Autumn Scheme of Learning

Year 4

#MathsEveryoneCan

2019-20

White Rose Maths

Contents

Welcome

Welcome to the White Rose Maths' new, more detailed schemes of learning for 2019-20.

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 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.

Thanks from the 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.
- This year there will also be updated assessments.
- We are also working with Diagnostic Questions to provide questions for every single objective of the National Curriculum.

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.

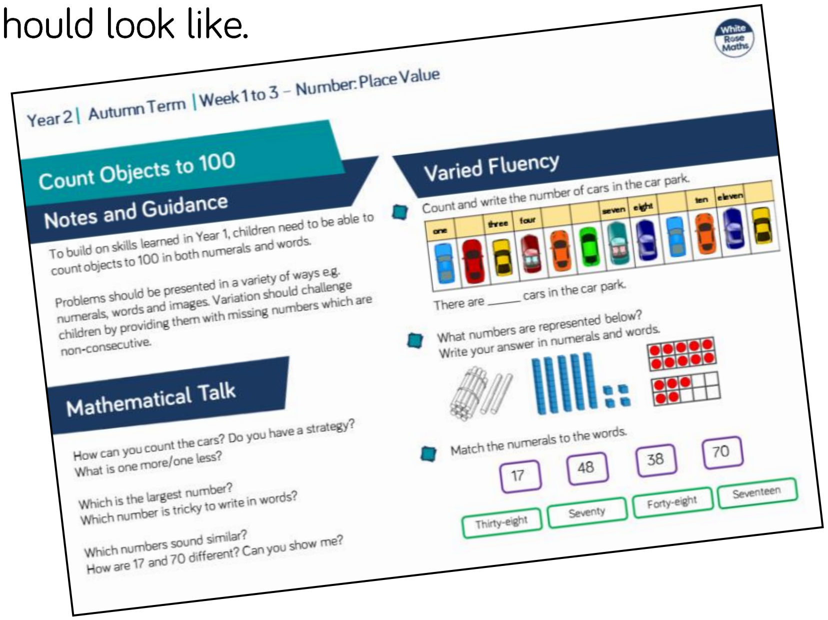
We know that breaking the curriculum down into small manageable steps should help children understand concepts better. Too often, we have noticed that teachers will try and cover too many concepts at once and this can lead to cognitive overload. In our opinion, it is better to follow a small steps approach.

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.

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

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

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

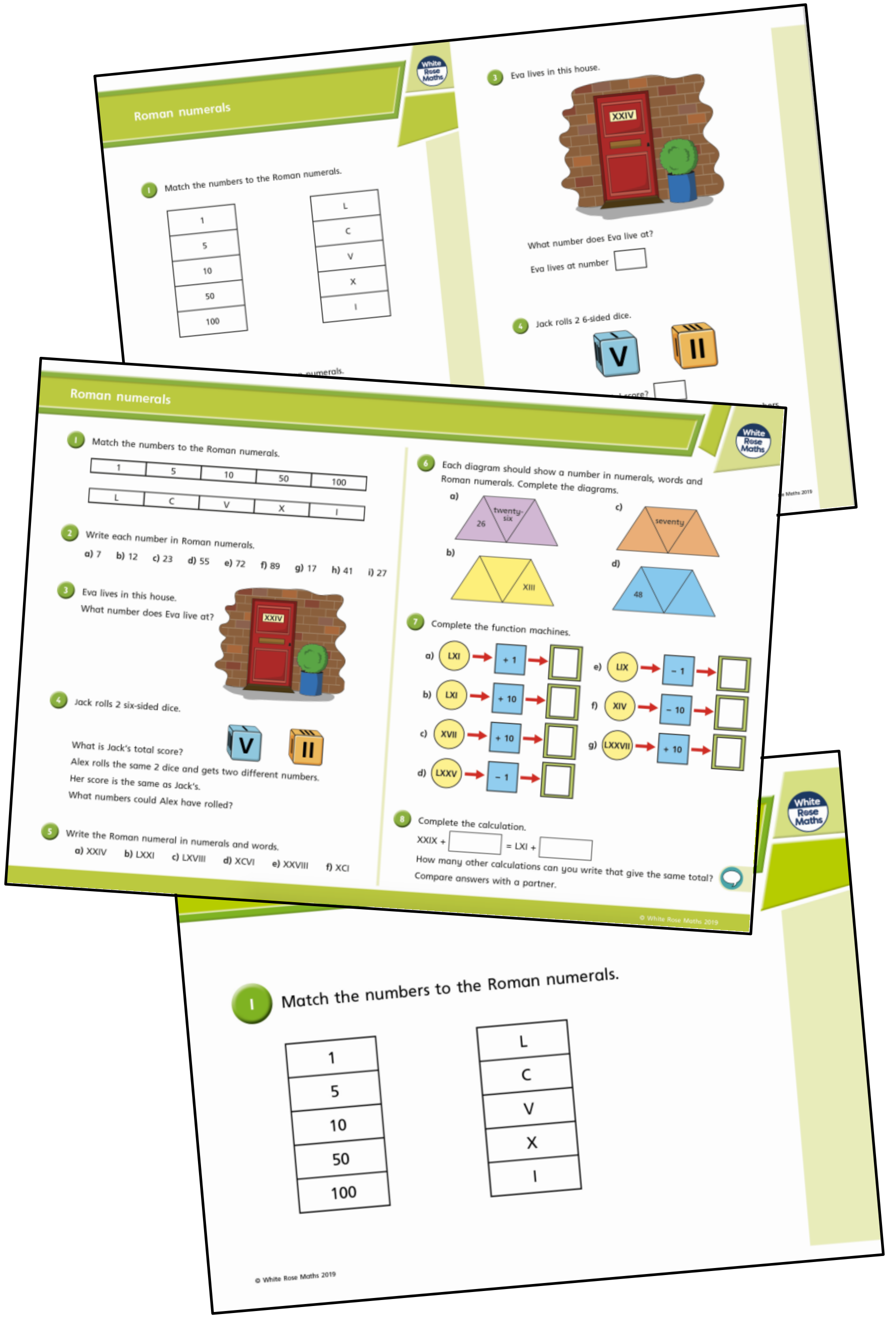
Supporting resources

NEW for 2019-20!

We have produced supporting resources for every small step from Year 1 to Year 8.

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 www.resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

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
- Reasoning & Problem Solving
- Thinking through Variation

For more information and to book visit our website www.whiterosemaths.com

NEW for 2019-20!

We have made the above courses available in a digital format. You can now have CPD whenever you want, wherever you want in easy to digest bite size chunks.

Find out more at www.resources.whiterosemaths.com

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 than one lesson on a small step, depending on your class' understanding.

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

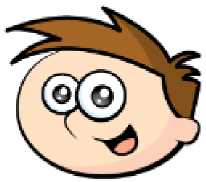
The questions are designed to be used by the teacher to help them understand the key teaching points that need to be covered. They should be used as inspiration and ideas to help teachers plan carefully structured lessons.

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

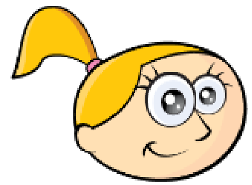
Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



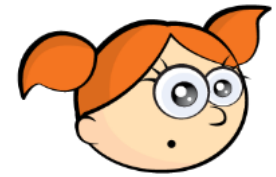
Teddy

Rosie

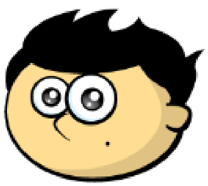
Mo



Eva

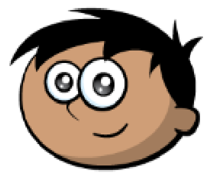


Alex

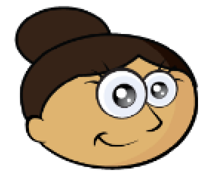


Jack

Whitney



Amir



Dora

Tommy

Dexter

Ron

Annie

White Rose Maths

<table>
<tr><th></th><th>Week 1</th><th>Week 2</th><th>Week 3</th><th>Week 4</th><th>Week 5</th><th>Week 6</th><th>Week 7</th><th>Week 8</th><th>Week 9</th><th>Week 10</th><th>Week 11</th><th>Week 12</th></tr>
<tr><td>Autumn</td><td colspan="4">Number: Place Value</td><td colspan="3">Number: Addition and Subtraction</td><td>Measurement: Length and Perimeter</td><td colspan="3">Number: Multiplication and Division</td><td>Consolidation</td></tr>
<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>
</table>

White Rose Maths

Autumn - Block 1

Place Value

White Rose Maths

Overview

Small Steps

- Roman Numerals to 100
- Round to the nearest 10
- Round to the nearest 100
- Count in 1,000s
- 1,000s, 100s, 10s and 1s
- Partitioning
- Number line to 10,000
- 1,000 more or less
- Compare numbers
- Order numbers
- Round to the nearest 1,000
- Count in 25s
- Negative numbers

NC Objectives

Count in multiples of 6, 7, 9, 25 and 1,000.

Find 1,000 more or less than a given number.

Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones).

Order and compare numbers beyond 1,000.

Identify, represent and estimate numbers using different representations.

Round any number to the nearest 10, 100 and 1,000.

Solve number and practical problems that involve all of the above and with increasingly large positive numbers.

Count backwards through zero to include negative numbers.

Roman Numerals

Notes and Guidance

Children will build on their knowledge of numerals to 12 on a clock face, from Year 3, to explore Roman Numerals to 100

They explore what is the same and what is different between the number systems, including the fact that in the Roman system there is no symbol for zero and so no placeholders.

Mathematical Talk

Why is there no zero in the Roman Numerals? What might it look like?

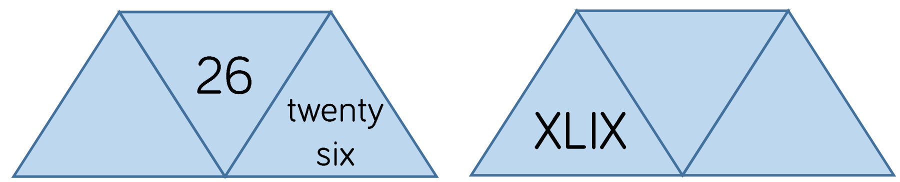
Can you spot any patterns? If 20 is XX what might 200 be?

How can you check you have represented the Roman Numeral correctly? Can you use numbers you know, such as 10 and 100 to help you?

Varied Fluency

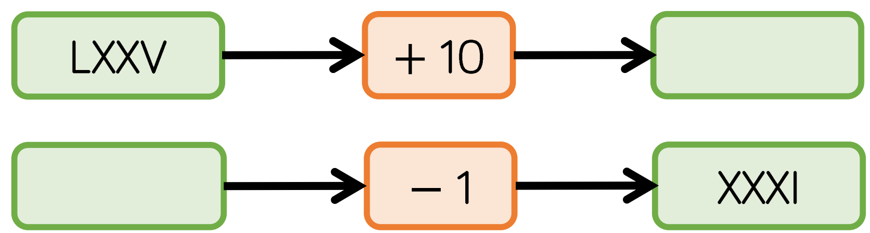
- Lollipop stick activity.
  The teacher shouts out a number and the children make it with lollipop sticks.
  Children could also do this in pairs or groups, and for a bit of fun they could test the teacher!

- Each diagram shows a number in numerals, words and Roman Numerals.



  Complete the diagrams.

- Complete the function machines.



Roman Numerals

Reasoning and Problem Solving

Solve the following calculation:

XIV + XXXVI = ____

How many other calculations, using Roman Numerals, can you write to get the same total?

Answer: L

Other possible calculations include:

C ÷ II = L
L ÷ I = L

X × V = L
XXV × II = L

LXV – XV = L
C – L = L

XX + XX + X = L

Mo says:

In the 10 times table, all the numbers have a zero. Therefore, in Roman Numerals all multiples of 10 have an X

Research and give examples to prove whether or not Mo is correct.

Mo is incorrect. A lot of multiples of 10 have an X in them, but the X can mean different things depending on its position.
For example, X in 10 just means one ten, but X in XL means 10 less than 50
X in 60 (LX) means 10 more than 50
The number 50 has no X and neither does 100

Round to the Nearest 10

Notes and Guidance

Children start to look at the position of a 2-digit number on a number line. They then apply their understanding to 3-digit numbers, focusing on the number of ones and rounding up or not.

Children must understand the importance of 5 and the idea that although it is in the middle of 0 and 10, that by convention any number ending in 5 is always rounded up, to the nearest 10

Mathematical Talk

What is a multiple of 10?

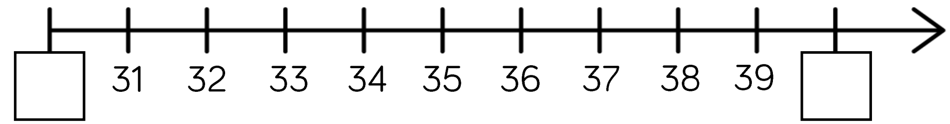
Which multiples of 10 does ____ sit between?

Which column do we look at when rounding to the nearest 10? What do we do if the number in that column is a 5?

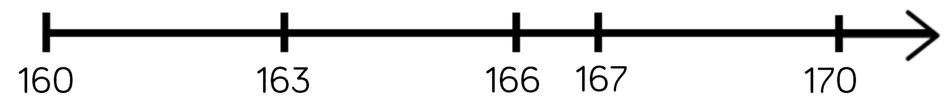
Which number is being represented? Will we round it up or not? Why?

Varied Fluency

- Which multiples of 10 do the numbers sit between?

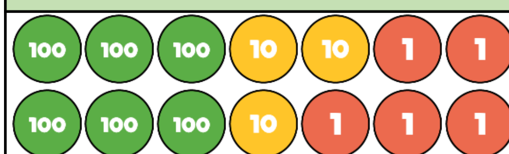


- Say whether each number on the number line is closer to 160 or 170?



Round 163, 166 and 167 to the nearest 10

- Complete the table:

Start number	Rounded to the nearest 10
	
851	
XCVIII	

Round to the Nearest 10

Reasoning and Problem Solving

A whole number is rounded to 370 What could the number be? Write down all the possible answers. 370	365 366 367 368 369 370 371 372 373 374
Two different two-digit numbers both round to 40 when rounded to the nearest 10 The sum of the two numbers is 79 What could the two numbers be? Is there more than one possibility?	35 + 44 = 79 36 + 43 = 79 37 + 42 = 79 38 + 41 = 79 39 + 40 = 79

Whitney says:  847 to the nearest 10 is 840 Do you agree with Whitney? Explain why.	I don't agree with Whitney because 847 rounded to the nearest 10 is 850. I know this because ones ending in 5, 6, 7, 8 and 9 round up.

Round to the Nearest 100

Notes and Guidance

Children compare rounding to the nearest 10 (looking at the ones column) to rounding to the nearest 100 (looking at the tens column.)

Children use their knowledge of multiples of 100, to understand which two multiples of 100 a number sits between. This will help them to round 3-digit numbers to the nearest 100

Mathematical Talk

What's the same/different about rounding to the nearest 10 and nearest 100? Which column do we need to look at when rounding to the nearest 100?

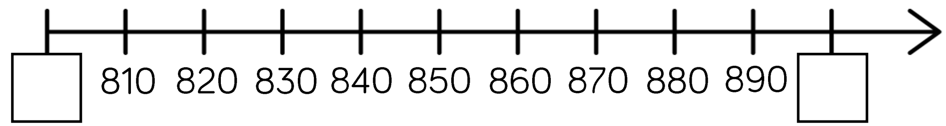
Why do numbers up to 49 round down to the nearest 100 and numbers 50 to 99 round up?

What would 49 round to, to the nearest 100?

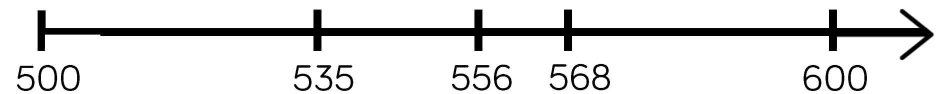
Can the answer be 0 when rounding?

Varied Fluency

- Which multiples of 100 do the numbers sit between?



- Say whether each number on the number line is closer to 500 or 600.



Round 535, 556 and 568 to the nearest 100
Use the stem sentence: _____ rounded to the nearest 100 is _____ .

- Complete the table:

Start number	Rounded to the nearest 100
	
994	
XLV	

Round to the Nearest 100

Reasoning and Problem Solving

Always, Sometimes, Never Explain your reasons for each statement. • A number with a five in the tens column rounds up to the nearest hundred. • A number with a five in the ones column rounds up to the nearest hundred. • A number with a five in the hundreds column rounds up to the nearest hundred.	Always – a number with five in the tens column will be 50 or above so will always round up. Sometimes – a number with five in the ones column might have 0 to 4 in the tens column (do not round up) or 5 to 9 (round up). Sometimes –a number with five in the hundreds column will also round up or down dependent on the number in the tens column.
When a whole number is rounded to the nearest 100, the answer is 200 When the same number is rounded to the nearest 10, the answer is 250 What could the number be? Is there more than one possibility?	245, 246, 247, 248 and 249 are all possible answers.
Using the digit cards 0 to 9, can you make whole numbers that fit the following rules? You can only use each digit once. 1. When rounded to the nearest 10, I round to 20 2. When rounded to the nearest 10, I round to 10 3. When rounded to the nearest 100, I round to 700	To 20, it could be 15 to 24 To 10, it could be 5 to 14 To 700, it could be 650 to 749 Use each digit once: 5, 24, 679 or 9, 17, 653 etc.

Count in 1,000s

Notes and Guidance

Children look at four-digit numbers for the first time. They explore what a thousand is through concrete and pictorial representations, to recognise that 1,000 is made up of ten hundreds.

They count in multiples of 1,000, representing numbers in numerals and words.

Mathematical Talk

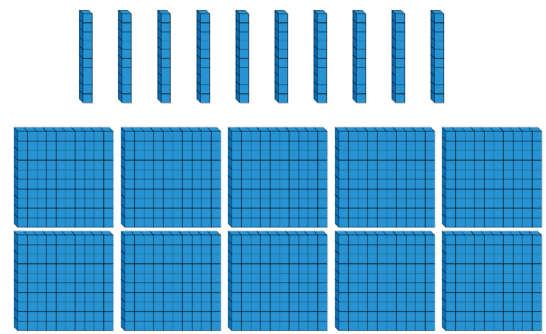
How many hundreds are there in one thousand?
How many hundreds make _____ thousands?

How is counting in thousands similar to counting in 1s?

When counting in thousands, which is the only digit to change?

How many sweets would there be in ___ jars?

Varied Fluency

- 

  ____ tens make ____ hundred.

  ____ hundreds make ____ thousand.

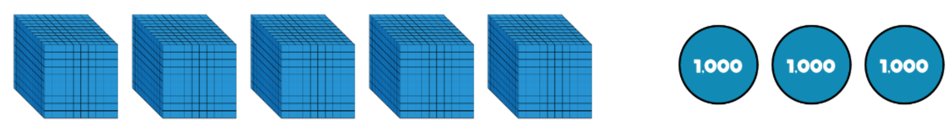
- How many sweets are there altogether?

  1,000 1,000 1,000

  There are three jars of ____ sweets.
  There are ____ sweets altogether.

- What numbers are represented below?

Count in 1,000s

Reasoning and Problem Solving

Always, Sometimes, Never

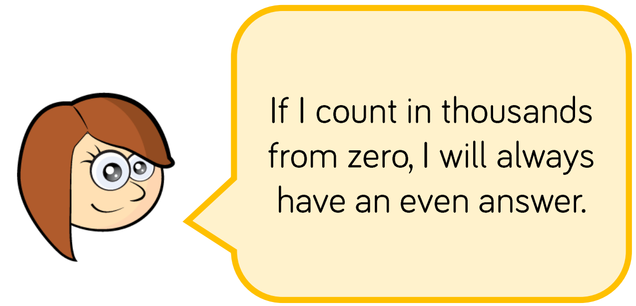
- When counting in hundreds, the ones digit changes.
- The thousands column changes every time you count in thousands.
- To count in thousands, we use 4-digit numbers.

Never, when counting in hundreds, the ones digit always stays the same.

Always, the thousands column changes every time you count in thousands.

Sometimes, to count in thousands, we use 4-digit numbers.

Rosie says,



True or false?
Explain how you know.

True, because they all end in zero, which are multiples of 10 and multiples of 10 are even.

1,000s, 100s, 10s and 1s

Notes and Guidance

Children represent numbers to 9,999, using concrete resources on a place value grid. They understand that a four-digit number is made up of 1,000s, 100s, 10s and 1s.

Moving on from Base 10 blocks, children start to partition by using place value counters and digits.

Mathematical Talk

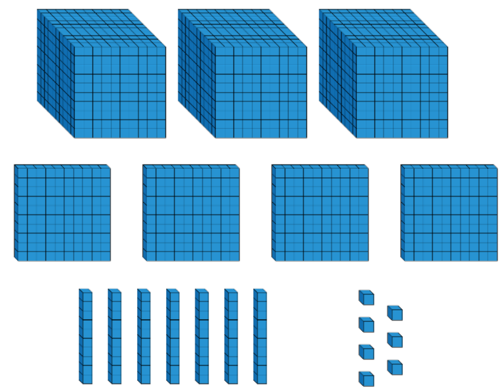
Can you represent the number on a place value grid?
How many thousands/hundreds/tens/ones are there?

How do you know you have formed the number correctly? What could you use to help you?

How is the value of zero represented on a place value grid or in a number?

Varied Fluency

Complete the sentences.

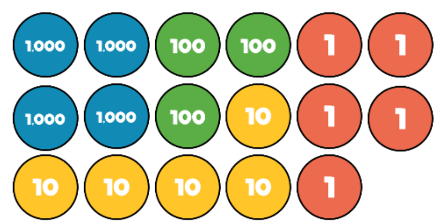


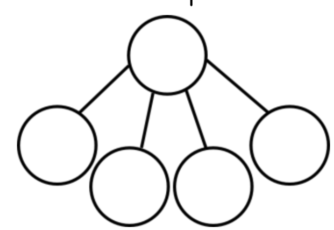
There are ______ thousands, ______ hundreds, ______ tens and ______ ones.

The number is ______ .

___ + ___ + ___ + ___ = ___

Complete the part-whole model for the number represented.





What is the value of the underlined digit in each number?

6,9<u>8</u>3	<u>9</u>,021	<u>7</u>89	6,57<u>0</u>

Represent each of the numbers on a place value grid.

1,000s, 100s, 10s and 1s

Reasoning and Problem Solving

Create four 4-digit numbers to fit the following rules: • The tens digit is 3 • The hundreds digit is two more than the ones digit • The four digits have a total of 12	Possible answers: 3,432 5,331 1,533 7,230
Use the clues to find the missing digits. ☐ ☐ ☐ ☐ The thousands and tens digit multiply together to make 36 The hundreds and tens digit have a digit total of 9 The ones digit is double the thousands digit. The whole number has a digit total of 21	4,098

Partitioning

Notes and Guidance

Children explore how numbers can be partitioned in more than one way.

They need to understand that, for example, 5000 + 300 + 20 + 9 is equal to 4000 + 1300 + 10 + 19
This is crucial to later work on adding and subtracting 4-digit numbers and children explore this explicitly.

Mathematical Talk

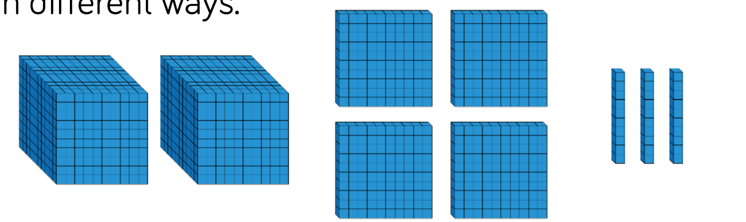
What number is being represented?

If we have 10 hundreds, can we exchange them for something?

If you know ten 100s are equal to 1,000 or ten 10s are equal to 100, how can you use this to make different exchanges?

Varied Fluency

- Move the Base 10 around and make exchanges to represent the number in different ways.

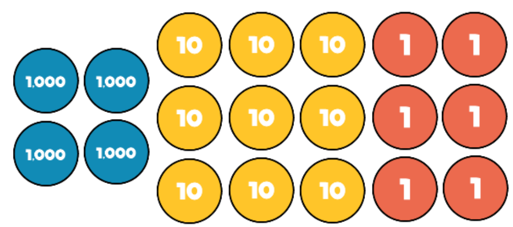


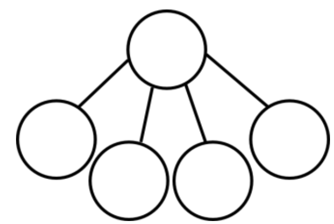
$2000 + 400 + \boxed{} + 4$

$1000 + \boxed{} + \boxed{} + 14$

$1000 + 1300 + \boxed{} + \boxed{}$

- Represent the number in two different ways in a part-whole model.





- Eva describes a number. She says,
  "My number has 4 thousands and 301 ones"
  What is Eva's number?
  Can you describe Eva's number in a different way?

Partitioning

Reasoning and Problem Solving

Which is the odd one out?

3,500 | 3,500 ones

2 thousands and 15 hundreds | 35 tens

Explain how you know.

35 tens is the odd one out because it does not make 3,500, it makes 350

Jack says:

My number has five thousands, three hundreds and 64 ones.

My number has fifty three hundreds, 6 tens and 4 ones.

Amir says:

Who has the largest number? Explain.

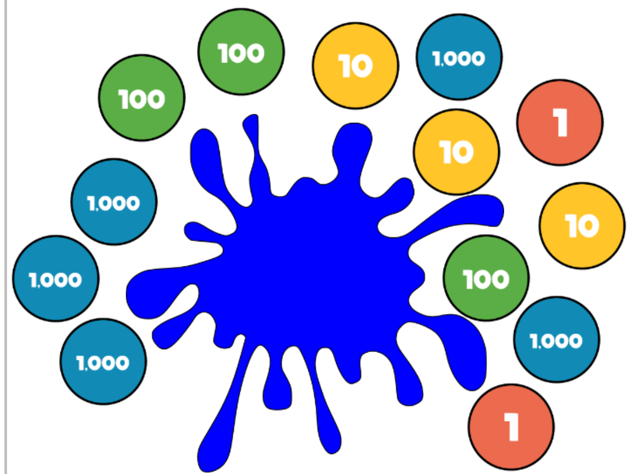
They both have the same number because 53 hundreds is equal to 5 thousands and 3 hundreds. Jack and Amir both have 5,364

Some place value counters are hidden.

The total is six thousand, four hundred and thirty two.

Which place value counters could be hidden?

Think of at least three solutions.



Possible answers:

One 1,000 counter and one 100 counter.

Ten 100 counters and ten 10 counters.

Eleven 100 counters.

Number Line to 10,000

Notes and Guidance

Children estimate, label and draw numbers on a number line to 10,000

They need to understand that it is possible to count forwards or backwards, in equal steps, from both sides.

Number lines should be shown with or without start and end numbers, or with numbers already placed on it.

Mathematical Talk

Which side of the number line did you start from? Why?

When estimating where a number should be placed, on a number line, what can help you?

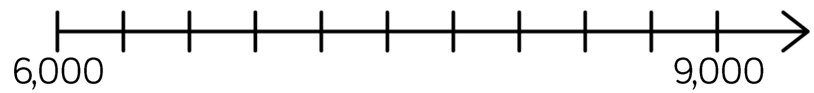
Can you use your knowledge of place value to prove that you are correct?

When a number line has no values at the end, what strategies could you use to help you figure out the missing value? Could there be more than one answer?

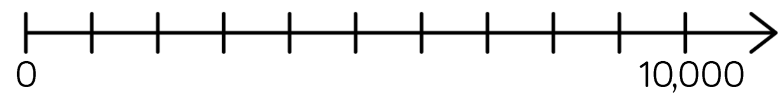
Varied Fluency

- Draw arrows to show where the numbers would be on the number line.

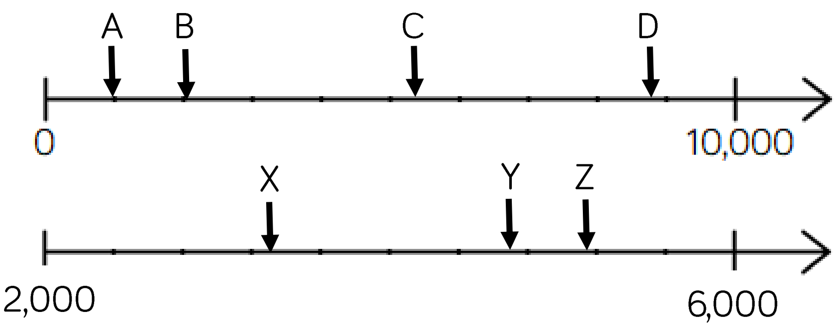
8,750



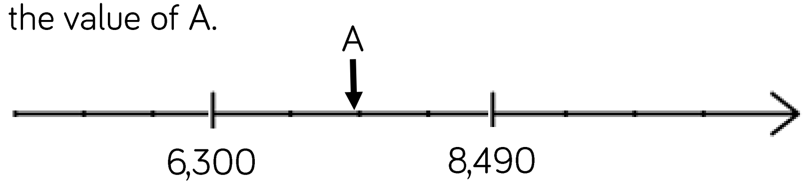
4,100



- Estimate the value of each letter.



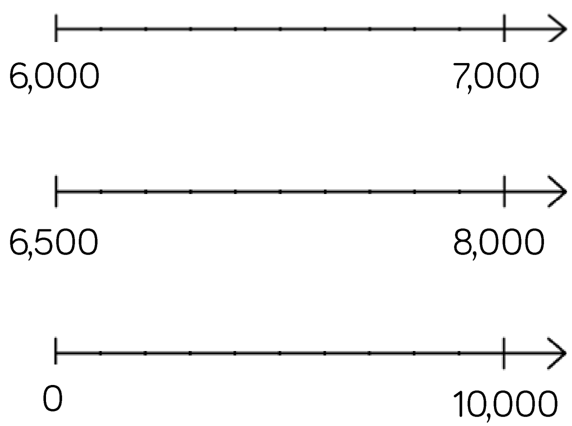
- Estimate the value of A.



Number Line to 10,000

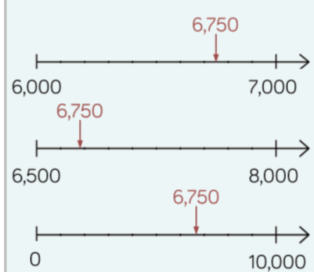
Reasoning and Problem Solving

Place 6,750 on each of the number lines.

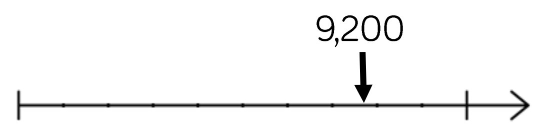


Are they in the same place on each line? Why?

No, each line has different numbers at the start and end so the position of 6,750 changes.



If the number on the number line is 9,200, what could the start and end numbers be?
Find three different possible answers.



Possible answers:

8,400 – 9,500
5,000 – 10,000
9,120 – 9,920

1,000 More or Less

Notes and Guidance

Children have explored finding 1, 10 and 100 more or less, in Year 3. They now extend their learning by finding 1,000 more or less than a given number.

Show children that they can represent their answer in a number of ways, for example using place value counters, Base 10 or numerals.

Mathematical Talk

What is 1,000 more than/less than a number?
Which column changes when I find 1,000 more or less?

What happens when I subtract 1,000 from 9,209?

Can you show me two different ways of showing 1,000 more/less than e.g. pictures, place value charts, equipment.

Complete this sentence: I know that 1,000 more than _____ is _____ because … I can prove this by _____ .

Varied Fluency

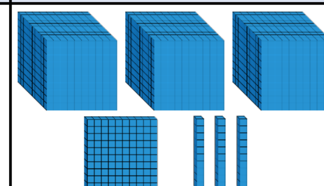
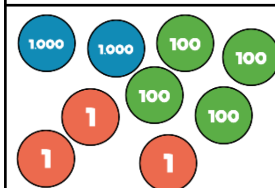
Fill in the missing values.

$$9{,}523 + 10 = \boxed{}$$

$$\boxed{} + 3{,}589 = 3{,}689$$

$$3{,}891 + \boxed{} = 4{,}891$$

Complete the table.

1,000 less	Number	1,000 more
		
		

Find 1,000 more and 1,000 less than each number.

5,000 7,500 2,359 8,999

Use concrete resources to prove you are correct.

1,000 More or Less

Reasoning and Problem Solving

Complete the missing boxes:

4,896 →	+ 1,000 →	
3,784 →	→	2,784
→	– 1,000 →	986

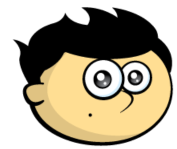
4,896 →	+ 1,000 →	5,896
3,784 →	– 1,000 →	2,784
1,986 →	– 1,000 →	986

10 less than my number is 1,000 more than 5,300. What is my number?

Can you write your own problem similar to this?

6,310

Jack says:



When I add 1,000 to 4,325, I only have to change 1 digit.

Is he correct?
Which digit does he need to change?

Yes, he is correct.
He will need to change the thousands digit (4).

Fill in the boxes by finding the patterns:

3,210		1,210	
3,110			
			6,010

3,210	2,210	1,210	210
3,110			
3,010	4,010	5,010	6,010
2,910			

White Rose Maths

Compare 4-digit Numbers

Notes and Guidance

Children compare 4-digit numbers using comparison language and symbols to determine/show which is greater and which is smaller.

Children should represent numbers using concrete manipulatives, draw them pictorially and write them using numerals.

Mathematical Talk

Which two numbers are being represented?

Do you start counting the thousands, hundreds, tens or ones first? Why?

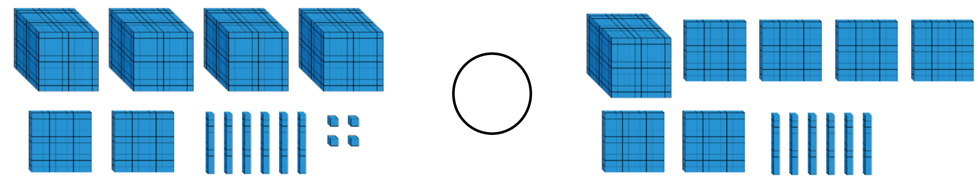
Which column do you start comparing from? Why?

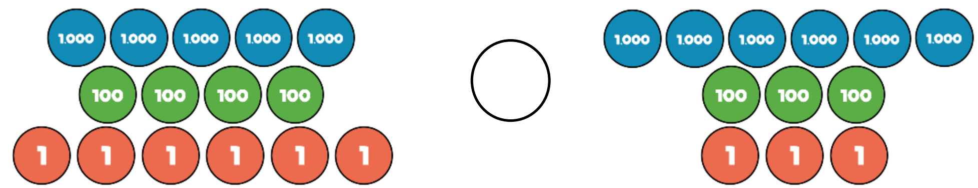
What strategy did you use to compare the two numbers? Is this the same or different to your partner?

How many answers can you find?

Varied Fluency

Complete the statements using < , > or =





5,689 ◯ 5,892

Circle the smallest amount in each pair.

Two thousand, three hundred and ninety seven	3,792
6,000 + 400 + 50 + 6	6,455
9 thousands, 2 hundreds and 6 ones	9,602

Complete the statements.

1,985 > ____

4,203 < 4,000 + ____ + 4

Compare 4-digit Numbers

Reasoning and Problem Solving

I am thinking of a number. It is greater than 3,000, but smaller than 5,000 The digits add up to 15 What could the number be? Write down as many possibilities as you can. The difference between the largest and smallest digit is 6. How many numbers do you now have?	I have 13 numbers: 3,228 3,282 3,822 4,560 4,650 4,506 4,605 3,660 3,606 3,147 3,174 3,417 3,471
Use digit cards 1 to 5 to complete the comparisons: $564\square < \square 73\square$ $2\square 38 > 23\square 5$ You can only use each digit once.	Possible answer: 5641 < 5732 2438 > 2335

Order Numbers

Notes and Guidance

Children explore ordering a set of numbers in ascending and descending order. They reinforce their understanding by using a variety of representations.

Children find the largest or smallest number from a set.

Mathematical Talk

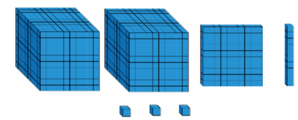
Which number is the greatest? Which number is smallest? How do you know?

Why have you chosen to order the numbers this way?

What strategy did you use to solve this problem?

Varied Fluency

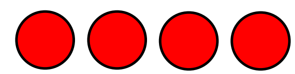
- Fill in the circle using < , > or =

  2,764 ◯  ◯ XXVII

- Here are four digit cards: 4 0 5 3

  Arrange them to make as many different 4-digit numbers as you can and put them in ascending order.

- Rearrange four counters in the place value chart to make different numbers.

1000s	100s	10s	1s

Record all your numbers and write them in descending order.

Order Numbers

Reasoning and Problem Solving

Alex has ordered five 4-digit numbers. The smallest number is 3,450, and the largest number is 3,650

All the other numbers have digit totals of 20

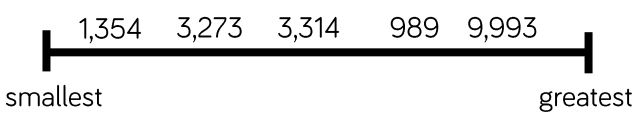
What could the other three numbers be?

3,476

3,584

3,593

What mistake has been made?

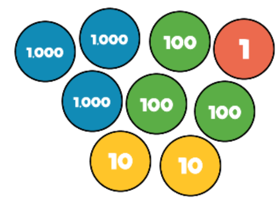


The number 989 is in the wrong place. A common misconception could be that the first digit is a high number the whole number must be large. They have forgotten to check how many digits there are in the number before ordering.

Put these amounts in ascending order.

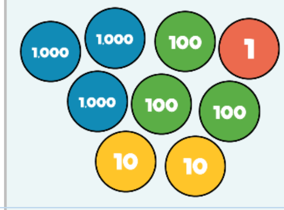
Half of 2,400

LXXXVI



LXXXVI

Half of 2,400



Put one number in each box so that the list of numbers is ordered smallest to largest.

1000s	100s	10s	1s
1	1		3
1		2	7
1	2	5	
1		5	9
1	3	8	
1		1	5

Can you find more than one way?

Possible answer:

1000s	100s	10s	1s
1	1	1	3
1	1	2	7
1	2	5	0
1	3	5	9
1	3	8	4
1	4	1	5

Round to the Nearest 1,000

Notes and Guidance

Children build on their knowledge of rounding to the nearest 10 and 100, to round to the nearest thousand for the first time.

Children must understand which multiples of 1,000 a number sits between.

When rounding to the nearest 1,000, children should look at the digits in the hundreds column.

Mathematical Talk

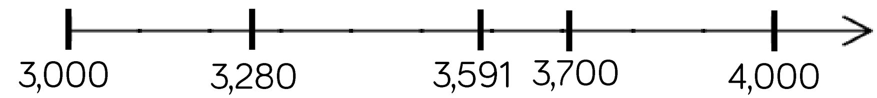
Which thousands numbers does _____ sit between?

How can the number line help you to see which numbers round up/down?

Which place value column do we need to look at when we round the nearest 1,000?

Varied Fluency

Say whether each number on the number line is closer to 3,000 or 4,000



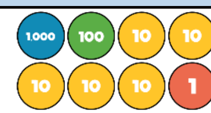
Round 3,280, 3,591 and 3,700 to the nearest thousand.

Round these numbers to the nearest 1,000

- Eight thousand and fifty-six
- 5 thousands, 5 hundreds, 5 tens and 5 ones
- 

- LXXXII

Complete the table.

Start number	Rounded to the nearest 10	Rounded to the nearest 100	Rounded to the nearest 1,000
			
4,999			
LXXXII			

White Rose Maths

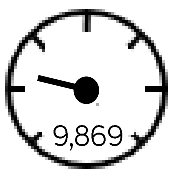
Round to the Nearest 1,000

Reasoning and Problem Solving

David's mum and dad are buying a car.

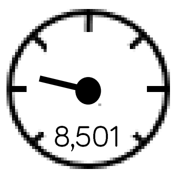
They look at the following cars:

Car A



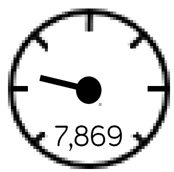
Approximately 10,000 miles

Car B



Approximately 8,000 miles

Car C



Approximately 8,000 miles

Are all of the cars correctly advertised?

Explain your reasoning.

Car B is incorrectly advertised. It should be rounded up to 9,000

A number is rounded to the nearest thousand.

The answer is 7,000

What could the original number have been?

Give five possibilities.

What is the greatest number possible?

What is the smallest number possible?

Possible answers:

6,678
7,423
7,192
6,991

Greatest: 7,499
Smallest: 6,500

White Rose Maths

Count in 25s

Notes and Guidance

Children will count in 25s to spot patterns. They use their knowledge of counting in 50s and 100s to become fluent in 25s.

Children should recognise and use the number facts that there are two 25s in 50 and four 25s in 100.

Mathematical Talk

What is the first/second number pattern counting up in?
Can you notice a pattern as the numbers increase/decrease?
Are any numbers in both of the number patterns? Why?

What digit do multiples of 25 end in?

What's the same and what's different when counting in 50s and 25s?

Varied Fluency

- Look at the number patterns.
  What do you notice?

25	50	75	100	125	150

50	100	150	200	250	300

- Complete the number tracks

25		75		125	150				250

	725	700		650		600			

- Circle the mistake in each sequence.

2, 275 2,300 2,325 2,350 2,400, …

1,000 975 925 900 875 …

Count in 25s

Reasoning and Problem Solving

Whitney is counting in 25s and 1,000s.
She says:

- Multiples of 1,000 are also multiples of 25
- Multiples of 25 are therefore multiples of 1,000

Do you agree with Whitney?
Explain why.

I don't agree. Multiples of 1,000 are multiples of 25 because 25 goes into 1,000 exactly, but not all multiples of 25 are multiples of 1,000 e.g. 1,075

Ron is counting down in 25s from 790.
Will he say 725?

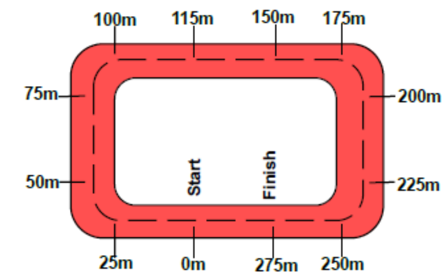
Explain your answer.

No, he will not say 725 because:

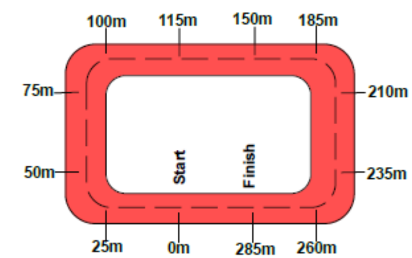
790, 765, 740, 715, 690, 665, …

Two race tracks have been split into 25m intervals.

Race track A



Race track B



What errors have been made?

Possible answers:

Race track A has miscounted when adding 25 m to 100 m. After this they have continued to count in 25s correctly from 150

Race track B has miscounted when adding 25 m to 150 m. They have then added 25 m from this point.

Negative Numbers

Notes and Guidance

Children recognise that there are numbers below zero. It is essential that this concept is linked to real life situations such as temperature, water depth etc.
Children should be able to count back through zero using correct mathematical language of "negative four" rather than "minus four" for example. This counting can be supported through the use of number squares, number lines or other visual aids.

Mathematical Talk

What number is missing next to –5? Can you count up to fill in the missing numbers?

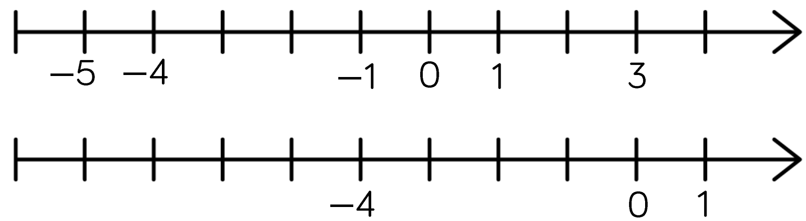
Can you use the words positive and negative in a sentence to describe numbers?

What do you notice about positive and negative numbers on the number line? Can you see any patterns?

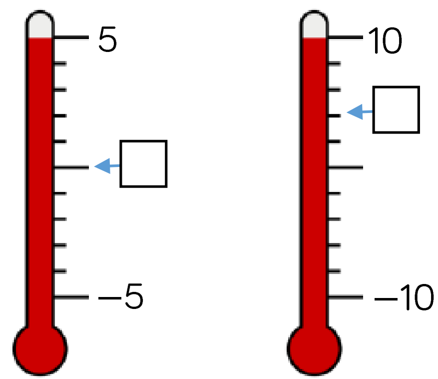
Is –1 degrees warmer or colder than –4 degrees?

Varied Fluency

- Complete the number lines



- Fill in the missing temperatures on the thermometers.



- Dexter is counting backwards out loud.
  He says,
  "Two, one, negative one, negative two, negative three …"
  What mistake has Dexter made?

Negative Numbers

Reasoning and Problem Solving

Can you spot the mistake in these number sequences? a) 2, 0, 0, –2, –4 b) 1, –2, –4, –6, –8 c) 5, 0, –5, –10, –20 Explain how you found the mistake and convince me you are correct.	a) 0 is incorrect as it is written twice. b) 1 is incorrect. The sequence has a difference of 2 each time, so the first number should be 2 c) –20 is incorrect. The sequence is decreasing by 5, so the final number should be –15
Teddy counted down in 3s until he reached –18 He started at 21, what was the tenth number he said?	–6 Ensure the first number said is 21 21, 18, 15, 12, 9, 6, 3, 0, –3, –6, …

White Rose Maths

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

- Add and subtract 1s, 10s, 100s and 1,000s
- Add two 4-digit numbers – no exchange
- Add two 4-digit numbers – one exchange
- Add two 4-digit numbers – more than one exchange
- Subtract two 4-digit numbers – no exchange
- Subtract two 4-digit numbers – one exchange
- Subtract two 4-digit numbers – more than one exchange
- Efficient subtraction
- Estimate answers
- Checking strategies

NC Objectives

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Estimate and use inverse operations to check answers to a calculation.

Solve addition and subtraction two step problems in contexts, deciding which operations and methods to use and why.

1s, 10s, 100s, 1,000s

Notes and Guidance

Children build on prior learning of adding and subtracting hundreds, tens and ones. They are introduced to adding and subtracting thousands.

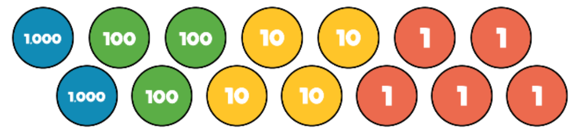
Children should use concrete representations (Base 10, place value counters etc.) before moving to abstract and mental methods.

Mathematical Talk

Can you represent the numbers using Base 10 and place value counters? What's the same about the representations? What's different?

If we are adding tens, are the digits in the tens column the only ones that change? Do the ones/hundreds/thousands ever change?

Varied Fluency



The number being represented is ____.

Add 3 thousands to the number. What do you have now?

Add 3 hundreds to the number. What do you have now?

Subtract 3 tens from the number. What do you have now?

Add 5 ones to the number. What do you have now?

Here is a number.

Thousands	Hundreds	Tens	Ones
5	3	8	2

Add 3 thousands to the number.
Subtract 4 thousands from the answer.
Subtract 2 ones.
Add 5 tens.
What number do you have now?

1s, 10s, 100s, 1,000s

Reasoning and Problem Solving

Which questions are easy?
Which questions are hard?

8,273 + 4 = ___

8,273 + 4 tens = ___

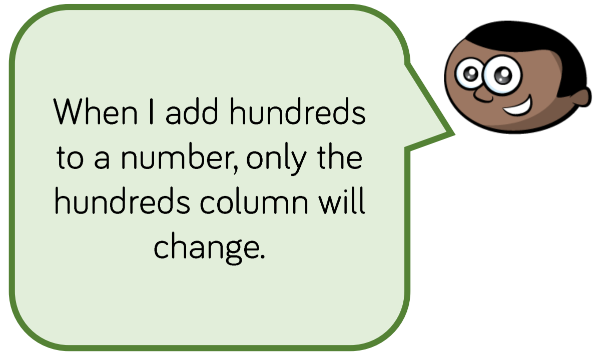
8,273 – 500 = ___

8,273 – 5 thousands = ___

Why are some easier than others?

8,273 + 4 and 8,273 – 5 thousands are easier because you do not cross any boundaries.
8,723 + 4 tens and 8,273 – 500 are harder because you have to cross boundaries and make an exchange.

Mo says,



Is Mo correct? Explain your answer.

Mo is incorrect because when you add hundreds to a number and end up with more than ten hundreds, you have to make an exchange which also affects the thousands column.

Add Two 4-digit Numbers (1)

Notes and Guidance

Children use their understanding of addition of 3-digit numbers to add two 4-digit numbers with no exchange.

They use concrete equipment and a place value grid to support their understanding alongside column addition.

Mathematical Talk

How many ones are there altogether? Can we make an exchange? Why? (Repeat questions for other columns)

Is it more difficult to add 3-digit or 4-digit numbers without exchanging? Why?

How can you find the missing numbers? Do you need to add or subtract?

Varied Fluency

- Use counters and a place value grid to calculate 242 + 213
- Use counters and a place value grid to calculate 3,242 + 2,213

1,000s	100s	10s	1s
1000 1000 1000	100 100	10 10 10 10	1 1
1000 1000	100 100	10	1 1 1

Now calculate 3,242 + 213 in the same way.
What is the same and what is different?

- Work out the missing numbers.

	Th	H	T	O
	4	___	6	___
+	2	5	___	1
	___	7	8	9

Add Two 4-digit Numbers (1)

Reasoning and Problem Solving

Rosie adds 2 numbers together that total 4,444

Both numbers have 4 digits.

All the digits in both numbers are even.

What could the numbers be?

Prove it.

How many ways can you find?

Possible answers:

2,222 + 2,222
2,244 + 2,200
2,224 + 2,220
2,442 + 2,002
2,242 + 2,202
2,424 + 2,020
2,422 + 2,022
2,444 + 2,000

There are more possible pairs. This includes 0 as an even number. Discussion could be had around whether 0 is odd or even and why.

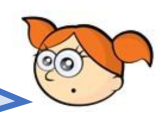
Two children completed the following calculation:

1,234 + 345

Dora

My answer is 1,589

My answer is 4,684



Alex

Both of the children have made a mistake in their calculations.

Calculate the actual answer to the question.

What mistakes did they make?

The actual answer is 1,579

Dora's mistake was a miscalculation for the 10s column, adding 30 and 40 to get 80 rather than 70

Alex's mistake was a place value error, placing the 3 hundred in the thousands column and following the calculation through incorrectly.

Add Two 4-digit Numbers (2)

Notes and Guidance

Children add two 4-digit numbers with one exchange. They use a place value grid to support understanding alongside column addition.

They explore exchanges as they occur in different place value columns and look for similarities/differences.

Mathematical Talk

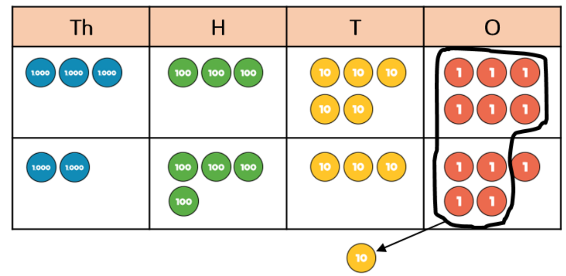
How many ones do we have altogether? Can we make an exchange? Why? How many ones do we exchange for one ten? Do we have any ones remaining? (Repeat for other columns.)

Why is it important to line up the digits in the correct column when adding numbers with different amounts of digits?

Which columns are affected if there are more than ten tens altogether?

Varied Fluency

- Rosie uses counters to find the total of 3,356 and 2,435



	Th	H	T	O
	3	3	5	6
+	2	4	3	5
	5	7	9	1
			1	

Use Rosie's method to calculate:
3,356 + 2,437 3,356 + 2,473 3,356 + 2,743

- Dexter buys a laptop costing £1,265 and a mobile phone costing £492
How much do the laptop and the mobile phone cost altogether?

- Complete the bar models.

1,185	405

3,535	2,634

3,264	1,655

Add Two 4-digit Numbers (2)

Reasoning and Problem Solving

What is the missing 4-digit number?

	Th	H	T	O
	___	___	___	___
+	6	3	9	5
	8	9	4	9

2,554

Annie, Mo and Alex are working out the solution to the calculation 6,374 + 2,823

Annie's Strategy

6,000 + 2,000 = 8,000
300 + 800 = 110
70 + 20 = 90
4 + 3 = 7
8,000 + 110 + 90 + 7 = 8,207

Mo's Strategy

	6	3	7	4
+	2	8	2	3
	8	1	9	7

Alex's Strategy

	6	3	7	4
+	2	8	2	3
				7
			9	0
	1	1	0	0
	8	0	0	0
	9	1	9	7

Who is correct?

Alex is correct with 9,197

Annie has miscalculated 300 + 800, forgetting to exchange a ten hundreds to make a thousand (showing 11 tens instead of 11 hundreds).

Mo has forgotten both to show and to add on the exchanged thousand.

White Rose Maths

Add Two 4-digit Numbers (3)

Notes and Guidance

Building on adding two 4-digit numbers with one exchange, children explore multiple exchanges within an addition.

Ensure children continue to use equipment alongside the written method to help secure understanding of why exchanges take place and how we record them.

Mathematical Talk

How many ones do we have altogether? Can we make an exchange? Why? How many ones do we exchange for one ten? How many ones are remaining? (Repeat for each column.)

Why do you have to add the digits from the right to the left, starting with the smallest place value column? Would the answer be the same if you went left to right?

What is different about the total of 4,844 and 2,156? Can you think of two other numbers where this would happen?

Varied Fluency

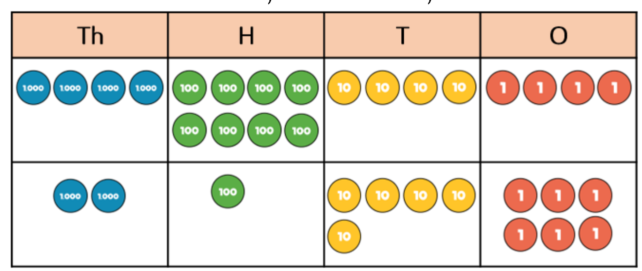
Use counters and a place value grid to calculate:

	5	9	3	4
+	2	2	4	6

	3	2	7	5
+	6	1	5	6

	1	7	7	2
+	2	2	5	0

Find the total of 4,844 and 2,156



	4	8	4	4
+	2	1	5	6

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

3,456 + 789	◯	1,810 + 2,436
2,829 + 1,901	◯	2,312 + 2,418
7,542 + 1,858	◯	902 + 8,496
1,818 + 1,999	◯	3,110 + 707

Add Two 4-digit Numbers (3)

Reasoning and Problem Solving

Jack says,

When I add two numbers together I will only ever make up to one exchange in each column.

Do you agree?
Explain your reasoning.

Jack is correct.
When adding any two numbers together, the maximum value in any given column will be 18 (e.g. 18 ones, 18 tens, 18 hundreds). This means that only one exchange can occur in each place value column.
Children may explore what happens when more than two numbers are added together.

Complete:

	Th	H	T	O
	6	?	?	8
+	?	?	8	?
	9	3	2	5

Mo says that there is more than one possible answer for the missing numbers in the hundreds column.
Is he correct?
Explain your answer.

The solution shows the missing numbers for the ones, tens and thousands columns.

6,__38 + 2,__87

Mo is correct. The missing numbers in the hundreds column must total 1,200 (the additional 100 has been exchanged).

Possible answers include:
6,338 + 2,987
6,438 + 2,887

Subtract Two 4-digit Numbers (1)

Notes and Guidance

Building on their experiences in Year 3, children use their knowledge of subtracting using the formal column method to subtract two 4-digit numbers.

Children will focus on calculations with no exchanges, concentrating on the value of each digit.

Mathematical Talk

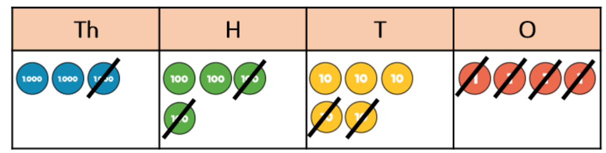
Do you need to make both numbers when you are subtracting with counters? Why?

Why is it important to always subtract the smallest place value column first?

How are your bar models different for the two problems? Can you use the written method to calculate the missing numbers?

Varied Fluency

Eva uses place value counters to calculate 3,454 – 1,224



	Th	H	T	O
	3	4	5	4
–	1	2	2	4
	2	2	3	0

Use Eva's method to calculate:

2,348 – 235 = ____   ____ = 4,572 – 2,341

6,582 – 582 = ____   ____ = 7,262 – 7,151

Use a bar model to represent each problem.

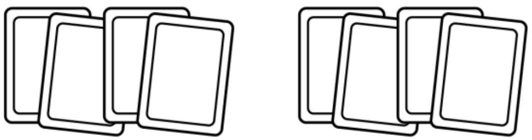
There are 3,597 boys and girls in a school.
2,182 are boys. How many are girls?

Car A travels 7,653 miles per year.
Car B travels 5,612 miles per year.
How much further does Car A travel than Car B per year?

Subtract Two 4-digit Numbers (1)

Reasoning and Problem Solving

Eva is performing a column subtraction with two four digit numbers.



The larger number has a digit total of 35

The smaller number has a digit total of 2

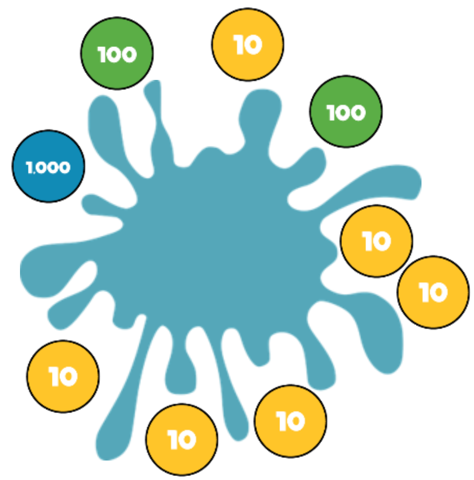
Use cards to help you find the numbers.

What could Eva's subtraction be?

How many different options can you find?

9998 – 1100 = 8898
9998 – 1010 = 8988
9998 – 1001 = 8997
9998 – 2000 = 7998
9989 – 1100 = 8889
9989 – 1010 = 8979
9989 – 1001 = 8988
9989 – 2000 = 7989
9899 – 1100 = 8799
9899 – 1010 = 8889
9899 – 1001 = 8898
9899 – 2000 = 7899
8999 – 1100 = 7899
8999 – 1010 = 7889
8999 – 1001 = 7998
8999 – 2000 = 6999

There are counters to the value of 3,470 on the table but some have been covered by the splat.



What is the total of the counters covered?
How many different ways can you make the missing total?

3470 – 1260 = 2210

Possible answers include:

- two 1000s, two 100s and one 10
- twenty-two 100s and one 10
- twenty-two 100s and ten 1s

Subtract Two 4-digit Numbers (2)

Notes and Guidance

Building on their experiences in Year 3, children use their knowledge of subtracting using the formal column method to subtract two 4-digit numbers.

Children explore subtractions where there is one exchange. They use place value counters to model the exchange and match this with the written column method.

Mathematical Talk

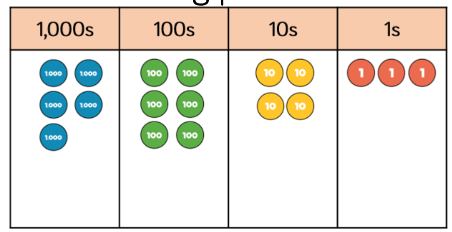
When do we need to exchange in a subtraction?
How do we indicate the exchange on the written method?

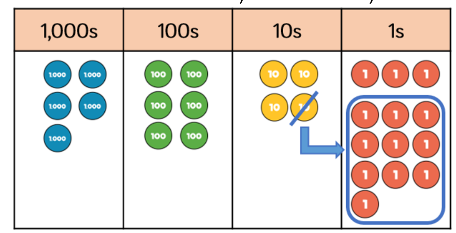
How many bars are you going to use in your bar model?
Can you find out how many tokens Mo has?
Can you find out how many tokens they have altogether?

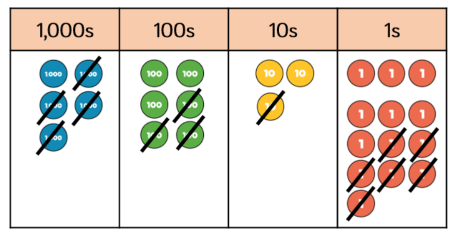
Can you create your own scenario for a friend to represent?

Varied Fluency

- Dexter is using place value counters to calculate 5,643 – 4,316







	Th	H	T	O
	5	6	3 ~~4~~	1 3
–	4	3	1	6
	1	3	2	7

Use Dexter's method to calculate:
4,721 – 3,605 = 4,721 – 3,650 = 4,172 – 3,650 =

- Dora and Mo are collecting book tokens.
Dora has collected 1,452 tokens.
Mo has collected 621 tokens fewer than Dora.

Represent this scenario on a bar model.
What can you find out?

Subtract Two 4-digit Numbers (2)

Reasoning and Problem Solving

1,235 people go on a school trip.

There are 1,179 children and 27 teachers. The rest are parents.

How many parents are there?

Explain your method to a friend.

Add children and teachers together first.

1,179 + 27 = 1,206

Subtract this from total number of people.

1,235 – 1,206 = 29

29 parents.

Find the missing numbers that could go into the spaces.

Give reasons for your answers.

____ – 1,345 = 4_6

What is the greatest number that could go in the first space?

What is the smallest?

How many possible answers could you have?

What is the pattern between the numbers?

What method did you use?

Possible answers:

1,751 and 0
1,761 and 10
1,771 and 20
1,781 and 30
1,791 and 40
1,801 and 50
1,811 and 60
1,821 and 70
1,831 and 80
1,841 and 90
1,841 is the greatest
1,751 is the smallest.

There are 10 possible answers. Both numbers increase by 10

White Rose Maths

Subtract Two 4-digit Numbers (3)

Notes and Guidance

Children explore whathappens when a subtraction has more than oneexchange. They can continue to use manipulatives to support their understanding. Some children may feel confident calculating with a written method.

Encourage children to continue to explain their working to ensure they have a secure understanding of exchange within 4-digits numbers

Mathematical Talk

When do we need to exchange within a column subtraction?

What happens if there is a zero in the next column? How do we exchange?

Can you use place value counters or Base 10 to support your understanding?

How can you find the missing 4-digit number? Are you going to add or subtract?

Varied Fluency

- Use place value counters and the column method to calculate:

  5,783 – 844 6,737 – 759 8,252 – 6,560

  1,205 – 398 2,037 – 889 2,037 – 1,589

- A shop has 8,435 magazines.
  367 are sold in the morning and 579 are sold in the afternoon.

  How many magazines are left?

8,435		
367	579	?

  There are ____ magazines left.

- Find the missing 4-digit number.

	Th	H	T	O
	?	?	?	?
+	4	6	7	8
	7	4	3	1

Subtract Two 4-digit Numbers (3)

Reasoning and Problem Solving

Amir and Tommy solve a problem.

When I subtract 546 from 3,232 my answer is 2,714

Amir

Tommy

When I subtract 546 from 3,232 my answer is 2,686

Who is correct?
Explain your reasoning.
Why is one of the answers wrong?

Tommy is correct.

Amir is incorrect because he did not exchange, he just found the difference between the numbers in the columns instead.

There were 2,114 visitors to the museum on Saturday.
650 more people visited the museum on Saturday than on Sunday.

Altogether how many people visited the museum over the two days?

What do you need to do first to solve this problem?

First you need to find the number of visitors on Sunday which is 2,114 – 650 = 1,464

Then you need to add Saturday's visitors to that number to solve the problem.
1,464 + 2,114 = 3,578

Efficient Subtraction

Notes and Guidance

Children use their understanding of column subtraction and mental methods to find the most efficient methods of subtraction.

They compare the different methods of subtraction and discuss whether they would partition, take away or find the difference.

Mathematical Talk

Is the column method always the most efficient method?
When we find the difference, what happens if we take one off each number? Is the difference the same? How does this help us when subtracting large numbers?
When is it more efficient to count on rather than use the column method?
Can you represent your subtraction in a part-whole model or a bar model?

Varied Fluency

Ron, Rosie and Dexter are calculating 7,000 – 3,582

Here are their methods:

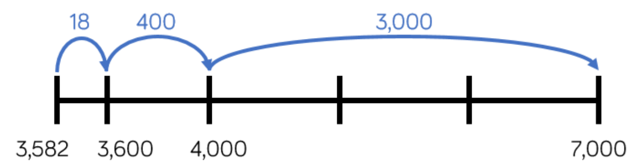
Ron

	Th	H	T	O
	$^{6}\cancel{7}$	$^{9}\cancel{0}$	$^{9}\cancel{0}$	$^{1}0$
–	3	5	8	2
	3	4	1	8

Rosie

	Th	H	T	O
	6	9	9	9
–	3	5	8	1
	3	4	1	8

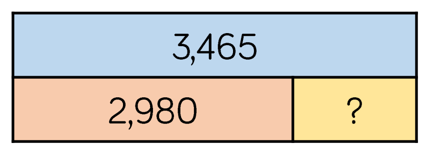
Dexter

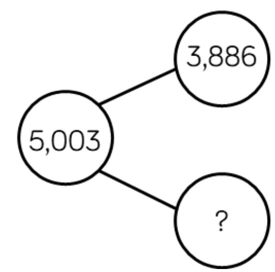


3,000 + 400 + 18 = 3,418

Whose method is most efficient?
Use the different methods to calculate 4,000 – 2,831

Find the missing numbers.
What methods did you use?





Efficient Subtraction

Reasoning and Problem Solving

Amir has £1,000

He buys a scooter for £345 and a skateboard for £110

How much money does he have left?

Show 3 different methods of finding the answer.

Explain how you completed each one.

Which is the most effective method?

Children should use the three methods demonstrated in the varied fluency section to get an answer of £545

Look at each pair of calculations.
Which one out of each pair has the same difference as 2,450 – 1,830?

2,451 – 1,831	2,451 – 1,829
2,500 – 1,880	2,500 – 1,780
2,449 – 1,829	2,449 – 1,831

When is it useful to use difference to solve subtractions?

2,451 – 1,831
Added one to each number.
2,500 – 1,880
Added 50 to both numbers.
2,449 – 1,829
Subtracted one from each number.

The difference is 620

Estimate Answers

Notes and Guidance

In this step, children use their knowledge of rounding to estimate answers for calculations and word problems.

They build on their understanding of near numbers in Year 3 to make sensible estimates.

Mathematical Talk

When in real life would we use an estimate?

Why should an estimate be quick?

Why have you rounded to the nearest 10/100/1,000?

Varied Fluency

- Match the calculations with a good estimate.

345 + 1,234	3,000 + 6,000
2,985 + 6,325	3,500 + 1,200
3,541 + 1,179	350 + 1,200
2,135 + 6,292	2,000 + 6,000

- Alex is estimating the answer to 3,625 + 4,277
She rounds the numbers to the nearest thousand, hundred and ten to give different estimates. Complete her working.

Original calculation: 3,625 + 4,277 = ____
Round to nearest thousands: 4,000 + 4,000 = ____
Round to nearest hundreds: 3,600 + ____ = ____
Round to nearest tens: ____ + ____ = ____

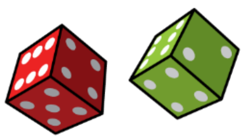
- Decide whether to round to the nearest 10, 100 or 1,000 and estimate the answers to the calculations.

4,623 + 3,421 9,732 – 6,489 8,934 – 1,187

Estimate Answers

Reasoning and Problem Solving

Game



The aim of the game is to get a number as close to 5,000 as possible.

Each child rolls a 1-6 die and chooses where to put the number on their grid.

Once they have each filled their grid, they add up their totals to see who is the closest.

	Th	H	T	O
	?	?	?	?
+	?	?	?	?

The aim of the game can be changed, i.e. make the smallest/largest possible total etc. Dice with more faces could also be used.

The estimated answer to a calculation is 3,400
The numbers in the calculation were rounded to the nearest 100 to find an estimate.
What could the numbers be in the original calculation?

Possible answers include

2,343 + 1,089 =

4,730 – 1,304 =

Use the number cards and + or – to make three calculations with an estimated answer of 2,500

1,295	1,120
4,002	1,489
3,812	1,449

3,812 – 1,295 (3,800 – 1,300 = 2,500)

4,002 – 1,489 (4,000 – 1,500 = 2,500)

1,449 + 1,120 (1,400 + 1,100 = 2,500)

Checking Strategies

Notes and Guidance

Children explore ways of checking to see if an answer is correct by using inverse operations.

Checking using inverse is to be encouraged so that children are using a different method and not just potentially repeating an error, for example, if they add in a different order.

Mathematical Talk

How can you tell if your answer is sensible?

What is the inverse of addition?

What is the inverse of subtraction?

Varied Fluency

- $2,300 + 4,560 = 6,860$

  Use a subtraction to check the answer to the addition.
  Is there more than one subtraction we can do to check the answer?

- If we know $3,450 + 4,520 = 7,970$, what other addition and subtraction facts do we know?

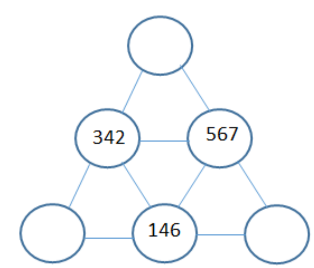
  ___ + ___ = ___

  ___ − ___ = ___

  ___ − ___ = ___

  Does the equal sign have to go at the end? Could we write an addition or subtraction with the equals sign at the beginning?
  How many more facts can you write now?

- Complete the pyramid.
  Which calculations do you use to find the missing numbers?
  Which strategies do you use to check your calculations?



Checking Strategies

Reasoning and Problem Solving

Here is a number sentence.

350 + 278 + 250

Add the numbers in different orders to find the answer.
Is one order of adding easier? Why?

Create a rule when adding more than one number of what to look for in a number.

It is easier to add 350 and 250 to make 600 and then add on 278 to make 878.
We can look for making number bonds to 10, 100 or 1,000 to make a calculation easier.

I completed an addition and then used the inverse to check my calculation.
When I checked my calculation, the answer was 3,800
One of the other numbers was 5,200
What could the calculation be?

____ + ____ = ____

____ – ____ = 3,800

Possible answers:

5,200 – 1,400 = 3,800

9,000 – 5,200 = 3,800

In the number square below, each horizontal row and vertical column adds up to 1,200
Find the missing numbers.
Is there more than one option?

897		
		832
	762	

Check the rows and columns using the inverse and adding the numbers in different orders.

There are many correct answers.

Top row missing boxes need to total 303

Middle row total 368

Bottom row total 438

897	270	33
200	168	832
103	762	335

Autumn - Block 3

Length & Perimeter

White Rose Maths

Overview

Small Steps

- Kilometres
- Perimeter on a grid
- Perimeter of a rectangle
- Perimeter of rectilinear shapes

NC Objectives

Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.

Convert between different units of measure [for example, kilometre to metre].

Kilometres

Notes and Guidance

Children multiply and divide by 1,000 to convert between kilometres and metres.
They apply their understanding of adding and subtracting with four-digit numbers to find two lengths that add up to a whole number of kilometres.
Children find fractions of kilometres, using their Year 3 knowledge of finding fractions of amounts. Encourage children to use bar models to support their understanding.

Mathematical Talk

Can you research different athletic running races? What different distances are the races? Can you convert the distances from metres into kilometres? Which other sports have races over distances measured in metres or kilometres?
If 10 children ran 100 metres each, how far would they run altogether? Can we go outside and do this? How long do you think it will take to run 1 kilometre?
How can we calculate half a kilometre? Can you find other fractions of a kilometre?

Varied Fluency

- Complete the statements.

3,000 m = ___ km   8 km = ________ m

5 km = ___ m   3 km + 6 km = ________ m

500 m = ___ km   250 m = _______ km

9,500 m = ___ km   4,500 m – 2,000 m = _____ km

- Complete the bar models.

3 kilometres	
	1,800 metres

___ km	
2,870 m	4,130 m

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

500 m ◯ $\frac{1}{2}$ km

7 km ◯ 800 m

5 km ◯ 500 m

Kilometres

Reasoning and Problem Solving

Dexter and Rosie walk 15 kilometres altogether for charity.
Rosie walks double the distance that Dexter walks.
How far does Dexter walk?

Rosie walks 10 km.

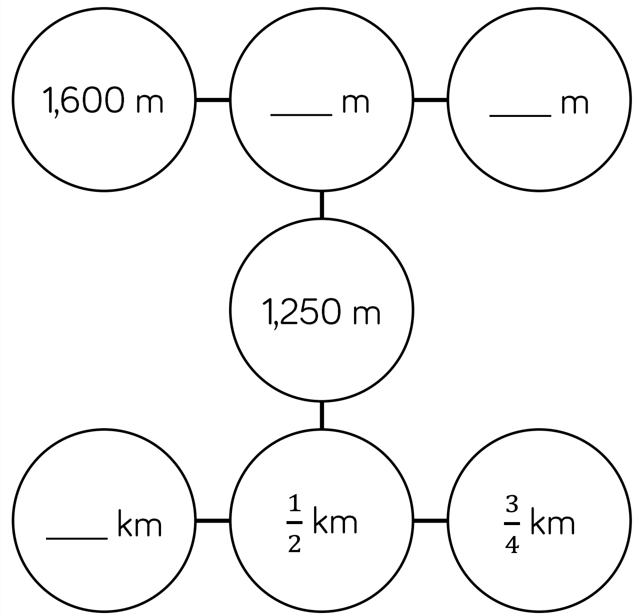
Dexter walks 5 km.

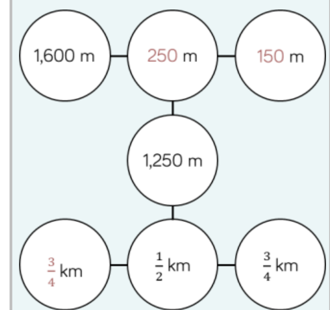
Dexter and Rosie each raise £1 for every 500 metres they walk.
How much money do they each make?

Rosie raises £20

Dexter raises £10

Complete the missing measurements so that each line of three gives a total distance of 2 km.





Perimeter on a Grid

Notes and Guidance

Children calculate the perimeter of rectilinear shapes by counting squares on a grid. Rectilinear shapes are shapes where all the sides meet at right angles.

Encourage children to label the length of each side and to mark off each side as they add the lengths together. Ensure that children are given centimetre squared paper to draw the shapes on to support their calculation of the perimeter.

Mathematical Talk

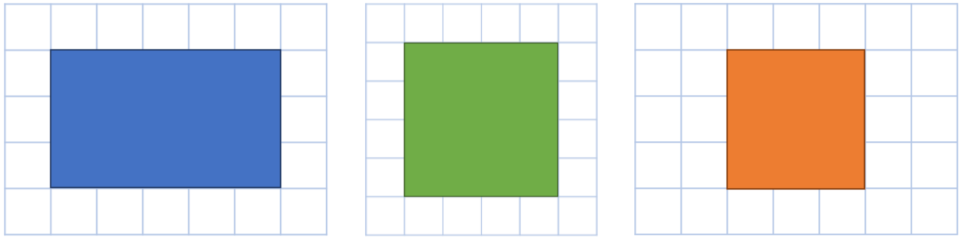
What is perimeter? How can we find the perimeter of a shape?

What do you think rectilinear means? Which part of the word sounds familiar?

If a rectangle has a perimeter of 16 cm, could one of the sides measure 14 cm? 8 cm? 7 cm?

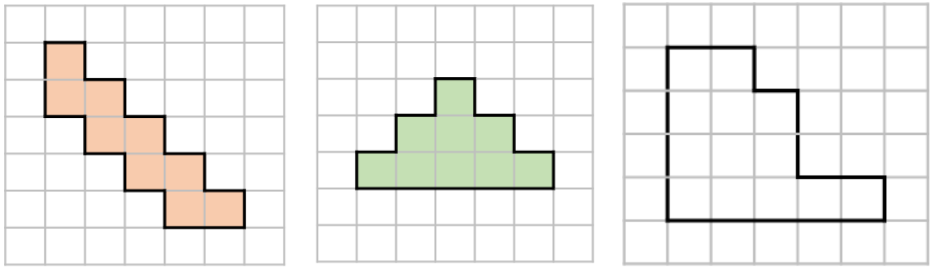
Varied Fluency

- Calculate the perimeter of the shapes.



- Using squared paper, draw two rectilinear shapes, each with a perimeter of 28 cm.
  What is the longest side in each shape? What is the shortest side in each shape?

- Draw each shape on centimetre square paper.

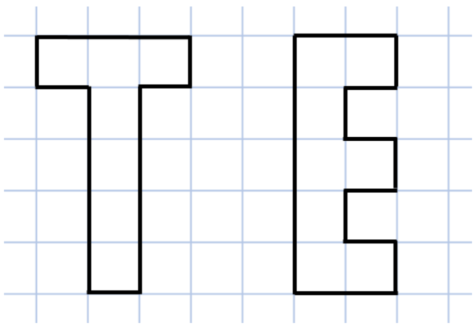


Order the shapes from smallest to largest perimeter.

Perimeter on a Grid

Reasoning and Problem Solving

Which of these shapes has the longest perimeter?



Explore other letters which could be drawn as rectilinear shapes.

Put them in order of shortest to longest perimeter.

Can you make a word?

E has a greater perimeter, it is 18 compared to 16 for T.

Open ended.

Letters which could be drawn include:

B C D F I J L O P

Letters with diagonal lines would be omitted.

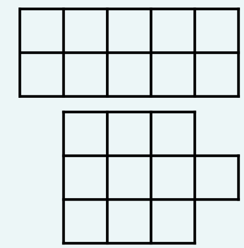
If heights of letters are kept the same, I or L could be the shortest.

You have 10 paving stones to design a patio. The stones are one metre square.

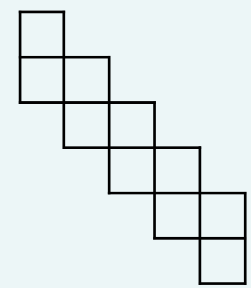
The stones must be joined to each other so that at least one edge is joined corner to corner.

Use squared paper to show which design would give the longest perimeter and which would give the shortest.

The shortest perimeter would be 14 m in a 2 × 5 arrangement or 3 × 3 square with one added on.



The longest would be 22 m.



Perimeter of a Rectangle

Notes and Guidance

Children calculate the perimeter of rectangles (including squares) that are not on a squared grid. When given the length and width, children explore different approaches of finding the perimeter: adding all the sides together, and adding the length and width together then multiplying by 2

Children use their understanding of perimeter to calculate missing lengths and to investigate the possible perimeters of squares and rectangles.

Mathematical Talk

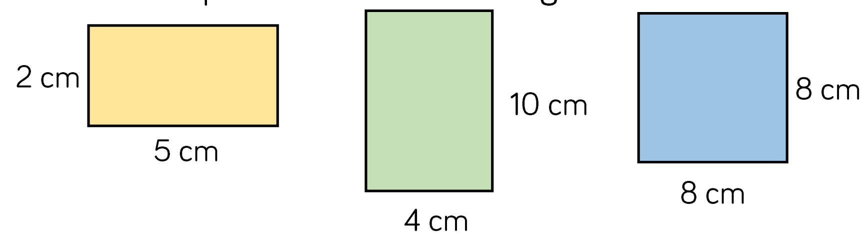
If I know the length and width of a rectangle, how can I calculate the perimeter? Can you tell me 2 different ways? Which way do you find the most efficient?

If I know the perimeter of a shape and the length of one of the sides, how can I calculate the length of the missing side?

Can a rectangle where the length and width are integers, ever have an odd perimeter? Why?

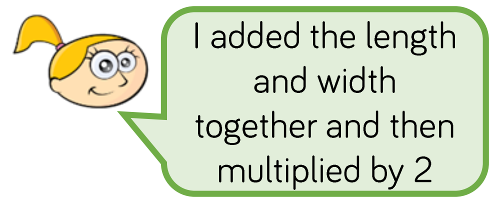
Varied Fluency

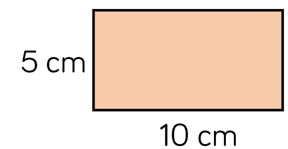
Calculate the perimeter of the rectangles.



___ cm + ___ cm + ___ cm + ___ cm = ___ cm

Eva is finding the perimeter of the rectangle.

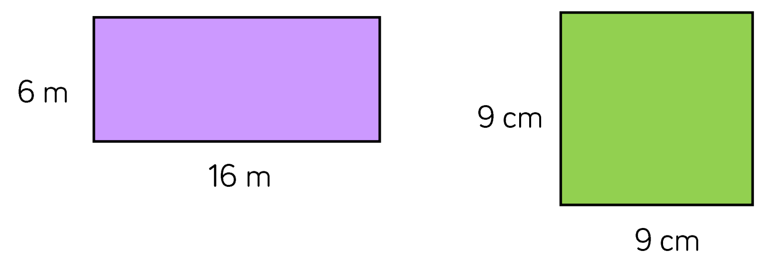




5 cm + 10 cm = 15 cm

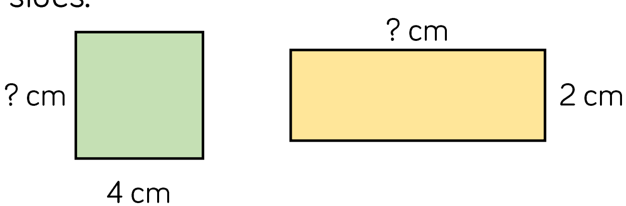
15 cm × 2 = 30 cm

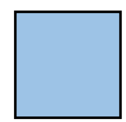
Use Eva's method to find the perimeter of the rectangles.



Perimeter of a Rectangle

Reasoning and Problem Solving

The width of a rectangle is 2 metres less than the length. The perimeter of the rectangle is between 20 m and 30 m. What could the dimensions of the rectangle be? Draw all the rectangles that fit these rules. Use 1 cm = 1 m.	If the perimeter is: 20 m Length = 6 m Width = 4 m 24 m Length = 7 m Width = 5 m 28 m Length = 8 m Width = 6 m
Each of the shapes have a perimeter of 16 cm. Calculate the lengths of the missing sides. 	4 cm 6 cm

Always, Sometimes, Never When all the sides of a rectangle are odd numbers, the perimeter is even. Prove it.	Always because when adding an odd and an odd they always equal an even number.
Here is a square. Each of the sides is a whole number of metres.  Which of these lengths could be the perimeter of the shape? 24 m, 34 m, 44 m, 54 m, 64 m, 74 m Why could the other values not be the perimeter?	24 cm Sides = 6 cm 44 cm Sides = 11 cm 64 cm Sides = 16 cm They are not divisible by 4

Perimeter of Rectilinear Shapes

Notes and Guidance

Children will begin to calculate perimeter of rectilinear shapes without using squared paper. They use addition and subtraction to calculate the missing sides. Teachers may use part-whole models to support the understanding of how to calculate missing sides.
Encourage children to continue to label each side of the shape and to mark off each side as they calculate the whole perimeter.

Mathematical Talk

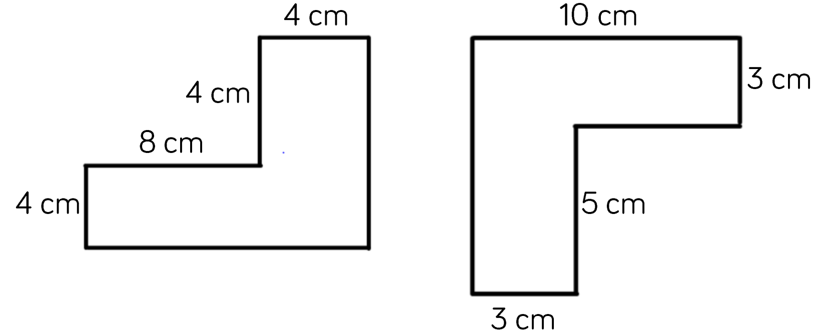
Why are opposite sides important when calculating the perimeter of rectilinear shapes?

If one side is 10 cm long, and the opposite side is made up of two lengths, one of which is 3 cm, how do you know what the missing length is? Can you show this on a part-whole model?

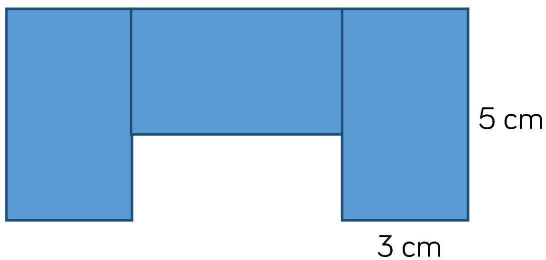
If a rectilinear shape has a perimeter of 24 cm, what is the greatest number of sides it could have? What is the least number of sides it could have?

Varied Fluency

- Find the perimeter of the shapes.



- The shape is made from 3 identical rectangles. Calculate the perimeter of the shape.

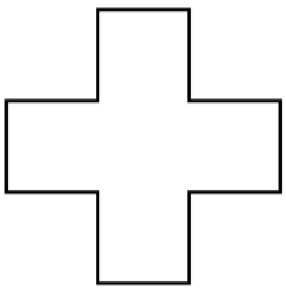


- How many different rectilinear shapes can you draw with a perimeter of 24 cm? How many sides do they each have? What is the longest side? What is the shortest side?

Perimeter of Rectilinear Shapes

Reasoning and Problem Solving

Here is a rectilinear shape. All the sides are the same length and are a whole number of centimetres.



Which of these lengths could be the perimeter of the shape?

48 cm, 36 cm, 80 cm, 120 cm, 66 cm

Can you think of any other answers which could be correct?

48 cm, 36 cm or 120 cm as there are 12 sides and these numbers are all multiples of 12

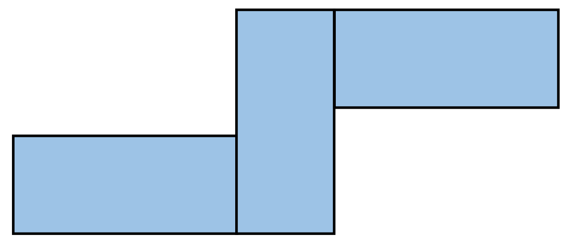
Any other answers suggested are correct if they are a multiple of 12

Amir has some rectangles all the same size.

3 cm

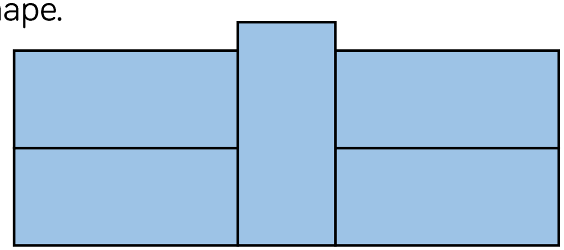
8 cm

He makes this shape using his rectangles. What is the perimeter?



54 cm

He makes another shape using the same rectangles. Calculate the perimeter of this shape.



54 cm

White Rose Maths

Autumn - Block 4

Multiplication & Division

Overview

Small Steps

- Multiply by 10
- Multiply by 100
- Divide by 10
- Divide by 100
- Multiply by 1 and 0
- Divide by 1 and itself
- Multiply and divide by 6
- 6 times table and division facts
- Multiply and divide by 9
- 9 times table and division facts
- Multiply and divide by 7
- 7 times table and division facts

NC Objectives

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

<u>Count in multiples of 6, 7, 9</u>, 25 and 1,000

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.

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

Multiply by 10

Notes and Guidance

Children need to be able to visualise and understand making a number ten times bigger and that 'ten times bigger' is the same as 'multiply by 10'

The language of 'ten lots of' is vital to use in this step. The understanding of the commutative law is essential because children need to see calculations such as 10×3 and 3×10 as equal.

Mathematical Talk

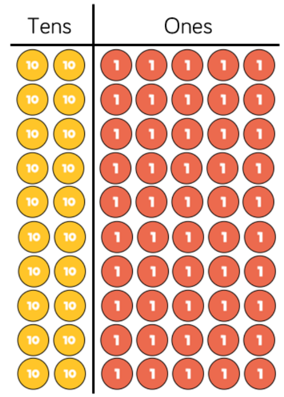
Can you represent these calculations with concrete objects or a drawing?

Can you explain what you did to a partner?

What do you notice when multiplying by 10? Does it always work?

What's the same and what's different about 5 buses with 10 passengers on each and 10 buses with 5 passengers on each?

Varied Fluency



Write the calculation shown by the place value counters.

Each row has ____ tens and ____ ones.

Each row has a value of ____.

There are ____ rows.

The calculation is ____ × ____ = ____.

Use place value counters to calculate:

10×3 $\quad$ 4×10 $\quad$ 12×10

Match each statement to the correct bar model.

5 buses have ten passengers.

8 pots each have ten pencils.

10 chickens lay 5 eggs each.

10	10	10	10	10

5	5	5	5	5	5	5	5	5	5

10	10	10	10	10	10	10	10

Multiply by 10

Reasoning and Problem Solving

Always, Sometimes, Never If you write a whole number in a place value grid and multiply it by 10, all the digits move one column to the left.	Always. Discuss the need for a placeholder after the new rightmost digit.
Annie has multiplied a whole number by 10 Her answer is between 440 and 540 What could her original calculation be? How many possibilities can you find?	45×10 46×10 47×10 48×10 49×10 50×10 51×10 52×10 53×10 (or the above calculations written as 10×45 etc.).

Multiply by 100

Notes and Guidance

Children build on multiplying by 10 and see links between multiplying by 10 and multiplying by 100

Use place value counters and Base 10 to explore what is happening to the value of the digits in the calculation and encourage children to see a rule so they can begin to move away from concrete representations.

Mathematical Talk

How do the Base 10 help us to show multiplying by 100?

Can you think of a time when you would need to multiply by 100?

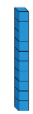
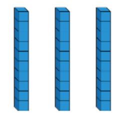
Will you produce a greater number if you multiply by 100 rather than 10? Why?

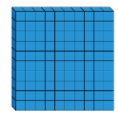
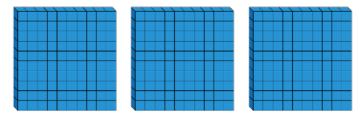
Can you use multiplying by 10 to help you multiply by 100? Explain why.

Varied Fluency

- 3 ×  =  = 3 ones = 3

  Complete:

  3 ×  =  = ___ tens = ___

  3 ×  =  = ___ hundreds = ___

- Use a place value grid and counters to calculate:

7 × 10	63 × 10	80 × 10
7 × 100	63 × 100	80 × 100

  What's the same and what's different comparing multiplying by 10 and 100? Write an explanation of what you notice.

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

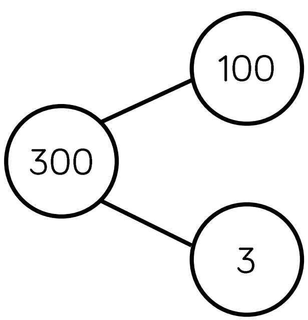
75 × 100	◯	75 × 10
39 × 100	◯	39 × 10 × 10
460 × 10	◯	100 × 47

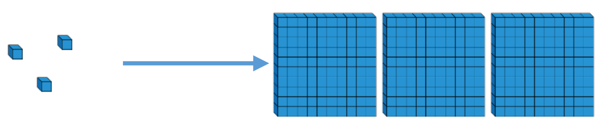
Multiply by 100

Reasoning and Problem Solving

Which representation does **not** show multiplying by 100?

Explain your answer.





The part-whole model does not represent multiplying by 100

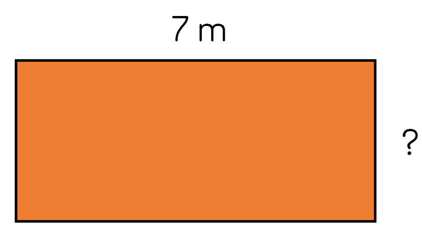
Part-whole models show addition (the aggregation structure) and subtraction (the partitioning structure), so if the whole is 300 and there are two parts, the parts added together should total 300 (e.g. 100 and 200, or 297 and 3). If the parts are 100 and 3, the whole should be 103.

To show multiplying 3 by 100 as a part-whole model, there would need to be 100 parts each with 3 in.

The perimeter of the rectangle is 26 m.

Find the length of the missing side.

Give your answer in cm.



The missing side length is 6 m so in cm it will be:

$6 \times 100 = 600$

The missing length is 600 cm.

Divide by 10

Notes and Guidance

Exploring questions with whole number answers only, children divide by 10
They should use concrete manipulatives and place value charts to see the link between dividing by 10 and the position of the digits before and after the calculation.
Using concrete resources, children should begin to understand the relationship between multiplying and dividing by 10 as the inverse of the other.

Mathematical Talk

What has happened to the value of the digits?

Can you represent the calculation using manipulatives?
Why do we need to exchange tens for ones?

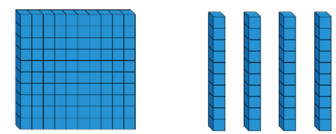
When dividing using a place value chart, in which direction do the digits move?

Varied Fluency

- Use place value counters to show the steps to divide 30 by 10

Can you use the same steps to divide a 3-digit number like 210 by 10?

- Use Base 10 to divide 140 by 10
Explain what you have done.



- Ten friends empty a money box. They share the money equally between them. How much would they have each if the box contained:
  - 20 £1 coins?
  - £120
  - £24?

After emptying the box and sharing the contents equally, each friend has 90 p.
How much money was in the box?

Divide by 10

Reasoning and Problem Solving

Four children are in a race. The numbers on their vests are:

350	35
3,500	53

Use the clues to match each vest number to a child.

- Jack's number is ten times smaller than Mo's.
- Alex's number is not ten times smaller than Jack's or Dora's or Mo's.
- Dora's number is ten times smaller than Jack's.

Alex – 53

Jack – 350

Dora – 35

Mo – 3,500

While in Wonderland, Alice drank a potion and everything shrank. All the items around her became ten times smaller! Are these measurements correct?

Item	Original measurement	After shrinking
Height of a door	220 cm	2,200 cm
Her height	160 cm	16 cm
Length of a book	340 mm	43 mm
Height of a mug	220 mm	?

Can you fill in the missing measurement?

Can you explain what Alice did wrong?

Write a calculation to help you explain each item.

<u>Height of a door</u>
Incorrect – Alice has multiplied by 10.

<u>Her height</u>
Correct

<u>Length of a book</u>
Incorrect – Alice has swapped the order of the digits. When dividing by 10 the order of the digits never changes.

<u>Height of a mug</u>
22 mm.

Divide by 100

Notes and Guidance

Children divide by 100 with whole number answers.

Money and measure is a good real-life context for this, as coins can be used for the concrete stage.

Mathematical Talk

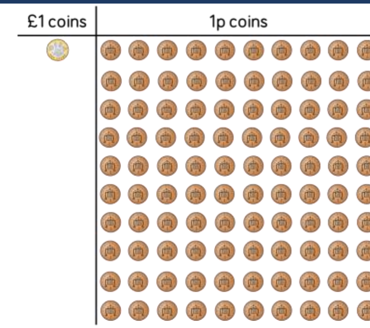
How can you use dividing by 10 to help you divide by 100?

How are multiplying and dividing by 100 related?

Write a multiplication and division fact family using 100 as one of the numbers.

Varied Fluency

- Is it possible for £1 to be shared equally between 100 people?
  How does this picture explain it?
  Can £2 be shared equally between 100 people?
  How much would each person receive?



- Match the calculation with the correct answer.

Calculation	Answer
4,200 ÷ 10	420
4,200 ÷ 100	42
420 ÷ 10	

- Use $<$, $>$ or $=$ to make each statement correct.

3,600 ÷ 10 ◯ 3,600 ÷ 100

2,700 ÷ 100 ◯ 270 ÷ 10

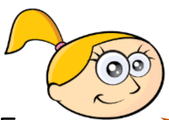
4,200 ÷ 100 ◯ 430 ÷ 10

Divide by 100

Reasoning and Problem Solving

Eva and Whitney are dividing numbers by 10 and 100
They both start with the same 4-digit number.

They give some clues about their answer.



Eva

My answer has 8 ones and 2 tens.

My answer has 2 hundreds, 8 tens and 0 ones.

Whitney

What number did they both start with?
Who divided by what?

They started with 2,800

Whitney divided by 10 to get 280 and Eva divided by 100 to get 28

Use the digit cards to fill in the missing digits.

1	2	3	4	5	6	7	8	9

170 ÷ 10 = __ __

__20 × 10 = 3,__00

1,8__0 ÷ 10 = 1__6

__9 × 100 = 5,__00

6__ = 6,400 ÷ 100

170 ÷ 10 = 17

320 × 10 = 3,200

1,860 ÷ 10 = 186

59 × 100 = 5,900

64 = 6,400 ÷ 100

Multiply by 1 and 0

Notes and Guidance

Children explore the result of multiplying by 1, using concrete equipment.

Linked to this, they look at multiplying by 0 and use concrete equipment and pictorial representations of multiplying by 0

Mathematical Talk

Use number pieces to show me 9 × 1, 3 × 1, 5 × 1

What do you notice?

What does 0 mean?

What does multiplying by 1 mean?

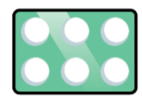
What's the same and what's different about multiplying by 1 and multiplying by 0?

Varied Fluency

Complete the calculation shown by the number pieces.

There are ____ ones.

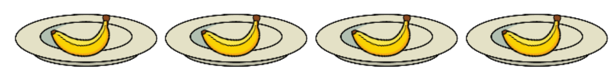
____ × ____ = ____



There is ____ six.

____ × ____ = ____

Complete the sentences.



There are ____ plates. There is ____ banana on each plate.
Altogether there are ____ bananas.

____ × ____ = ____

Complete:

4 × ____ = 4	____ = 1 × 7	0 = ____ × 42
63 × 1 = ____	____ × 27 = 0	50 × ____ = 50

Multiply by 1 and 0

Reasoning and Problem Solving

Which answer could be the odd one out? What makes it the odd one out?

$3 + 0 =$ ___

$3 - 0 =$ ___

$3 \times 0 =$ ___

Explain why the answer is different.

$3 \times 0 = 0$ is the odd one out because it is the only one with 0 as an answer.

The addition and subtraction calculations have an answer of 3 because they started with that amount and added or subtracted 0 (nothing).

3×0 means '3 lots of nothing', so the total is zero.

Circle the incorrect calculations and write them correctly.

$5 \times 0 = 50$

$19 \times 1 = 19$

$7 \times 0 = 7$

$1 \times 1 = 2$

$0 \times 35 = 0$

$0 \times 0 = 1$

$1 \times 8 = 9$

Choose one calculation and create a drawing to show it.

The incorrect calculations are:
$5 \times 0 = 50$
$7 \times 0 = 7$
$1 \times 1 = 2$
$0 \times 0 = 1$
$1 \times 8 = 9$

Corrected calculations:

$5 \times 0 = 0$
$7 \times 0 = 0$
$1 \times 1 = 1$
$0 \times 0 = 0$
$1 \times 8 = 8$

White Rose Maths

Divide by 1

Notes and Guidance

Children learn what happens to a number when you divide it by 1 or by itself. Using concrete and pictorial representations, children demonstrate how both the sharing and grouping structures of division can be used to divide a number by 1 or itself. Use stem sentence to encourage children to see this e.g.
5 grouped into 5s equals 1 ($5 \div 5 = 1$)
5 grouped into 1s equals 5 ($5 \div 1 = 5$)

Mathematical Talk

What does sharing mean? Give an example.

What does grouping mean? Give an example.

Can you write a worded question where you need to group?

Can you write a worded question where you need to share?

Varied Fluency

Use counters and hands to complete.

- 4 counters **shared** between 4 hands ____ ÷ ____ = ____
- 4 counters **shared** between 1 hand ____ ÷ ____ = ____
- 9 counters **grouped** in 1s ____ ÷ ____ = ____
- 9 counters **grouped** in 9s ____ ÷ ____ = ____

Choose the correct bar model to help you answer this question.
Annie has £4 in total. She gives away £4 at a time to her friends.
How many friends receive £4?

£4			
£1	£1	£1	£1

£4
£4

Draw a bar model for each question to help you work out the answer.

- Tommy baked 7 cookies and shared them equally between his 7 friends. How many cookies did each friend receive?
- There are 5 sweets. Children line up and take 5 sweets at a time. How many children have 5 sweets?

Divide by 1

Reasoning and Problem Solving

Use <, > or = to complete the following:

$8 \div 1 \bigcirc 7 \div 1$

$6 \div 6 \bigcirc 5 \div 5$

$4 \div 4 \bigcirc 4 \div 1$

Draw an image for each one to show that you are correct.

>

=

<

Mo says,

25 divided by 1 is equal to 1 divided by 25

Do you agree?

Explain your answer.

No, Mo is incorrect because division is not commutative.

$25 \div 1 = 25$

$1 \div 25 = \frac{1}{25}$

Multiply and Divide by 6

Notes and Guidance

Children draw on their knowledge of times tables facts in order to multiply and divide by 6

They use their knowledge of equal groups in using concrete and pictorial methods to solve multiplication and division problems.

Mathematical Talk

How many equal groups do we have? How many are in each group? How many do we have altogether?

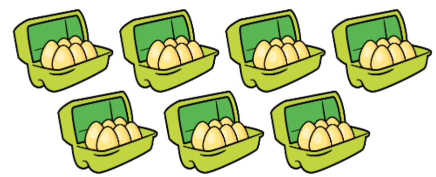
Can you write a number sentence to show this?

Can you represent the problem in a picture?

What does each number in the calculation represent?

Varied Fluency

- Complete the sentences.



There are ____ lots of ____ eggs.

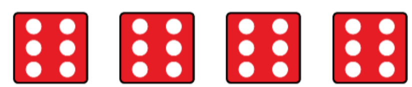
There are ____ eggs in total.

____ × ____ = ____

First there were ____ eggs. Then they were shared into ____ boxes.
Now there are ____ eggs in each box.

____ ÷ ____ = ____

- Complete the fact family.



____ × ____ = ____
____ × ____ = ____
____ ÷ ____ = ____
____ ÷ ____ = ____

- There are 9 baskets.
Each basket has 6 apples in.
How many apples are there in total?
Write a multiplication sentence to describe this word problem.

Multiply and Divide by 6

Reasoning and Problem Solving

Always, Sometimes, Never

When you multiply any whole number by 6 it will always be an even number.

Explain your answer.

Always, because 6 itself is even and odd × even and even × even will always give an even product.

Teddy says,

If
$6 \times 12 = 72$
then
$12 \div 6 = 72$

Is Teddy correct?
Explain your answer.

Teddy is not correct because $12 \div 6 = 2$ not 72

He should have written $72 \div 6 = 12$ or $72 \div 12 = 6$

6 Times Table & Division Facts

Notes and Guidance

Children use known table facts to become fluent in the six times table.
For example, applying knowledge of the 3 times table by understanding that each multiple of 6 is double the equivalent multiple of 3
Children should also be able to apply this knowledge to multiplying and dividing by 10 and 100 (for example, knowing that $30 \times 6 = 180$ because they know that $3 \times 6 = 18$).

Mathematical Talk

What do you notice about the 3 times table and the 6 times table?

Can you use 3 × ___ to work out 6 × ___?

Can you use 7×5 to work out 7×6?

Which known fact did you use?

Varied Fluency

- Complete the number sentences.

1 × 3 = ___	1 × ___ = 6
2 × ___ = 6	2 × 6 = ___
3 × 3 = ___	3 × 6 = ___

- What do you notice about the 5 times table and the 6 times table?

5 times table:	5	10	15	20	25	30
6 times table:	6	12	18	24	30	36

- Use your knowledge of the 6 times table to complete the missing values?

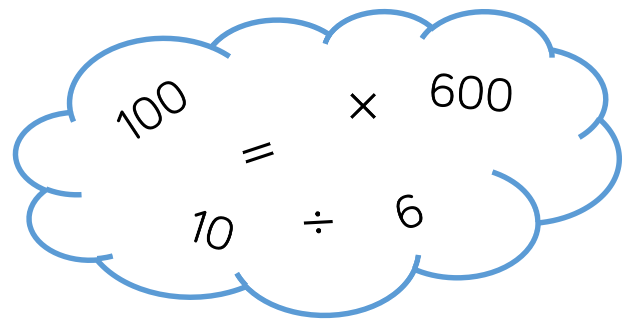
6 × 2 = ___	___ × 6 = 12	6 × 2 × 10 = ___
___ × 20 = 120	20 × ___ = 120	6 × 2 × ___ = 1,200
6 × ___ = 1,200	200 × 6 = ___	10 × ___ × 6 = 120

White Rose Maths

6 Times Table and Division Facts

Reasoning and Problem Solving

I am thinking of 2 numbers where the sum of the numbers is 15 and the product is 54 What are my numbers? Think of your own problem for a friend to solve?	6 and 9 because $9 \times 6 = 54$ $6 \times 9 = 54$ $6 + 9 = 15$ $9 + 6 = 15$
Always, Sometimes, Never If a number is a multiple of 3 it is also a multiple of 6 Explain why you think this.	Sometimes. Every even multiple of 3 is a multiple of 6, but the odd multiples of 3 are not multiples of 6

Choose the correct number or symbol from the cloud to fill in the boxes.  ___ ÷ ___ = 6 60 = 600 ___ 10	$600 \div 100 = 6$ $60 = 600 \div 10$

Multiply and Divide by 9

Notes and Guidance

Children use their previous knowledge of multiplying and dividing to become fluent in the 9 times table.

They apply their knowledge in different contexts.

Mathematical Talk

Can you use concrete or pictorial representations to help you answer the questions?

What other facts can you link to this fact?

What other times tables will help you with this times table?

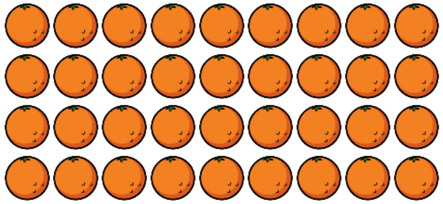
What does each number in the calculation represent?

How many lots of 9 do we have?

How many groups of 9 do we have?

Varied Fluency

- Complete the sentences to describe the oranges:

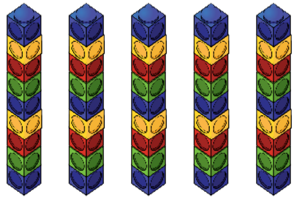


There are ____ lots of 9

There are ____ nines.

4 × ____ = ____

- Complete the fact family.



____ × ____ = ____
____ × ____ = ____
____ ÷ ____ = ____
____ ÷ ____ = ____

- Complete the sentences.

There are ____ lots of ____.
____ × ____ = ____
____ ÷ ____ = ____

9	9	9

There are ____ lots of ____.
____ × ____ = ____
____ ÷ ____ = ____

3	3	3	3	3	3	3	3	3

What's the same about each question? What's different?

Multiply and Divide by 9

Reasoning and Problem Solving

True or False?

$6 \times 9 = 9 \times 3 \times 2$

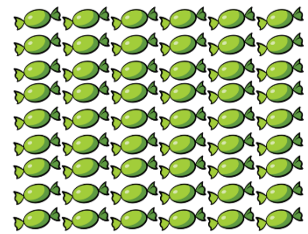
$9 \times 6 = 3 \times 9 + 9$

Explain your answer.

$6 \times 9 = 9 \times 3 \times 2$
is true because
$6 \times 9 = 54$
and
$9 \times 3 = 27$
$27 \times 2 = 54$

$9 \times 6 = 3 \times 9 + 9$ is false because
$6 \times 9 = 54$
and
$3 \times 9 = 27$
$27 + 9 = 36$

Amir and Whitney both receive some sweets.

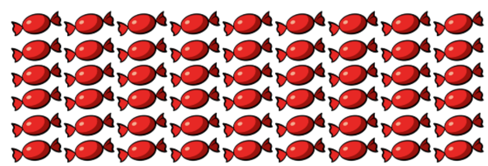


Amir

I have more sweets because I have more rows.

Whitney

I have more sweets because I have more in each row.



Who has more sweets? Explain your reasoning.

They both have 54 sweets, arranged in two different arrays.

9 Times Table & Division Facts

Notes and Guidance

Children use known times table facts to become fluent in the 9 times table.

For example, knowing that each multiple of 9 is one less than the equivalent multiple of 10, and using that knowledge to derive related facts.

Children should also be able to apply the knowledge of the 9 times table when multiplying and dividing by 10 and 100

Mathematical Talk

How did you work out the missing numbers?

What do you notice about the multiples of 9?

What do you notice about the 9 times table and the 10 times table?

Varied Fluency

- What are the missing numbers from the 9 times table?

9	18	27	___	45
54	___	72	81	90

Circle the multiples of 9.

54   108   18   24   9   67   72   37

- Use your knowledge of the 9 times table to complete the missing values.

$1 \times 9 =$ ___	___ $\times 1 = 9$	$1 \times 9 \times$ ___ $= 90$
___ $\times 9 = 90$	$900 = 100 \times$ ___	$9 \times 1 \times 10 =$ ___
$9 \times$ ___ $= 900$	$4 \times 9 =$ ___	$9 \times 1 \times$ ___ $= 900$

- What do you notice about the 9 times table and the 10 times table?

9 times table:	9	18	27	36	45	54
10 times table:	10	20	30	40	50	60

9 Times Table and Division Facts

Reasoning and Problem Solving

Can you complete the calculations using some of the symbols or numbers in the box? $\div$ 9 100 10 900 $=$ ___ $\div$ ___ $= 9$ $90 = 900$ ___ 10	$900 \div 100 = 9$ $90 = 900 \div 10$

I am thinking of two numbers. The sum of the numbers in 17. The product of the numbers is 72. What are my secret numbers? Can you choose your own two secret numbers from the 9 times table and create clues for your partner?	8 and 9 because $8 \times 9 = 72$ or $9 \times 8 = 72$ and $8 + 9 = 17$ or $9 + 8 = 17$
Always, Sometimes, Never All multiples of 9 have digits that have a sum of 9.	Always.

Multiply and Divide by 7

Notes and Guidance

Children use their knowledge of multiplication and division to multiply by 7
They count in 7s, and use their knowledge of equal groups supported by use of concrete and pictorial methods to solve multiplication calculations and problems.
They explore commutativity and also understand that multiplication and division are inverse operations.

Mathematical Talk

How many do we have altogether?

What do you notice?

Can you work out the answers by partitioning 7 into 4 and 3?

Which multiples of 7 do you already know from your other tables?

Varied Fluency

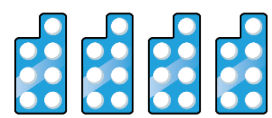
- Use a number stick to support counting in sevens. What do you notice?

  Write down the first five multiples of 7

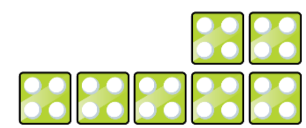
  ____ ____ ____ ____ ____

- Rosie uses number pieces to represent seven times four. She does it in two ways.

  4 sevens
  4 lots of 7
  4×7

  7 fours
  7 lots of 4
  7×4

  Use Rosie's method to represent seven times six in two ways.

- Seven children share 56 stickers. How many stickers will they get each?
  Use a bar model to solve the problem.

  One apple costs 7 pence. How much would 5 apples cost?
  Use a bar model to solve the problem.

Multiply and Divide by 7

Reasoning and Problem Solving

Mrs White's class are selling tickets at £2 each for the school play. The class can sell one ticket for each chair in the hall. There are 7 rows of chairs in the hall. Each row contains 9 chairs. How much money will they make?	Number of tickets (chairs): $7 \times 9 = 63$ $63 \times £2 = £126$

What do you notice about the pattern when counting in 7s from 0? Does this continue beyond 7 times 12? Can you explain why? In which other times tables will you see the same pattern?	Odd, even pattern because odd + odd = even. Then even + odd = odd, and this will continue throughout the whole times table. The same pattern will occur in all other odd multiplication tables (e.g. 1, 3, 5, 9).

7 Times Table & Division Facts

Notes and Guidance

Children apply the facts from the 7 times table (and other previously learned tables) to solve calculations with larger numbers.
They need to spend some time exploring links between multiplication tables and investigating how this can help with mental strategies for calculation.
e.g. $7 \times 7 = 49$, $5 \times 7 = 35$ and $2 \times 7 = 14$

Mathematical Talk

If you know the answer to three times seven, how does it help you?

What's the same and what's different about the number facts?

How does your 7 times table help you work out the answers?

Varied Fluency

- Complete.

  $3 \times 7 =$ ____

  $30 \times 7 =$ ____

  $300 \times 7 =$ ____

- Use your knowledge of the 7 times table to calculate.

  $80 \times 7 =$ ____ ____ $= 60 \times 7$

  $70 \times 7 =$ ____ $7 \times 500 =$ ____

- How would you use times tables facts to help you calculate how many days there are in 15 weeks? Complete the sentences.

  There are ____ days in one week.

  ____ $\times 10 =$ ____
  There are ____ days in 10 weeks.

  ____ $\times 5 =$ ____
  There are ____ days in 5 weeks.

  ____ + ____ = ____
  There are ____ days in 15 weeks.

7 Times Table & Division Facts

Reasoning and Problem Solving

True or False? $7 \times 6 = 7 \times 3 \times 2$ $7 \times 6 = 7 \times 7 + 8$ Explain your answer to a friend. Prove using a drawing.	True. False, because $7 \times 6 = 42$ whereas $7 \times 7 = 49$ then $49 + 8 = 57$ Children could draw a bar model or bundles of straws.

Children were arranged into rows of seven. There were 5 girls and 2 boys in each row.  Use your times table knowledge to show how many girls would be in 10 rows and in 100 rows. Show as many number sentences using multiplication and division as you can which are linked to this picture. How many children in total are there in 200 rows? How many girls? How many boys?	10 rows $5 \times 10 = 50$ girls 100 rows $5 \times 100 = 500$ girls 200 rows Children in total: $7 \times 200 = 1{,}400$ Girls: $5 \times 200 = 1{,}000$ Boys: $2 \times 200 = 400$