Spring Scheme of Learning

Year 4

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

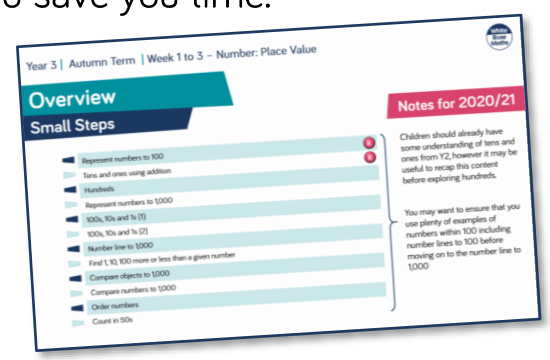
2020 will go down in history. The world has changed for all of us.

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

We have amended our schemes for 2020/21 to:

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

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



Lesson-by-lesson overviews

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

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

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

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

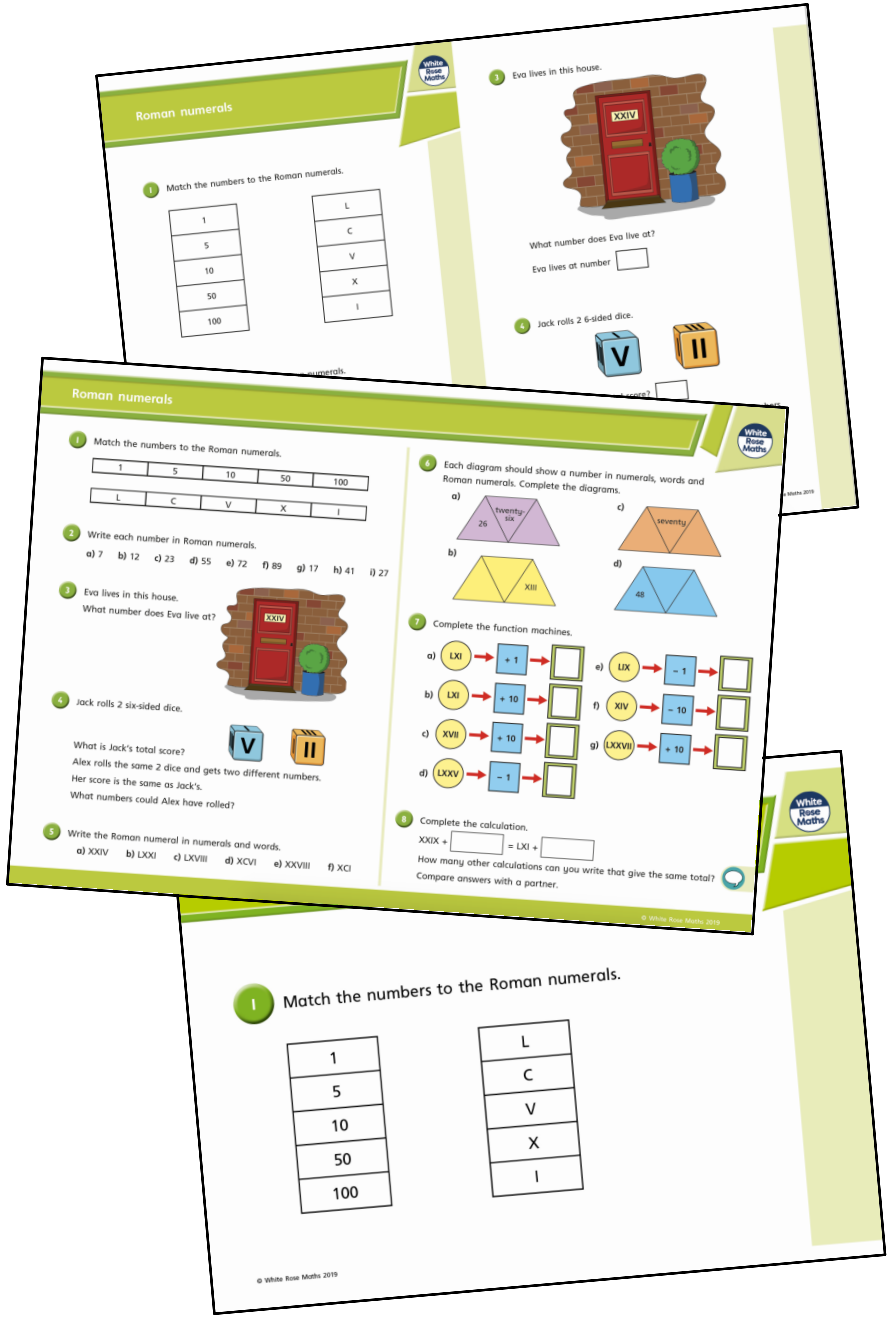
Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Supporting resources

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

The worksheets are provided in three different formats:

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

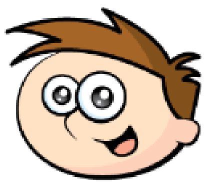


For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

Notes and Guidance

Meet the Characters

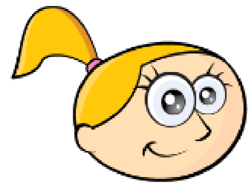
Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



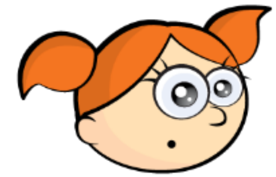
Teddy

Rosie

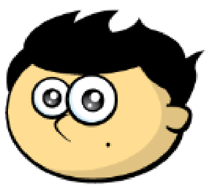
Mo



Eva

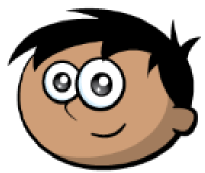


Alex

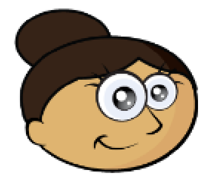


Jack

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			Measurement: Length and Perimeter		Number: Multiplication and Division		
Spring	Number: Multiplication and Division			Measurement: Area	Number: Fractions				Number: Decimals			Consolidation
Summer	Number: Decimals		Measurement: Money		Measurement: Time		Statistics	Geometry: Properties of Shape		Geometry: Position and Direction		Consolidation

White Rose Maths

Spring - Block 1

Multiplication & Division

Overview

Small Steps

- 11 and 12 times-table
- Multiply 3 numbers
- Factor pairs
- Efficient multiplication
- Written methods
- Multiply 2-digits by 1-digit (1) R
- Multiply 2-digits by 1-digit
- Multiply 3-digits by 1-digit
- Divide 2-digits by 1-digit (1) R
- Divide 2-digits by 1-digit (1)

Notes for 2020/21

These steps may look similar but these are difficult concepts and children need to spend time exploring different representations of multiplication with no exchange before moving on. They need to use manipulatives to support understanding and make links with repeated addition.

Similarly with division, children will first need to explore examples with no exchange or remainders, making links to the inverse.

Overview

Small Steps

- Divide 2-digits by 1-digit (2) R
- Divide 2-digits by 1-digit (2)
- Divide 3-digits by 1-digit
- Correspondence problems

Notes for 2020/21

The final division steps introduce remainders and begin to look at generalisations.
Continue to use place value counters and visual models to support understanding.

11 and 12 Times-table

Notes and Guidance

Building on their knowledge of the 1, 2 and 10 times-tables, children explore the 11 and 12 times-tables through partitioning.
They use Base 10 equipment to build representations of the times-tables and use them to explore the inverse of multiplication and division statements.
Highlight the importance of commutativity as children should already know the majority of facts from other times-tables.

Mathematical Talk

Which multiplication and division facts in the 11 and 12 times-tables have not appeared before in other times-tables?

Can you partition 11 and 12 into tens and ones? What times-tables can we add together to help us multiply by 11 and 12?

If I know 11×10 is equal to 110, how can I use this to calculate 11×11?

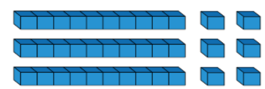
Varied Fluency

- Fill in the blanks.

$2 \times 10 =$ ___ $2 \times 1 =$ ___

2 lots of 10 doughnuts = ___ 2 lots of 1 doughnut = ___
2 lots of 11 doughnuts = ___
$2 \times 10 + 2 \times 1 = 2 \times 11 =$ ___

- Use Base 10 to build the 12 times-table. e.g.



$3 \times 12 = \square$

Complete the calculations.

$12 \times 5 = \square$ $5 \times 12 = \square$ $48 \div 12 = \square$ $84 \div 12 = \square$

$12 \times \square = 120$ $12 \times \square = 132$ $\square \div 12 = 8$ $\square = 9 \times 12$

- There are 11 players on a football team.
7 teams take part in a tournament.
How many players are there altogether in the tournament?

11 and 12 Times-table

Reasoning and Problem Solving

Here is one batch of muffins.

Teddy bakes 11 batches of muffins.
How many muffins does he have altogether?

In each batch there are 3 strawberry, 3 vanilla, 4 chocolate and 2 toffee muffins.
How many of each type of muffin does Teddy have in 11 batches?

Teddy sells 5 batches of muffins.
How many muffins does he have left?

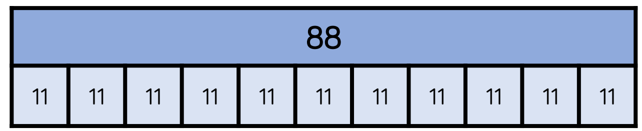
Teddy has 132 muffins altogether.

Strawberry: 33
Vanilla: 33
Chocolate: 44
Toffee: 22

132 – 55 = 77

Teddy has 77 muffins left.

Rosie uses a bar model to represent 88 divided by 11



Explain Rosie's mistake.

Can you draw a bar model to represent 88 divided by 11 correctly?

Rosie has divided by grouping in 11s but has found 11 groups of 11 which is equal to 121

To divide 88 by sharing into 11 equal groups, there would be 8 in each group.

To divide 88 by grouping in 11s, there would be 8 groups of 11

Multiply 3 Numbers

Notes and Guidance

Children are introduced to the 'Associative Law' to multiply 3 numbers. This law focuses on the idea that it doesn't matter how we group the numbers when we multiply
e.g. $4 \times 5 \times 2 = (4 \times 5) \times 2 = 20 \times 2 = 40$
or $4 \times 5 \times 2 = 4 \times (5 \times 2) = 4 \times 10 = 40$
They link this idea to commutativity and see that we can change the order of the numbers to group them more efficiently, e.g. $4 \times 2 \times 5 = (4 \times 2) \times 5 = 8 \times 5 = 40$

Mathematical Talk

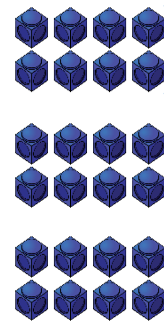
Can you use concrete materials to build the calculations?

How will you decide which order to do the multiplication in?

What's the same and what's different about the arrays? Which order do you find easier to calculate efficiently?

Varied Fluency

Complete the calculations.

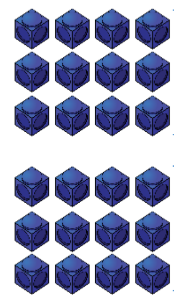


$2 \times 4 =$ ____

$2 \times 4 =$ ____

$2 \times 4 =$ ____

$3 \times 2 \times 4 = 3 \times 8 =$ ____



$\square \times \square = \square$

$\square \times \square = \square$

$\square \times \square \times \square = \square \times \square = \square$

Use counters or cubes to represent the calculations. Choose which order you will complete the multiplication.

$5 \times 2 \times 6$ $8 \times 4 \times 5$ $2 \times 8 \times 6$

White Rose Maths

Multiply 3 Numbers

Reasoning and Problem Solving

Choose three digit cards.
Arrange them in the calculation.

$\square \times \square \times \square = \square$

How many different calculations can you make using your three digit cards?
Which order do you find it the most efficient to calculate the product?
How have you grouped the numbers?

Possible answers using 3, 4 and 7:

$7 \times 3 \times 4 = 84$
$7 \times 4 \times 3 = 84$
$4 \times 3 \times 7 = 84$
$4 \times 7 \times 3 = 84$
$3 \times 4 \times 7 = 84$
$3 \times 7 \times 4 = 84$

Children may find it easier to calculate 7×3 first and then multiply it by 4 as 21 multiplied by 4 has no exchanges.

Make the target number of 84 using three of the digits below.

7	5	3	4	6	2

$\square \times \square \times \square = 84$

Multiply the remaining three digits together, what is the product of the three numbers?

Is the product smaller or larger than 84?

Can you complete this problem in more than one way?

Possible answers:

$7 \times 2 \times 6 = 84$

$4 \times 3 \times 5 = 60$

60 is smaller than 84

$7 \times 3 \times 4 = 84$

$2 \times 6 \times 5 = 60$

60 is smaller than 84

Children may also show the numbers in a different order.

Factor Pairs

Notes and Guidance

Children learn that a factor is a whole number that multiplies by another number to make a product e.g. $3 \times 5 = 15$, factor × factor = product.
They develop their understanding of factor pairs using concrete resources to work systematically, e.g. factor pairs for 12 – begin with 1×12, 2×6, 3×4. At this stage, children recognise that they have already used 4 in the previous calculation therefore all factor pairs have been identified.

Mathematical Talk

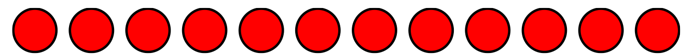
Which number is a factor of every whole number?

Do factors always come in pairs?
Do whole numbers always have an even number of factors?

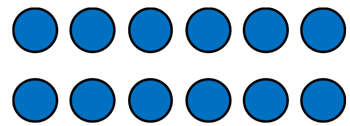
How do arrays support in finding factors of a number?
How do arrays support us in seeing when a number is not a factor of another number?

Varied Fluency

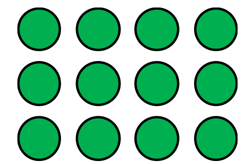
- Complete the factor pairs for 12



$1 \times \square = 12$



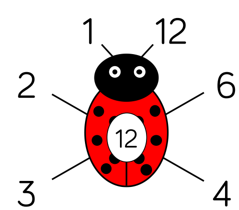
$\square \times 6 = 12$

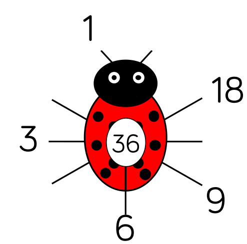


$\square \times \square = 12$

12 has ____ factor pairs. 12 has ____ factors altogether.
Use counters to create arrays for 24
How many factor pairs can you find?

- Here is an example of a factor bug for 12
Complete the factor bug for 36



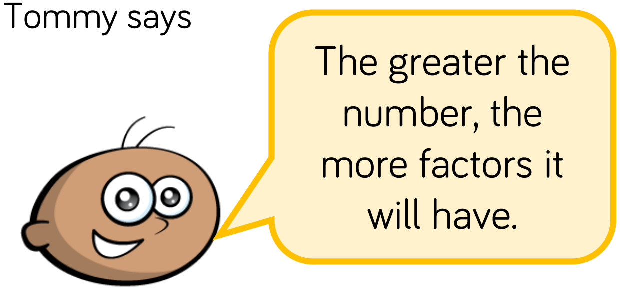


Are all the factors in pairs?
Draw your own factor bugs for 16, 48, 56 and 35

Factor Pairs

Reasoning and Problem Solving

Tommy says



Is Tommy correct?

Use arrays to explain your answer.

Tommy is incorrect. Children explain by showing an example of two numbers where the greater number has less factors.
For example, 15 has 4 factors 1, 3, 5 and 15
17 has 2 factors 1 and 17

Some numbers are equal to the sum of all their factors (not including the number itself).
e.g. 6
6 has 4 factors, 1, 2, 3 and 6
Add up all the factors not including 6 itself.
$1 + 2 + 3 = 6$
6 is equal to the sum of its factors (not including the number itself)

How many other numbers can you find that are equal to the sum of their factors?
Which numbers are less than the sum of their factors?
Which numbers are greater than the sum of their factors?

Possible answers

$28 = 1 + 2 + 4 + 7 + 14$

28 is equal to the sum of its factors.

$12 < 1 + 2 + 3 + 4 + 6$

12 is less than the sum of its factors.

$8 > 1 + 2 + 4$

8 is greater than the sum of its factors.

Efficient Multiplication

Notes and Guidance

Children develop their mental multiplication by exploring different ways to calculate.
They partition two-digit numbers into tens and ones or into factor pairs in order to multiply one and two-digit numbers.
By sharing mental methods, children can learn to be more flexible and efficient.

Mathematical Talk

Which method do you find the most efficient?

Can you see why another method has worked? Can you explain someone else's method?

Can you think of an efficient way to multiply by 99?

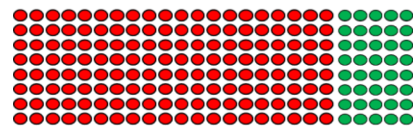
Varied Fluency

Class 4 are calculating 25×8 mentally.
Can you complete the calculations in each of the methods?

Method 1

$25 \times 8 = 20 \times 8 + 5 \times 8$

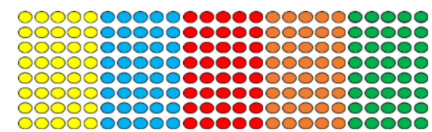
$= 160 + \boxed{} = \boxed{}$



Method 2

$25 \times 8 = 5 \times 5 \times 8$

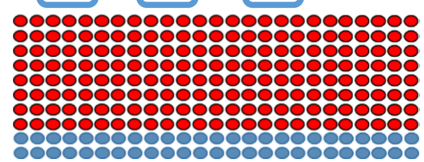
$= 5 \times \boxed{} = \boxed{}$



Method 3

$25 \times 8 = 25 \times 10 - 25 \times 2$

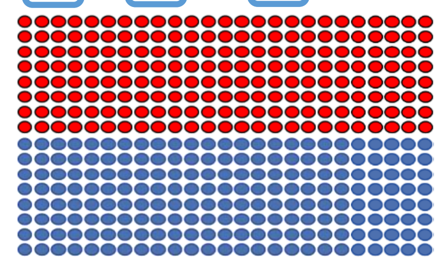
$= \boxed{} - \boxed{} = \boxed{}$



Method 4

$25 \times 8 = 50 \times 8 \div 2$

$= \boxed{} \div \boxed{} = \boxed{}$

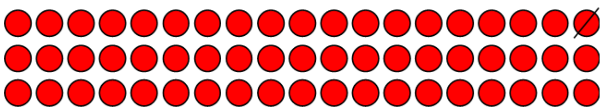


Can you think of any other ways to mentally calculate 25×8?
Which do you think is the most efficient?
How would you calculate 228×5 mentally?

Efficient Multiplication

Reasoning and Problem Solving

Teddy has calculated 19 × 3



20 × 3 = 60
60 – 1 = 59
19 × 3 = 59

Can you explain his mistake and correct the diagram?

Teddy has subtracted one, rather than one group of 3

He should have calculated,

20 × 3 = 60

60 – 1 × 3 = 57

Here are three number cards.

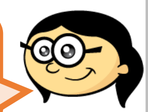
21 42 38

Dora, Annie and Eva choose one of the number cards each.
They multiply their number by 5
Dora says,

I did 40 × 5 and then subtracted 2 lots of five.

Annie says,

I multiplied my number by 10 and then divided 210 by 2



Eva says,

I halved my 2-digit number and doubled 5 so I calculated 21 × 10

Which number card did each child have?
Would you have used a different method to multiply the numbers by 5?

Dora has 38

Annie has 21

Eva has 42

Children can then discuss the methods they would have used and why.

Written Methods

Notes and Guidance

Children use a variety of informal written methods to multiply a two-digit and a one-digit number.
It is important to emphasise when it would be more efficient to use a mental method to multiply and when we need to represent our thinking by showing working.

Mathematical Talk

Why are there not 26 jumps of 8 on the number line?

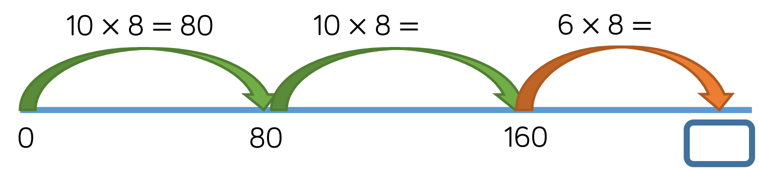
Could you find a more efficient method?

Can you calculate the multiplication mentally or do you need to write down your method?

Can you partition your number into more than two parts?

Varied Fluency

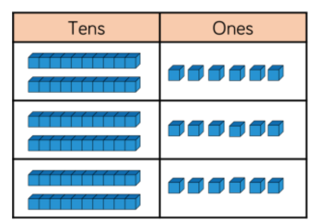
- There are 8 classes in a school.
  Each class has 26 children.
  How many children are there altogether?
  Complete the number line to solve the problem.

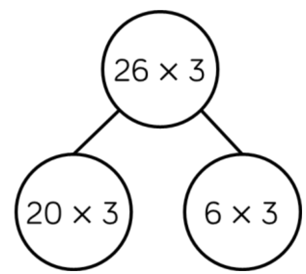


Use this method to work out the multiplications.

16×7 34×6 27×4

- Rosie uses Base 10 and a part-whole model to calculate 26×3
  Complete Rosie's calculations.





Use Rosie's method to work out:
36×3
24×6
45×4

Written Methods

Reasoning and Problem Solving

Here are 6 multiplications.

43 × 5	54 × 6	38 × 6
33 × 2	19 × 7	84 × 5

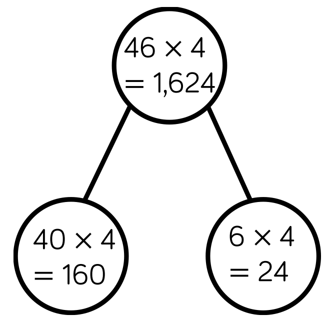
Which of the multiplications would you calculate mentally?
Which of the multiplications would you use a written method for?

Explain your choices to a partner.
Did your partner choose the same methods as you?

Children will sort the multiplications in different ways.

It is important that teachers discuss with the children why they have made the choices and refer back to the efficient multiplication step to remind children of efficient ways to multiply mentally.

Ron is calculating 46 multiplied by 4 using the part-whole model.



Can you explain Ron's mistake?

Ron has multiplied the parts correctly, but added them up incorrectly.
160 + 24 = 184

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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?

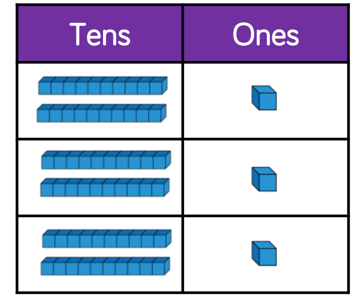
How does the written method match the concrete representation?

Varied Fluency

R

- 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.

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

$\square + \square + \square + \square = \square$

$\square \times \square = \square$

- Annie uses place value counters to work out 34×2

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

	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

R

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

Notes and Guidance

Children build on their understanding of formal multiplication from Year 3 to move to the formal short multiplication method.
Children use their knowledge of exchanging ten ones for one ten in addition and apply this to multiplication, including exchanging multiple groups of tens. They use place value counters to support their understanding.

Mathematical Talk

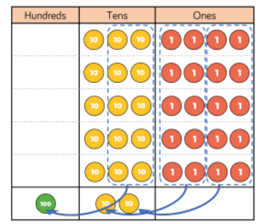
Which column should we start with, the ones or the tens?

How are Ron and Whitney's methods the same?
How are they different?

Can we write a list of key things to remember when multiplying using the column method?

Varied Fluency

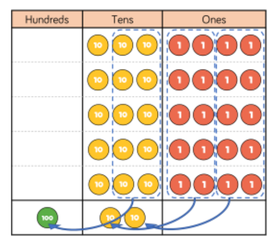
- Whitney uses place value counters to calculate 5×34



	H	T	O		
		3	4		
×			5		
		2	0	(5 × 4)	
+	1	5	0	(5 × 30)	
	1	7	0		

Use Whitney's method to solve
5×42
23×6
48×3

- Ron also uses place value counters to calculate 5×34



	H	T	O		
		3	4		
×			5		
	1	7	0		
	1	2			

Use Ron's method to complete:

	T	O
	4	3
×		3

	T	O
	3	6
×		4

	T	O
	7	4
×		5

White Rose Maths

Multiply 2-digits by 1-digit

Reasoning and Problem Solving

Here are three incorrect multiplications.

	T	O
	6	1
×		5
	3	5

	T	O
	7	4
×		7
4	9	8

	T	O
	2	6
×		4
8	2	4

Correct the multiplications.

	T	O
	6	1
×		5
3	0	5
3		

	T	O
	7	4
×		7
5	1	8
	2	

	T	O
	2	6
×		4
1	0	4
	2	

Always, sometimes, never

- When multiplying a two-digit number by a one-digit number, the product has 3 digits.
- When multiplying a two-digit number by 8 the product is odd.
- When multiplying a two-digit number by 7 you need to exchange.

Prove it.

Sometimes: 12 × 2 has only two-digits; 23 × 5 has three digits.

Never: all multiples of 8 are even.

Sometimes: most two-digit numbers need exchanging, but not 10 or 11

Multiply 3-digits by 1-digit

Notes and Guidance

Children build on previous steps to represent a three-digit number multiplied by a one-digit number with concrete manipulatives.
Teachers should be aware of misconceptions arising from 0 in the tens or ones column.
Children continue to exchange groups of ten ones for tens and record this in a written method.

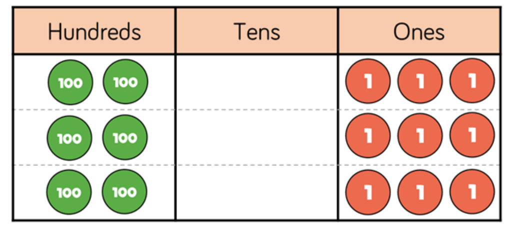
Mathematical Talk

How is multiplying a three-digit number by one-digit similar to multiplying a two-digit number by one-digit?

Would you use counters to represent 84 multiplied by 8? Why?

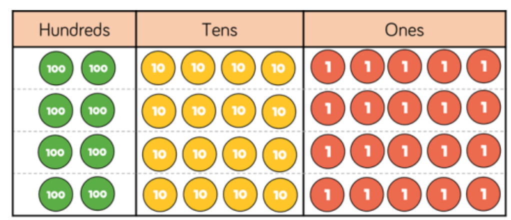
Varied Fluency

- Complete the calculation.



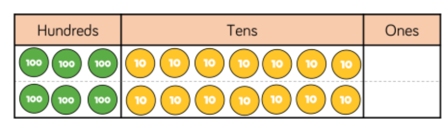
	H	T	O
	2	0	3
×			3

- A school has 4 house teams.
There are 245 children in each house team.
How many children are there altogether?



	H	T	O
	2	4	5
×			4

- Write the multiplication represented by the counters and calculate the answer using the formal written method.



Multiply 3-digits by 1-digit

Reasoning and Problem Solving

Spot the mistake

Alex and Dexter have both completed the same multiplication.

Alex

	H	T	O
	2	3	4
×			6
1	2	0	4
	2	2	

Dexter

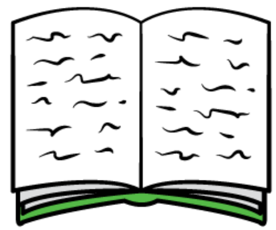
	H	T	O
	2	3	4
×			6
1	4	0	4
	2	2	

Who has the correct answer?
What mistake has been made by one of the children?

Dexter has the correct answer.

Alex has forgotten to add the two hundreds she exchanged from the tens column.

Teddy and his mum were having a reading competition.
In one month, Teddy read 814 pages.



His mum read 4 times as many pages as Teddy.
How many pages did they read altogether?
How many fewer pages did Teddy read?
Use the bar model to help.

Teddy	814			
Mum	814	814	814	814

$814 \times 5 = 4,070$

They read 4,070 pages altogether.

$814 \times 3 = 2,442$

Teddy read 2,442 fewer pages than his mum.

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?

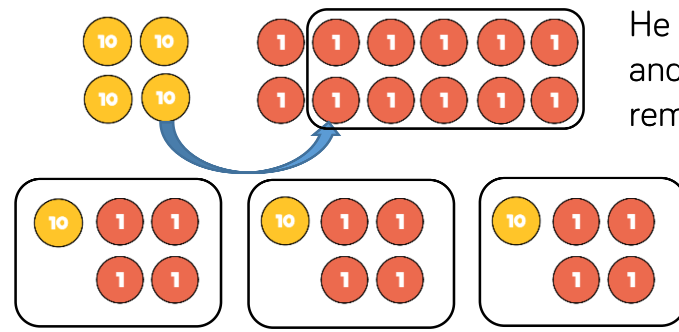
What do you notice about the partitioned numbers and the divisor?

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

Varied Fluency

R

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

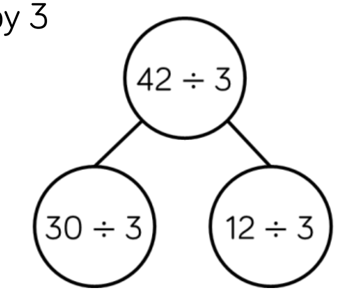


He shares the tens first and exchanges the remaining ten for ones.

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



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

R

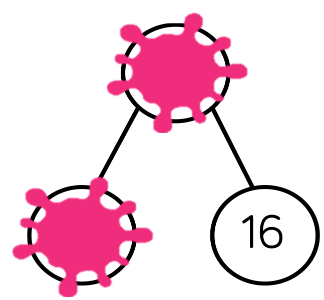
Compare the statements using <, > or = 48 ÷ 4 ◯ 36 ÷ 3 52 ÷ 4 ◯ 42 ÷ 3 60 ÷ 3 ◯ 60 ÷ 4	= < >

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?

 ÷ 8



The answer could be 56 or 96

White Rose Maths

Divide 2-digits by 1-digit (1)

Notes and Guidance

Children build on their knowledge of dividing a 2-digit number by a 1-digit number from Year 3 by sharing into equal groups.

Children use examples where the tens and the ones are divisible by the divisor, e.g. 96 divided by 3 and 84 divided by 4. They then move on to calculations where they exchange between tens and ones.

Mathematical Talk

How can we partition 84?
How many rows do we need to share equally between?

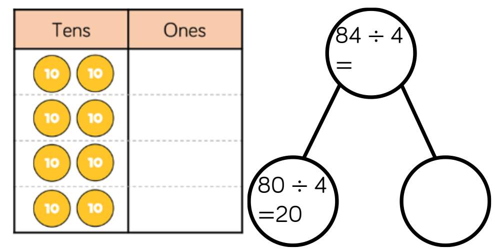
If I cannot share the tens equally, what do I need to do?
How many ones will I have after exchanging the tens?

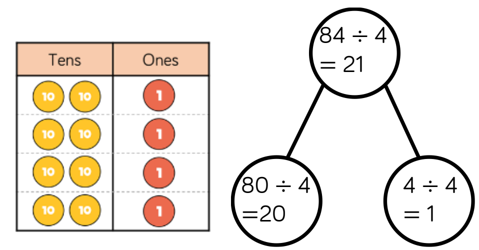
If we know 96 ÷ 4 = 24, what will 96 ÷ 8 be?
What will 96 ÷ 2 be? Can you spot a pattern?

Varied Fluency

Jack is dividing 84 by 4 using place value counters.

First, he divides the tens. Then, he divides the ones.

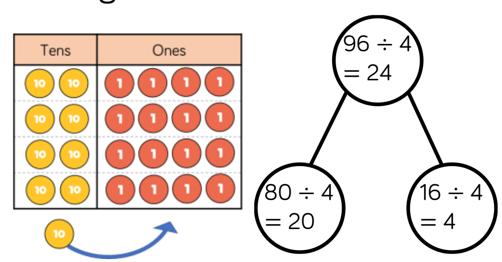




Use Jack's method to calculate:

69 ÷ 3 88 ÷ 4 96 ÷ 3

Rosie is calculating 96 divided by 4 using place value counters. First, she divides the tens. She has one ten remaining so she exchanges one ten for ten ones. Then, she divides the ones.



Use Rosie's method to solve
65 ÷ 5
75 ÷ 5
84 ÷ 6

White Rose Maths

Divide 2-digits by 1-digit (1)

Reasoning and Problem Solving

Dora is calculating $72 \div 3$ Before she starts, she says the calculation will involve an exchange. Do you agree? Explain why.	Dora is correct because 70 is not a multiple of 3 so when you divide 7 tens between 3 groups there will be one remaining which will be exchanged.
Use $<$, $>$ or $=$ to complete the statements. $69 \div 3$ ◯ $96 \div 3$ $96 \div 4$ ◯ $96 \div 3$ $91 \div 7$ ◯ $84 \div 6$	$<$ $<$ $<$

Eva has 96 sweets. She shares them into equal groups. She has no sweets left over. How many groups could Eva have shared her sweets into?	Possible answers $96 \div 1 = 96$ $96 \div 2 = 48$ $96 \div 3 = 32$ $96 \div 4 = 24$ $96 \div 6 = 16$ $96 \div 8 = 12$

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?

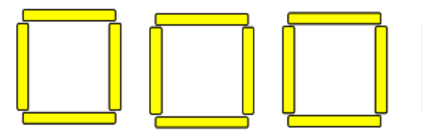
Can a remainder ever be more than the divisor?

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

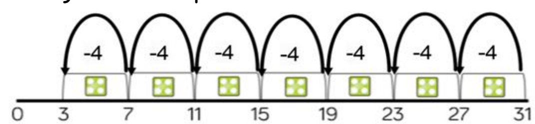
Varied Fluency

R

- How many squares can you make with 13 lollipop sticks?
There are ___ lollipop sticks.
There are ___ groups of 4
There is ___ lollipop stick remaining.
$13 \div 4 =$ ___ remainder ___
Use this method to see how many triangles you can make with 38 lollipop sticks.



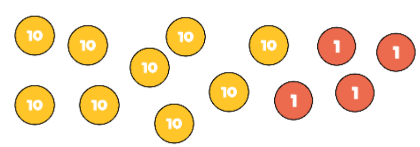
- Tommy uses repeated subtraction to solve $31 \div 4$



$31 \div 4 = 7 \text{ r } 3$

Use Tommy's method to solve 38 divided by 3

- Use place value counters to work out $94 \div 4$
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

R

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.

Divide 2-digits by 1-digit (2)

Notes and Guidance

Children explore dividing 2-digit numbers by 1-digit numbers involving remainders.

They continue to use the place value counters to divide in order to explore why there are remainders. Teachers should highlight, through questioning, that the remainder can never be greater than the number you are dividing by.

Mathematical Talk

If we are dividing by 3, what is the highest remainder we can have?

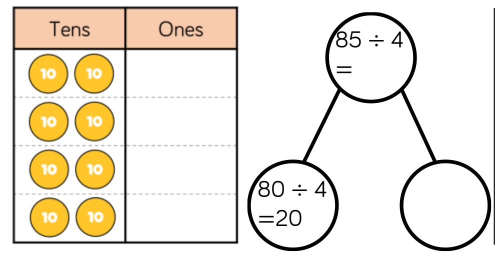
If we are dividing by 4, what is the highest remainder we can have?

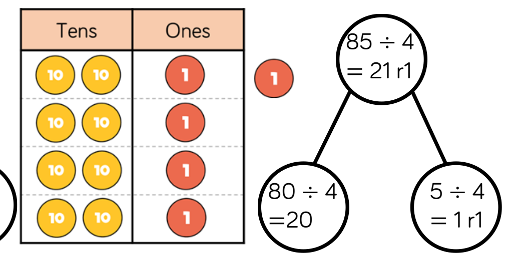
Can we make a general rule comparing our divisor (the number we are dividing by) to our remainder?

Varied Fluency

Teddy is dividing 85 by 4 using place value counters.

First, he divides the tens. Then, he divides the ones.

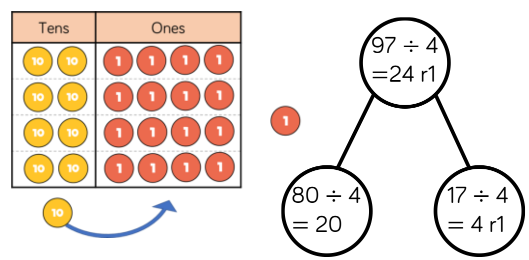




Use Teddy's method to calculate:

86 ÷ 4 87 ÷ 4 88 ÷ 4 97 ÷ 3 98 ÷ 3 99 ÷ 3

Whitney uses the same method, but some of her calculations involve an exchange.



Use Whitney's method to solve
57 ÷ 4
58 ÷ 4
58 ÷ 3

White Rose Maths

Divide 2-digits by 1-digit (2)

Reasoning and Problem Solving

Rosie writes, 85 ÷ 3 = 28 r 1 She says 85 must be 1 away from a multiple of 3 Do you agree?	I agree, remainder 1 means there is 1 left over. 85 is one more than 84 which is a multiple of 3
37 sweets are shared between 4 friends. How many sweets are left over? Four children attempt to solve this problem. • Alex says it's 1 • Mo says it's 9 • Eva says it's 9 r 1 • Jack says it's 8 r 5 Can you explain who is correct and the mistakes other people have made?	Alex is correct as there will be one remaining sweet. Mo has found how many sweets each friend will receive. Eva has written the answer to the calculation. Jack has found a remainder that is larger than the divisor so is incorrect.

Whitney is thinking of a 2-digit number that is less than 50 When it is divided by 2, there is no remainder. When it is divided by 3, there is a remainder of 1 When it is divided by 5, there is a remainder of 3 What number is Whitney thinking of?	Whitney is thinking of 28

Divide 3-digits by 1-digit

Notes and Guidance

Children apply their previous knowledge of dividing 2-digit numbers to divide a 3-digit number by a 1-digit number.

They use place value counters and part-whole models to support their understanding.

Children divide numbers with and without remainders.

Mathematical Talk

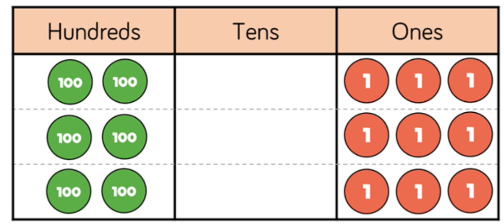
What is the same and what's different when we are dividing 3-digit number by a 1-digit number and a 2-digit number by a 1-digit number?

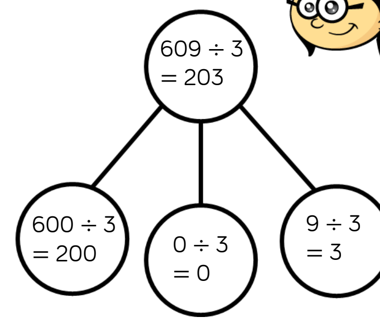
Do we need to partition 609 into three parts or could it just be partitioned into two parts?

Can we partition the number in more than one way to support dividing more efficiently?

Varied Fluency

Annie is dividing 609 by 3 using place value counters.

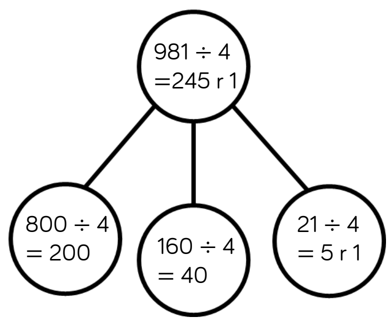


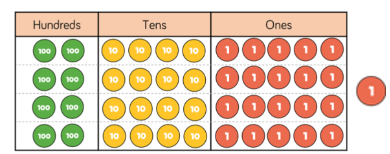


Use Annie's method to calculate the divisions.

906 ÷ 3 884 ÷ 4 884 ÷ 8 489 ÷ 2

Rosie is using flexible partitioning to divide 3-digit numbers. She uses her place value counters to support her.



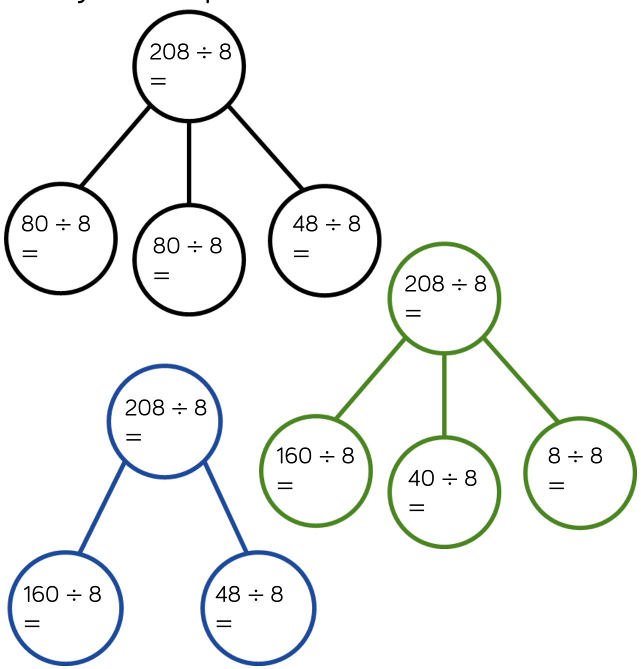


Use Rosie's method to solve:
726 ÷ 6
846 ÷ 6
846 ÷ 7

Divide 3-digits by 1-digit

Reasoning and Problem Solving

Dexter is calculating 208 ÷ 8 using part-whole models.
Can you complete each model?



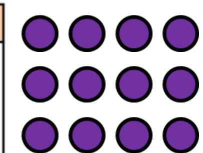
How many part-whole models can you make to calculate 132 ÷ 4?

208 ÷ 8 = 26
80 ÷ 8 = 10
48 ÷ 8 = 6
160 ÷ 8 = 20
40 ÷ 8 = 5
8 ÷ 8 = 1

Children can then make a range of part-whole models to calculate 132 ÷ 4
e.g.
100 ÷ 4 = 25
32 ÷ 4 = 8

You have 12 counters and the place value grid. You must use all 12 counters to complete the following.

Hundreds	Tens	Ones



Create a 3-digit number divisible by 2
Create a 3-digit number divisible by 3
Create a 3-digit number divisible by 4
Create a 3-digit number divisible by 5
Can you find a 3-digit number divisible by 6, 7, 8 or 9?

2: Any even number

3: Any 3-digit number (as the digits add up to 12, a multiple of 3)

4: A number where the last two digits are a multiple of 4

5: Any number with 0 or 5 in the ones column.

Possible answers

6: Any even number

7: 714, 8: 840

9: impossible

Correspondence Problems

Notes and Guidance

Children solve more complex problems building on their understanding from Year 3 of when *n* objects relate to *m* objects.

They find all solutions and notice how to use multiplication facts to solve problems.

Mathematical Talk

Can you use a table to support you to find all the combinations?

Can you use a code to help you find the combinations? e.g. VS meaning Vanilla and Sauce

Can you use coins to support you to make all the possible combinations?

Varied Fluency

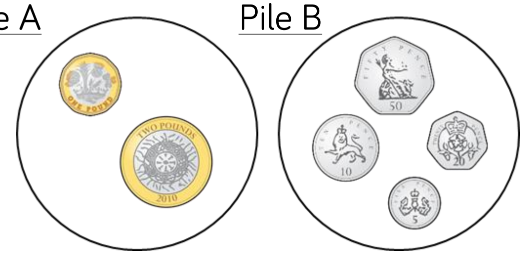
- An ice-cream van has 4 flavours of ice-cream and 2 choices of toppings.

Ice-cream flavour	Toppings
Vanilla Chocolate Strawberry Banana	Sauce Flake

How many different combinations of ice-cream and toppings can be made?
Complete the multiplication to represent the combinations.
___ × ___ = ____ There are ____ combinations.

- Jack has two piles of coins.
He chooses one coin from each pile.

Pile A Pile B



What are all the possible combinations of coins Jack can choose?
What are all the possible totals he can make?

Correspondence Problems

Reasoning and Problem Solving

Here are the meal choices in the school canteen.

Starter	Main	Dessert
Soup Garlic Bread	Pasta Chicken Beef Salad	Cake Ice-cream Fruit Salad

There are 2 choices of starter, 4 choices of main and 3 choices of dessert.

How many meal combinations can you find? Can you use a systematic approach?
Can you represent the combinations in a multiplication?

If there were 20 meal combinations, how many starters, mains and desserts might there be?

There are 24 meal combinations altogether.
$2 \times 4 \times 3 = 24$

20 combinations
$1 \times 1 \times 20$
$1 \times 2 \times 10$
$1 \times 4 \times 5$
$2 \times 2 \times 5$
Accept all other variations of these four multiplications e.g. $1 \times 20 \times 1$

Alex has 6 T-shirts and 4 pairs of shorts.
Dexter has 12 T-shirts and 2 pairs of shorts.
Who has the most combinations of T-shirts and shorts?
Explain your answer.

Alex and Dexter have the same number of combinations of T-shirts and shorts.

White Rose Maths

Spring - Block 2

Area

Overview

Small Steps

- What is area?
- Counting squares
- Making shapes
- Comparing area

Notes for 2020/21

This is brand new learning for children. Opportunities for exploration of vocabulary is key. Make sure children cover larger surfaces and have a clear understanding of the concept of area before moving onto counting small squares.

What is Area?

Notes and Guidance

Children are introduced to area for the first time. They understand that area is the amount space is taken up by a 2D shape or surface.
Children investigate different shapes that an be made with sets of sticky notes. They should be encouraged to see that the same number of sticky notes can make different shapes but they cover the same amount of surface. We call this the area of a shape.

Mathematical Talk

Use square sticky notes to find areas of different items in the classroom, which items have the largest surface area?
Would we want to find the area of the playground using sticky notes? What else could we use?
Why are shapes with perpendicular sides more effective to find the area of rectilinear shapes?

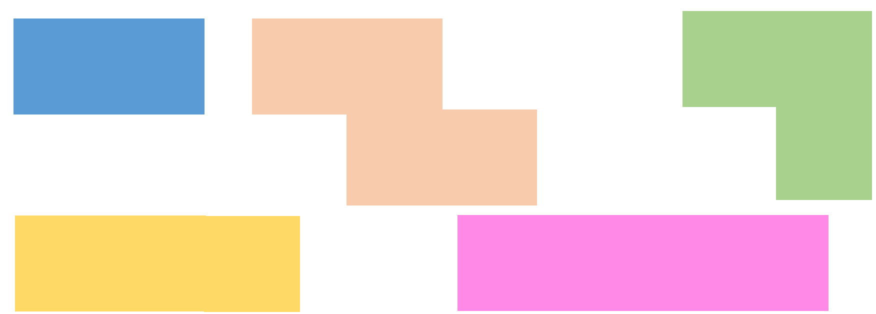
Varied Fluency

- Which of the two shapes covers most surface?

How do you know?

- This is a square sticky note. 

Estimate how many sticky notes you need to make these shapes?



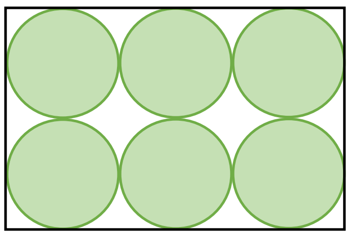
Now make the shapes using sticky notes.
Which ones cover the largest amount of surface? Which ones cover the least amount of surface?

What is Area?

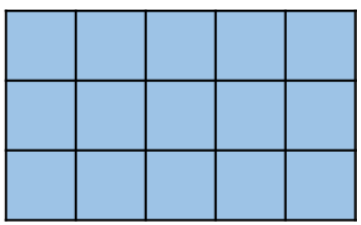
Reasoning and Problem Solving

Teddy and Eva are measuring the area of the same rectangle.

Teddy uses circles to find the area.



Eva uses squares to find the area.

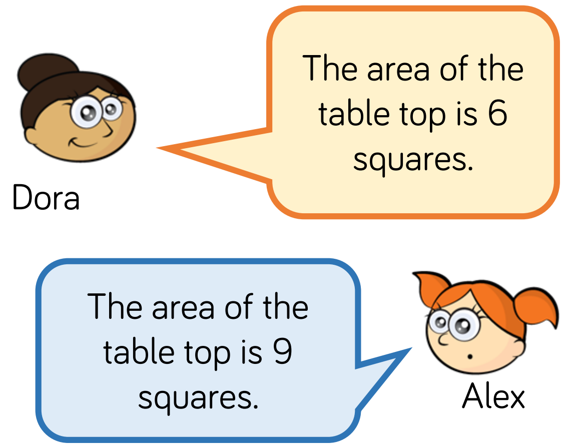


Whose method do you think is more reliable?
Explain why.

Possible answer:

Eva's method is more reliable than Teddy's because her squares cover the whole surface of the rectangle whereas the circles leave some of the surface uncovered.

Two children have measured the top of their desk. They used different sized squares.



Who used the largest squares?
How do you know?

Dora needed fewer squares to cover the space, so her squares must have been the larger ones. If the squares are smaller, you need more of them.

Counting Squares

Notes and Guidance

Once children understand that area is measured in squares, they use the strategy of counting the number of squares in a shape to measure and compare the areas of rectilinear shapes.
They explore the most efficient method of counting squares and link this to their understanding of squares and rectangles.

Mathematical Talk

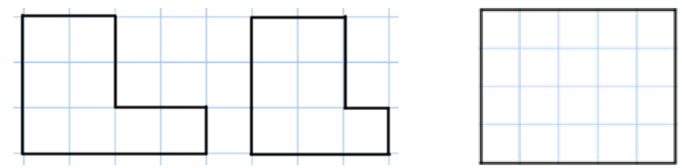
What strategy can you use to ensure you don't count a square twice?

Which colour covers the largest area of the quilt?
Which colour covers the smallest area of the quilt?

Will Jack's method work for every rectilinear shape?

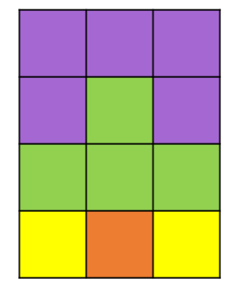
Varied Fluency

- Complete the sentences for each shape.



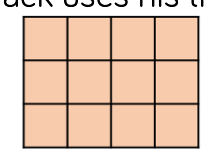
The area of the shape is ___ squares.

- Here is a patchwork quilt.
It is made from different coloured squares.
Find the area of each colour.



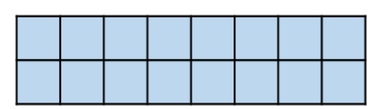
Purple = ___ squares Green = ___ squares
Yellow = ___ squares Orange = ___ squares

- Jack uses his times-tables to count the squares more efficiently.



There are 4 squares in 1 row.
There are 3 rows altogether.
3 rows of 4 squares = 12 squares

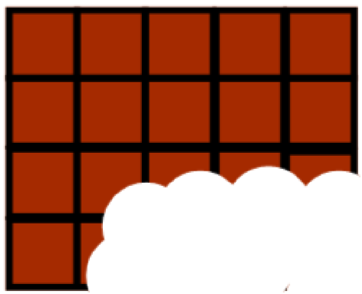
Use Jack's method to find the area of this rectangle.



Counting Squares

Reasoning and Problem Solving

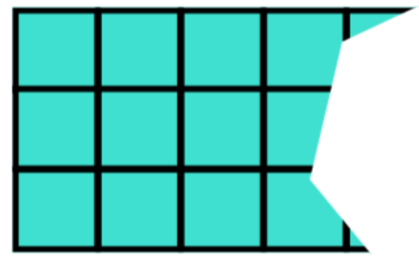
Dexter has taken a bite of the chocolate bar.



The chocolate bar was a rectangle.
Can you work out how many squares of chocolate there were to start with?

There were 20 squares. You know this because two sides of the rectangle are shown.

This rectangle has been ripped.



What is the smallest possible area of the original rectangle?

What is the largest possible area if the length of the rectangle is less than 10 squares?

Smallest area – 15 squares.

Largest area – 30 squares.

Making Shapes

Notes and Guidance

Children make rectilinear shapes using a given number of squares.

It is important that children understand that the rectilinear shapes they make need to touch at the sides not just at the corners. They can work systematically to find all the different rectilinear shapes by moving one square at a time.

Mathematical Talk

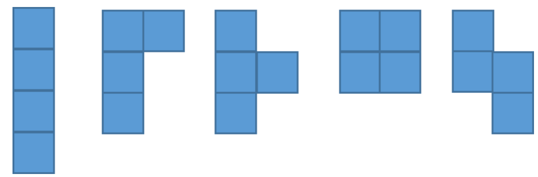
If you turn Ron's shapes upside down, do they stay the same or are they different?

Should you overlap the squares when counting area? Explain your answer.

How many different rectilinear shapes can you make with 8 squares? Will the area always be the same? Why?

Varied Fluency

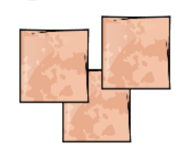
- Ron has 4 squares.
  He systematically makes rectilinear shapes.



  Use 5 squares to make rectilinear shapes.
  Can you work systematically?

- Use squared paper to draw 4 different rectilinear shapes with an area of 12 squares.
  Compare your shapes to a partner.
  Are they the same?
  Are they different?

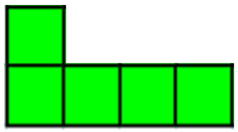
- Mo is building a patio made of 20 square slabs.
  What could the patio look like?
  Mo is using 6 black square slabs in his design.
  None of them are touching each other.
  Where could they be in the designs you have made?



Making Shapes

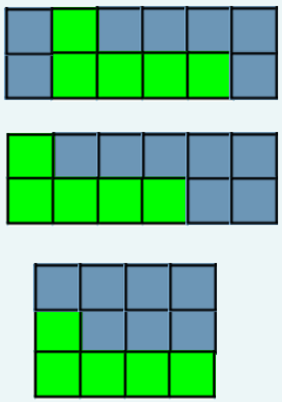
Reasoning and Problem Solving

Here is a rectilinear shape.

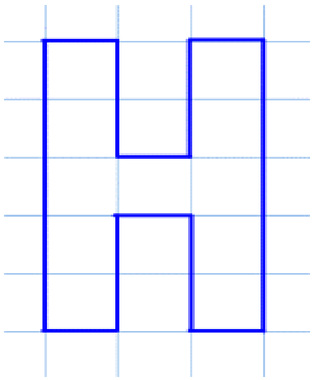


Using 7 more squares, can you make a rectangle?
Can you find more than one way?

Possible answers include:



Can you make some capital letters on squared paper using less than 20 squares?



Make a word from some and count the total area of the letters.
Which letters have a line of symmetry?
What is the area of half of each letter?

Most letters can be made. They could be drawn on large squared paper or made with square tiles.

Comparing Area

Notes and Guidance

Children compare the area of rectilinear shapes where the same size square has been used.

Children will be able to use < and > with the value of the area to compare shapes.

They will also put shapes in order of size by comparing their areas.

Mathematical Talk

How much larger/smaller is the area of the shape?

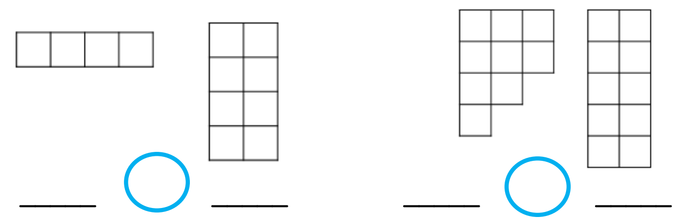
How can we order the shapes?

Can we draw a shape that would have the same area as ____?

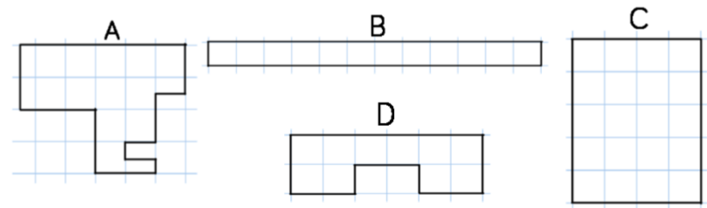
What is different about the number of squares covered by shape A?

Varied Fluency

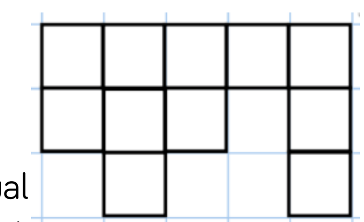
- Use the words 'greater than' and 'less than' to compare the rectilinear shapes.
Complete the sentence stems using < and >



- Put the shapes in order from largest to smallest area.

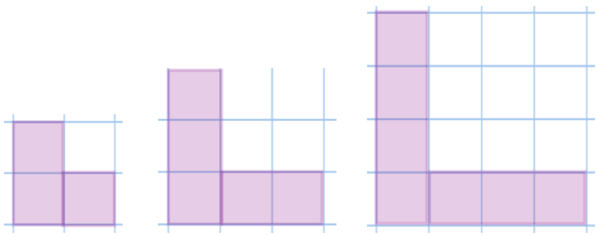


- Here is a shape.
Draw a shape that has a smaller area than this shape but an area greater than 7 squares.
Draw a shape that has an area equal to the first shape, but looks different.



Comparing Area

Reasoning and Problem Solving



Look at the shapes. Can you spot the pattern and explain how the area is changing each time?

Draw the next shape. What is its area?

Can you predict what the area of the 6^{th} shape would be?

Can you spot any patterns in your answers?

The area increases by 2 each time.

The next shape will have an area of 9.

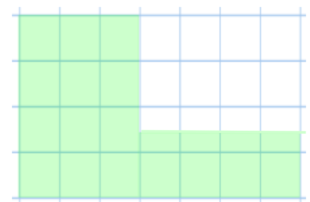
The 6th shape will have an area of 13.

The answers are all odd numbers and increase by 2 each time.

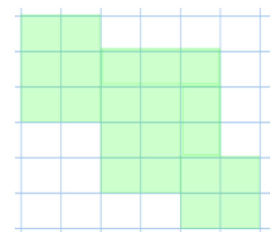
Shape C has been deleted.

Area C > Area B
Area C < Area D

Can you draw what shape C could look like?



B



D

Shape A is missing too.

- It has the smallest area.
- It is symmetrical.

Can you draw what it could look like?

Shape B has an area of 18 squares.

Shape D has an area of 21 squares.

So Shape C can be any shape that has an area between 18 and 21 squares.

Shape A must have area less than 18 squares, but can be any symmetrical design e.g. a 4 by 4 square.

Spring - Block 3

Fractions

Overview

Small Steps

- Unit and non-unit fractions R
- What is a fraction?
- Tenths R
- Count in tenths R
- Equivalent fractions (1) R
- Equivalent fractions (2) R
- Equivalent fractions (1)
- Equivalent fractions (2)
- Fractions greater than 1
- Count in fractions
- Add fractions R
- Add 2 or more fractions

Notes for 2020/21

Year 3 fractions work was in the summer term and learning may have been missed. We have therefore added a number of recap steps to ensure children have a thorough understanding of tenths and equivalent fractions before moving into adding and subtracting.

The progression from paper folding and finding two equivalent fractions is explored before moving onto looking at numerical relationships in a more abstract way.

Overview

Small Steps

- Subtract fractions R
- Subtract 2 fractions
- Subtract from whole amounts
- Fractions of a set of objects (1) R
- Fractions of a set of objects (2) R
- Calculate fractions of a quantity
- Problem solving – calculate quantities

Notes for 2020/21

The recap step here suggests children use practical equipment and pictorial representations to subtract fractions with the same denominator within one whole. They can then apply this to subtracting more than one fraction and from whole amounts.

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?

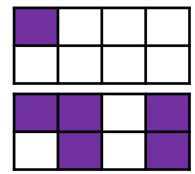
What fraction is shaded? What fraction is not shaded?

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

Varied Fluency

R

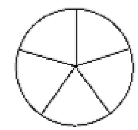
- Complete the sentences to describe the images.



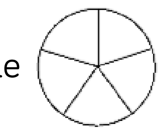
___ out of ___ equal parts are shaded.

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

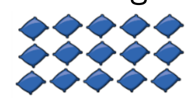
- Shade $\frac{1}{5}$ of the circle.



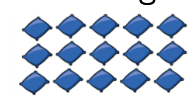
Shade $\frac{3}{5}$ of the circle



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 ____

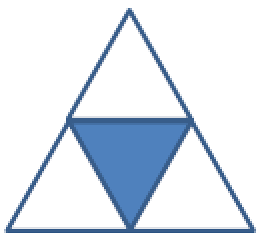
Can you draw a unit fraction and a non-unit fraction with the same denominator?

Unit and Non-unit Fractions

Reasoning and Problem Solving

R

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.

What is a Fraction?

Notes and Guidance

Children explore fractions in different representations, for example, fractions of shapes, quantities and fractions on a number line.

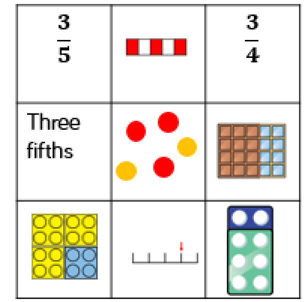
They explore and recap the meaning of numerator and denominator, non-unit and unit fractions.

Mathematical Talk

How can we sort the fraction cards?
What fraction does each one represent?
Could some cards represent more than one fraction?
Is $\frac{1.5}{3}$ an example of a non-unit fraction? Why?
Using Cuisenaire, how many white rods are equal to an orange rod? How does this help us work out what fraction the white rod represents?

Varied Fluency

Here are 9 cards.
Sort the cards into different groups.
Can you explain how you made your decision?
Can you sort the cards in a different way?
Can you explain how your partner has sorted the cards?



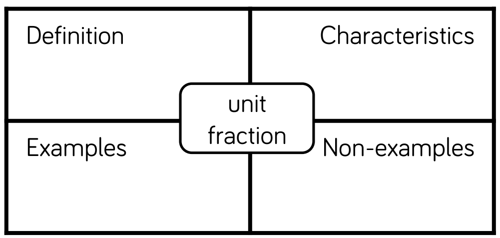
Complete the Frayer model to describe a unit fraction.

Can you use the model to describe the following terms?

Non-unit fraction

Numerator

Denominator



Use Cuisenaire rods.
If the orange rod is one whole, what fraction is represented by:
- The white rod
- The red rod
- The yellow rod
- The brown rod

Choose a different rod to represent one whole.; what do the other rods represent now?

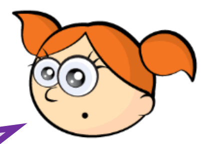
What is a Fraction?

Reasoning and Problem Solving

Always, Sometimes, Never?

Alex says,

If I split a shape into 4 parts, I have split it into quarters.

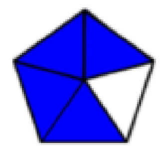


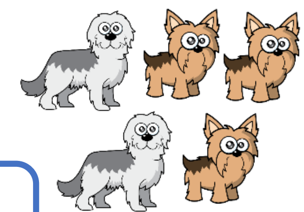
Explain your answer.

Sometimes

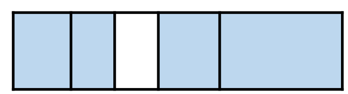
If the shape is not split equally, it will not be in quarters.

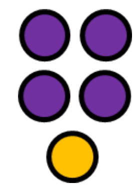
Which representations of $\frac{4}{5}$ are incorrect?





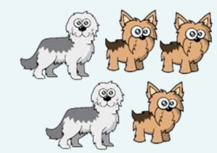
$\frac{4}{5}$



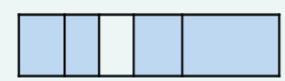


Explain how you know.

The image of the dogs could represent $\frac{2}{5}$ or $\frac{3}{5}$



The bar model is not divided into equal parts so this does not represent $\frac{4}{5}$



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

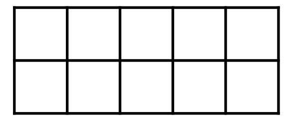
How are fractions linked to division?

Varied Fluency

R

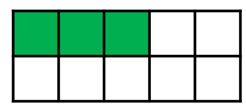
If the frame represents 1 whole, what does each box represent?
Use counters to represent:

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

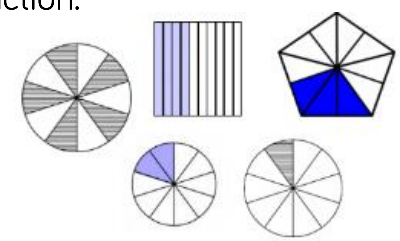


Identify what fraction of each shape is shaded.
Give your answer in words and as a fraction.

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.

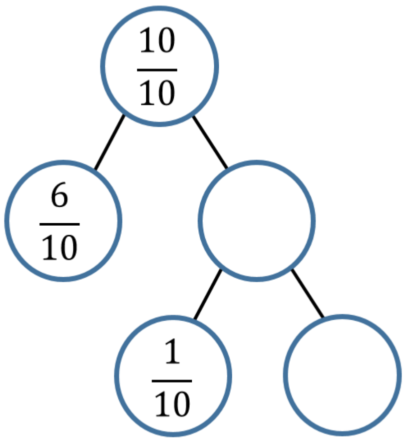
___ ÷ ____ = _____

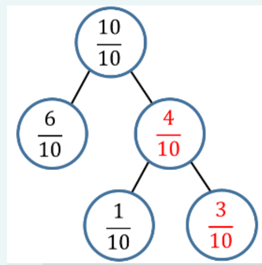
What fraction would they get if Annie had 4 cakes?

Tenths

Reasoning and Problem Solving

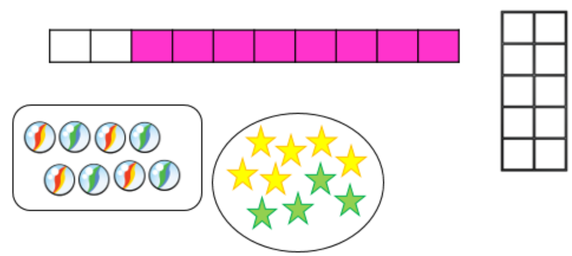
Fill in the missing values.
Explain how you got your answers.





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

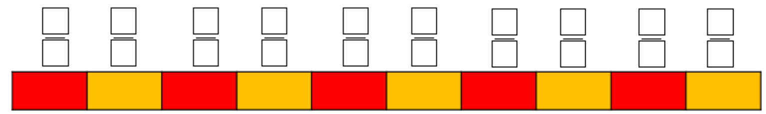
Let's count in tenths. What comes next? Explain how you know.

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

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

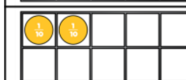
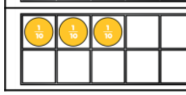
Varied Fluency

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

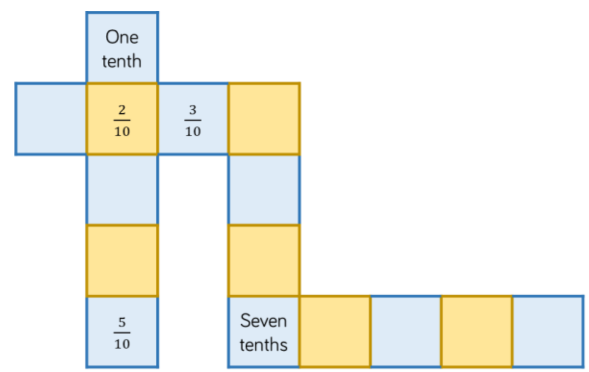


Continue the pattern in the table.

- 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	$\frac{1}{10}$
		
		

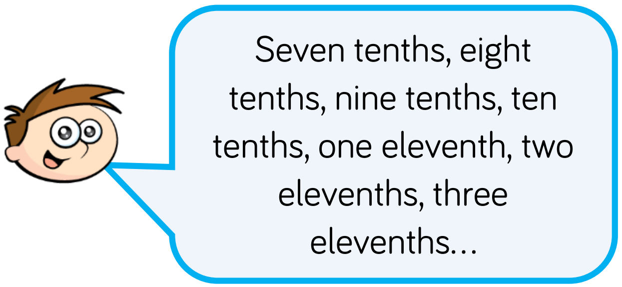
Complete the sequences.



Count in Tenths

Reasoning and Problem Solving

Teddy is counting in tenths.



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.

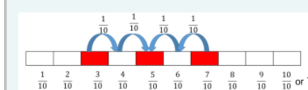
Five tenths is $\frac{2}{10}$ larger than three tenths.

Do you agree?

Explain why.

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

For example:



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

R

- 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?

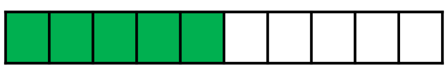
Equivalent Fractions (1)

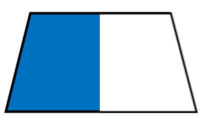
Reasoning and Problem Solving

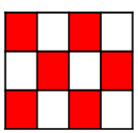
Explain how the diagram shows both $\frac{2}{3}$ and $\frac{4}{6}$

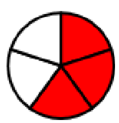
The diagram is divided in to six equal parts and four out of the six are yellow. You can also see three **columns** and two columns are yellow.

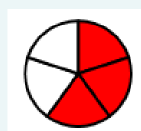
Which is the odd one out? Explain why



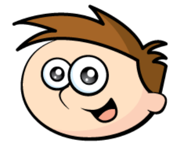








This is the odd one out because the other fractions are all equivalent to $\frac{1}{2}$



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.

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

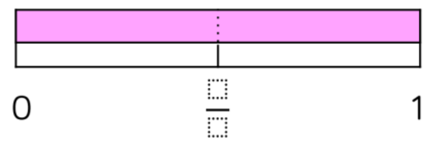
The number line represents 1 whole, where can we see the fraction $\frac{\square}{\square}$? Can we see any equivalent fractions?

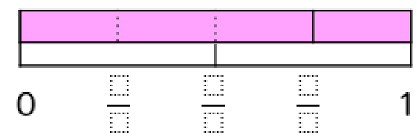
Look at the number line divided into twelfths. Which unit fractions can you place on the number line as equivalent fractions? e.g. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ etc. Which unit fractions are not equivalent to twelfths?

Varied Fluency

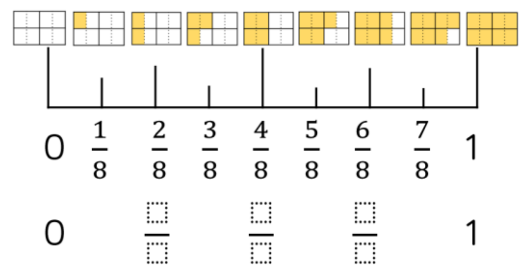
R

- 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.

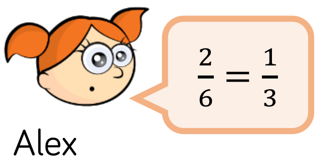
$\frac{1}{4}$ $\frac{3}{4}$ $\frac{1}{6}$ $\frac{1}{3}$ $\frac{2}{3}$

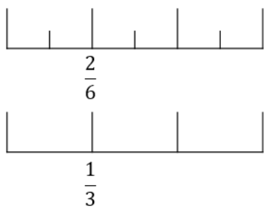
Are there any other equivalent fractions you can identify on the number line?

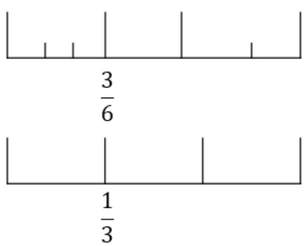
Equivalent Fractions (2)

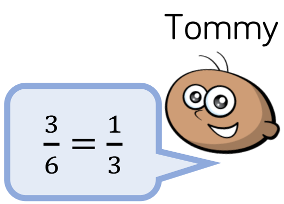
Reasoning and Problem Solving

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



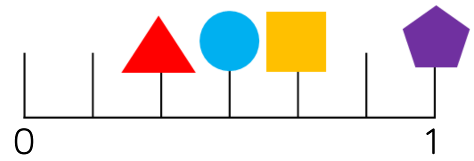






Who do you agree with? Explain why.

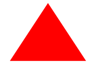
Alex is correct. Tommy's top number line isn't split into equal parts which means he cannot find the correct equivalent fraction.

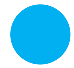


Use the clues to work out which fraction is being described for each shape.

- 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?

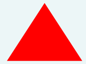
 =

 =

 =

 =

- Circle
- Triangle
- Square
- Pentagon

 $= \frac{1}{3}$ or $\frac{2}{6}$

 $= \frac{1}{2}$ or $\frac{3}{6}$

 $= \frac{2}{3}$ or $\frac{4}{6}$

 $= \frac{6}{6}$ or $\frac{3}{3}$

Accept other correct equivalences

Equivalent Fractions (1)

Notes and Guidance

Children use strip diagrams to investigate and record equivalent fractions.

They start by comparing two fractions before moving on to finding more than one equivalent fraction on a fraction wall.

Mathematical Talk

Look at the equivalent fractions you have found.
What relationship can you see between the numerators and denominators? Are there any patterns?

Can a fraction have more than one equivalent fraction?

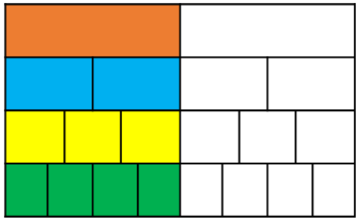
Can you use Cuisenaire rods or pattern blocks to investigate equivalent fractions?

Varied Fluency

- 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. $\frac{2}{4} = \frac{?}{8}$
Start by drawing a bar 8 squares long.
Underneath, compare the same length bar split into four equal parts.

- How many fractions that are equivalent to one half can you see on the fraction wall?



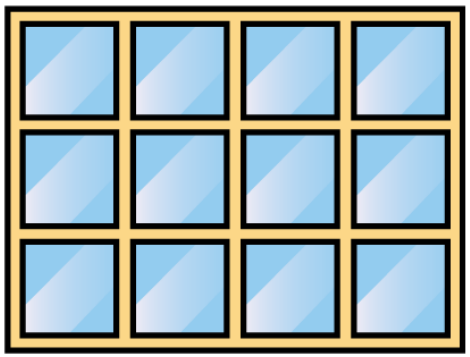
Draw extra rows to show other equivalent fractions.

White Rose Maths

Equivalent Fractions (1)

Reasoning and Problem Solving

How many equivalent fractions can you see in this picture?

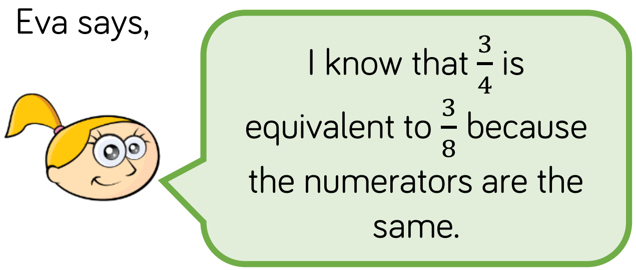


Children can give a variety of possibilities.
Examples:

$$\frac{1}{2} = \frac{6}{12} = \frac{3}{6}$$

$$\frac{1}{4} = \frac{3}{12}$$

Eva says,



Is Eva correct?
Explain why.

Eva is not correct.
$\frac{3}{4}$ is equivalent to $\frac{6}{8}$
When the numerators are the same, the larger the denominator, the smaller the fraction.

Ron has two strips of the same sized paper.
He folds the strips into different sized fractions.
He shades in three equal parts on one strip and six equal parts on the other strip.
The shaded areas are equal.

What fractions could he have folded his strips into?

Ron could have folded his strips into sixths and twelfths, quarters and eighths or any other fractions where one of the denominators is double the other.

Equivalent Fractions (2)

Notes and Guidance

Children continue to understand equivalence through diagrams. They move onto using proportional reasoning to find equivalent fractions.

Attention should be drawn to the method of multiplying the numerators and denominators by the same number to ensure that fractions are equivalent.

Mathematical Talk

What other equivalent fractions can you find using the diagram?

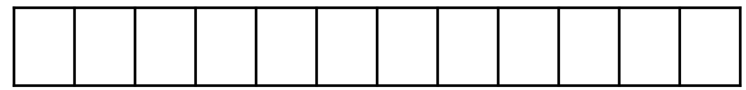
What relationships can you see between the fractions?

If I multiply the numerator by a number, what do I have to do to the denominator to keep it equivalent? Is this always true?

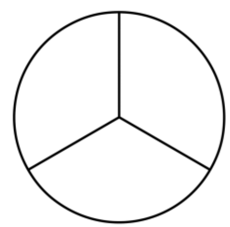
What relationships can you see between the numerator and denominator?

Varied Fluency

- Using the diagram, complete the equivalent fractions.



$\frac{1}{4} = \frac{\square}{12}$ $\frac{1}{\square} = \frac{6}{12}$ $\frac{2}{3} = \frac{\square}{12}$ $\frac{5}{12} = \frac{\square}{24}$

- 

Using the diagram, complete the equivalent fractions.

$\frac{1}{3} = \frac{\square}{6} = \frac{\square}{12} = \frac{\square}{24}$

- Complete:

$\frac{1}{4} = \frac{2}{\square} = \frac{\square}{12} = \frac{4}{\square} = \frac{\square}{100} = \frac{\square}{500}$

Equivalent Fractions (2)

Reasoning and Problem Solving

Tommy is finding equivalent fractions.

$$\frac{3}{4} = \frac{5}{6} = \frac{7}{8} = \frac{9}{10}$$

He says,

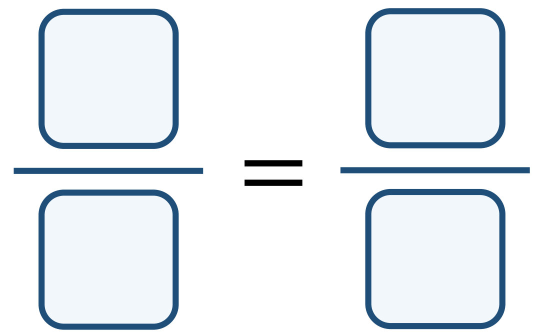
I did the same thing to the numerator and the denominator so my fractions are equivalent.

Do you agree with Tommy?
Explain your answer.

Tommy is wrong.
He has added two to the numerator and denominator each time.
When you find equivalent fractions you either need to multiply or divide the numerator and denominator by the same number.

Use the digit cards to complete the equivalent fractions.

1	2	3
4	6	8



How many different ways can you find?

Possible answers:

$\frac{1}{2} = \frac{3}{6}$, $\frac{1}{2} = \frac{4}{8}$,

$\frac{1}{3} = \frac{2}{6}$, $\frac{1}{4} = \frac{2}{8}$,

$\frac{3}{4} = \frac{6}{8}$, $\frac{2}{3} = \frac{4}{6}$

Fractions Greater than 1

Notes and Guidance

Children use manipulatives and diagrams to show that a fraction can be split into wholes and parts.

Children focus on how many equal parts make a whole dependent on the number of equal parts altogether. This learning will lead on to Year 5 where children learn about improper fractions and mixed numbers.

Mathematical Talk

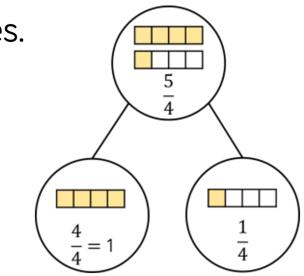
How many ____ make a whole?

If I have _____ eighths, how many more do I need to make a whole?

What do you notice about the numerator and denominator when a fraction is equivalent to a whole?

Varied Fluency

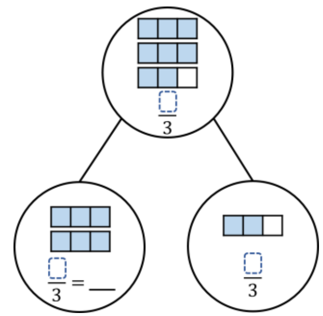
Complete the part-whole models and sentences.

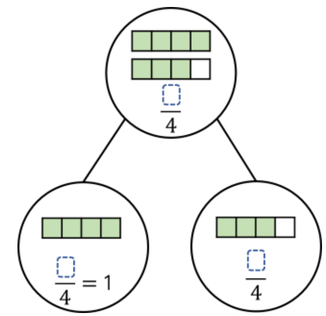


There are ____ quarters altogether.

___ quarters = ____ whole and ____ quarter.

Write sentences to describe these part-whole models.





Complete. You may use part-whole models to help you.

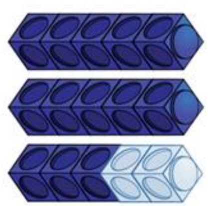
$$\frac{10}{3} = \frac{9}{3} + \frac{\square}{3} = 3\frac{\square}{3}$$

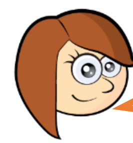
$$\frac{\square}{3} = \frac{6}{3} + \frac{2}{3} = \square\frac{2}{3}$$

$$\frac{\square}{8} = \frac{16}{8} + \frac{3}{8} = \square\frac{\square}{\square}$$

Fractions Greater than 1

Reasoning and Problem Solving

3 friends share some pizzas. Each pizza is cut into 8 equal slices. Altogether, they eat 25 slices. How many whole pizzas do they eat?	They eat 3 whole pizzas and 1 more slice.
Spot the mistake.  $\frac{13}{5}$ = 10 wholes and 3 fifths	There are 2 wholes not 10 $\frac{10}{5}$ = 2 wholes $\frac{13}{5}$ = 2 wholes and 3 fifths

Rosie says,  $\frac{16}{4}$ is greater than $\frac{8}{2}$ because 16 is greater than 8 Do you agree? Explain why.	I disagree with Rosie because both fractions are equivalent to 4 Children may choose to build both fractions using cubes, or draw bar models.

Count in Fractions

Notes and Guidance

Children explore fractions greater than one on a number line and start to make connections between improper and mixed numbers.

They use cubes and bar models to represent fractions greater than a whole. This will support children when adding and subtracting fractions greater than a whole.

Mathematical Talk

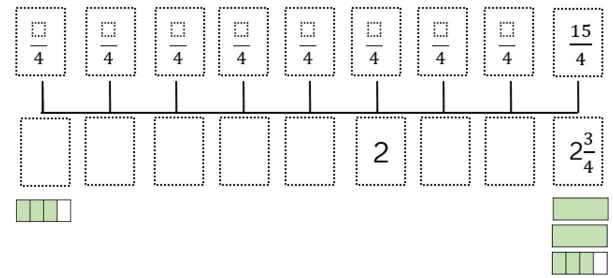
How many ____ make a whole?

Can you write the missing fractions in more than one way?

Are the fractions ascending or descending?

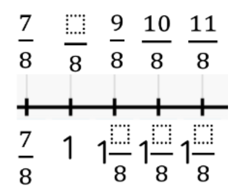
Varied Fluency

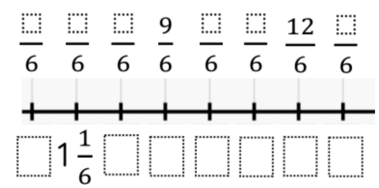
- Complete the number line.



Draw bar models to represent each fraction.

- Fill in the blanks using cubes or bar models to help you.





- Write the next two fractions in each sequence.

a) $\frac{12}{7}$, $\frac{11}{7}$, $\frac{10}{7}$, ____, ____

b) $3\frac{1}{3}$, 3, $2\frac{2}{3}$, ____, ____

c) $\frac{4}{11}$, $\frac{6}{11}$, $\frac{8}{11}$, ____, ____

d) $12\frac{3}{5}$, $13\frac{1}{5}$, $13\frac{4}{5}$, ____, ____

Count in Fractions

Reasoning and Problem Solving

Here is a number sequence. $\frac{5}{12}, \frac{7}{12}, \frac{10}{12}, \frac{14}{12}, \frac{19}{12}, \_\_\_$ Which fraction would come next? Can you write the fraction in more than one way?	The fractions are increasing by one more twelfth each time. The next fraction would be $\frac{25}{12}$
Circle and correct the mistakes in the sequences. $\frac{5}{12}, \frac{8}{12}, \frac{11}{12}, \frac{15}{12}, \frac{17}{12}$ $\frac{9}{10}, \frac{7}{10}, \frac{6}{10}, \frac{3}{10}, \frac{1}{10}$	$\frac{5}{12}, \frac{8}{12}, \frac{11}{12}, \frac{14}{12}, \frac{17}{12}$ $\frac{9}{10}, \frac{7}{10}, \frac{5}{10}, \frac{3}{10}, \frac{1}{10}$

Play the fraction game for four players. Place the four fraction cards on the floor. Each player stands in front of a fraction. We are going to count up in tenths starting at 0 When you say a fraction, place your foot on your fraction. $\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{5}{10}$ How can we make 4 tenths? What is the highest fraction we can count to? How about if we used two feet?	2 children can make four tenths by stepping on one tenth and three tenths at the same time. Alternatively, one child can make four tenths by stepping on $\frac{2}{10}$ with 2 feet. With one foot, they can count up to 11 tenths or one and one tenth. With two feet they can count up to 22 tenths.

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

R

- 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

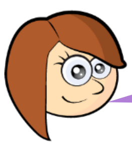
Reasoning and Problem Solving

R

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)

White Rose Maths

Add 2 or More Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to add two or more fractions. Children record their answers as an improper fraction when the total is more than 1
A common misconception is to add the denominators as well as the numerators. Use bar models to support children's understanding of why this is incorrect.
Children can also explore adding fractions more efficiently by using known facts or number bonds to help them.

Mathematical Talk

How many equal parts is the whole split into? How many equal parts am I adding?

Which bar model do you prefer when adding fractions? Why?

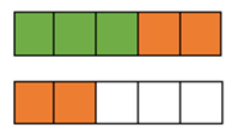
Can you combine any pairs of fractions to make one whole when you are adding three fractions?

Varied Fluency

- Take two identical strips of paper.
  Fold your paper into quarters.
  Can you use the strips to solve
  $\frac{1}{4} + \frac{1}{4}$ $\quad \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$ $\quad \frac{3}{4} + \frac{3}{4}$ $\quad \frac{\square}{4} + \frac{\square}{4} = \frac{7}{4}$
  What other fractions can you make and add?

- Use the models to add the fractions:

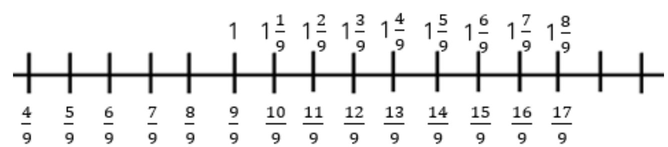
$\frac{2}{7} + \frac{2}{7} =$



$\frac{3}{5} + \frac{4}{5} =$

Choose your preferred model to add:
$\frac{2}{5} + \frac{1}{5}$ $\quad \frac{3}{7} + \frac{6}{7}$ $\quad \frac{7}{9} + \frac{4}{9}$

- Use the number line to add the fractions.



$\frac{4}{9} + \frac{4}{9} + \frac{8}{9} =$

$\frac{4}{9} + \frac{5}{9} + \frac{8}{9}$ $\quad \frac{1}{9} + \frac{11}{9} + 1$ $\quad \frac{\square}{9} + \frac{5}{9} + \frac{7}{9} = \frac{17}{9}$

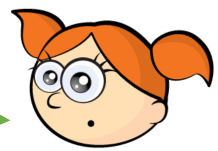
White Rose Maths

Add 2 or More Fractions

Reasoning and Problem Solving

Alex is adding fractions.

$$\frac{3}{9} + \frac{2}{9} = \frac{5}{18}$$



Is she correct? Explain why.

Alex is incorrect. Alex has added the denominators as well as the numerators.

How many different ways can you find to solve the calculation?

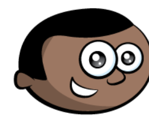
$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{11}{9}$$

Any combination of ninths where the numerators total 11.

Mo and Teddy are solving:

$$\frac{6}{13} + \frac{5}{13} + \frac{7}{13}$$

Mo



The answer is 1 and $\frac{5}{13}$

Teddy

The answer is $\frac{18}{13}$

Who do you agree with? Explain why.

They are both correct.

Mo has added $\frac{6}{13}$ + $\frac{7}{13}$ to make 1 whole and then added $\frac{5}{13}$

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?

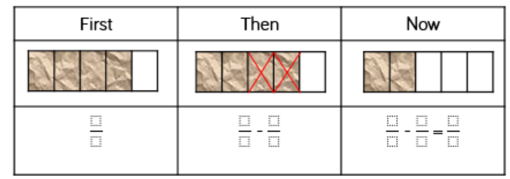
Which models show take away? Which models show finding the difference? What's the same? What's different?
Can we represent these models in a number story?

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

Varied Fluency

R

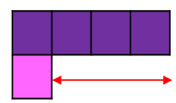
- Eva is eating a chocolate bar. Fill in the missing information.



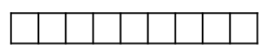
Can you write a number story using 'first', 'then' and 'now' to describe your calculation?

- Use the models to help you subtract the fractions.

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

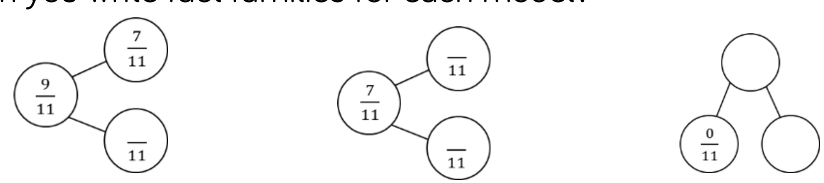


$\frac{4}{8} - \frac{\square}{8} = \frac{\square}{8}$



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

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



Subtract Fractions

Reasoning and Problem Solving

R

Find the missing fractions:

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

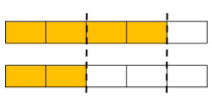
$$\frac{\boxed{}}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$$

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

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

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

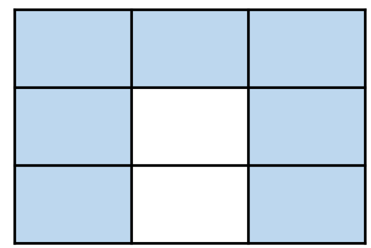
Jack's method: 

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.

Subtract 2 Fractions

Notes and Guidance

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

Encourage children to explore subtraction as take away and as difference. Difference can be represented on a bar model by using a comparison model and making both fractions in the subtraction.

Mathematical Talk

Have you used take away or difference to subtract the eighths using the strips of paper? How are they the same? How are they different?

How can I find a missing number in a subtraction? Can you count on to find the difference?

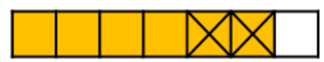
Can I partition my fraction to help me subtract?

Varied Fluency

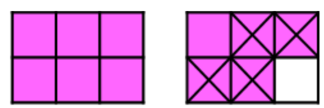
- Use identical strips of paper and fold them into eighths. Use the strips to solve the calculations.

$\frac{8}{8} - \frac{3}{8} =$ $\quad \frac{7}{8} - \frac{3}{8} =$ $\quad \frac{16}{8} - \frac{9}{8} =$ $\quad \frac{13}{8} - \frac{\square}{8} = \frac{7}{8}$

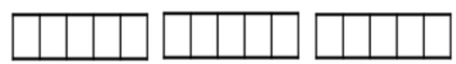
- Use the bar models to subtract the fractions.



$\frac{6}{7} - \frac{2}{7} =$

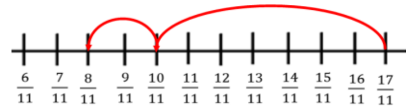


$\frac{11}{6} - \frac{\square}{6} = \frac{\square}{6}$



$\frac{13}{5} - \frac{\square}{5} = \frac{6}{5}$

- Annie uses the number line to solve $\frac{17}{11} - \frac{9}{11}$



Use a number line to solve:

$\frac{16}{13} - \frac{9}{13}$ $\quad \frac{16}{9} - \frac{9}{9}$ $\quad \frac{16}{7} - \frac{9}{7}$ $\quad \frac{16}{16} - \frac{9}{16}$

Subtract 2 Fractions

Reasoning and Problem Solving

Match the number stories to the correct calculations.

Teddy eats $\frac{7}{8}$ of a pizza. Dora eats $\frac{4}{8}$ How much do they eat altogether?	$\frac{7}{8} + \frac{3}{8} = -$
Teddy eats $\frac{7}{8}$ of a pizza. Dora eats $\frac{4}{8}$ less. How much do they eat altogether?	$\frac{7}{8} + \frac{4}{8} = -$
Teddy eats $\frac{7}{8}$ of a pizza. Dora eats $\frac{3}{8}$ less. How much does Dora eat?	$\frac{7}{8} - \frac{3}{8} = -$

1st question matches with second calculation.
2nd question with first calculation.
3rd question with third calculation.

How many different ways can you find to solve the calculation?

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

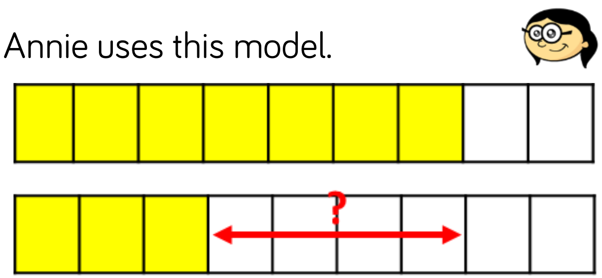
$$\frac{\square}{7} - \frac{3}{7} = \frac{\square}{7} - \frac{\square}{7}$$

Children may give a range of answers as long as the calculation for the numerators is correct.

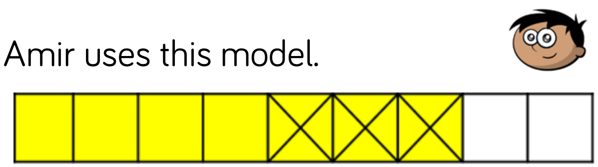
Annie and Amir are working out the answer to this problem.

$$\frac{7}{9} - \frac{3}{9}$$

Annie uses this model.



Amir uses this model.



Which model is correct? Explain why.

Can you write a number story for each model?

They are both correct. The first model shows finding the difference and the second model shows take away.

Ensure the number stories match the model of subtraction. For Annie's this will be finding the difference. For Amir this will be take away.

Subtract from Whole Amounts

Notes and Guidance

Children continue to use practical equipment and pictorial representations to subtract fractions.

Children subtract fractions from a whole amount. Children need to understand how many equal parts are equivalent to a whole e.g. $\frac{9}{9} = 1$, $\frac{18}{9} = 2$ etc.

Mathematical Talk

What do you notice about the numerator and denominator when a fraction is equal to one whole?

Using Jack's method, what's the same about your bar models? What's different?

How many more thirds/quarters/ninths do you need to make one whole?

Varied Fluency

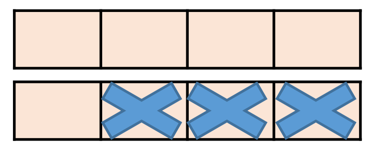
- Use cubes, strips of paper or a bar model to solve:

  $\frac{9}{9} - \frac{4}{9} = \frac{\boxed{}}{9}$ $\qquad$ $\frac{9}{9} - \frac{\boxed{}}{9} = \frac{2}{9}$ $\qquad$ $\frac{13}{9} - \frac{9}{9} = \frac{\boxed{}}{9}$

  What's the same? What's different?

- Jack uses a bar model to subtract fractions.

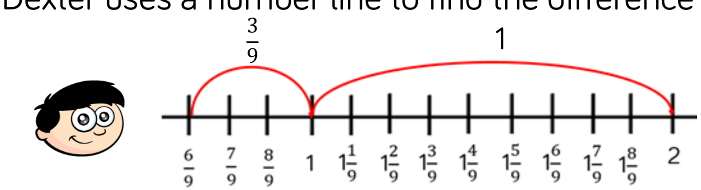
  

  $2 - \frac{3}{4} = \frac{8}{4} - \frac{3}{4} = \frac{5}{4} = 1\frac{1}{4}$

  Use Jack's method to calculate.

  $3 - \frac{3}{4} =$ $\qquad$ $3 - \frac{3}{8} =$ $\qquad$ $3 - \frac{7}{8} =$ $\qquad$ $3 - \frac{15}{8} =$

- Dexter uses a number line to find the difference between 2 and $\frac{6}{9}$

  $2 - \frac{6}{9} = 1\frac{3}{9}$

  Use a number line to find the difference between:

  2 and $\frac{2}{3}$ $\qquad$ 2 and $\frac{2}{5}$ $\qquad$ $\frac{2}{5}$ and 4

Subtract from Whole Amounts

Reasoning and Problem Solving

Dora is subtracting a fraction from a whole.

$5 - \frac{3}{7} = \frac{2}{7}$

Can you spot her mistake?

What should the answer be?

Dora has not recognised that 5 is equivalent to $\frac{35}{7}$

$5 - \frac{3}{7} = \frac{33}{7} = 4\frac{5}{7}$

How many ways can you make the statement correct?

$$2 - \frac{\square}{8} = \frac{5}{8} + \frac{\square}{8}$$

Lots of possible responses.

e.g.

$2 - \frac{1}{8} = \frac{5}{8} + \frac{10}{8}$

$2 - \frac{7}{8} = \frac{5}{8} + \frac{4}{8}$

$2 - \frac{9}{8} = \frac{5}{8} + \frac{2}{8}$

Whitney has a piece of ribbon that is 3 metres long.

She cuts it into 12 equal pieces and gives Teddy 3 pieces.

How many metres of ribbon does Whitney have left?

Cutting 3 metres of ribbon into 12 pieces means each metre of ribbon will be in 4 equal pieces. Whitney will have $\frac{12}{4}$ to begin with.

$\frac{12}{4} - \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$

Whitney has $2\frac{1}{4}$ metres of ribbon left.

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

R

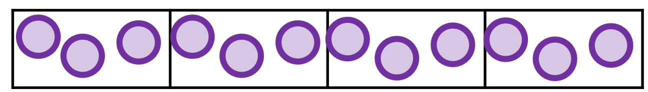
- Find $\frac{1}{5}$ of Eva's marbles.

I have divided the marbles into $\boxed{}$ equal groups.

There are $\boxed{}$ marbles in each group.

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

$\frac{1}{\boxed{}}$ 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

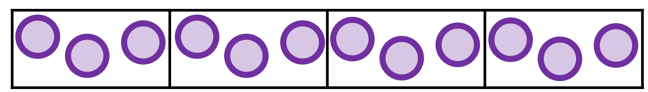
- Find $\frac{2}{5}$ of Eva's marbles.

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

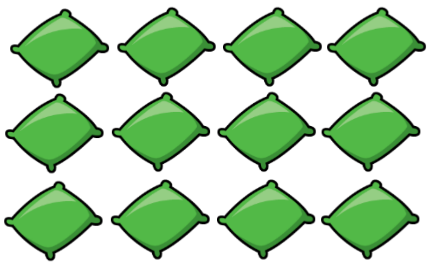
- Amir uses a bar model and place value counters to find three quarters of 84

Use Amir's method to find:

$\frac{2}{3}$ of 36 $\quad$ $\frac{2}{3}$ of 45 $\quad$ $\frac{3}{5}$ 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.

Fractions of a Quantity

Notes and Guidance

Children use their knowledge of finding unit fractions of a quantity, to find non-unit fractions of a quantity.

They use concrete and pictorial representations to support their understanding. Children link bar modelling to the abstract method in order to understand why the method works.

Mathematical Talk

What is the whole? What fraction of the whole are we finding? How many equal parts will I divide the whole into?

What's the same and what's different about the calculations? Can you notice a pattern?

What fraction of her chocolate bar does Whitney have left? How many grams does she have left? Can you represent this on a bar model?

Varied Fluency

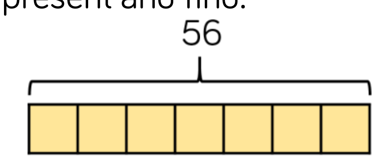
- Mo has 12 apples.
  Use counters to represent his apples and find:
  $\frac{1}{2}$ of 12 $\frac{1}{4}$ of 12 $\frac{1}{3}$ of 12 $\frac{1}{6}$ of 12

  Now calculate:
  $\frac{2}{2}$ of 12 $\frac{3}{4}$ of 12 $\frac{2}{3}$ of 12 $\frac{5}{6}$ of 12

  What do you notice? What's the same and what's different?

- Use a bar model to help you represent and find:

  $\frac{1}{7}$ of 56 = 56 ÷ $\boxed{}$



  $\frac{2}{7}$ of 56 $\frac{3}{7}$ of 56 $\frac{4}{7}$ of 56 $\frac{4}{7}$ of 28 $\frac{7}{7}$ of 28

- Whitney eats $\frac{3}{8}$ of 240 g bar of chocolate.
  How many grams of chocolate has she eaten?

Fractions of a Quantity

Reasoning and Problem Solving

True or False?

To find $\frac{3}{8}$ of a number, divide by 3 and multiply by 8

Convince me.

False.
Divide the whole by 8 to find one eighth and then multiply by three to find three eighths of a number.

Ron gives $\frac{2}{9}$ of a bag of 54 marbles to Alex.

Teddy gives $\frac{3}{4}$ of a bag of marbles to Alex.

Ron gives Alex more marbles than Teddy.

How many marbles could Teddy have to begin with?

$$\frac{2}{9} \text{ of } 54 > \frac{3}{4} \text{ of } \square$$

Teddy could have 16, 12, 8 or 4 marbles to begin with.

Calculate Quantities

Notes and Guidance

Children solve more complex problems for fractions of a quantity. They continue to use practical equipment and pictorial representations to help them see the relationships between the fraction and the whole.

Encourage children to use the bar model to solve word problems and represent the formal method.

Mathematical Talk

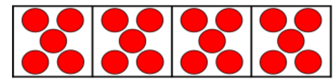
If I know one quarter of a number, how can I find three quarters of a number?

If I know one of the equal parts, how can I find the whole?

How can a bar model support my working?

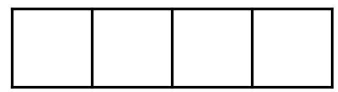
Varied Fluency

Use the counters and bar models to calculate the whole:



There are ____ counters in one part.

$\frac{1}{4}$ = ____ $\frac{2}{4}$ = ____ $\frac{3}{4}$ = ____ $\frac{4}{4}$ or 1 whole = ____



There are 7 counters in one part.

$\frac{1}{4}$ = ____ $\frac{2}{4}$ = ____ $\frac{3}{4}$ = ____ $\frac{4}{4}$ or 1 whole = ____

Complete.

Whole	Unit Fraction	Non-unit Fraction
The whole is 24	$\frac{1}{6}$ of 24 = ____	$\frac{5}{6}$ of 24 = ____
The whole is ____	$\frac{1}{3}$ of ____ = 30	$\frac{2}{3}$ of ____ = ____
The whole is ____	$\frac{1}{5}$ of ____ = 30	$\frac{3}{5}$ of ____ = ____

Jack has a bottle of lemonade.
He has one-fifth left in the bottle.
There are 150 ml left.
How much lemonade was in the bottle when it was full?

Calculate Quantities

Reasoning and Problem Solving

The school kitchen needs to buy carrots for lunch.

A large bag has 200 carrots and a medium bag has $\frac{3}{5}$ of a large bag.

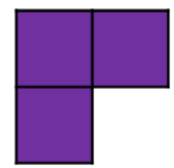
Mrs Rose says,

I need 150 carrots so I will have to buy a large bag.

Is Mrs Rose correct?
Explain your reasoning.

Mrs Rose is correct.
$\frac{3}{5}$ of 200 = 120
Mrs Rose will need a large bag.

These three squares are $\frac{1}{4}$ of a whole shape.



How many different shapes can you draw that could be the complete shape?

Lots of different possibilities. The shape should have 12 squares in total.

If $\frac{1}{8}$ of A = 12, find the value of A, B and C.

$$\frac{5}{8} \text{ of A} = \frac{3}{4} \text{ of B} = \frac{1}{6} \text{ of C}$$

A = 96
B = 80
C = 360

White Rose Maths

Spring - Block 4

Decimals

Overview

Small Steps

- Recognise tenths and hundredths
- Tenths as decimals
- Tenths on a place value grid
- Tenths on a number line
- Divide 1-digit by 10
- Divide 2-digits by 10
- Hundredths
- Hundredths as decimals
- Hundredths on a place value grid
- Divide 1 or 2-digits by 100

Notes for 2020/21

This is new learning so there are no recap steps here. Children will need to explore the link with fractions and decimals using concrete manipulatives and pictorial representations.

Using counters on a place value chart will help children see the connections when dividing by 10 and by 100.

Tenths & Hundredths

Notes and Guidance

Children recognise tenths and hundredths using a hundred square.

When first introducing tenths and hundredths, concrete manipulatives such as Base 10 can be used to support children's understanding.

They see that ten hundredths are equivalent to one tenth and can use a part-whole model to partition a fraction into tenths and hundredths.

Mathematical Talk

If each row is one row out of ten equal rows, what fraction does this represent?

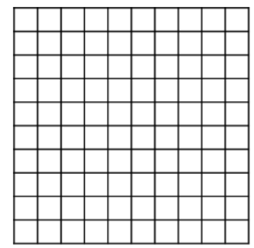
If each square is one square out of one hundred equal squares, what fraction does this represent?

How many squares are in one row? How many squares are in one column? How many hundredths are in one tenth?

How else could you partition these numbers?

Varied Fluency

If the hundred square represents one whole :



Each square is ___ out of ___ equal squares.

Each square represents $\frac{\square}{\square}$

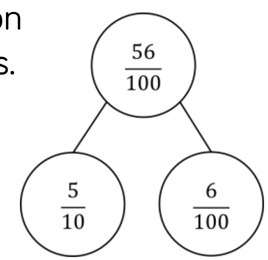
Each row is ___ out of ___ equal rows.

Each row represents $\frac{\square}{\square}$

Complete the table.

Shaded	Tenths	Hundredths
20 squares	$\frac{2}{10}$	$\frac{20}{100}$
4 columns		
3 rows		
	$\frac{7}{10}$	

We can use a part-whole model to partition 56 hundredths into tenths and hundredths.



Partition into tenths and hundredths:

- 65 hundredths
- $\frac{31}{100}$
- 80 hundredths

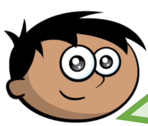
Tenths and Hundredths

Reasoning and Problem Solving

Who is correct?

Dora

5 hundredths is equivalent to 50 tenths.



50 hundredths is equivalent to 5 tenths.

Amir

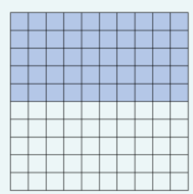
Explain why.

Amir is correct.
$\frac{50}{100}$ is equivalent to $\frac{5}{10}$

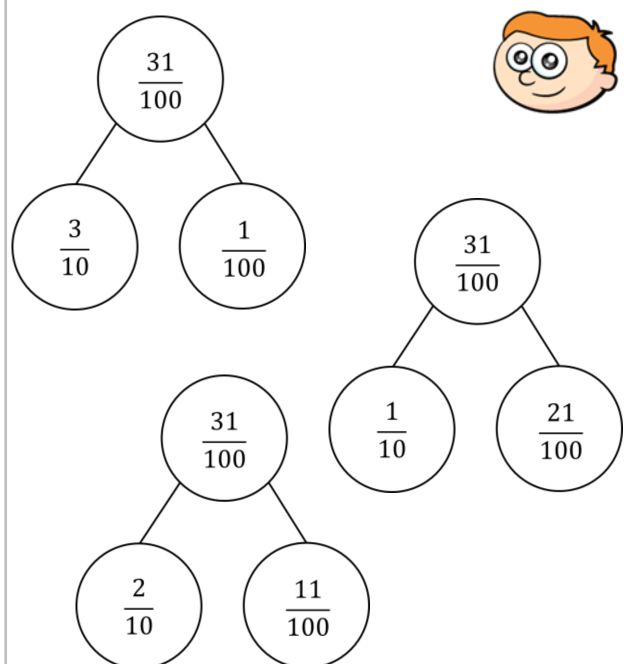
This can be demonstrated with Base 10 or a hundred square.

50 squares is $\frac{50}{100}$

5 rows is $\frac{5}{10}$



Ron says he can partition tenths and hundredths in more than one way.



Use Ron's method to partition 42 hundredths in more than one way.

Children may partition 42 hundredths as:

- 4 tenths and 2 hundredths
- 3 tenths and 12 hundredths
- 2 tenths and 22 hundredths
- 1 tenth and 32 hundredths
- 0 tenths and 42 hundredths

Other methods of partitioning are possible.

Tenths as Decimals

Notes and Guidance

Using the hundred square and Base 10, children can recognise the relationship between $\frac{1}{10}$ and 0.1
Children write tenths as decimals and as fractions. They write any number of tenths as a decimal and represent them using concrete and pictorial representations.
Children understand that a tenth is a part of a whole split into 10 equal parts.
In this small step children stay within one whole.

Mathematical Talk

What is a tenth?

How many different ways can we write a tenth?

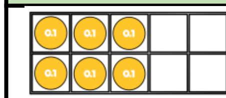
When do we use tenths in real life?

Which representation do you think is clearest? Why?

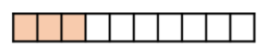
How else could you represent the decimal/fraction?

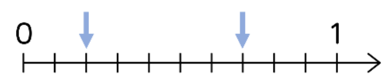
Varied Fluency

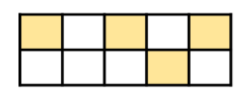
Complete the table.

Image	Words	Fraction	Decimal
			
	five tenths		
			0.9

What fractions and decimals are represented in these diagrams?







How could you represent these decimals?

0.4 0.8 0.2

What's the same? What's different?

Tenths as Decimals

Reasoning and Problem Solving

Who is correct?

Annie

1.2 is equivalent to 1 whole and 2 tenths.

1.2 is equivalent to 12 tenths.

Dexter

Explain why.

Both children are correct.
1 whole is equal to 10 tenths so 1.2 is equal to 12 tenths.

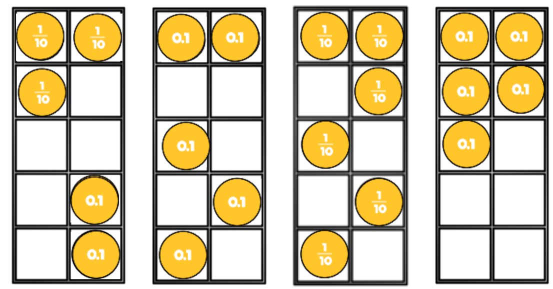
six tens

six tenths

What is the same? What's different? Show me.

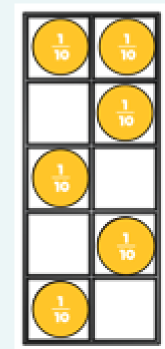
Children use concrete and pictorial representations to show the difference.

Which ten frame is the odd one out?



Explain your answer.

Three of the ten frames represent 0.5



This ten frame is the odd one out because it represents 6 tenths not 5 tenths.

Tenths on a Place Value Grid

Notes and Guidance

Children read and represent tenths on a place value grid. They see that the tenths column is to the right of the decimal point.
Children use concrete representations to make tenths on a place value grid and write the number they have made as a decimal.
In this small step children will be introduced to decimals greater than 1

Mathematical Talk

How many ones are there?

How many tenths are there?

What's the same/different between 0.2 , 1.2 and 0.8?

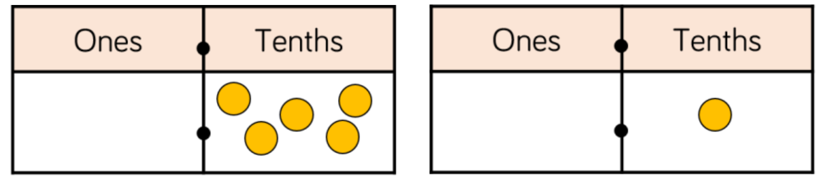
How many different ways can you make a whole using the three decimals?

Why do we need to use the decimal point?

How many tenths are equivalent to one whole?

Varied Fluency

- Complete the stem sentences for the decimals in the place value grid.



There are ☐ ones and ☐ tenths.

The decimal represented is ☐

- Use counters or place value counters to make the decimals on a place value grid.

0.2 1.2 0.8

-

Ones	Tenths
3	2

There are ☐ ones and ☐ tenths.
☐ ones + ☐ tenths
= 3 + 0.2
= 3.2

Use the place value grid and stem sentences to describe the decimals:

4.0 5.9 2.2

Tenths on a Place Value Grid

Reasoning and Problem Solving

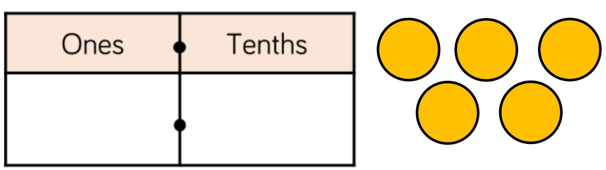
Use five counters and a place value grid. Place all five counters in either the ones or the tenths column.

How many different numbers can you make?

Describe the numbers you have made by completing the stem sentences.

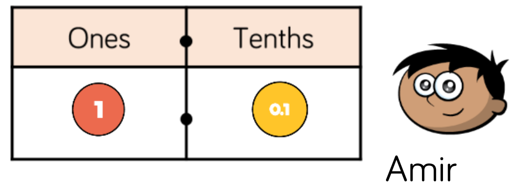
There are ☐ ones and ☐ tenths.

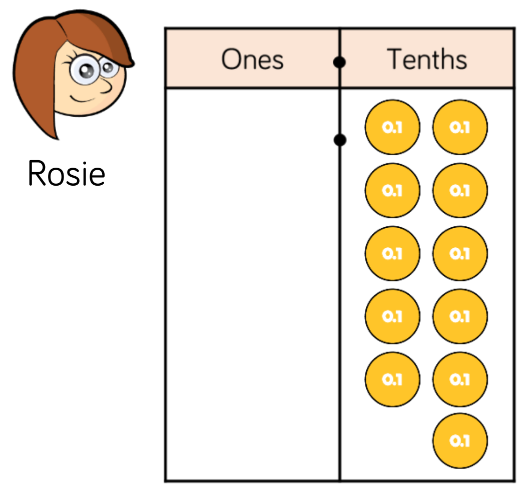
☐ ones + ☐ tenths = ☐



Children can make:
0.5
1.4
2.3
3.2
4.1
5.0

Two children are making eleven tenths.





Who has made it correctly?
Explain your answer.

Amir and Rosie have both made eleven tenths correctly.
Amir has seen that 10 tenths is equivalent to 1 one.

Tenths on a Number Line

Notes and Guidance

Children read and represent tenths on a number line.

They link the number line to measurement, looking at measuring in centimetres and millimetres.

Children use number lines to explore relative scale.

Mathematical Talk

How many equal parts are between 0 and 1?

What are the intervals between each number?

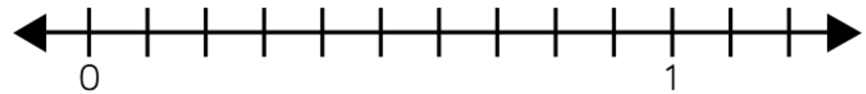
How many tenths are in one whole?

What is 0.1 metres in millimetres?

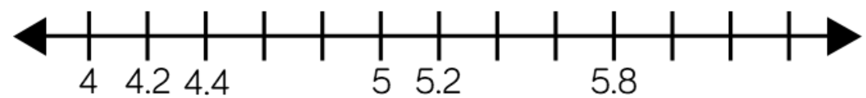
Varied Fluency

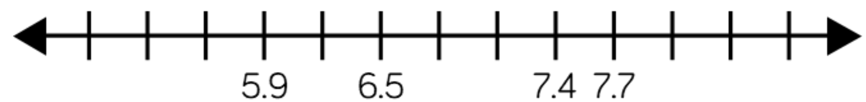
- Place the decimals on the number line.

0.5	0.9	1.1

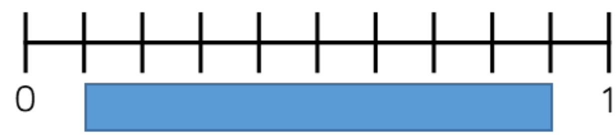


- Complete the number lines.





- How long is the ribbon?

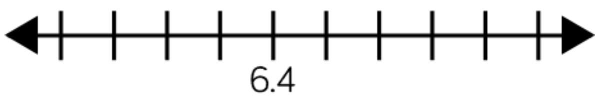


The ribbon is ___ metres long.

Tenths on a Number Line

Reasoning and Problem Solving

What could the start and end numbers on the number line be?

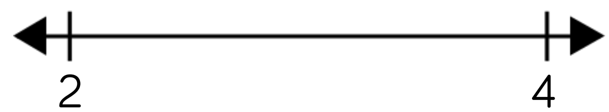


Explain your reasons.

The start and end numbers could be 6 and 6.9 respectively, or 5.6 and 7.4

Children can find different start and end numbers by adjusting the increments that the number line is going up in.

Place the decimals on the number line.



2.7 2.3 1.9 2.5 2.9 3.2

Which order did you place your numbers on the number line?

Some children will draw on 20 intervals first. This method will allow them to identify where the numbers are placed but can be considered inefficient. Encourage children to think about the numbers first and consider which numbers are easiest to place e.g. 2.5 is probably easiest, followed by 1.9 or 2.9 etc.

Divide 1-digit by 10

Notes and Guidance

Children need to understand when dividing by 10 the number is being split into 10 equal parts and is 10 times smaller.

Children use counters on a place value chart to see how the digits move when dividing by 10. Children should make links between the understanding of dividing by 10 and this more efficient method.

Emphasise the importance of 0 as a place holder.

Mathematical Talk

What number is represented on the place value chart?

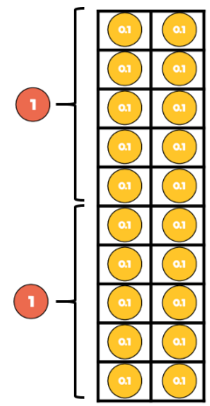
What links can you see between the 2 methods?

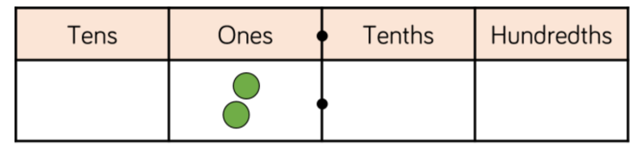
Which method is more efficient?

What is the same and what is different when dividing by 10 on a Gattegno chart compared to a place value chart?

Varied Fluency

Eva uses counters to make a 1-digit number.





To divide the number by 10, we move the counters one column to the right.
What is the value of the counters now?

Use this method to solve:

$3 \div 10 = \square$ $\quad$ $7 \div 10 = \square$ $\quad$ $\square = 4 \div 10$

Here is a one-digit number on a place value chart.

Ones	Tenths
5	

When dividing by 10, we move the digits one place to the ________.

$5 \div 10 = \square$

Use this method to solve:

$8 \div 10 = \square$ $\quad$ $\square = 9 \div 10$ $\quad$ $0.2 = \square \div 10$

White Rose Maths

Divide 1-digit by 10

Reasoning and Problem Solving

Choose a digit card from 1 – 9 and place a counter over the top of that number on the Gattegno chart.

100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

Ron says,

To divide by 10, you need to move the counters to the right.

Do you agree? Use the Gattegno chart to explain your reason.

Ron is incorrect. Children will see that you move down one row to divide by 10 on a Gattegno chart whereas on a place value chart you move on column to the right.

Complete the number sentences.

$4 \div 10 = 8 \div \square \div 10$

$15 \div 3 \div 10 = \square \div 10$

$64 \div \square \div 10 = 32 \div 4 \div 10$

2

5

8

Divide 2-digits by 10

Notes and Guidance

As in the previous step, it is important for children to recognise the similarities and differences between the understanding of dividing by 10 and the more efficient method of moving digits.
Children use a place value chart to see how 2 digit-numbers move when dividing by 10
They use counters to represent the digits before using actual digits within the place value chart.

Mathematical Talk

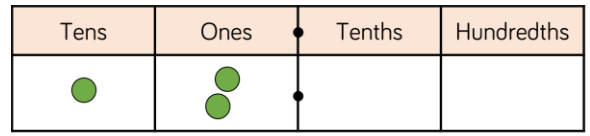
What number is represented on the place value chart?

Do I need to use 0 as a place holder when dividing a 2-digit number by 10?

What is the same and what is different when dividing by 10 on a Gattegno chart compared to a place value chart?

Varied Fluency

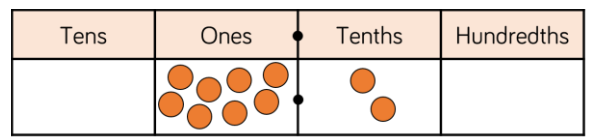
- Teddy uses counters to make a 2-digit number.



To divide the number by 10, we move the counters one column to the right.
What is the value of the counters now?
Use this method to solve:

$42 \div 10 = \square$ $\quad 35 \div 10 = \square$ $\quad \square = 26 \div 10$

- Here is a 2-digit number on a place value chart.



When dividing by 10, we move the digits 1 place to the ________.

$82 \div 10 = \square$

Use this method to solve:

$55 \div 10 = \square$ $\quad \square = 90 \div 10$ $\quad 3.2 = \square \div 10$

Divide 2-digits by 10

Reasoning and Problem Solving

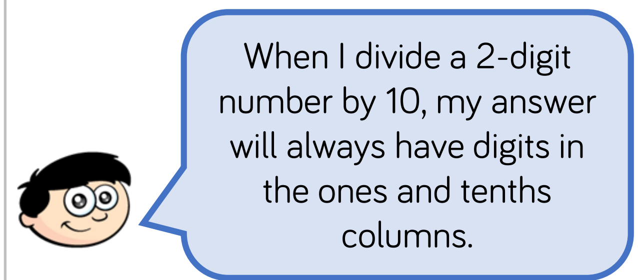
Jack has used a Gattegno chart to divide a 2-digit number by 10
He has placed counters over the numbers in his answer.

100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1		3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5		0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

What was Jack's original number?
How can you use the chart to help you?

Jack's original number was 26
You can move each counter up one to multiply them by 10, which is the inverse to division.

Dexter says,



Show that Dexter is incorrect.

Children should give an example of when Dexter is incorrect.
For example, when you divide 80 by 10, the answer is 8 so there does not need to be anything in the tenths column.

Hundredths

Notes and Guidance

Children recognise that hundredths arise from dividing one whole into one hundred equal parts.

Linked to this, they see that one tenth is ten hundredths.

Children count in hundredths and represent tenths and hundredths on a place value grid and a number line.

Mathematical Talk

One hundredth is one whole split into how many equal parts?

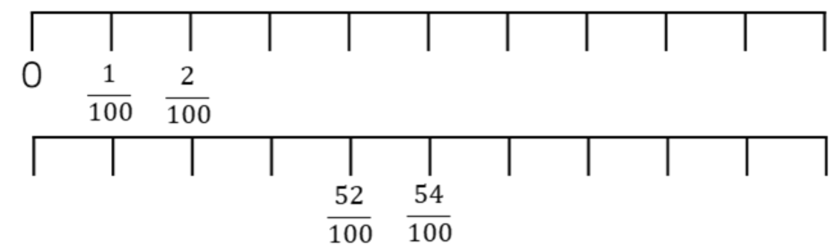
How many hundredths can I exchange one tenth for?

How many hundredths are equivalent to 5 tenths? How does this help me complete the sequence?

How does Base 10 help you represent the difference between tenths and hundredths?

Varied Fluency

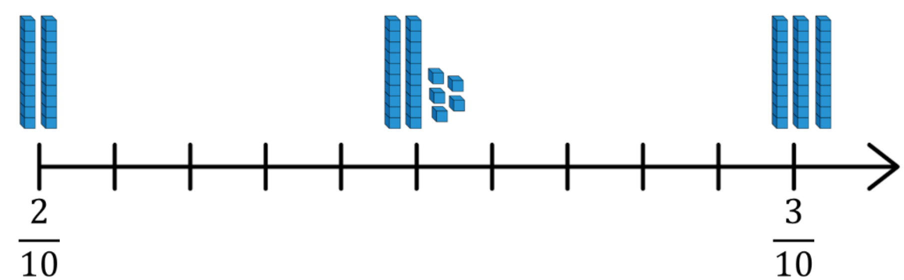
Complete the number lines.



Complete the sequences.

- $\frac{27}{100}$, $\frac{28}{100}$, $\square$, $\square$, $\frac{31}{100}$, $\square$
- $\frac{52}{100}$, $\frac{51}{100}$, $\frac{5}{10}$, $\square$, $\square$, $\square$

Use fractions to complete the number lines

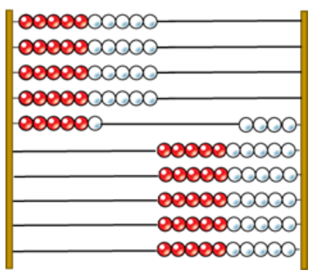


Hundredths

Reasoning and Problem Solving

Here is a Rekenrek made from 100 beads.

If the Rekenrek represents one whole, what fractions have been made on the left and on the right?



Can you partition both of the fractions into tenths and hundredths?

On the left, there are 46 hundredths, this is equivalent to 4 tenths and 6 hundredths.
On the right, there are 54 hundredths, this is equivalent to 5 tenths and 4 hundredths.

Children could also explore hundredths using a 100 bead string.

Complete the statements.

3 tenths and 2 hundredths = 2 tenths and $\square$ hundredths

14 hundredths and 3 tenths = 4 tenths and $\square$ hundredths

5 tenths and 1 hundredth < 5 tenths and $\square$ hundredths

5 tenths and 1 hundredth > $\square$ tenths and 5 hundredths

Can you list all the possibilities?

12

4

Anything more than 1

0, 1, 2, 3 or 4

Hundredths as Decimals

Notes and Guidance

Using the hundred square and Base 10, children can recognise the relationship between $\frac{1}{100}$ and 0.01

Children write hundredths as decimals and as fractions. They write any number of hundredths as a decimal and represent the decimals using concrete and pictorial representations.

Children understand that a hundredth is a part of a whole split into 100 equal parts.

In this small step children stay within one whole.

Mathematical Talk

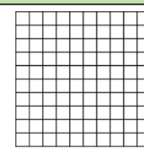
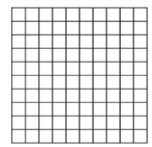
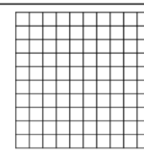
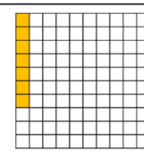
One hundredth is one whole split into _____ equal parts.

What is the same and what is different about a number written as a fraction and a number written as a decimal?

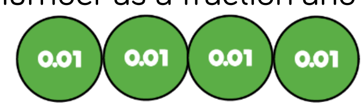
What is the same and different between 0.3 and 4 hundredths?

Varied Fluency

Complete the table.

Image	Words	Fraction	Decimals
	56 hundredths		
		$\frac{17}{100}$	
			0.2
			

Write the number as a fraction and as a decimal.

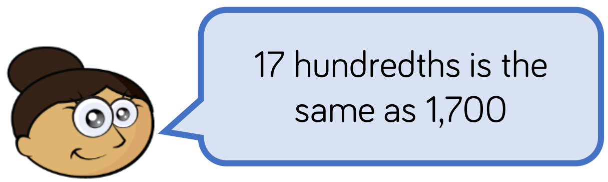


How else could you represent this number?

Hundredths as Decimals

Reasoning and Problem Solving

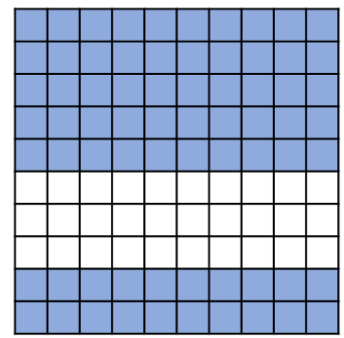
Dora says,



Is she correct?
Explain your answer.

Dora is wrong as she has mistaken hundredths for hundreds.

Alex and Eva have been asked to write the decimal shaded on the 100 grid.



Alex says the grid shows 0.70

Eva says the grid shows 0.7

Who do you agree with?

Explain your answer.

They are both correct.
The grid shows 70 hundredths or 7 tenths and this is what Alex and Eva have given as their answers.
In Alex's answer the 0 in the hundredths column isn't needed as it is not a place holder and doesn't change the value of the number.

White Rose Maths

Hundredths on a Place Value Grid

Notes and Guidance

Children read and represent hundredths on a place value grid. They see that the hundredths column is to the right of the decimal point and the tenths column.

Children use concrete representations to make numbers with tenths and hundredths on a place value grid and write the number they have made as a decimal.

Mathematical Talk

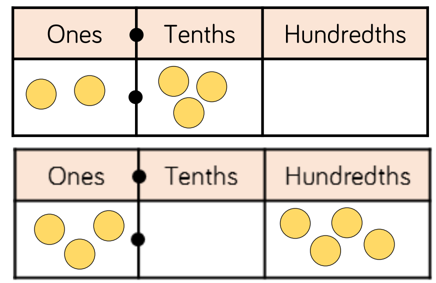
What is a hundredth?

How many hundredths are equivalent to one tenth?

Look at the decimals you have represented on the place value grid and in the part whole models.
What's the same about the numbers? What's different?

Varied Fluency

- Write the decimal represented in each place value grid.



There are ___ ones.

There are ___ tenths.

There are ___ hundredths.

The decimal represented is ___

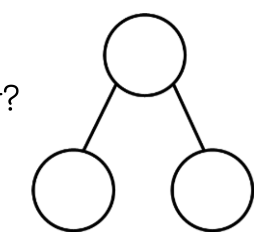
- Make the decimals on a place value grid.

0.34 2.15 0.03 1.01

Use the sentence stems to describe each number.

- Represent the decimals on a place value grid and in a part whole model.
How many ways can you partition each number?

0.27 0.72 0.62



Hundredths on a Place Value Grid

Reasoning and Problem Solving

Use four counters and a place value grid. Place all four counters in either the ones, tenths or hundredths column.

How many different numbers can you make?

Describe the numbers you have made by completing the sentences.

There are $\square$ ones, $\square$ tenths and $\square$ hundredths.

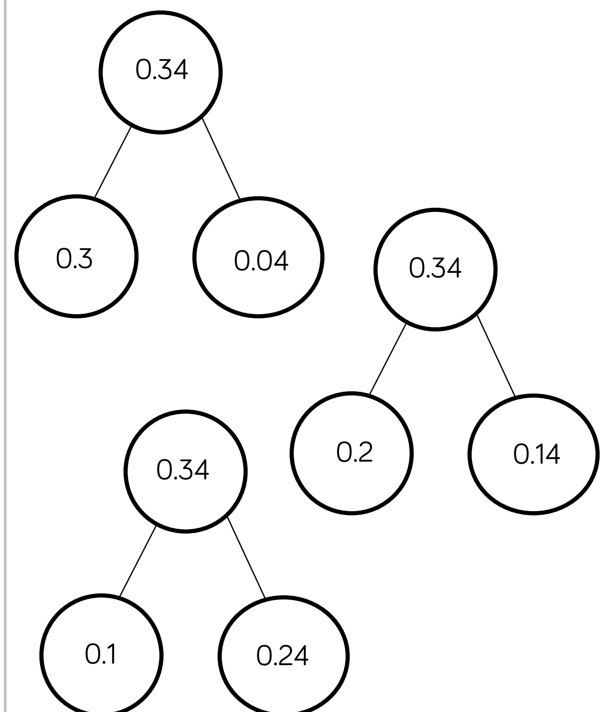
$\square$ ones + $\square$ tenths + $\square$ hundredths = $\square$

Children can either make:
4, 3.1, 3.01, 2.2, 2.11, 2.02, 1.3, 1.21, 1.12, 1.03, 0.4, 0.31, 0.22, 0.13, 0.04

e.g. There are 2 ones, 0 tenths and 2 hundredths.

2 ones + 0 tenths + 2 hundredths = 2.02

Ron says he can partition 0.34 in more than one way.



Use Ron's method to partition 0.45 in more than one way.

Children may partition 0.45 into:
0 tenths and 45 hundredths
1 tenth and 35 hundredths
2 tenths and 25 hundredths
3 tenths and 15 hundredths
4 tenths and 5 hundredths

Other ways of partitioning are possible.

Divide 1 or 2-digits by 100

Notes and Guidance

Children need to understand when dividing by 100 the number is being split into 100 equal parts and is 100 times smaller. Children use counters on a place value chart to see how the digits move when dividing by 100. Children should make links between the understanding of dividing by 100 and this more efficient method.
Emphasise the importance of 0 as a place holder.

Mathematical Talk

What number is represented on the place value chart?
Why is 0 important when dividing a one or two-digit number by 100?
What is the same and what is different when dividing by 100 on a Gattegno chart compared to a place value chart?
What happens to the value of each digit when you divide by 10 and 100?

Varied Fluency

- Dexter uses counters to make a 1-digit number.

Tens	Ones	Tenths	Hundredths

To divide the number by 100, we move the counters two columns to the right.
What is the value of the counters now?

Use this method to solve:

$4 \div 100 = \square$ $5 \div 100 = \square$ $\square = 6 \div 100$

- Here is a two-digit number on a place value chart.

Tens	Ones	Tenths	Hundredths
7	2		

When dividing by 100, we move the digits 2 places to the ______.

$72 \div 100 = \square$

Use this method to solve:

$82 \div 100 = \square$ $\square = 93 \div 100$ $0.23 = \square \div 100$

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Reasoning and Problem Solving

Describe the pattern.

$$7{,}000 \div 100 = 70$$
$$700 \div 100 = 7$$
$$70 \div 100 = 0.7$$
$$7 \div 100 = 0.07$$

Can you complete the pattern starting with 5,300 divided by 100?

Children will describe the pattern they see e.g. 7,000 is 10 times bigger than 700, therefore the answer has to be 10 times bigger as the divisor has remained the same.

For 5,300:
$5{,}300 \div 100 = 53$
$530 \div 100 = 5.3$
$53 \div 100 = 0.53$
$5.3 \div 100 = 0.053$

Teddy says,

45 divided by 100 is 0.45 so I know 0.45 is 100 times smaller than 45

Mo says,

45 divided by 100 is 0.45 so I know 45 is 100 times bigger than 0.45

Who is correct?
Explain your answer.

Teddy and Mo are both correct. Children may use a place value chart to help them explain their answer.