Scheme of Learning

Year 4

#MathsEveryoneCan

White Rose Maths

Contents

Welcome

Welcome to the White Rose Maths' new, more detailed schemes of learning for 2018-19.

We have listened to all the feedback over the last 2 years and as a result of this, we have made some changes to our primary schemes. *They are bigger, bolder and more detailed than before.*

The new schemes still have the *same look and feel* as the old ones, but we have tried to provide more detailed guidance. We have worked with enthusiastic and passionate teachers from up and down the country, who are experts in their particular year group, to bring you additional guidance. *These schemes have been written for teachers, by teachers.*

We all believe that every child can succeed in mathematics. Thank you to everyone who has contributed to the work of White Rose Maths. It is only with your help that we can make a difference.

We hope that you find the new schemes of learning helpful. As always, get in touch if you or your school want support with any aspect of teaching maths.

If you have any feedback on any part of our work, do not hesitate to contact us. Follow us on Twitter and Facebook to keep up-to-date with all our latest announcements.

White Rose Maths Team
#MathsEveryoneCan

White Rose Maths contact details

support@whiterosemaths.com

@WhiteRoseMaths

White Rose Maths

What's included?

Our schemes include:

- Small steps progression. These show our blocks broken down into smaller steps.
- Small steps guidance. For each small step we provide some brief guidance to help teachers understand the key discussion and teaching points. This guidance has been written for teachers, by teachers.
- A more integrated approach to fluency, reasoning and problem solving.
- Answers to all the problems in our new scheme.
- We have also worked with Diagnostic Questions to provide questions for every single objective of the National Curriculum.

Meet the Team

The schemes have been developed by a wide group of passionate and enthusiastic classroom practitioners.


Caroline Hamilton


Beth Smith


Kelsey Brown


Mary-Kate Connolly


James Clegg


Jane Brown


Sam Shutkever


Kate Henshall

Special Thanks

The White Rose Maths team would also like to say a huge thank you to the following people who came from all over the country to contribute their ideas and experience. We could not have done it without you.

Year 2 Team

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Daniel Ballard
Isobel Gabanski
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Year 5 Team

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Laura Heath
Clare Bolton
Helen Eddie
Chris Dunn
Rebecca Gascoigne

Year 6 Team

Lindsay Coates
Kayleigh Parkes
Shahir Khan
Sarah Howlett

How to use the small steps

We were regularly asked how it is possible to spend so long on particular blocks of content and National Curriculum objectives.

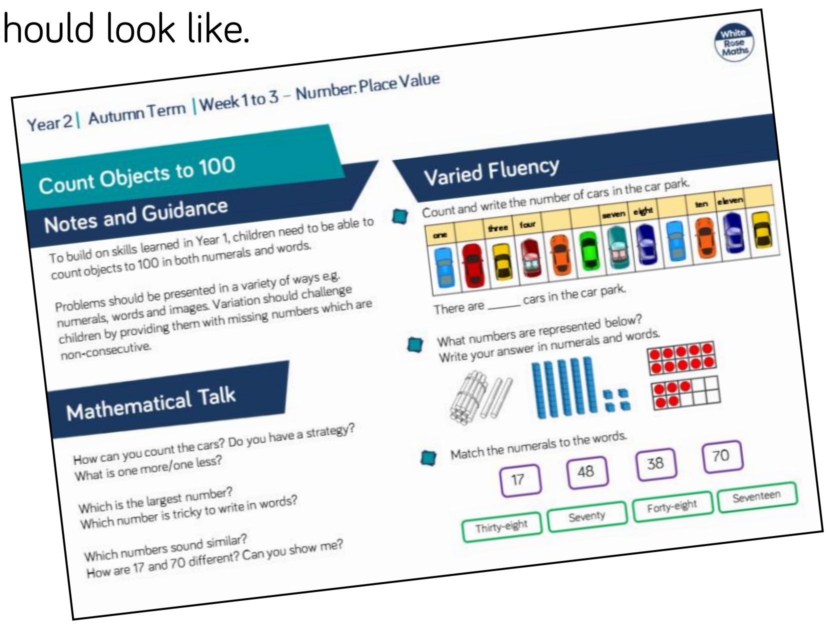
We know that breaking the curriculum down into small manageable steps should help children understand concepts better. Too often, we have noticed that teachers will try and cover too many concepts at once and this can lead to cognitive overload. In our opinion, it is better to follow a small steps approach.

As a result, for each block of content we have provided a "Small Step" breakdown. We recommend that the steps are taught separately and would encourage teachers to spend more time on particular steps if they feel it is necessary. Flexibility has been built into the scheme to allow this to happen.

Teaching notes

Alongside the small steps breakdown, we have provided teachers with some brief notes and guidance to help enhance their teaching of the topic. The "Mathematical Talk" section provides questions to encourage mathematical thinking and reasoning, to dig deeper into concepts.

We have also continued to provide guidance on what varied fluency, reasoning and problem solving should look like.



Year 2 | Autumn Term | Week 1 to 3 – Number: Place Value

Count Objects to 100

Notes and Guidance

To build on skills learned in Year 1, children need to be able to count objects to 100 in both numerals and words.

Problems should be presented in a variety of ways e.g. numerals, words and images. Variation should challenge children by providing them with missing numbers which are non-consecutive.

Mathematical Talk

How can you count the cars? Do you have a strategy?
What is one more/one less?

Which is the largest number?
Which number is tricky to write in words?

Which numbers sound similar?
How are 17 and 70 different? Can you show me?

Varied Fluency

Count and write the number of cars in the car park.

one		three	four			seven	eight		ten	eleven	

There are ______ cars in the car park.

What numbers are represented below?
Write your answer in numerals and words.

Match the numerals to the words.

17 48 38 70

Thirty-eight Seventy Forty-eight Seventeen

Assessments

Alongside these overviews, our aim is to provide an assessment for each term's plan. Each assessment will be made up of two parts:

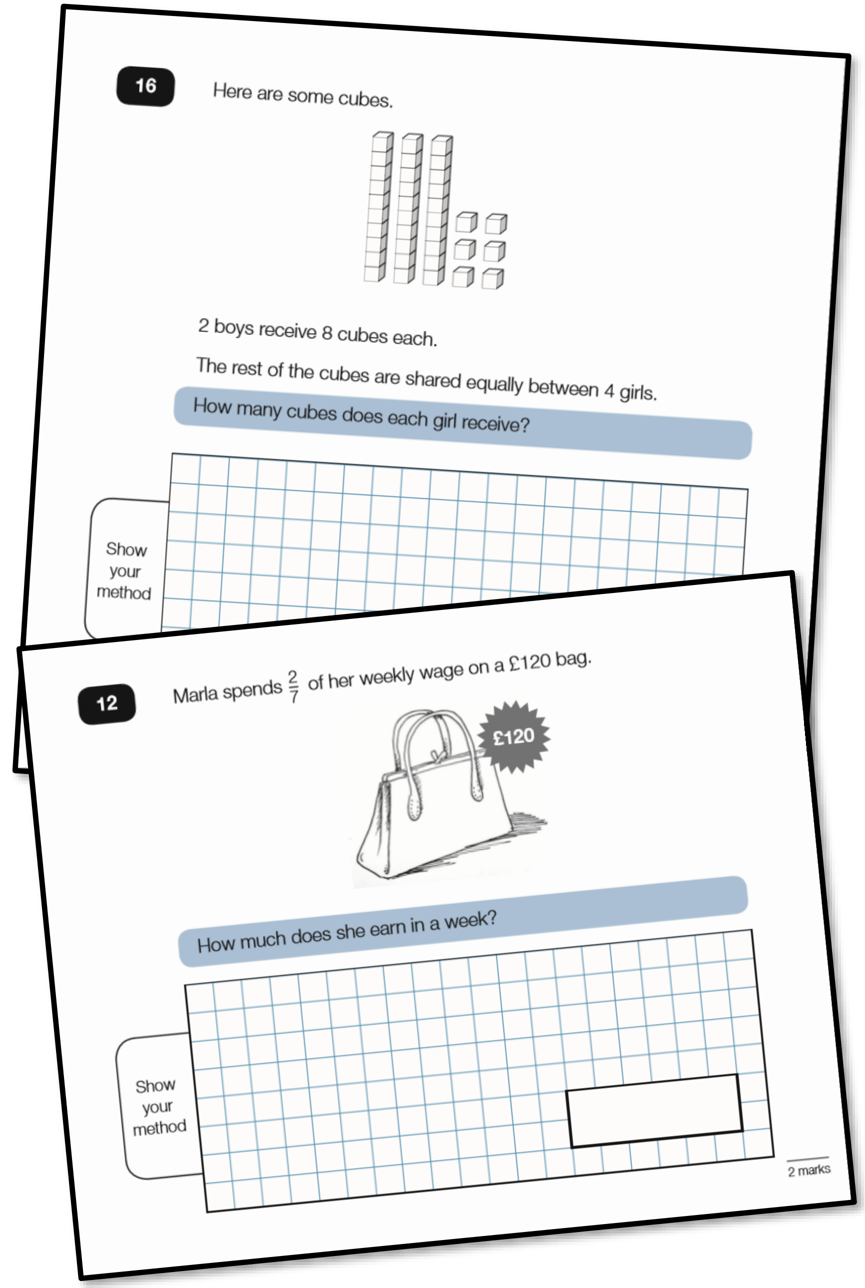
Part 1: Fluency based arithmetic practice

Part 2: Reasoning and problem solving based questions

Teachers can use these assessments to determine gaps in children's knowledge and use them to plan support and intervention strategies.

The assessments have been designed with new KS1 and KS2 SATs in mind.

For each assessment we provide a summary spread sheet so that schools can analyse their own data. We hope to develop a system to allow schools to make comparisons against other schools. Keep a look out for information next year.



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.

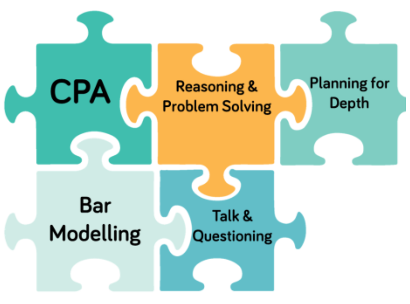
Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Training

White Rose Maths offer a plethora of training courses to help you embed teaching for mastery at your school.

Our popular JIGSAW package consists of five key elements:

- CPA
- Bar Modelling
- Mathematical Talk & Questioning
- Planning for Depth
- Reasoning & Problem Solving



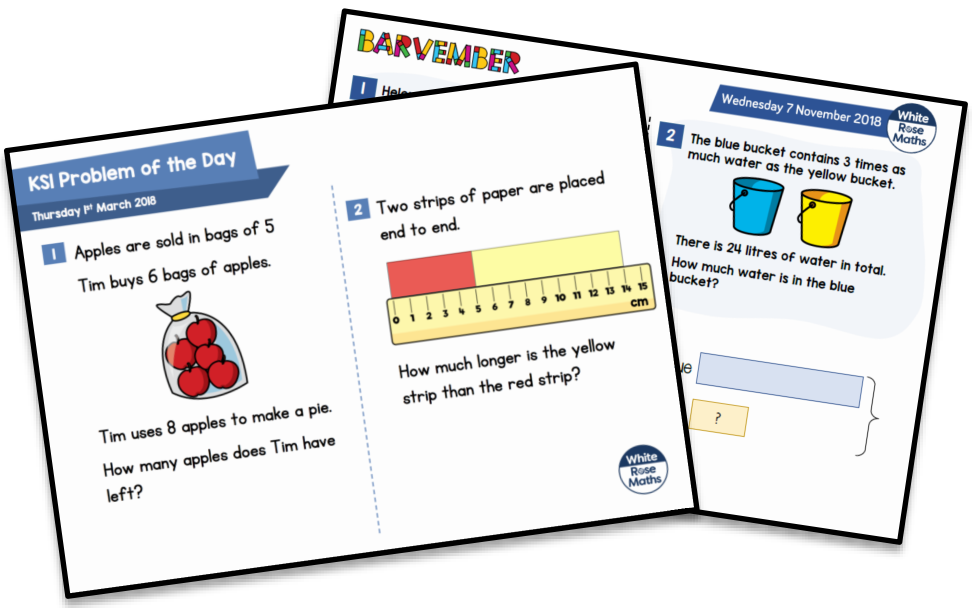
For more information and to book visit our website www.whiterosemaths.com or email us directly at support@whiterosemaths.com

Additional Materials

In addition to our schemes and assessments we have a range of other materials that you may find useful.

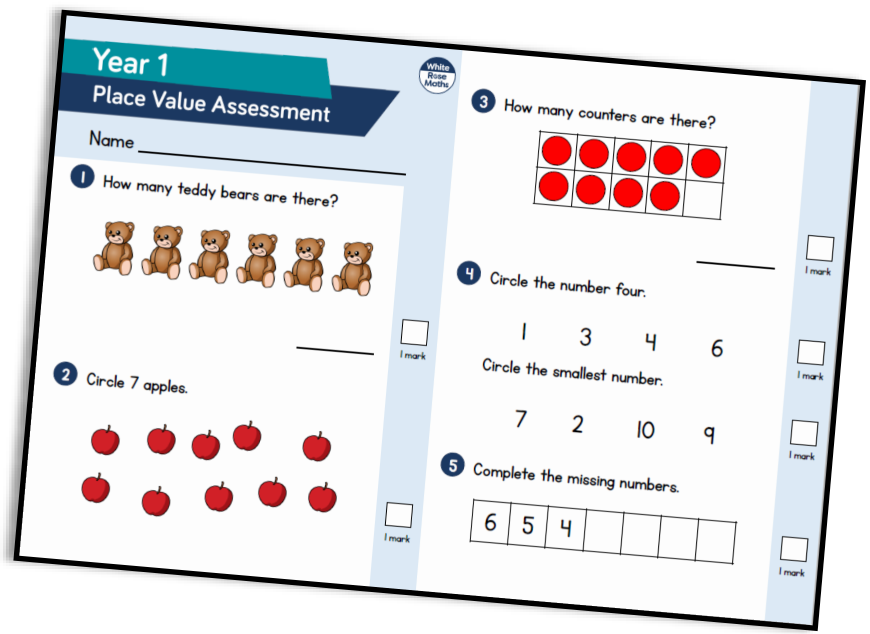
KS1 and KS2 Problem Solving Questions

For the last three years, we have provided a range of KS1 and KS2 problem solving questions in the run up to SATs. There are over 200 questions on a variety of different topics and year groups. You will also find more questions from our Barvember campaign.



End of Block Assessments

New for 2018 we are providing short end of block assessments for each year group. The assessments help identify any gaps in learning earlier and check that children have grasped concepts at an appropriate level of depth.



FAQs

If we spend so much time on number work, how can we cover the rest of the curriculum?

Children who have an excellent grasp of number make better mathematicians. Spending longer on mastering key topics will build a child's confidence and help secure understanding. This should mean that less time will need to be spent on other topics.

In addition, schools that have been using these schemes already have used other subjects and topic time to teach and consolidate other areas of the mathematics curriculum.

Should I teach one small step per lesson?

Each small step should be seen as a separate concept that needs teaching. You may find that you need to spend more time on particular concepts. Flexibility has been built into the curriculum model to allow this to happen. This may involve spending more or less than one lesson on a small step, depending on your class' understanding.

How do I use the fluency, reasoning and problem solving questions?

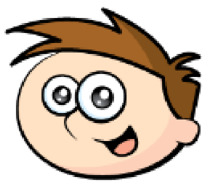
The questions are designed to be used by the teacher to help them understand the key teaching points that need to be covered. They should be used as inspiration and ideas to help teachers plan carefully structured lessons.

How do I reinforce what children already know if I don't teach a concept again?

The scheme has been designed to give sufficient time for teachers to explore concepts in depth, however we also interleave prior content in new concepts. E.g. when children look at measurement we recommend that there are lots of questions that practice the four operations and fractions. This helps children make links between topics and understand them more deeply. We also recommend that schools look to reinforce number fluency through mental and oral starters or in additional maths time during the day.

Meet the Characters

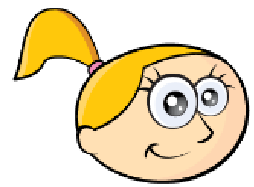
Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



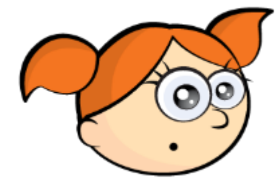
Teddy

Rosie

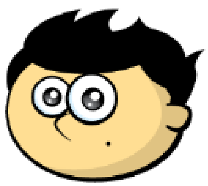
Mo



Eva

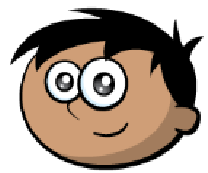


Alex

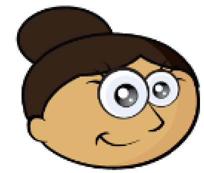


Jack

Whitney



Amir



Dora

Tommy

Dexter

Ron

Annie

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

Multiplication & Division

White Rose Maths

Overview

Small Steps

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

NC Objectives

Recall and use multiplication and division facts for multiplication tables up to 12 × 12.

Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers.

Recognise and use factor pairs and commutativity in mental calculations.

Multiply two-digit and three-digit numbers by a one digit number using formal written layout.

Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one-digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

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?

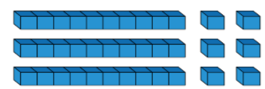
Varied Fluency

- Fill in the blanks.

$2 \times 10 =$ ____ $\qquad 2 \times 1 =$ ____

2 lots of 10 doughnuts = ____ $\qquad$ 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.

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

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

- 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

88										
11	11	11	11	11	11	11	11	11	11	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

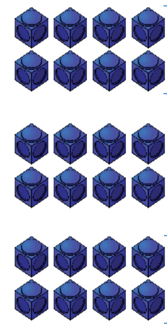
Can you use concrete materials to build the calculations?

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.

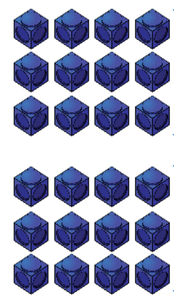


$2 \times 4 =$ ___

$2 \times 4 =$ ___

$2 \times 4 =$ ___

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



$\square \times \square = \square$

$\square \times \square = \square$

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

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

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

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

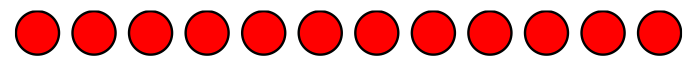
Which number is a factor of every whole number?

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

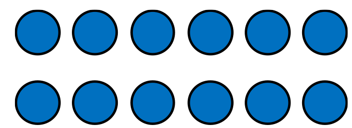
How do arrays support in finding factors of a number?
How do arrays support us in seeing when a number is not a factor of another number?

Varied Fluency

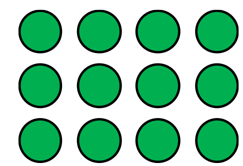
- Complete the factor pairs for 12



$1 \times \square = 12$



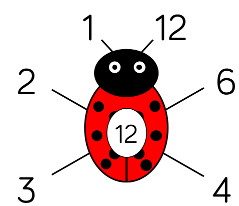
$\square \times 6 = 12$

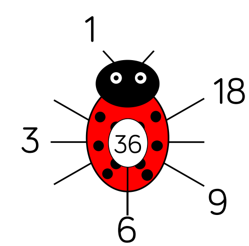


$\square \times \square = 12$

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

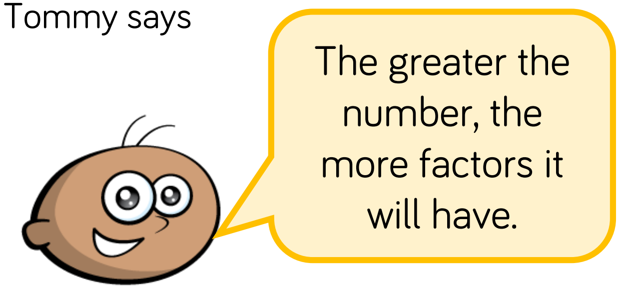




Are all the factors in pairs?
Draw your own factor bugs for 16, 48, 56 and 35

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?

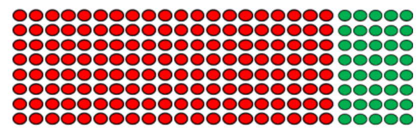
Can you think of an efficient way to multiply by 99?

Varied Fluency

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

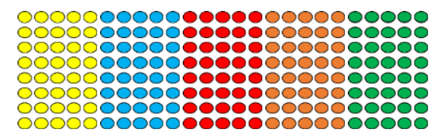
Method 1

$25 \times 8 = 20 \times 8 + 5 \times 8$
$= 160 + \boxed{} = \boxed{}$



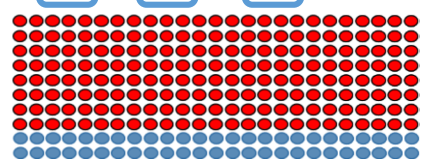
Method 2

$25 \times 8 = 5 \times 5 \times 8$
$= 5 \times \boxed{} = \boxed{}$



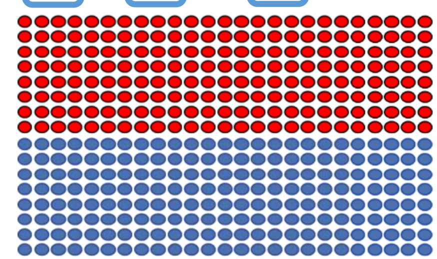
Method 3

$25 \times 8 = 25 \times 10 - 25 \times 2$
$= \boxed{} - \boxed{} = \boxed{}$



Method 4

$25 \times 8 = 50 \times 8 \div 2$
$= \boxed{} \div \boxed{} = \boxed{}$

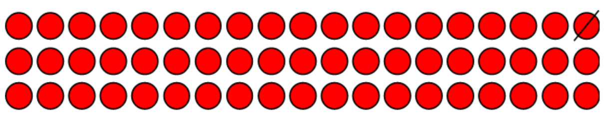


Can you think of any other ways to mentally calculate 25×8?
Which do you think is the most efficient?
How would you calculate 228×5 mentally?

Efficient Multiplication

Reasoning and Problem Solving

Teddy has calculated 19×3



$20 \times 3 = 60$
$60 - 1 = 59$
$19 \times 3 = 59$

Can you explain his mistake and correct the diagram?

Teddy has subtracted one, rather than one group of 3

He should have calculated,

$20 \times 3 = 60$

$60 - 1 \times 3 = 57$

Here are three number cards.

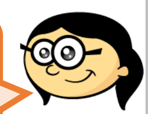
21	42	38

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?

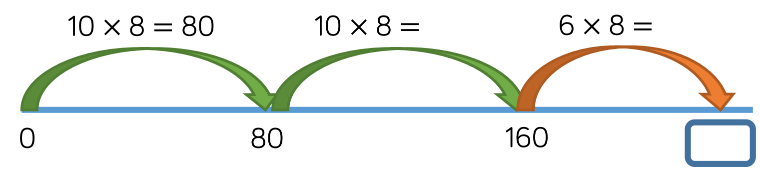
Could you find a more efficient method?

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

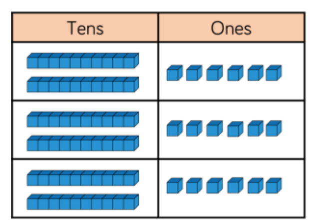
- There are 8 classes in a school.
Each class has 26 children.
How many children are there altogether?
Complete the number line to solve the problem.

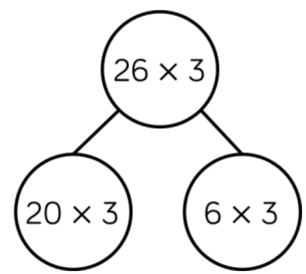


Use this method to work out the multiplications.

16×7 $\quad 34 \times 6$ $\quad 27 \times 4$

- 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

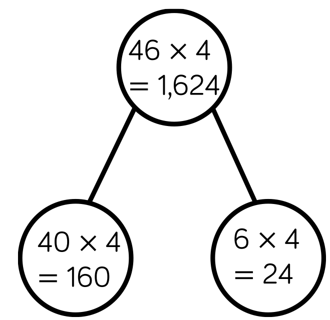
Which of the multiplications would you calculate mentally?
Which of the multiplications would you use a written method for?

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.
$160 + 24 = 184$

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

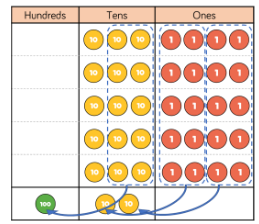
Which column should we start with, the ones or the tens?

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

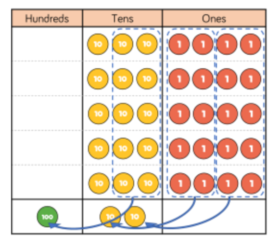
Whitney uses place value counters to calculate 5×34



	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.

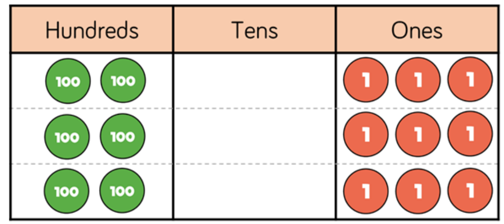
Mathematical Talk

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?

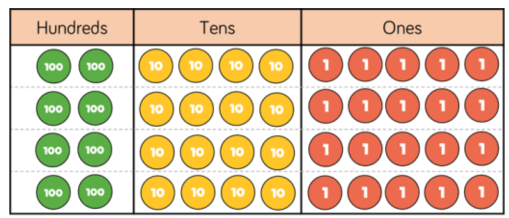
Varied Fluency

- Complete the calculation.



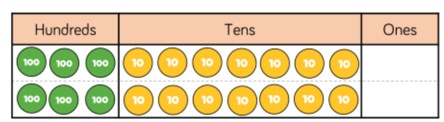
	H	T	O
	2	0	3
×			3

- 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

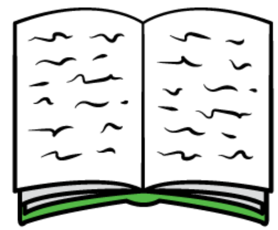
2 2

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

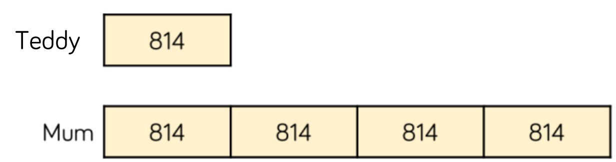
Dexter has the correct answer.

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.



$814 \times 5 = 4{,}070$

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 (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?

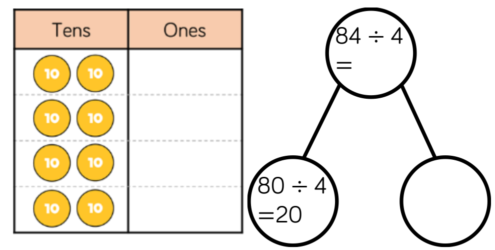
If I cannot share the tens equally, what do I need to do?
How many ones will I have after exchanging the tens?

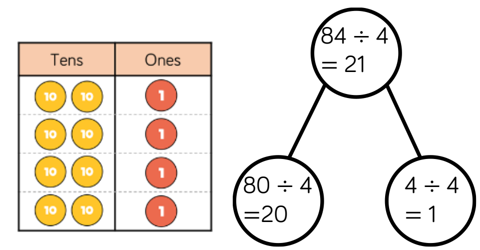
If we know 96 ÷ 4 = 24, what will 96 ÷ 8 be?
What will 96 ÷ 2 be? Can you spot a pattern?

Varied Fluency

Jack is dividing 84 by 4 using place value counters.

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

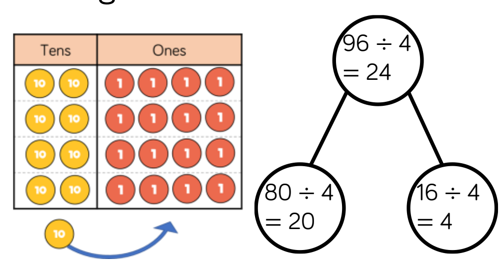




Use Jack's method to calculate:

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

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 (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?

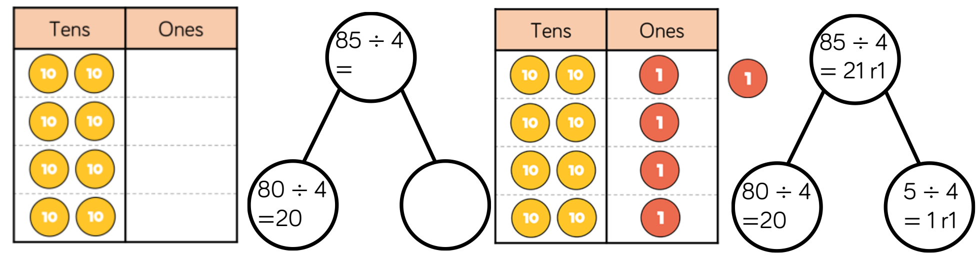
If we are dividing by 4, what is the highest remainder we can have?

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.

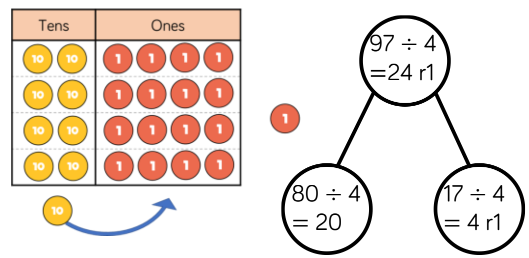
First, he divides the tens. Then, he divides the ones.



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

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

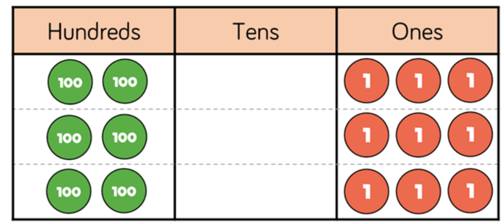
What is the same and what's different when we are dividing 3-digit number by a 1-digit number and a 2-digit number by a 1-digit number?

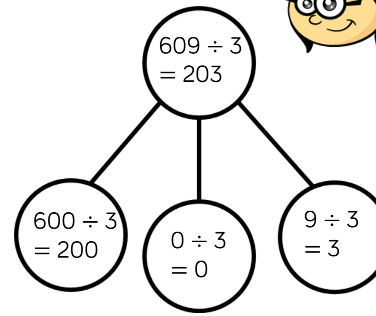
Do we need to partition 609 into three parts or could it just be partitioned into two parts?

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.

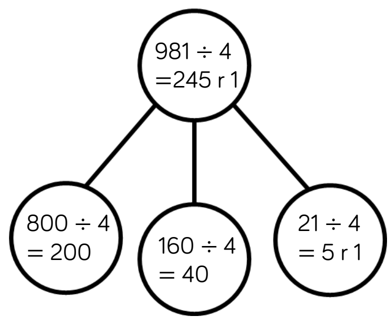


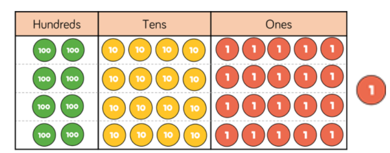


Use Annie's method to calculate the divisions.

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.



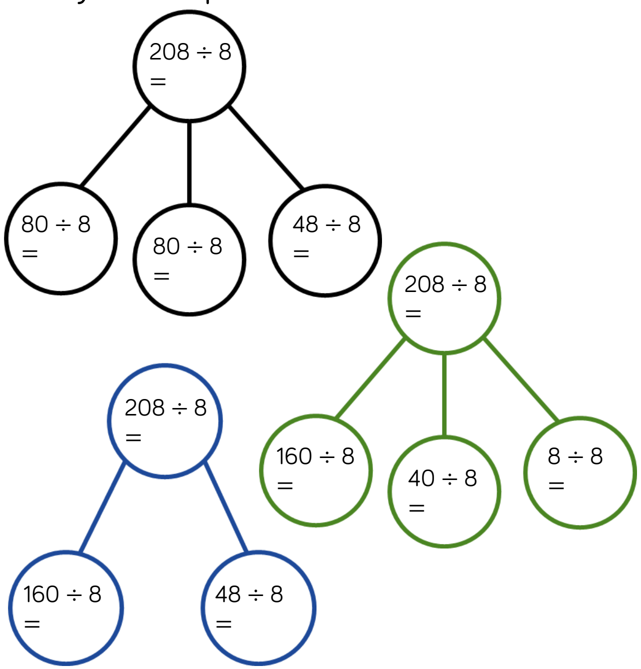


Use Rosie's method to solve:
726 ÷ 6
846 ÷ 6
846 ÷ 7

Divide 3-digits by 1-digit

Reasoning and Problem Solving

Dexter is calculating 184 ÷ 8 using part-whole models.
Can you complete each model?



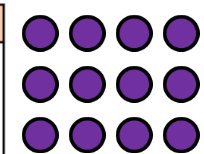
How many part-whole models can you make to calculate 132 ÷ 4?

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

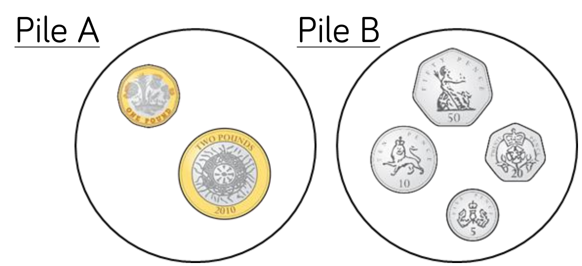
An ice-cream van has 4 flavours of ice-cream and 2 choices of toppings.

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.



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

White Rose Maths

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.