Scheme of Learning

Year 3

#MathsEveryoneCan

White Rose Maths

Contents

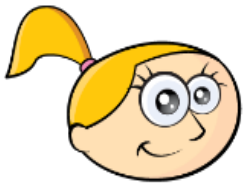
Meet the Characters

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			Consolidation
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

Spring - Block 1

Multiplication & Division

Overview

Small Steps

- Comparing statements
- Related calculations
- Multiply 2-digits by 1-digit (1)
- Multiply 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (1)
- Divide 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (3)
- Scaling
- How many ways?

NC Objectives

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

Write and calculate mathematical statements for multiplication and division using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.

Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Comparing Statements

Notes and Guidance

Children use their knowledge of multiplication and division facts to compare statements using inequality symbols.

It is important that children are exposed to a variety of representations of multiplication and division, including arrays and repeated addition.

Mathematical Talk

What other number sentences does the array show?

If you know your 4 times-table, how can you use this to work out your 8 times-table?

What's the same and what's different about 8 × 3 and 7 × 4?

Varied Fluency

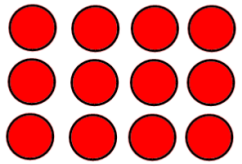
Use the array to complete the number sentences.

$3 \times 4 = \square$

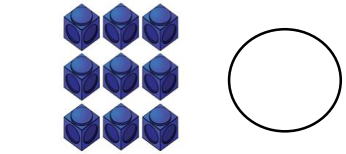
$4 \times 3 = \square$

$\square \div 3 = \square$

$\square \div 4 = \square$



Use <, > or = to compare.



$\square \times \square = \square$

$\square \times \square = \square$

$8 \times 3 \bigcirc 7 \times 4$

$36 \div 6 \bigcirc 36 \div 4$

Complete the number sentences.

$5 \times 1 < \_\_\_\_ \times \_\_\_\_$

$4 \times 3 = \_\_\_\_ \div 3$

Comparing Statements

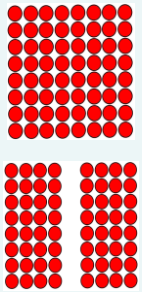
Reasoning and Problem Solving

Whitney says,

8 × 8 is greater than two lots of 4 × 8

Do you agree?
Can you prove your answer?

Possible answer:
She is wrong because they are equal.



True or false?

$6 \times 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6$

False

$7 \times 6 = 7 \times 3 + 7 \times 3$

True

$2 \times 3 + 3 > 5 \times 3$

False

Can you find three different ways to complete each number sentence?

$\_\_\_ \times 3 + \_\_\_ \times 3 < \_\_\_ \div 3$

$\_\_\_ \div 4 < \_\_\_ \times 4 < \_\_\_ \times 4$

$\_\_\_ \times 8 > \_\_\_ \div 8 > \_\_\_ \times 8$

Possible answers include:

$1 \times 3 + 1 \times 3 < 21 \div 3$
$1 \times 3 + 1 \times 3 < 24 \div 3$
$1 \times 3 + 1 \times 3 < 27 \div 3$

$24 \div 4 < 8 \times 4 < 12 \times 4$
$16 \div 4 < 5 \times 4 < 7 \times 4$
$8 \div 4 < 3 \times 4 < 4 \times 4$

$4 \times 8 > 88 \div 8 > 1 \times 8$
$2 \times 8 > 80 \div 8 > 1 \times 8$
$6 \times 8 > 96 \div 8 > 1 \times 8$

Related Calculations

Notes and Guidance

Children use known multiplication facts to solve other multiplication problems.
They understand that because one of the numbers in the calculation is ten times bigger, then the answer will also be ten times bigger.
It is important that children develop their conceptual understanding through the use of concrete manipulatives.

Mathematical Talk

What is the same and what is different about the place value counters?

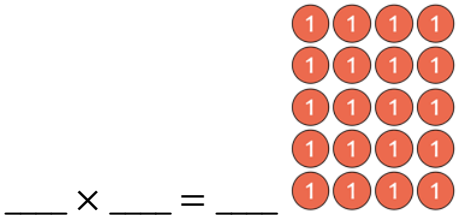
How does this fact help us solve this problem?

If we know these facts, what other facts do we know?

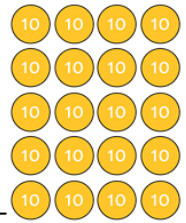
Can you prove your answer using manipulatives?

Varied Fluency

Complete the multiplication facts.



___ × ___ = ___



___ × ___ = ___

The number pieces represent 5 × ___ = ____

If each hole is worth ten, what do the pieces represent?

If we know 2 × 6 = 12, we also know 2 × 60 = 120
Use this to complete the fact family.

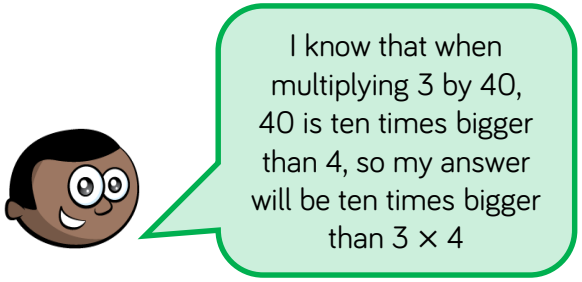
2 × 60 = 120	□ × □ = □
□ ÷ □ = □	□ ÷ □ = □

Complete the fact families for the calculations.

3 × 30 = □
□ = 4 × 80
160 ÷ 2 = □

Related Calculations

Reasoning and Problem Solving



Is Mo correct?
Explain your answer.

Mo is correct. I know 3 × 4 = 12, so if he has 3 × 40 then his answer will be ten times bigger because 4 has become ten times bigger.

Rosie has 240 cakes to sell.
She puts the same number of cakes in each box and has no cakes left over.
Which of these boxes could she use?

She could use 10, 20, 30, 40, 60, 80 because 240 is a multiple of all of these numbers.
10 × 24 = 240
20 × 12 = 240
30 × 8 = 240
40 × 6 = 240
60 × 4 = 240
80 × 3 = 240

True or false?

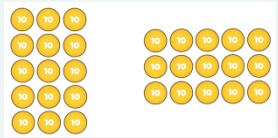
$$5 \times 30 = 3 \times 50$$

Prove it.

Possible response:

Children may represent it with place value counters.

True because they are equal.



Children may explore the problem in a context.

e.g. 5 lots of 30 apples compared to 3 lots of 50 apples.

Multiply 2-digits by 1-digit (1)

Notes and Guidance

Children use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives. They use the formal method of column multiplication alongside the concrete representation. They also apply their understanding of partitioning to represent and solve calculations.
In this step, children explore multiplication with no exchange.

Mathematical Talk

How does multiplication link to addition?

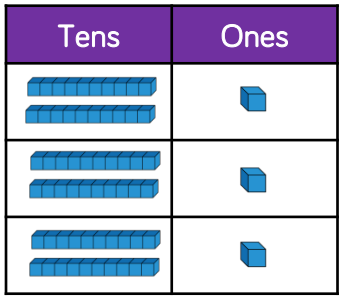
How does partitioning help you to multiply 2-digits by a 1-digit number?

How does the written method match the concrete representation?

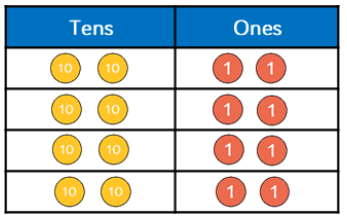
Varied Fluency

There are 21 coloured balls on a snooker table.
How many coloured balls are there on 3 snooker tables?

Use Base 10 to calculate:
21 × 4 and 33 × 3



Complete the calculations to match the place value counters.



□ + □ + □ + □ = □

□ × □ = □

Annie uses place value counters to work out 34 × 2

	T	O
	3	4
×		2
	6	8

Use Annie's method to solve:
23 × 3
32 × 3
42 × 2

Multiply 2-digits by 1-digit (1)

Reasoning and Problem Solving

Alex completes the calculation:

$$43 \times 2$$

Can you spot her mistake?

	T	O
	4	3
×		2
		6
+		8
	1	4

Alex has multiplied 4 by 2 rather than 40 by 2

Teddy completes the same calculation as Alex.
Can you spot and explain his mistake?

	T	O
	4	3
×		2
8	0	6

Teddy has written 80 where he should have just put an 8 because he is multiplying 4 tens by 2 which is 8 tens. The answer should be 86

Dexter says,

$4 \times 21 = 2 \times 42$

Is Dexter correct?

True. Both multiplications are equal to 84

Children may explore that one number has halved and the other has doubled.

Multiply 2-digits by 1-digit (2)

Notes and Guidance

Children continue to use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives.
They move on to explore multiplication with exchange. Each question in this step builds in difficulty.

Mathematical Talk

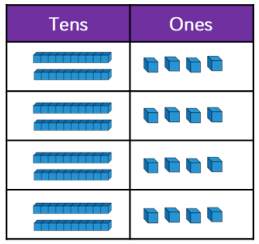
What happens when we have ten or more ones in a column?
What happens when we have twenty or more ones in a column?

How do we record our exchange?

Do you prefer Jack's method or Amir's method?
Can you use either method for all the calculations?

Varied Fluency

- Jack uses Base 10 to calculate 24 × 4

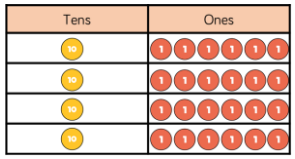


	T	O
	2	4
×		4
	9	6

1

Use Jack's method to solve:
13 × 4
23 × 4
26 × 3

- Amir uses place value counters to calculate 16 × 4



	T	O
	1	6
×		4
	6	4

2

Use Amir's method to solve:
16 × 6
17 × 5
28 × 3

- Amir then calculates 5 × 34

	T	O
	3	4
×		5
1	7	0

1 2

Use Amir's method to solve:
36 × 6
48 × 4

Multiply 2-digits by 1-digit (2)

Reasoning and Problem Solving

Always, Sometimes, Never?

A two-digit number multiplied by a one-digit number has a two-digit product.

Sometimes.

e.g.

$13 \times 5 = 65$

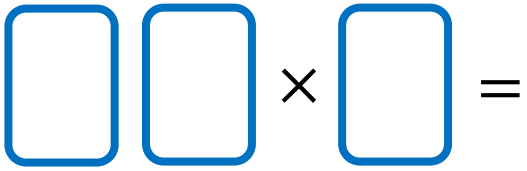
$31 \times 5 = 155$

Explain the mistake.

H	T	O
	2	7
×		3
6	2	1

They have not performed the exchange correctly.
6 tens and 2 tens should be added together to make 8 tens so the correct answer is 81

How close can you get to 100?
Use each digit card once in the multiplication.



You can get within 8 of 100

$23 \times 4 = 92$ this is the closest answer.

$24 \times 3 = 72$

$32 \times 4 = 128$

$34 \times 2 = 68$

Divide 2-digits by 1-digit (1)

Notes and Guidance

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that do not involve exchange or remainders.

It is important that children divide the tens first and then the ones.

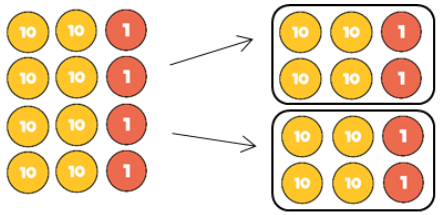
Mathematical Talk

How can we partition the number?
How many tens are there?
How many ones are there?
What could we use to represent this number?
How many equal groups do I need?

How many rows will my place value chart have?
How does this link to the number I am dividing by?

Varied Fluency

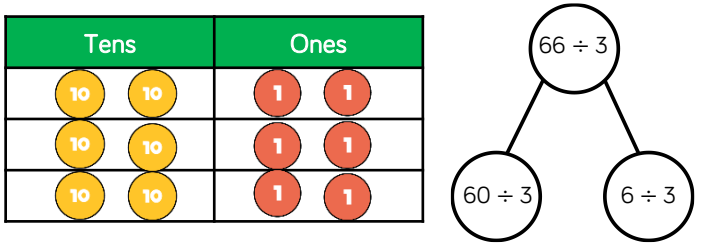
Ron uses place value counters to solve 84 ÷ 2



Use Ron's method to calculate:

84 ÷ 4 66 ÷ 2 66 ÷ 3

Eva uses a place value grid and part-whole model to solve 66÷ 3



Use Eva's method to calculate:

69 ÷ 3 96 ÷ 3 86 ÷ 2

Divide 2-digits by 1-digit (1)

Reasoning and Problem Solving

Teddy answers the question 44 ÷ 4 using place value counters.

Tens	Ones
10 10	1 1
10 10	1 1

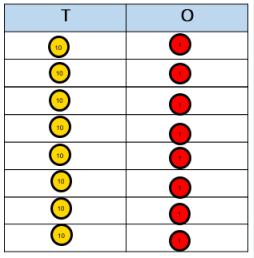
Is he correct?
Explain your reasoning.

Teddy is incorrect. He has divided 44 by 2 instead of by 4

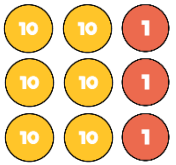
Dora thinks that 88 sweets can be shared equally between eight people.

Is she correct?

Dora is correct because 88 divided by 8 is equal to 11



Alex uses place value counters to help her calculate 63 ÷ 3



Tens	Ones
10	10 1
10	10 1
10	10 1

She gets an answer of 12
Is she correct?

Alex is incorrect because she has not placed counters in the correct columns.

It should look like this:

Tens	Ones
10 10	1
10 10	1
10 10	1

The correct answer is 21

Divide 2-digits by 1-digit (2)

Notes and Guidance

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that involve exchanging between the tens and ones. The answers do not have remainders.

Children use their times-tables to partition the number into multiples of the divisor.

Mathematical Talk

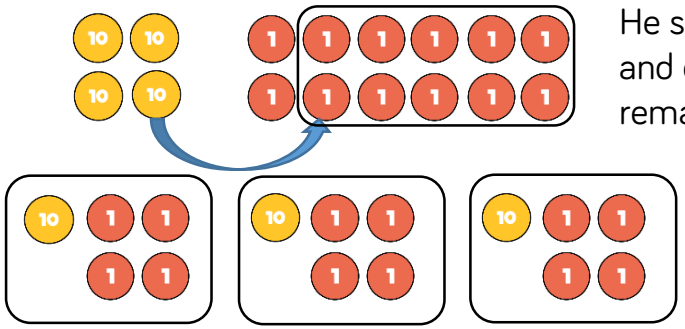
Why have we partitioned 42 into 30 and 12 instead of 40 and 2?

What do you notice about the partitioned numbers and the divisor?

Why do we partition 96 in different ways depending on the divisor?

Varied Fluency

Ron uses place value counters to divide 42 into three equal groups.



He shares the tens first and exchanges the remaining ten for ones.

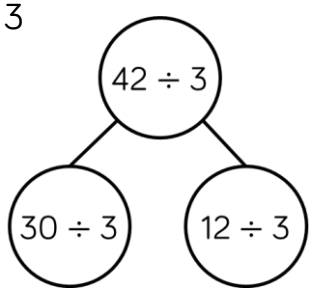
Then he shares the ones.

$42 \div 3 = 14$

Use Ron's method to calculate $48 \div 3$, $52 \div 4$ and $92 \div 8$

Annie uses a similar method to divide 42 by 3

Tens	Ones
10	1 1 1 1
10	1 1 1 1
10	1 1 1 1



Use Annie's method to calculate:

$96 \div 8$ $96 \div 4$ $96 \div 3$ $96 \div 6$

Divide 2-digits by 1-digit (2)

Reasoning and Problem Solving

Compare the statements using <, > or =

48 ÷ 4 ◯ 36 ÷ 3

52 ÷ 4 ◯ 42 ÷ 3

60 ÷ 3 ◯ 60 ÷ 4

=

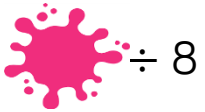
<

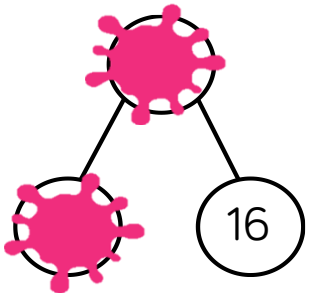
>

Amir partitioned a number to help him divide by 8

Some of his working out has been covered with paint.

What number could Amir have started with?





The answer could be 56 or 96

Divide 2-digits by 1-digit (3)

Notes and Guidance

Children move onto solving division problems with a remainder.
Links are made between division and repeated subtraction, which builds on learning in Year 2
Children record the remainders as shown in Tommy's method.
This notation is new to Year 3 so will need a clear explanation.

Mathematical Talk

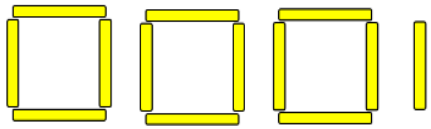
How do we know 13 divided by 4 will have a remainder?

Can a remainder ever be more than the divisor?

Which is your favourite method?
Which methods are most efficient with larger two digit numbers?

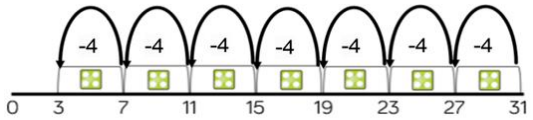
Varied Fluency

- How many squares can you make with 13 lollipop sticks?
There are ___ lollipop sticks.
There are ___ groups of 4
There is ___ lollipop stick remaining.
13 ÷ 4 = ___ remainder ___



Use this method to see how many triangles you can make with 38 lollipop sticks.

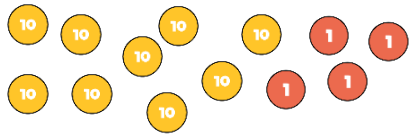
- Tommy uses repeated subtraction to solve 31 ÷ 4



31 ÷ 4 = 7 r 3

Use Tommy's method to solve 38 divided by 3

- Use place value counters to work out 94 ÷ 4
Did you need to exchange any tens for ones?
Is there a remainder?



Tens	Ones

Divide 2-digits by 1-digit (3)

Reasoning and Problem Solving

Which calculation is the odd one out?
Explain your thinking.

64 ÷ 8 | 77 ÷ 4 | 49 ÷ 6 | 65 ÷ 3

64 ÷ 8 could be the odd one out as it is the only calculation without a remainder.

Make sure other answers are considered such as 65 ÷ 3 because it is the only one being divided by an odd number.

Jack has 15 stickers.

He sorts his stickers into equal groups but has some stickers remaining.
How many stickers could be in each group and how many stickers would be remaining?

There are many solutions, encourage a systematic approach.
e.g. 2 groups of 7, remainder 1
3 groups of 4, remainder 3
2 groups of 6, remainder 3

Dora and Eva are planting bulbs.
They have 76 bulbs altogether.

Dora plants her bulbs in rows of 8 and has 4 left over.
Eva plants her bulbs in rows of 10 and has 2 left over.

How many bulbs do they each have?

Dora has 44 bulbs.
Eva has 32 bulbs.

Scaling

Notes and Guidance

It is important that children are exposed to problems involving scaling from an early age.
Children should be able to answer questions that use the vocabulary "times as many".
Bar models are particularly useful here to help children visualise the concept. Examples and non-examples should be used to ensure depth of understanding.

Mathematical Talk

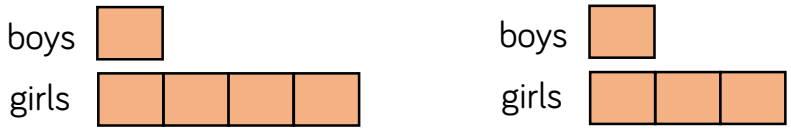
Why might someone draw the first bar model? What have they misunderstood?

What is the value of Amir's counters? How do you know?

How many adults are at the concert? How will you work out the total?

Varied Fluency

- In a playground there are 3 times as many girls as boys.



Which bar model represents the number of boys and girls?
Explain your choice.

- Draw a bar model to represent this situation.

In a car park there are 5 times as many blue cars as red cars.

- Eva has these counters 

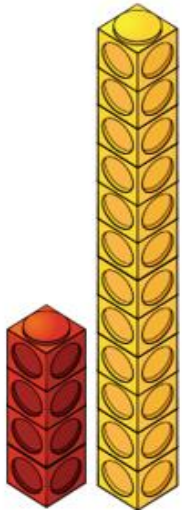
Amir has 4 times as many counters.
How many counters does Amir have?

- There are 35 children at a concert.
3 times as many adults are at the concert.
How many people are at the concert in total?

Scaling

Reasoning and Problem Solving

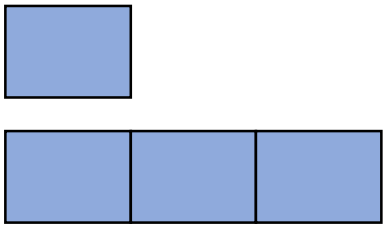
Dora says Mo's tower is 3 times taller than her tower.
Mo says his tower is 12 times taller than Dora's tower.
Who do you agree with?
Explain why?



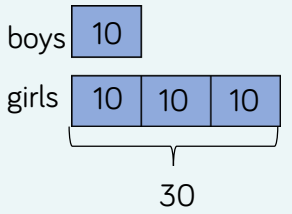
Dora's tower Mo's tower

I agree with Dora. Her tower is 4 cubes tall. Mo's tower is 12 cubes tall. 12 is 3 times as big as 4. Mo has just counted his cubes and not compared them to Dora's tower.

In a playground there are 3 times as many girls as boys.
There are 30 girls.
Label and complete the bar model to help you work out how many boys there are in the playground.



There are 10 boys in the playground.



A box contains some counters.
There are twice as many green counters as pink counters.
There are 18 counters in total.
How many pink counters are there?

There are 6 pink counters.

How Many Ways?

Notes and Guidance

Children list systematically the possible combinations resulting from two groups of objects. Encourage the use of practical equipment and ensure that children take a systematic approach to each problem.
Children should be encouraged to calculate the total number of ways without listing all the possibilities. e.g. Each T-shirt can be matched with 4 pairs of trousers so altogether $3 \times 4 = 12$ outfits.

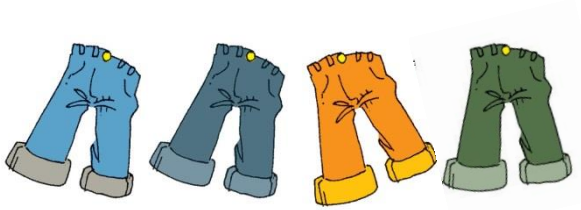
Mathematical Talk

What are the names of the shapes on the shape cards?
How do you know you have found all of the ways?
Would making a table help?

Without listing, can you tell me how many possibilities there would be if there are 5 different shape cards and 4 different number cards?

Varied Fluency

Jack has 3 T-shirts and 4 pairs of trousers.
Complete the table to show how many different outfits he can make.



T-shirt	Trousers
Blue	Blue
Blue	Dark blue
Blue	Orange
Blue	Green

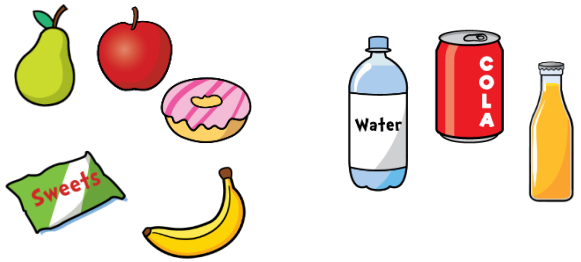
Alex has 4 shape cards and 3 number cards.

She chooses a shape card and a number card.
List all the possible ways she could do this.

How Many Ways?

Reasoning and Problem Solving

Eva chooses a snack and a drink.



What could she have chosen?
How many different possibilities are there?

____ × ____ = ____

There are ____ possibilities.

How many of the ways contain an apple?

There are 15 possibilities.
AW
AC
AO
PW
PC
PO
SW
SC
SO
DW
DC
DO
BW
BC
BO

3 ways contain an apple.

Jack has some jumpers and pairs of trousers.
He can make 15 different outfits.
How many jumpers could he have and how many pairs of trousers could he have?

He could have:
1 jumper and 15 pairs of trousers.
3 jumpers and 5 pairs of trousers.
15 jumpers and 1 pair of trousers.
5 jumpers and 3 pairs of trousers.

Spring - Block 2

Money

Overview

Small Steps

- Pounds and pence
- Convert pounds and pence
- Add money
- Subtract money
- Give change

NC Objectives

Add and subtract amounts of money to give change, using both £ and p in practical contexts.

Pounds and Pence

Notes and Guidance

Children need to know the value of each coin and note and understand what these values represent.
They should understand that money can be represented in different ways but still have the same value.
Children will need to be able to add coin values together to find the total amount.

Mathematical Talk

What is the value of the coin/note?

What does p mean?

Why do we have different values of coins and notes?

What's the difference between £5 and 5p?

Varied Fluency

Match the amounts that are equal.

Fifteen pounds | Fifteen pence | Fifty pounds | Fifty pence




How much money does the jar contain?

The jar contains £____ and ____ p.

Use <, > or = to make the statements correct.




Pounds and Pence

Reasoning and Problem Solving

Rosie has 5 silver coins in her purse.

She can make 40p with three coins.

She can also make 75p with three coins.

How much money does Rosie have in her purse?

Rosie has 95 pence in her purse. She has one 20p coin, one 50p coin, two 10p coins and one 5p coin.

Amir has 5 different coins in his wallet.

What is the greatest amount of money he could have in his wallet?
What is the least amount of money?

Greatest:
£3 and 80p

Least:
38p

Convert Pounds and Pence

Notes and Guidance

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

Mathematical Talk

How many pennies are there in £1?

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

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

Varied Fluency

- What is the total of the coins shown?

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

- Write the amounts in pounds and pence.

- Write each amount in pounds and pence.

165p 234p 199p 112p 516p

Convert Pounds and Pence

Reasoning and Problem Solving

Dexter has 202 pence.

He has **one** pound coin.

Show five possible combinations of other coins he may have.

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

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

Explain your answer.

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

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

Convince me.

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

This is greater than £6

Add Money

Notes and Guidance

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

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

Mathematical Talk

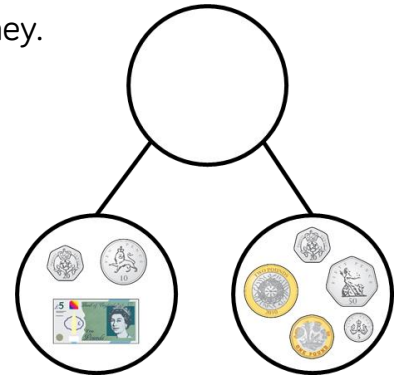
Can you group any of the coins to make a pound?

Can you use estimation to support your calculation?

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

Varied Fluency

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



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

Use Mo's method to find the total of:

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

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

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

Add Money

Reasoning and Problem Solving

Dora bought these muffins.

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

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

How much more money did Tommy spend than Dora?

Dora spent 105p or £1 and 5p.

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

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

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

£3 and 35p

£2 and 55p

85p

75p

What combinations of items could Rosie buy with £5?

£3 and 35p + 85p + 85p = £5 and 5p

She does not have enough money.

Rosie could buy

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

Subtract Money

Notes and Guidance

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

Mathematical Talk

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

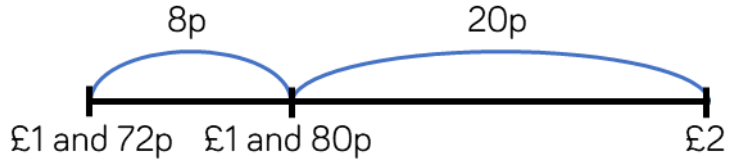
Varied Fluency

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

£3 – £2 = £____ 50p – 10p = ____ p

Alex has £____ and ____ p remaining.

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



Rosie has ____ p more than Tommy.

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

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

Subtract Money

Reasoning and Problem Solving

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

How much more money does Teddy have than Jack?

Rosie has twice as much money as Teddy.

How much more money does Rosie have than Jack?

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

Teddy has £5 and 80p more than Jack.

Rosie has £14 and 50p more than Jack.

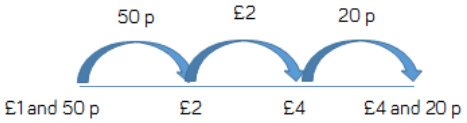
Use coins to support children in calculating.

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

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

Annie

Teddy



The difference is £2 and 70p.

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

Eva

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

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

Give Change

Notes and Guidance

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

Mathematical Talk

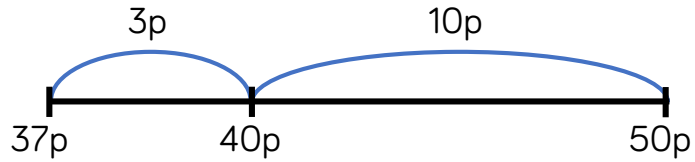
What do we mean by 'change' in the context of money?

Which method do you find most effective?

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

Varied Fluency

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

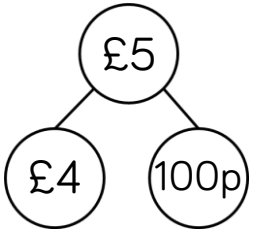


Mo will receive ____ p change.

Use a number line to solve the problems.

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

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



Use a part-whole model to solve the problem.

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

Give Change

Reasoning and Problem Solving

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

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

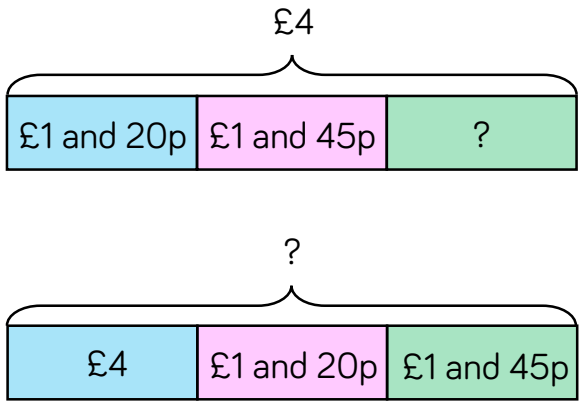
The shopkeeper gives her six coins for her change.
What coins could they be?

She receives £2 and 24p change.

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

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

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



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

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

White Rose Maths

Spring - Block 3

Statistics

Overview

Small Steps

- Pictograms
- Bar Charts
- Tables

NC Objectives

Interpret and present data using bar charts, pictograms and tables.

Solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

Pictograms

Notes and Guidance

Children build on their understanding of pictograms from Year 2. They continue to read and interpret information in order to answer questions about the data. It is important that children understand the value of each symbol used and what it means when half a symbol is used.

Children construct pictograms and choose an appropriate key. Encourage children to carry out their own data collection.

Mathematical Talk

What is each symbol worth?

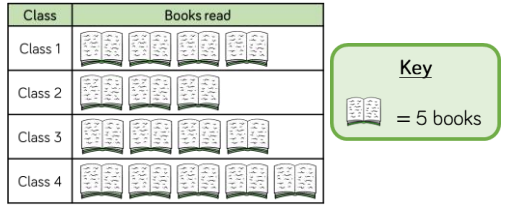
What does half of the symbol represent? Is it always possible to use half of a symbol? Why?

What other questions could you ask about the pictogram?

What would each symbol represent in your pictogram? Have you used the same key as a friend? Could it be represented in different ways?

Varied Fluency

4 classes are recording how many books they read in a week.
Here are the results of how many books they read last week.

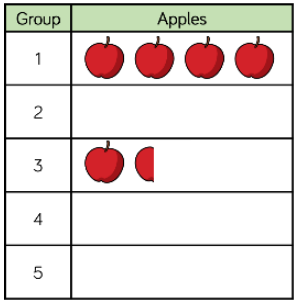


- Which class read the most books?
- Which class read the least books?
- How many more books did Class 4 read than Class 2?

Complete the pictogram using the information.

- Group 2 collected 40 apples.
- Group 4 collected half as many apples as Group 1
- Group 5 collected 20 more apples than Group 3

How many apples did each group collect?



Class 3 are counting the colour of cars that pass the school.

Red	Blue	Black	Silver	White	Other
12	6	14	10	14	2

Draw a pictogram to represent their findings.

Pictograms

Reasoning and Problem Solving

Ron, Amir and Alex record the scores of six football matches. Unfortunately, Ron spilt paint on them.

Record the results based on what the children remember.

Match	Number of goals ⚽ = 2 goals
1	
2	⚽⚽⚽
3	⚽
4	
5	⚽⚽⚽⚽
6	⚽

Match 1 had 3 more goals than match 3

Match 6 had 1 less goal than match 2

Match 4 had twice as many goals as match 3

Possible answer:

Match	Number of goals
1	⚽⚽◔
2	⚽⚽⚽
3	⚽
4	⚽⚽
5	⚽⚽⚽⚽
6	⚽⚽◔

Whitney and Teddy are making pictograms to show how many chocolate eggs each class won at the school fair.

Class	Number of eggs
1	🥚🥚🥚🥚🥚
2	🥚🥚🥚🥚🥚
3	🥚🥚🥚🥚🥚🥚🥚
4	🥚🥚🥚🥚🥚
5	🥚🥚🥚🥚
6	🥚🥚🥚🥚🥚🥚

Key
🥚 = 5 eggs

Class	Number of eggs
1	🥚🥚🥚
2	🥚🥚🥚
3	🥚🥚🥚🥚
4	🥚🥚🥚
5	🥚🥚
6	🥚🥚🥚◔

Key
🥚 = 10 eggs

What's the same and what's different about their pictograms?
Whose pictogram do you prefer and why?

Possible answer:

Same image/symbol for key, same total of eggs, different values for the key...

Bar Charts

Notes and Guidance

Children interpret information in pictograms and tally charts in order to construct bar charts. They interpret information from bar charts and answer questions relating to the data.

Children read and interpret bar charts with scales of 1, 2, 5 and 10. They decide which scale will be the most appropriate when drawing their own bar charts.

Mathematical Talk

What's the same and what's different about the pictogram and the bar chart?

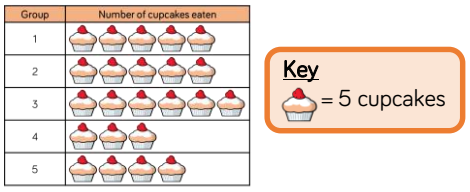
How does the bar chart help you understand the information?

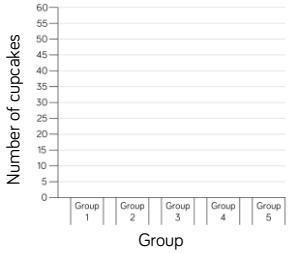
Which scale should we use? How can we decide whether to have a scale going up in intervals of 1, 2, 5 or 10?

What other questions could you ask about the bar chart?

Varied Fluency

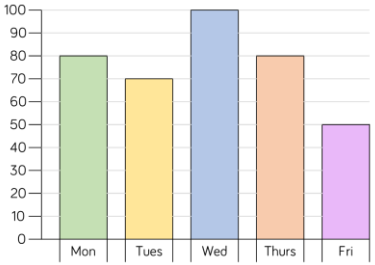
Use the information from the pictogram to complete the bar chart.





A bar chart to show the number of cupcakes eaten

The bar chart shows how many children attend after school clubs.



Which day is the most popular?
Which day is the least popular?
What is the difference between the number of children attending on Tuesday and on Thursday?
What information is missing from the bar chart?

Here is a tally chart showing the number of children in each sports club.
Draw a bar chart to represent the data.

Sport	Tally	Total
Football	𝍸 𝍸 𝍸	15
Tennis	𝍸 𝍸 ||||	
Rugby	𝍸 𝍸 𝍸 |||	
Cricket	𝍸 𝍸 ||	
Basketball	𝍸 |||	

Bar Charts

Reasoning and Problem Solving

Which would be more suitable to represent this information, a bar chart or a pictogram?
Explain why.

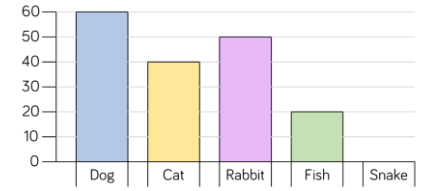
Child	Number of Skips in 30 Seconds
Teddy	12
Annie	15
Whitney	17
Ron	8

Possible answer:

I think a bar chart would be more suitable because in a pictogram you would need to draw symbols representing 1 or 2 which would make it less efficient. Children may draw both to experiment which representation is clearer.

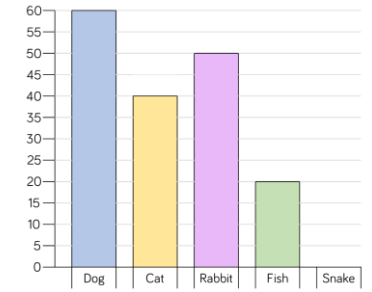
Rosie and Jack have drawn bar charts to show how many people have pets

Rosie says,



I asked more people because my scale goes up in larger jumps.

Jack says,



I asked more people because my bars are taller.

Who is correct? Explain why.

Possible answer:

They are both incorrect as they asked the same amount of people but they have just used different scales on their bar charts.
Children could discuss which scale is more efficient.

Tables

Notes and Guidance

Children interpret information from tables to answer one and two-step problems.

They use their addition and subtraction skills to answer questions accurately and ask their own questions about the data in tables.

Mathematical Talk

What information can we gather from the table?

Can you explain to a friend how to read the table?

Where do we need to use tables in real life?

What other questions could I ask and answer using the information in the table?

Varied Fluency

The table shows which sports children play.

	Whitney	Jack	Eva	Mo	Teddy	Annie
Football	✓		✓	✓		✓
Rugby			✓		✓	
Tennis	✓	✓		✓		✓
Cricket			✓		✓	
Basketball		✓	✓	✓		✓

How many children play tennis?
Which sports does Mo play?
Which children play football and tennis?
Which child plays the most sport?

The table shows the increase in bus ticket prices.

- The cost of Ron's new ticket is 60p. How much was his ticket last year? How much has the price increased by?
- Which ticket price has increased the most from 2016 to 2017? Which ticket price has increased the least?

1st January	
2016	2017
44p	49p
56p	60p
64p	69p
76p	85p
85p	93p
98p	£1.03
£1.05	£1.11

Tables

Reasoning and Problem Solving

How many questions can you create for your partner about this table?

Day	Number of hours shop is open
Monday	8
Tuesday	8
Wednesday	4
Thursday	10
Friday	7
Saturday	12

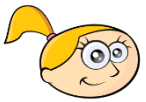
Possible answers:

How many hours does the shop open for in total?
Which day does it open the longest?
How many more hours does the shop open for on Saturday than Thursday?
Which day was the shop open the shortest amount of time?

Eva has created a table to show how many boys and girls took part in after school clubs last week.

Day	Boys	Girls
Monday	11	9
Tuesday	18	12
Wednesday	13	11
Thursday	8	8
Friday	9	7

Eva says,



106 boys took part in after school clubs last week.

Is Eva correct?

Explain why.

Possible answer:

Eva is incorrect. She has counted all the children rather than just the boys. 59 boys took part in after school clubs last week.

White Rose Maths

Spring - Block 4

Length & Perimeter

Overview

Small Steps

- Measure length
- Equivalent lengths – m & cm
- Equivalent lengths – mm & cm
- Compare lengths
- Add lengths
- Subtract lengths
- Measure perimeter
- Calculate perimeter

NC Objectives

Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).

Measure the perimeter of simple 2-D shapes.

Measure Length

Notes and Guidance

Children are introduced to millimetres for the first time and build on their understanding of centimetres and metres.

Children use different measuring equipment including rulers, tape measures, metre sticks and trundle wheels. They discuss which equipment is the most appropriate depending on the object they are measuring.

Mathematical Talk

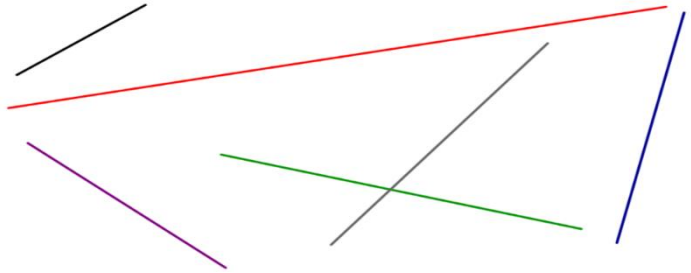
What would be the best equipment to measure _____ with? (e.g. tape measure, ruler, metre stick)

What do we have to remember when using a ruler to measure? Which unit of measurement are we going to use to measure? Centimetres or millimetres?

What unit of measure would be best to measure____ ?

Varied Fluency

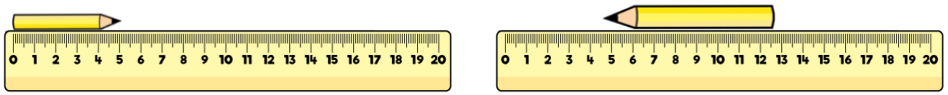
- Measure the lines to the nearest centimetre.
  Can you measure the lines in millimetres?



- What unit of measurement would you use to measure these real life objects? Millimetres, centimetres or metres?

Fingernail	Eraser	Pencil
Height of a house	Length of a playground	Length of a table

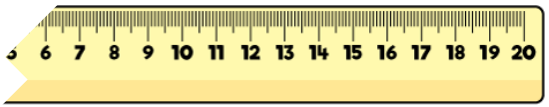
- What is the length of each pencil?



Measure Length

Reasoning and Problem Solving

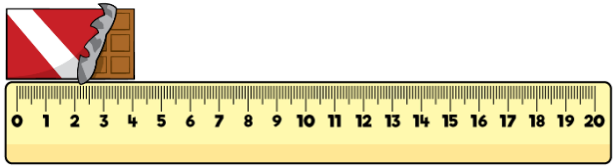
Whitney's ruler is broken.
How could she use it to still measure items?



Possible answer:

She could start from a different number and count on.

Tommy thinks that this chocolate bar is 4 cm long.
Is he correct?

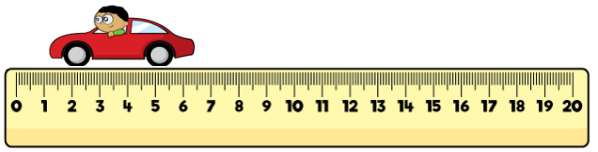


Convince me.

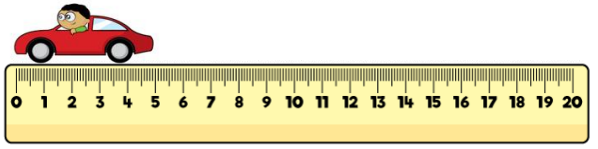
He is incorrect because he has not placed the chocolate bar at 0, he has put it at the end of the ruler.

Three children measured the same toy car.

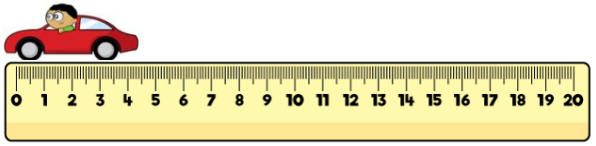
Eva says that the car is 6 cm and 5 mm



Dexter says the car is 5 cm



Annie says the car is 4 cm 5 mm



Who is correct?
Who is incorrect?
Explain why.

Dexter is correct. The other two children have not lined up the ruler correctly: Eva has started at 1 cm and 5 mm instead of 0 and Annie has started at the end of the ruler.

Equivalent Lengths – m & cm

Notes and Guidance

Children recognise that 100 cm is equivalent to 1 metre. They use this knowledge to convert other multiples of 100 cm into metres and vice versa.

When looking at lengths that are not multiples of 100, they partition the measurement and convert into metres and centimetres. At this stage, children do not use decimals. This is introduced in Year 4.

Mathematical Talk

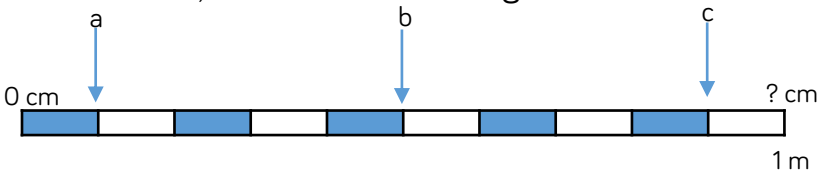
If there are 100 cm in 1 metre, how many centimetres are in 2 metres? How many centimetres are in 3 metres?

Do we need to partition 235 cm into hundreds, tens and ones to convert it to metres? Is it more efficient to partition it into two parts? What would the two parts be?

If 100 cm is equal to one whole metre, what fraction of a metre would 50 cm be equivalent to? Can you show me this in a bar model?

Varied Fluency

If a = 10 cm, calculate the missing measurements.



b = ____ cm c = ____ cm 1 metre = ____ cm

Can you match the equivalent measurements?

100 cm	9 m
5 m	200 cm
300 cm	500 cm
2 m	1 metre
900 centimetres	3 m

Eva uses this diagram to convert between centimetres and metres.

Use Eva's method to convert:

- 130 cm
- 230 cm
- 235 cm
- 535 cm
- 547 cm

120 cm	
100 cm	20 cm
1 m	20 cm
1m 20 cm	

Equivalent Lengths – m & cm

Reasoning and Problem Solving

Mo and Alex each have a skipping rope.

Alex says,

I have the longest skipping rope. My skipping rope is $2\frac{1}{2}$ metres long.

Mo says,

My skipping rope is the longest because it is 220 cm and 220 is greater than $2\frac{1}{2}$

Who is correct?
Explain your answer.

Alex is correct because her skipping rope is 250 cm long which is 30 cm more than 220 cm.

Three children are partitioning 754 cm

Teddy says,

75 m and 4 cm

Whitney says,

7 m and 54 cm

Jack says,

54 cm and 7 m

Who is correct?
Explain why.

Whitney and Jack are both correct. Teddy has incorrectly converted from cm to m when partitioning.

Equivalent Lengths – mm & cm

Notes and Guidance

Children recognise that 10 mm is equivalent to 1 cm. They use this knowledge to convert other multiples of 10 mm into centimetres and vice versa.

When looking at lengths that are not multiples of 10, they partition the measurement and convert into centimetres and millimetres. At this stage, children do not use decimals. This is introduced in Year 4.

Mathematical Talk

What items might we measure using millimetres rather than centimetres?

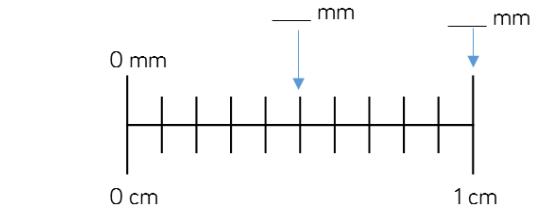
If there are 10 mm in 1 cm, how many mm would there be in 2 cm?

How many millimetres are in $\frac{1}{2}$ cm?

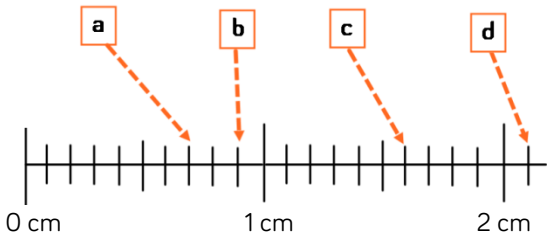
How many different ways can you partition 54 cm?

Varied Fluency

- Fill in the blanks.



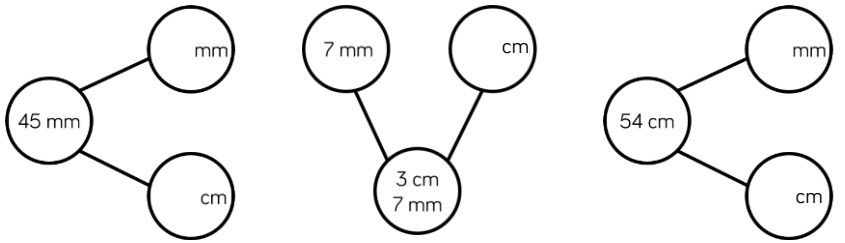
There are ____ mm in 1 cm.



a = ____ cm ____ mm
b = ____ cm ____ mm
c = ____ cm ____ mm
d = ____ cm ____ mm

- Measure different items around your classroom.
Record your measurements in a table in cm and mm, and just mm.

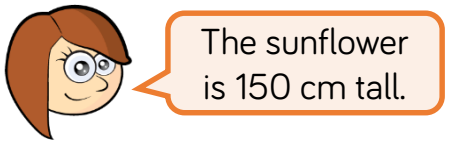
- Complete the part whole models.



Equivalent Lengths – mm & cm

Reasoning and Problem Solving

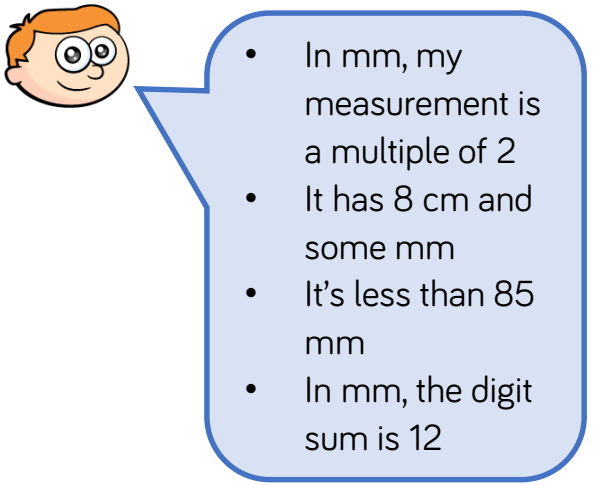
Rosie is measuring a sunflower using a 30 cm ruler.
Rosie says,



Rosie is incorrect.
Explain what mistake she might have made.
How tall is the sunflower?

Rosie is incorrect. She has used the wrong unit on the ruler.
The sunflower is 15 cm tall or 150 mm tall.

Ron is thinking of a measurement.
Use his clues to work out which measurement he is thinking of.



Ron is thinking of 84 mm (8 cm and 4 mm)

Compare Lengths

Notes and Guidance

Children compare and order lengths based on measurements in mm, cm and m.

They use their knowledge of converting between units of measurement to help them compare and order. Encourage children to convert all the measurements to the same unit of length before comparing.

Mathematical Talk

Is descending order, shortest to tallest or tallest to shortest?

Can you order the children's heights in ascending order?

Why does converting to the same unit of length, make it easier to compare lengths?

Estimate which child's tower you think will be the tallest. Explain why.

Varied Fluency

Complete the sentences.

Child	Height
Rosie	109 cm
Amir	1 m 5 cm
Jack	135 cm
Dora	1 m 45 mm

Rosie is _____ than Jack.

Jack is _____ than Dora.

Amir is _____ than Rosie.

Dora is _____ than Amir.

Four friends are building towers.
Eva's tower is 22 cm and 7 mm tall.
Teddy's tower is 22 cm tall.
Annie's tower is 215 mm tall.
Dexter's tower is 260 mm tall.
Order the children's towers in descending order.

Using a ruler, measure the width of 5 different books to the nearest mm. Record your results in a table, then compare and order them.

Compare Lengths

Reasoning and Problem Solving

Always, Sometimes, Never?

mm lengths are smaller than cm lengths.

Possible answer:

Sometimes.
E.g. 1 mm is smaller than 1 cm but 70 mm is larger than 3 cm.

Sort the lengths into the table.

Longer than a metre	Shorter than a metre

1 m 65 cm | 165 mm | 165 m

165 cm | 16 cm 5 mm | 1 cm 65 mm

Are any of the lengths equivalent?

1 m 65 cm, 165 cm and 165 m are longer than a metre.
165 mm, 16cm 5 mm and 1 cm 65 mm are shorter than a metre.

1 m 65 cm is equivalent to 165 cm.
165 mm is equivalent to 16 cm 5 mm.

Add Lengths

Notes and Guidance

Children add lengths given in different units of measurement. They convert measurements to the same unit of length to add more efficiently. Children should be encouraged to look for the most efficient way to calculate and develop their mental addition strategies.

This step helps prepare children for adding lengths when they calculate the perimeter.

Mathematical Talk

How did you calculate the height of the tower?

Estimate which route is the shortest from Tommy's house to his friend's house.

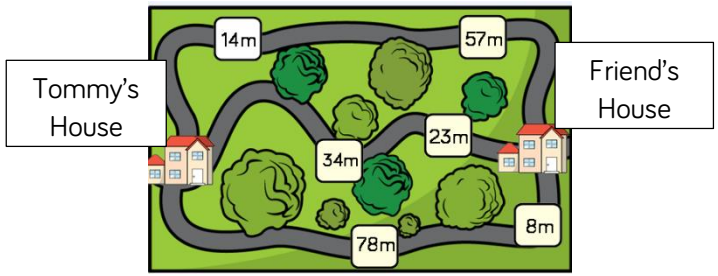
Which route is the longest?

Why does converting the measurements to the same unit of length make it easier to add them?

Varied Fluency

- Ron builds a tower that is 14 cm tall.
  Jack builds a tower than is 27 cm tall.
  Ron puts his tower on top of Jack's tower.
  How tall is the tower altogether?

- Tommy needs to travel to his friend's house.
  He wants to take the shortest possible route.
  Which way should Tommy go?



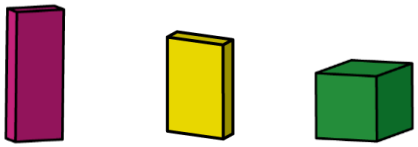
- Miss Nicholson measured the height of four children in her class.
  What is their total height?

95 cm	1 m and 11 cm	1 m and 50 mm	89 cm

Add Lengths

Reasoning and Problem Solving

Eva is building a tower using these blocks.



100 mm 80 mm 50 mm

How many different ways can she build a tower measuring 56 cm?
Can you write your calculations in mm and cm?

Possible answer:

Four 100 mm blocks and two 80 mm blocks.

There are many other solutions.

Eva and her brother Jack measured the height of their family.

134 cm | 1 m and 60 cm | 1 m and 85 cm | 1 m and 10 cm

Eva thinks their total height is 4 m and 55 cm

Jack thinks their total height is 5 m and 89 cm

Who is correct? Prove it.

Jack is correct. Eva has not included her own height.

Subtract Lengths

Notes and Guidance

Children use take-away and finding the difference to subtract lengths. Children should be encouraged to look for the most efficient way to calculate and develop their mental subtraction strategies.

This step will prepare children for finding missing lengths within perimeter.

Mathematical Talk

What is the difference between the length of the two objects? How would you work it out?

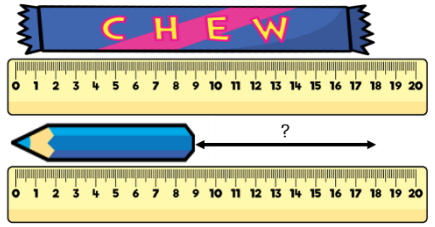
How are Alex's models different? How are they the same?

Which model do you prefer? Why?

What is the most efficient way to subtract mixed units?

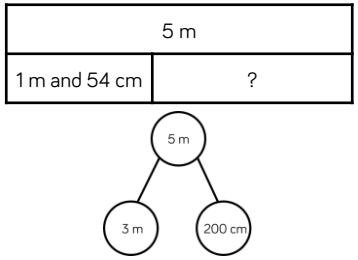
Varied Fluency

Find the difference in length between the chew bar and the pencil.



The chew bar is ___ cm long.
The pencil is ___ cm long.
The chew bar is ___ cm longer than the pencil.

Alex has 5 m of rope. She uses 1 m and 54 cm to make a skipping rope. She works out how much rope she has left using two different models.



5 m − 1 m = 4 m
4 m − 54 cm = 3 m 46 cm

200 cm − 154 cm = 46 cm
3 m + 46 cm = 3 m 46 cm

Use the models to solve:

- Mrs Brook's ball of wool is 10 m long. She uses 4 m and 28 cm to knit a scarf. How much does she have left?
- A roll of tape is 3 m long. If I use 68 cm of it wrapping presents, how much will I have left?

Subtract Lengths

Reasoning and Problem Solving

A bike race is 950 m long.
Teddy cycles 243 m and stops for a break.
He cycles another 459 m and stops for another break.
How much further does he need to cycle to complete the race?

Teddy needs to cycle 248 metres further.

A train is 20 metres long.
A car is 15 metres shorter than the train.
A bike is 350 cm shorter than the car.

Calculate the length of the car.
Calculate the length of the bike.
How much longer is the train than the bike?

The car is 5 m and the bike is 150 cm or 1 m 50 cm.

The train is 18 metres and 50 cm longer than the bike.

Annie has a 3 m roll of ribbon.

She is cutting it up into 10 cm lengths.
How many lengths can she cut?

Annie gives 240 cm of ribbon to Rosie.
How much ribbon does she have left?
How many 10 cm lengths does she have left?

Annie can cut it in to 30 lengths.

Annie has 60 cm left.
She has 6 lengths left.

Measure Perimeter

Notes and Guidance

Children are introduced to perimeter for the first time. They explore what perimeter is and what it isn't.

Children measure the perimeter of simple 2-D shapes. They may compare different 2-D shapes which have the same perimeter.

Children make connections between the properties of 2-D shapes and measuring the perimeter.

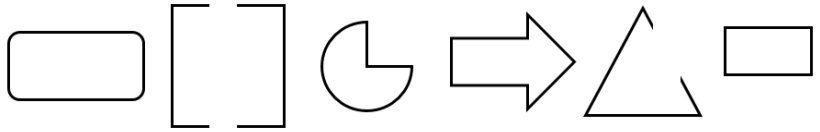
Mathematical Talk

What is perimeter?
Which shape do you predict will have the longest perimeter?
Does it matter where you start when you measure the length of the perimeter? Can you mark the place where you start and finish measuring?
Do you need to measure all the sides of a rectangle to find the perimeter? Explain why.

Varied Fluency

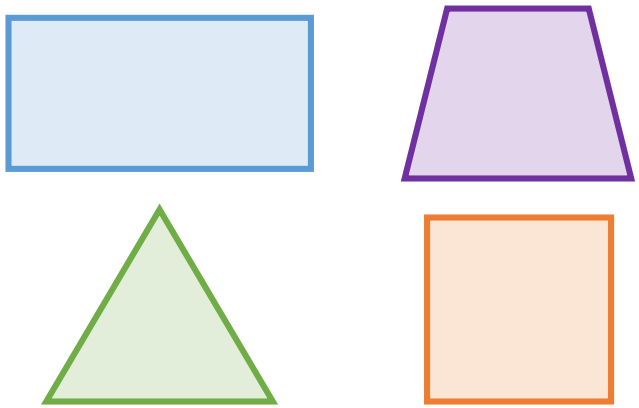
- Using your finger, show me the perimeter of your table, your book, your whiteboard etc.

- Tick the images where you can find the perimeter.



Explain why you can't find the perimeter of some of the images.

- Use a ruler to measure the perimeter of the shapes.

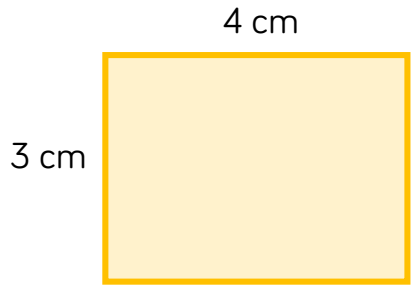


Measure Perimeter

Reasoning and Problem Solving

Amir is measuring the shape below.
He thinks the perimeter is 7 cm.

Can you spot his mistake?



Amir has only included two of the sides. To find the perimeter he needs all 4 sides. It should be 14 cm.

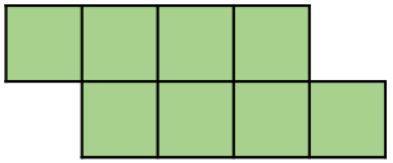
Whitney is measuring the perimeter of a square.
She says she only needs to measure one side of the square.

Do you agree?
Explain your answer.

Whitney is correct because all four sides of a square are equal in length so if she measures one side she can multiply it by 4

Here is a shape made from centimetre squares.

Find the perimeter of the shape.



The perimeter is 14 cm.

Can you use 8 centimetre squares to make different shapes?

Find the perimeter of each one.

There are various different answers depending on the shape made.

Calculate Perimeter

Notes and Guidance

Children use their understanding of the properties of shape to calculate the perimeter of simple 2-D shapes.

It is important to note they will not explore the formula to find the perimeter of a rectangle at this point.

They explore different methods for calculating the perimeter of a shape. For example, they may use repeated addition or they may make connections to multiplication.

Mathematical Talk

How can we calculate the perimeter of each shape?

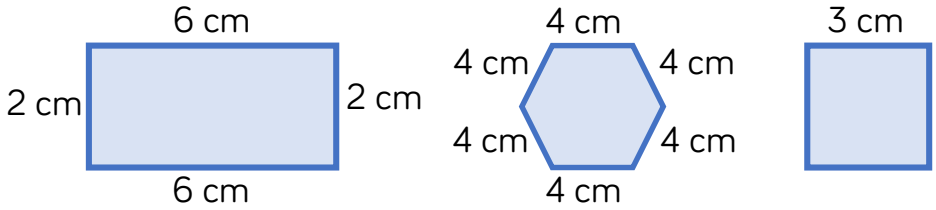
Can we calculate the perimeter using a different method?

What is the same about the two methods? What is different?

How can we work out the length of the missing side? What other information do we know about the rectangle? Can we write on the lengths of all the sides?

Varied Fluency

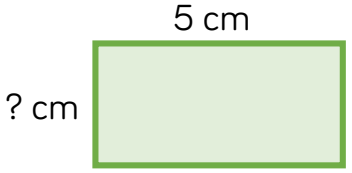
- Calculate the perimeter of the shapes.



Can you find more than one way to calculate the perimeter?

- Use two different methods to calculate the perimeter of the squares.

- What is the length of the missing side?



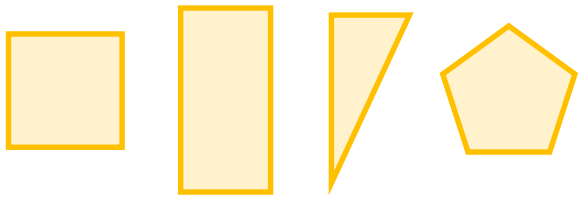
Perimeter = 16 cm

Calculate Perimeter

Reasoning and Problem Solving

Teddy says,

You only need to know the length of one side of these 2-D shapes to work out the perimeter.



Do you agree with Teddy?
Explain your answer.

You only need to know the length of one side for the square and the pentagon as all the sides are the same.
However, Teddy is wrong because for the rectangle you need to know two lengths and for the triangle you need to know all of them.

Each side of this shape is of equal length.
The perimeter is 60 cm.
How long is each side?

The shape has 10 sides so the length of each side is 6 cm

How many different rectangles can you draw with a perimeter of 20 cm?

There are 5 different rectangles.

1 cm by 9 cm
2 cm by 8 cm
3 cm by 7 cm
4 cm by 6 cm
5 cm by 5 cm

White Rose Maths

Spring - Block 5

Fractions

Overview

Small Steps

1. Unit and non-unit fractions
2. Making the whole
3. Tenths
4. Count in tenths
5. Tenths as decimals
6. Fractions on a number line
7. Fractions of a set of objects (1)
8. Fractions of a set of objects (2)
9. Fractions of a set of objects (3)

NC Objectives

Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10

Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators.

Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.

Solve problems that involve all of the above.

Unit and Non-unit Fractions

Notes and Guidance

Children recap their understanding of unit and non-unit fractions from Year 2. They explain the similarities and differences between unit and non-unit fractions.

Children are introduced to fractions with denominators other than 2, 3 and 4, which they used in Year 2. Ensure children understand what the numerator and denominator represent.

Mathematical Talk

What is a unit fraction?

What is a non-unit fraction?

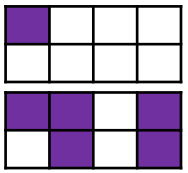
Show me $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ What's the same? What's different?

What fraction is shaded? What fraction is not shaded?

What is the same about the fractions? What is different?

Varied Fluency

- Complete the sentences to describe the images.

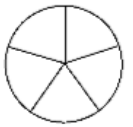


___ out of ___ equal parts are shaded.

$\frac{\square}{\square}$ of the shape is shaded.

- Shade $\frac{1}{5}$ of the circle.

Shade $\frac{3}{5}$ of the circle



Circle $\frac{1}{5}$ of the beanbags.

Circle $\frac{3}{5}$ of the beanbags.

What's the same and what's different about $\frac{1}{5}$ and $\frac{3}{5}$?

- Complete the sentences.

A unit fraction always has a numerator of _____

A non-unit fraction has a numerator that is _____ than _____

An example of a unit fraction is _____

An example of a non-unit fraction is ____

Can you draw a unit fraction and a non-unit fraction with the same denominator?

Unit and Non-unit Fractions

Reasoning and Problem Solving

True or False?

$\frac{1}{3}$ of the shape is shaded.

False, one quarter is shaded. Ensure when counting the parts of the whole that children also count the shaded part.

Sort the fractions into the table.

	Fractions equal to one whole	Fractions less than one whole
Unit fractions		
Non-unit fractions		

Are there any boxes in the table empty? Why?

$\frac{3}{4}$	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{2}$	$\frac{4}{4}$	$\frac{2}{5}$	$\frac{1}{2}$

Top left: Empty

Top right: $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$

Bottom left: $\frac{2}{2}$ and $\frac{4}{4}$

Bottom right: $\frac{3}{4}$, $\frac{3}{5}$ and $\frac{2}{5}$

There are no unit fractions that are equal to one whole other than $\frac{1}{1}$ but this isn't in our list.

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

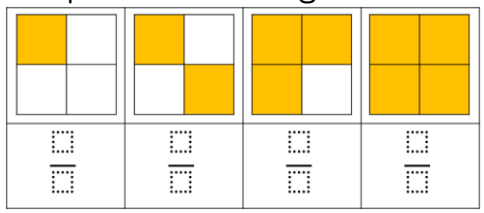
Is a fraction always less than one?

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?

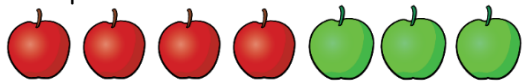
Varied Fluency

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.

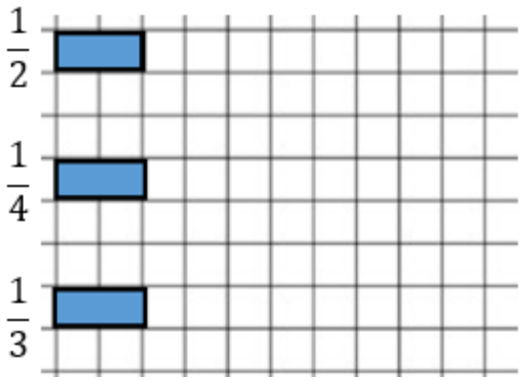
When a fraction is equal to a whole, the numerator and the denominator are _____

Use pictures to prove your answer.

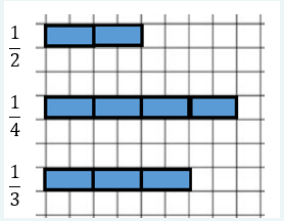
The same/equal

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?

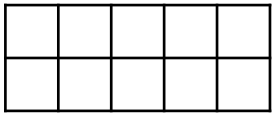
When I am writing tenths, the _____ is always 10

How are fractions linked to division?

Varied Fluency

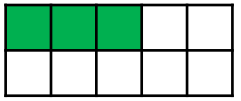
If the frame represents 1 whole, what does each box represent?
Use counters to represent:

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

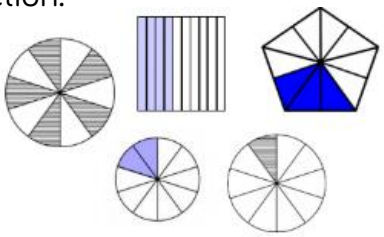


Identify what fraction of each shape is shaded.
Give your answer in words and as a fraction.

e.g.



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



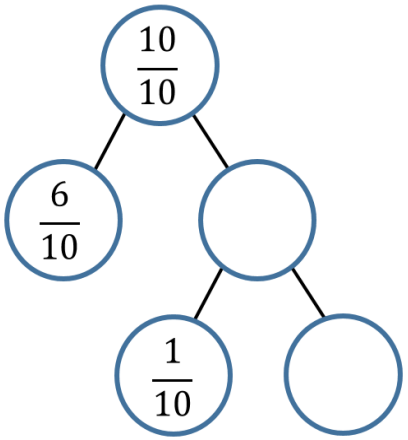
Annie has 2 cakes. She wants to share them equally between 10 people. What fraction of the cakes will each person get?

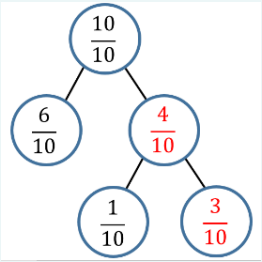
There are ____ cakes.
They are shared equally between ___ people.
Each person has $\frac{\square}{\square}$ of the cake.
___ ÷ ___ = ____
What fraction would they get if Annie had 4 cakes?

Tenths

Reasoning and Problem Solving

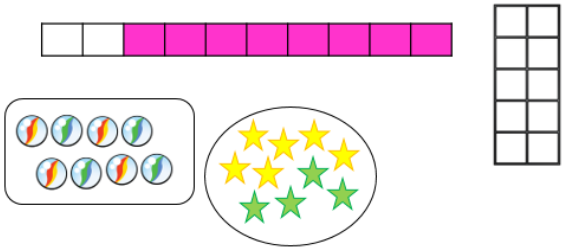
Fill in the missing values.
Explain how you got your answers.





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

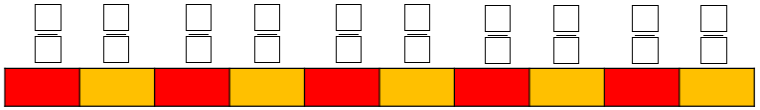
Let's count in tenths. What comes next? Explain how you know.

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

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

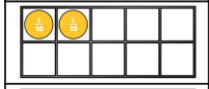
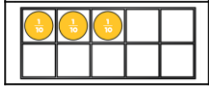
Varied Fluency

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

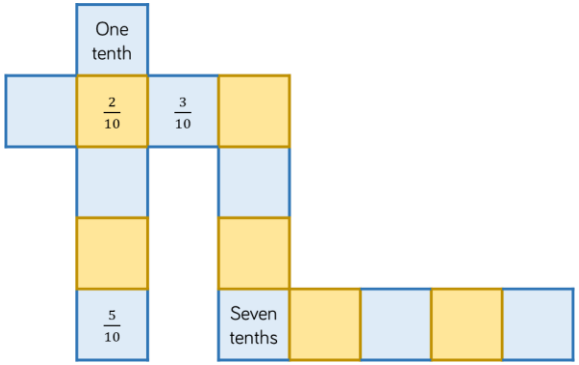


Continue the pattern in the table.

- 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?

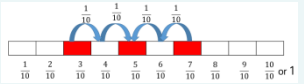
Five tenths is $\frac{2}{10}$ smaller than 7 tenths.

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?

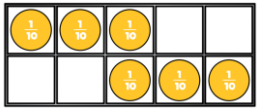
How many different ways can we write a tenth?

What does equivalent mean?

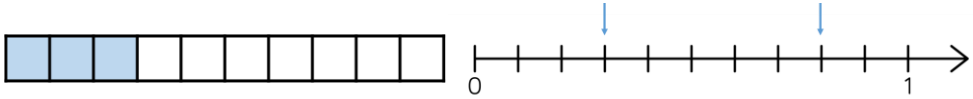
What is the same and what is different about decimals and fractions?

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.

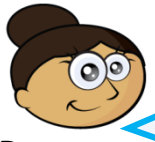
Ones	Tenths
0	8

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

Tenths as Decimals

Reasoning and Problem Solving

True or False?



Dora

10 cm is one tenth of 1 metre

10 cm is 0.1 metres.

Amir

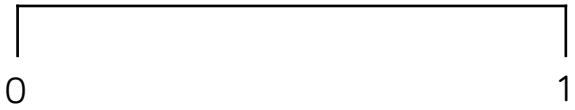
Explain your answer.

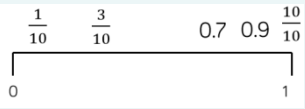
They are both correct.

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?

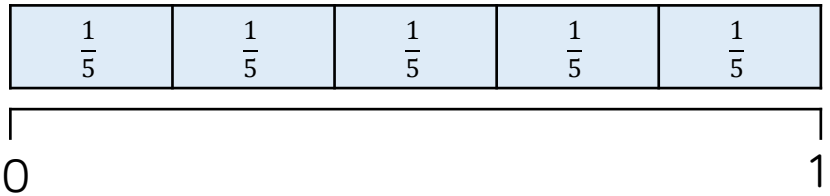
How are the bar model and the number line the same? How are they different?

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

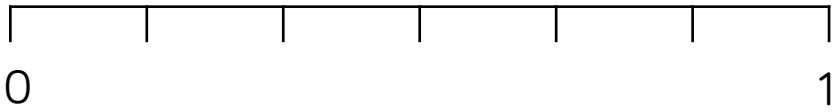
How do we label fractions larger than one.

Varied Fluency

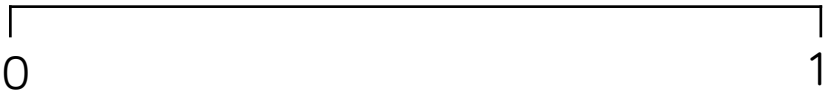
Show $\frac{1}{5}$ on the number line. Use the bar model to help you.



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



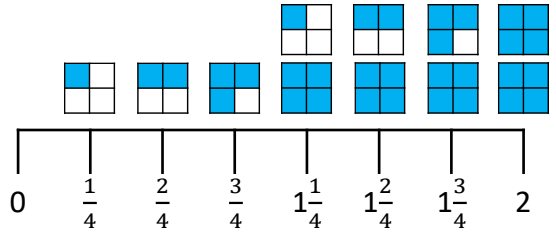
Divide the number line into eighths.
Can you continue the number line up to 2?



Fractions on a Number Line

Reasoning and Problem Solving

Eva has drawn a number line.



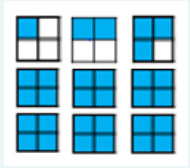
Tommy says it is incorrect.

Do you agree with Tommy?

Explain why.

Can you draw the next three fractions?

Tommy is correct because Eva has missed 1 whole out.



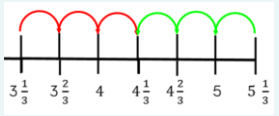
Alex and Jack are counting up and down in thirds.

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

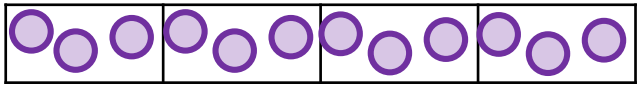
Find $\frac{1}{5}$ of Eva's marbles.

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 $\square$

80

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

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

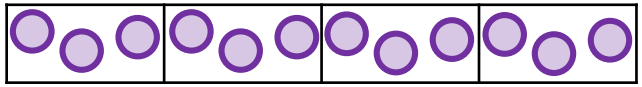
Find $\frac{2}{5}$ of Eva's marbles.

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

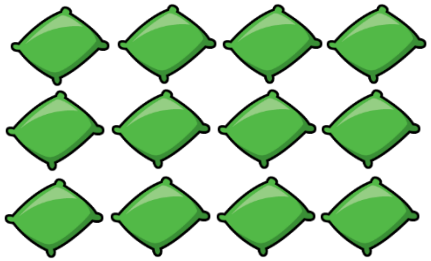
Use Amir's method to find:

$\frac{2}{3}$ 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?

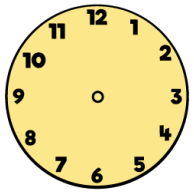
What is the whole? How can we represent this problem?

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.