children use litres and millilitres and standard scales to explore capacity.
Children measure capacity with litres and millilitres together and record measurements as __ l and __ ml, for example 5 l and 500 ml.
Children continue to use place value skills to read and interpret scales.

Mathematical Talk

How many millilitres are in 1 litre? If we know this, what else do we know?

Look at the scale, show me where ____ would be.

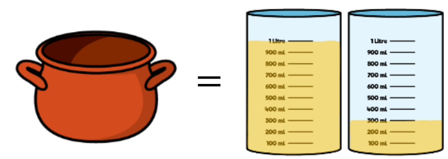
What is the capacity of the ______? How can we record this as l and ml?

How would I show how much water is left on the scale?

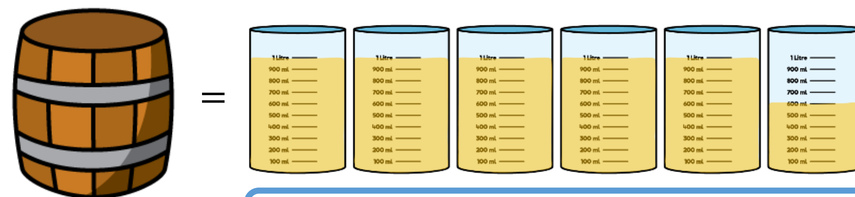
Varied Fluency

- Use equipment and liquid to count in increments of 100 ml. Discuss what happens when you reach 1,000 ml. Explore other connections linked to this. For example, 2 l = 2,000 ml.

- Complete the missing information.

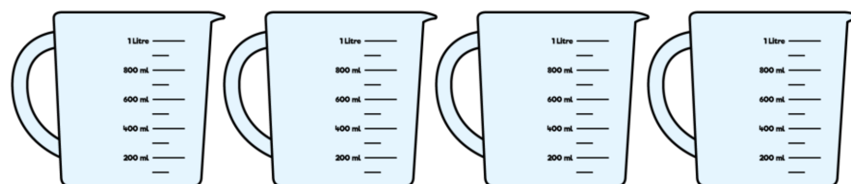


The pot's capacity is _____ l and _____ ml



The barrel's capacity is _____ l and _____ ml

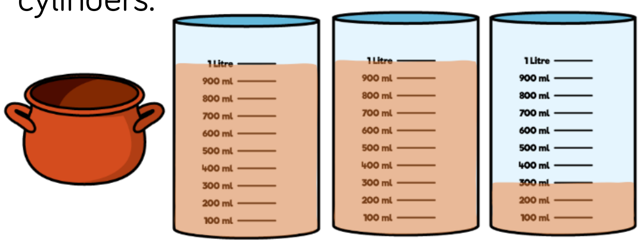
- The capacity of the full fish bowl is 8 l and 750 ml.
  Hannah pours 5 l of water out of the bowl.
  Show how much water is left in the measuring jugs.

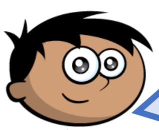


Measure Capacity (2)

Reasoning and Problem Solving

Amir and Alex work out the capacity of the pot by filling it with water, then pouring the water into the measuring cylinders.





Amir: The capacity of the pot is 302 ml

Alex: The capacity of the pot is 2 l and 300 ml.

Who do you agree with?
Explain why.

Alex is correct because there are 2 full litres and 300 millilitres in the third cylinder.

True or False?

The tallest container has the largest capacity.

Use containers to decide whether the statement is true or false.

Record the capacity of the different containers in a table.

Children will collect different measurements of capacities from different containers. Children will hopefully find that as well as height, the capacity of the container also depends on its width.

Compare Capacities

Notes and Guidance

Children continue to build on Year 2 and use ‘full’ and ‘empty’ to compare capacity.
They use their understanding that litres are used for larger containers and will use this to help them compare capacity.
For example 500 ml is less than 5 l.
Children also compare actual numerical measures, including mixed measurements using the inequality symbols. For example, 1 l and 500 ml < 2 l.

Mathematical Talk

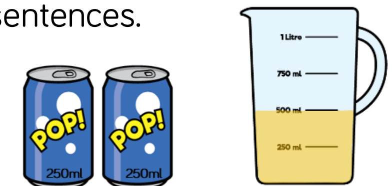
Which container is the most full?
Which container is the least full?

Which has the most liquid in it?
What does the liquid measure?

Which has the least liquid in it?
What does the liquid measure?

Varied Fluency

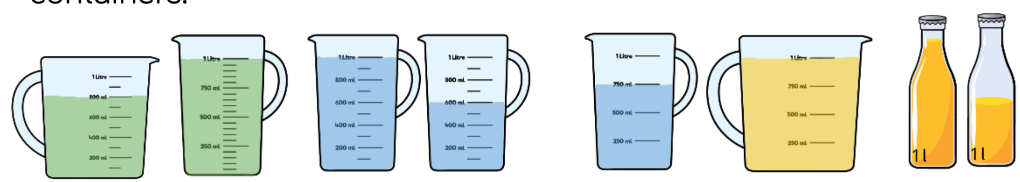
Complete the sentences.



☐ cans of pop are equal to ☐ jug of orange juice.

1 can of pop is equal to ☐ jug of orange juice.

Use <, > or = to compare the volume of liquid in each pair of containers.



800 ml ◯ 1 l

__l and __ml ◯ 750 ml

☐ ◯ ☐

Whitney has 3 bottles of water with 500 ml in each.
Sophie has one bottle of water with 1 and a half litres in it.
Who has the most water?
Can you prove it?

Compare Capacities

Reasoning and Problem Solving

Rosie has a litre bottle of water.

She pours a drink for herself and two friends. Their glasses can hold up to 250 ml.

Teddy has more than Amir.
Rosie has the most.

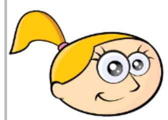
How much could each child have in their glass?

How much would be left in the bottle?

There are a range of possible answers the children could find. Rosie should have the most and Amir should have the least. The total should not exceed 750 ml

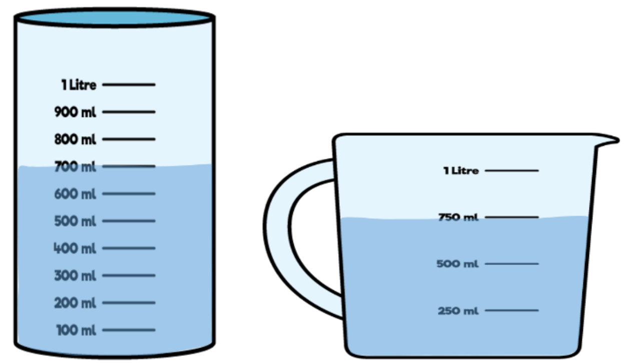
Possible answer:

Rosie: 250 ml
Teddy: 200 ml
Amir: 150 ml
There is 400 ml left in the bottle.



Eva

I know container 1 has more than container 2 in it because the water goes further up the side.



Container 1 Container 2

Is Eva correct? Explain your answer.

Eva is not correct. The measurements show that container 1 has 700 ml in it whereas container 2 has 750 ml in. Container 2 is wider than container 1 which is why it looks like it has less in it.

Add & Subtract Capacity

Notes and Guidance

Children add and subtract volumes and capacities. They can apply their understanding of different methods such as column addition/subtraction, finding the difference etc. Children should choose the correct method depending on the context of the problem. They continue to use mixed measures.
Children may use concrete resources to represent litres and millilitres. Children could also use bar models to represent calculations.

Mathematical Talk

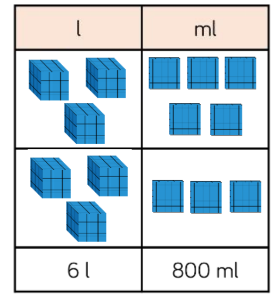
How many millitres are in one litre? How could I show this using concrete resources?

How many litres are there in total?
How many millilitres are there in total?

What methods can we use to add volumes or capacities?
What methods can we use to subtract volumes or capacities?

Varied Fluency

Teddy uses Base Ten and a place value chart to add 3 l and 500 ml and 3 l and 300 ml



Use the same approach to calculate:
- 4 l and 600 ml + 2 l and 100 ml
- 7 l and 320 ml + 1 l and 125 ml
- 3 l and 950 ml – 3 l and 50 ml
- 800 ml – 375 ml

To make Summer Punch for 2 people:

- 300 ml of pineapple juice
- 250 ml of orange juice
- 500 ml of lemonade

- How much liquid is used in total to make Summer Punch for 2 people?
- How much orange juice would be need to make enough for 4 people?
- Would a 1 l bottle of lemonade be enough to make drinks for 6 people?

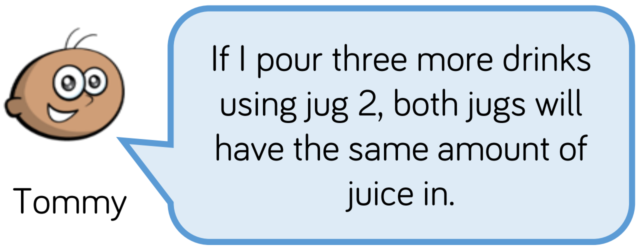
Rosie keeps a record of how much milk she has in her café. Work out how much milk is used for each order.

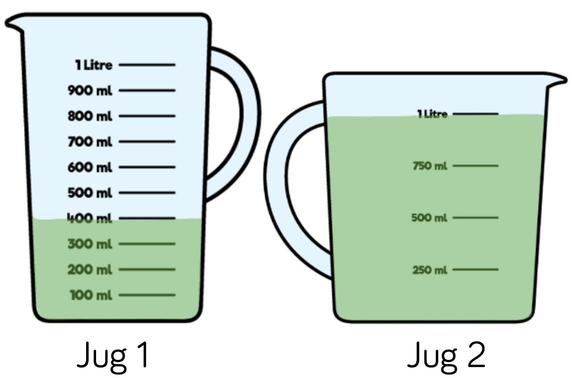
Amount of milk to start	Amount of milk used	Amount of milk left
1 l and 430 ml		1 l and 100 ml
1 l and 100 ml		890 ml
890 ml		545 ml

Add & Subtract Capacity

Reasoning and Problem Solving

Tommy is pouring drinks using these jugs.
A drink is 125 ml.





Is Tommy correct?
If not, how much juice will be left in jug 2?

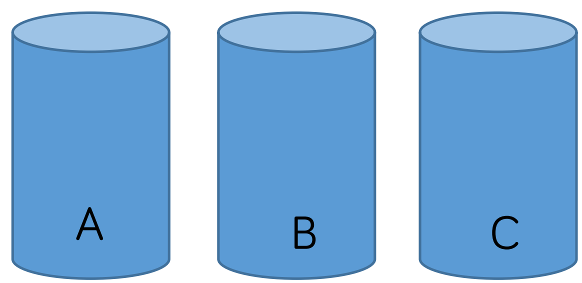
Tommy is not correct.
If Tommy makes three more drinks he will use a further 375 ml of juice.
1 l – 375 ml = 625 ml

Here are some measuring cylinders.
The total liquid in all three cylinders is 400 ml.

Cylinder A has half of the total amount in it.

Cylinder B has 67 ml less than Cylinder A.

How much liquid does each cylinder contain?



A: 200 ml

B: 133 ml

C: 67 ml

White Rose Maths

Temperature

Notes and Guidance

Children are introduced to temperature, thermometers and the units 'degrees Centigrade', written °C for the first time. They learn that the temperature is higher when it is warmer.

They apply their counting in 2s, 5s and 10s skills when reading different scales on thermometers.

Mathematical Talk

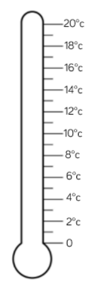
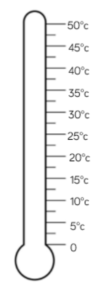
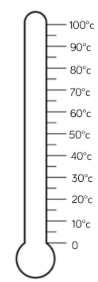
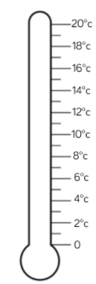
What unit can we use to measure temperature?
What is the scale going up in? How do you know?
If the temperature increases what happens to the number on the scale?
If the temperature decreases what happens to the number on the scale?
Can we compare temperatures using vocabulary such as increased, decreased, warmer, colder and difference?

Varied Fluency

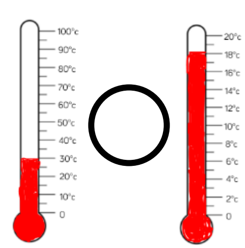
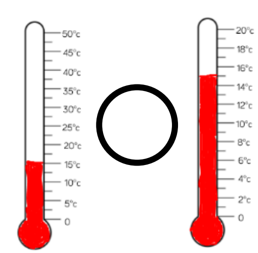
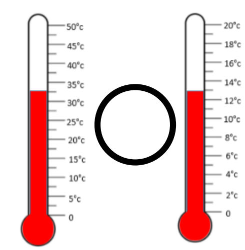
R

- Take temperatures around the school and complete the following stem sentences:
  The temperature in the classroom is ________.
  The classroom is _________ than the playground.
  The difference in temperature between the _________ and the _________ is __ degrees Celsius.

- Complete the thermometers to show the temperatures.


16 °C

35 °C

70 °C

9 °C

- Compare the temperatures using <, > or =

Temperature

Reasoning and Problem Solving

Mollie took the temperature at 12 p.m. and again at 5 p.m.

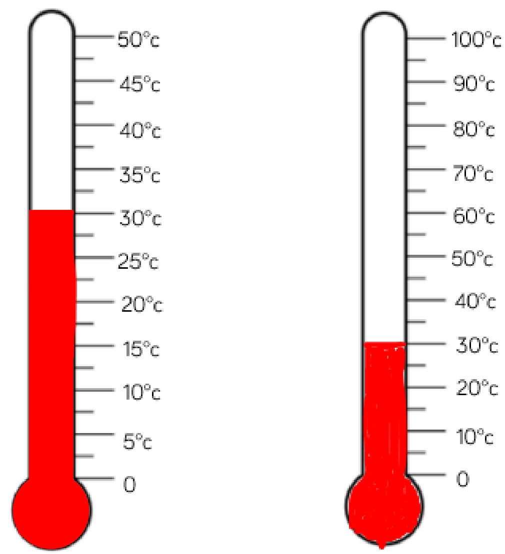
There was a difference of 7°C

What could the temperatures be?

Children may give any temperatures that have a difference of 7

Some children may realise that it is usually cooler in the evening and therefore make sure there 12pm temperature is always warmer than the 5pm temperature.

What is the same and what is different about the thermometers/temperatures?



Both thermometers are showing 30°C

The scale on the first thermometer counts up in 5°c. The scale on the second thermometer counts up in 10°C

The second thermometer will be able to record higher temperatures.