

Scheme of Learning

Year 4

#MathsEveryoneCan



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Welcome

Welcome to the White Rose Maths' new, more detailed schemes of learning for 2017-18.

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

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

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

We hope that you find the new schemes of learning helpful. As always, 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 get in touch. Follow us on Twitter and Facebook to keep up-to-date with all our latest announcements.

White Rose Maths Team

[#MathsEveryoneCan](#)

White Rose Maths contact details

 support@whiterosemaths.com

 @WhiteRoseMaths

 White Rose Maths

What's included?

Our schemes include:

- Small steps progression. These show our blocks broken down into smaller steps.
- Small steps guidance. For each small step we provide some brief guidance to help teachers understand the key discussion and teaching points. This guidance has been written for teachers, by teachers.
- A more integrated approach to fluency, reasoning and problem solving.
- Answers to all the problems in our new scheme.
- 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.

Teaching notes and examples

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 is the smallest? Write in words?

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.

Answers to Reasoning Questions

Is he correct?
Explain your reasoning.

Here are two sets of objects.
Which are easier to count?
Explain your answer.

The strawberries are easier to count because they are set out on ten frames.

Jack is incorrect. He has 16 not 61.

Each jar contains 10 cookies.
There are 48 (forty-eight) cookies altogether.
Children may count in 10s and 1s or know that there are 4 tens which are equal to 40 and then count on 8 more.

How many cookies are there altogether?
Write your answer in numerals and words.
What strategy did you use?
Did your partner...

Small Steps Guidance

Overview
Small Steps

- Count objects to 100 and read and write numbers in numerals and words
- Represent numbers to 100
- Tens and ones with a part-whole model
- Tens and ones using addition
- Use a place value chart
- Compare objects
- Compare numbers
- Order objects and numbers
- Count in 2s, 5s and 10s
- Count in 3s

NC Objectives

Read and write numbers to at least 100 in numerals and in words.

Recognise the place value of each digit in a two-digit number (tens, ones)

Identify, represent and estimate numbers using different representations including the number line.

Compare and order numbers from 0 up to 100; use < and > signs.

Use place value and number facts to solve problems.

Count in steps of 2, 3 and 5 from 0, and in tens from any number, forward and backward.

Meet the Team

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



Caroline Hamilton



Beth Smith



Kelsey Brown



Julie Matthews



Faye Hirst



Emma Davison



Mary-Kate Connolly



Kate Henshall



Sam Shutkever



Rachel Otterwell



Jenny Lewis



Stephen Monaghan

Special Thanks

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

Year 2 Team

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Helen Eddie
Chris Dunn
Rebecca Gascoigne

Year 6 Team

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Kayleigh Parkes
Shahir Khan
Sarah Howlett



How to use the small steps

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

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

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

Teaching notes

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

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

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

Count Objects to 100

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

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

one	three	four	seven	eight	ten	seven
-----	-------	------	-------	-------	-----	-------

There are _____ cars in the car park.

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

Match the numerals to the words.

17	48	38	70
Thirty-eight	Seventy	Forty-eight	Seventeen

Assessments

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

Part 1: Fluency based arithmetic practice

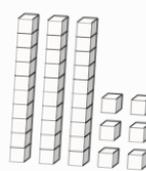
Part 2: Reasoning and problem solving based questions

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

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

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

16 Here are some cubes.



2 boys receive 8 cubes each.
The rest of the cubes are shared equally between 4 girls.
How many cubes does each girl receive?

Show your method

12 Marla spends $\frac{2}{7}$ of her weekly wage on a £120 bag.



How much does she earn in a week?

Show your method

2 marks

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

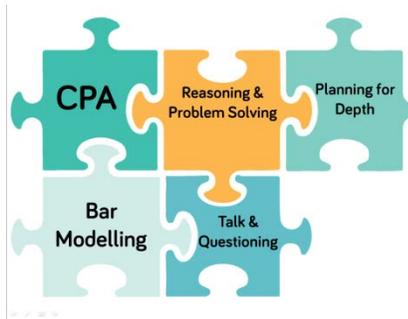
Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Training

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

Our popular JIGSAW package consists of five key elements:

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



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



Additional Materials

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

KS1 and KS2 Problem Solving Questions

For the last three years, we have provided a range of KS1 and KS2 problem solving questions in the run up to SATs. There are over 200 questions on a variety of different topics and year groups.

Shopping and Baking

1 These items are sold in a shop.



£9



£6



£7



£10

Ray buys three items.
Two of them were the same item.
He spent £23
Which items does he buy?

2 Erik bakes 5 trays of muffins.
Each tray contains 6 muffins.



He sells 16 muffins and eats 5
How many muffins does he have left?

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End of Block Assessments

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

Year 1

Place Value Assessment

Name _____

1 How many teddy bears are there?



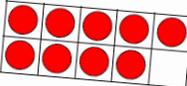
1 mark

2 Circle 7 apples.



1 mark

3 How many counters are there?



1 mark

4 Circle the number four: _____

1 3 4 6

Circle the smallest number: _____

7 2 10 9

1 mark

5 Complete the missing numbers.

6	5	4				
---	---	---	--	--	--	--

1 mark

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?

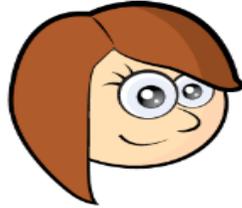
The scheme has been designed to give sufficient time for teachers to explore concepts in depth, however we also interleave prior content in new concepts. E.g. when children look at measurement we recommend that there are lots of questions that practice the four operations and fractions. This helps children 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?



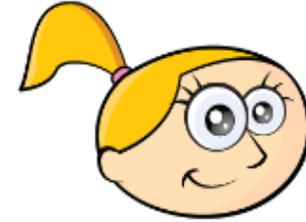
Teddy



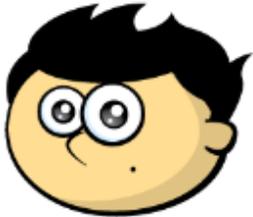
Rosie



Mo



Eva



Jack



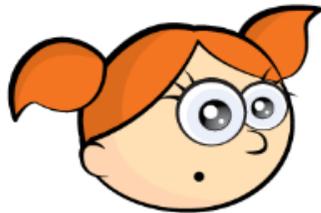
Whitney



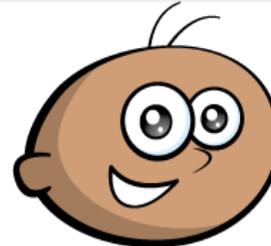
Amir



Dora



Alex



Tommy

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

White

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Maths**

Autumn - Block 1

Place Value

Overview

Small Steps

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 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

Roman Numerals

Notes and Guidance

Building on their Year 3 knowledge of numerals to 12 on a clock face, children explore Roman Numerals to 100

They explore what is the same and what is different between the number systems, for example there is no zero.

Mathematical Talk

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

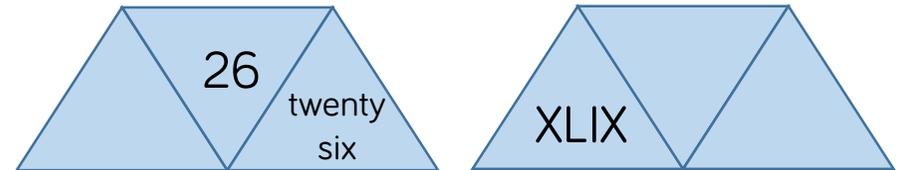
Do you notice any patterns? If 20 is XX what might 200 be?

How can you check you have represented the Roman Numeral correctly?

Varied Fluency

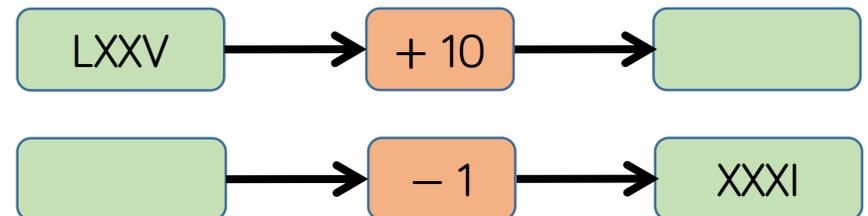
- Lollipop stick activity.
 The teacher shouts out a number and the children make it with lollipop sticks.
 Children could also do this in pairs or groups, and for a bit of fun they could test the teacher!

- 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:

$$XIV + XXXVI = \underline{\quad}$$

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

Answer: L

Other possible calculations:

$$C \div II = L$$

$$L \div I = L$$

$$X \times V = L$$

$$XXV \times II = L$$

$$LXV - XV = L$$

$$C - L = L$$

$$XX + XX + X = L$$

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 Bobby 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

Starting with two digit numbers, children look at the position of a number on a number line. They apply their understanding to three digit numbers, focusing on the number of ones and rounding up or down.

Highlight the importance of five and the idea that although it is in the middle of the two numbers, the number is always rounded up.

Mathematical Talk

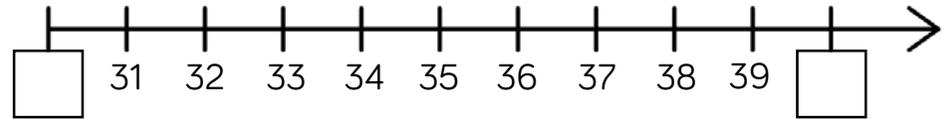
What is a multiple of 10? Which multiples of 10 does ____ sit between?

Which column do we look at when rounding to the nearest 10?

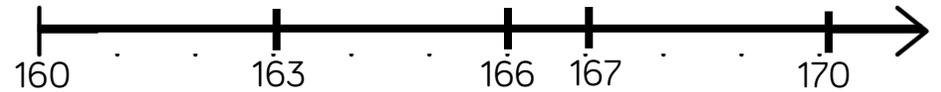
Which number is being represented? Will we round it up or down? Why?

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 number is rounded to 370
What could all the possibilities be?

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, and understanding of which hundreds a number sits between, to help them round.

Mathematical Talk

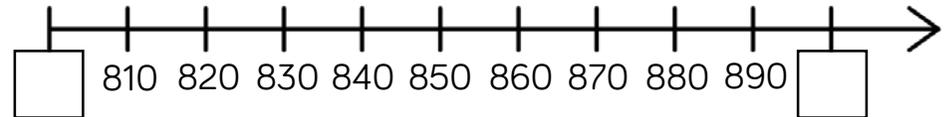
How is rounding to the nearest 100 similar and different to the nearest 10?

Which column do we need to look at when rounding to the nearest 100?

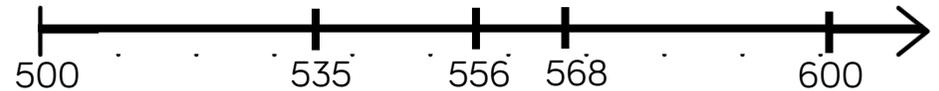
Why do numbers up to 49 round down to the nearest 100 and numbers 50 to 99 round up?

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 – 4 in the tens column (round down) or 5 – 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 number is rounded to the nearest 100, it is 200

When the same number is rounded to the nearest 10, it is 250

What could the number be?

Is there more than one possibility?

Using the digit cards 0 – 9, can you make 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 1000

245, 246, 247, 248 and 249 are all possible answers.

To 20, it could be 15 – 24

To 10, it could be 5 – 14

To 500, it could be 650 – 749

Only 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, recognising that 1,000 is made up of ten hundreds.

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

Mathematical Talk

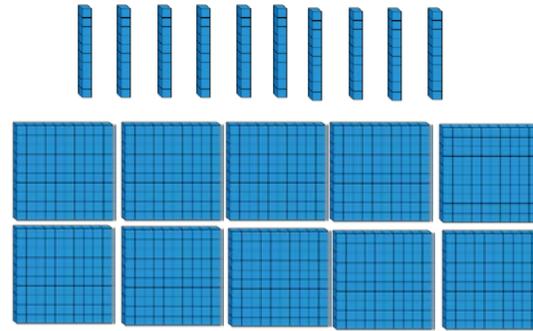
How many hundreds make ____ thousands?

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.



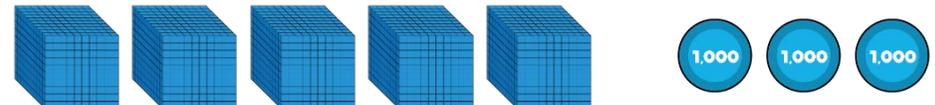
How many sweets are there altogether?



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.

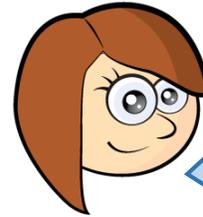
- When counting in hundreds, the ones digit changes.
- The thousands column changes every time you count in thousands.
- To count in thousands, we use 4-digit numbers.

Never, when counting in hundreds, the ones digit changes.

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

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

Rosie says,



If I count in thousands from zero, I will always have an even answer.

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 on a place value grid and 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 unitise by using place value counters and digits.

Mathematical Talk

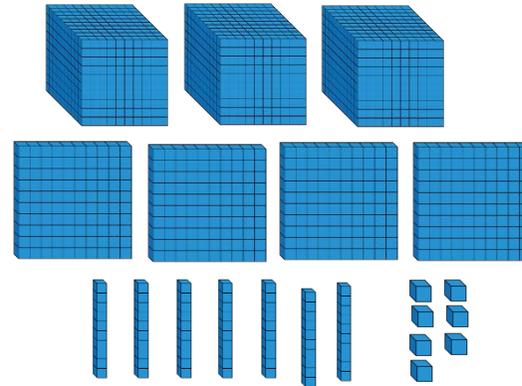
Can you represent the number on a place value grid?

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

How is the value of zero represented within a number?

Varied Fluency

Complete the sentences.

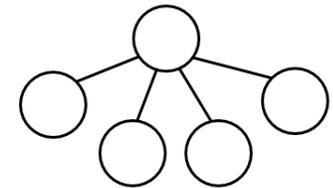
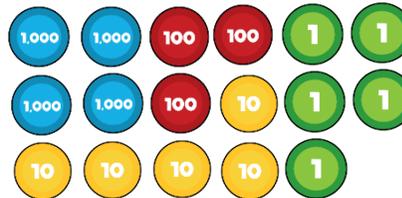


There are _____ thousands,
_____ hundreds, _____
tens and _____ ones.

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	6,5 <u>7</u> 0
----------------	---------------	-------------	----------------

Represent each of the numbers on a place value grid.

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

Reasoning and Problem Solving

Create 4 four-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.

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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.

The whole number has a digit total of 21

4,098

Partitioning

Notes and Guidance

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

They need to understand that $5000 + 300 + 20 + 9$ is equal to $4000 + 1300 + 10 + 19$ is crucial; children explore this explicitly.

Mathematical Talk

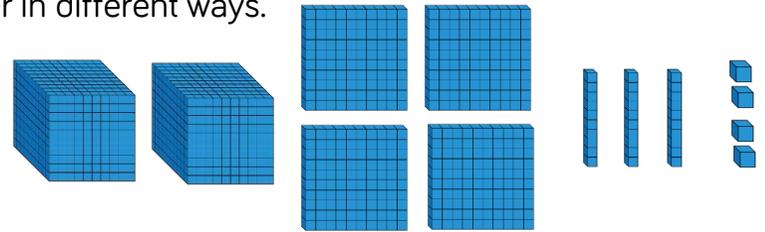
What number is being represented?

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

If you know ten 100s are equal to 1000 and 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.

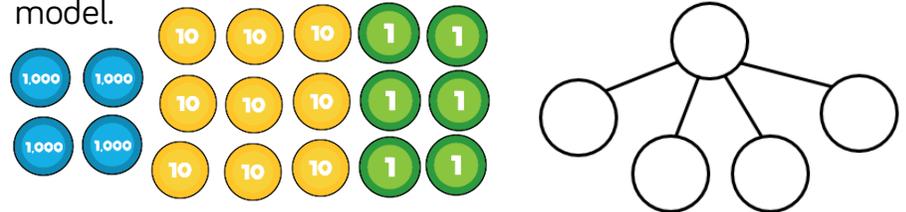


$$2000 + 400 + \boxed{} + 4$$

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

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

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



Lily describes a number. She says,
“My number has 4 thousands and 301 ones”
 What is Lily’s number?
 Can you describe Lily’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.

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.

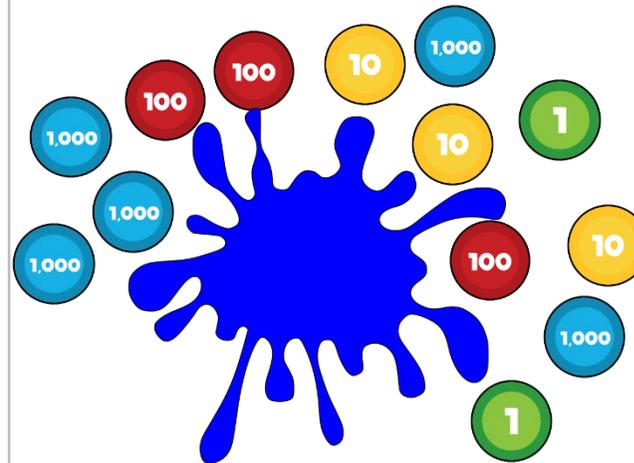
35 tens is the odd one out because it does not make 3,500, it makes 350

They both have the same number because 53 hundreds is equal to 5 thousands and 3 hundreds. Jeff and John 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.



Could be one 1,000 counter and one 100 counter.

Could be ten 100 counters and ten 10 counters.

Could be eleven 100 counters.

Number Line to 10,000

Notes and Guidance

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

They need to understand that it is possible to count in 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, what facts can help you?

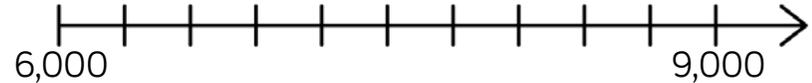
Can you use your knowledge of place value to prove that you are correct?

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?

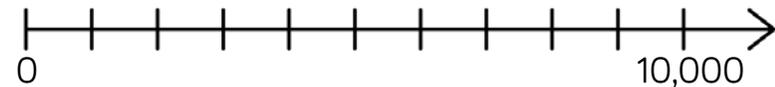
Varied Fluency

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

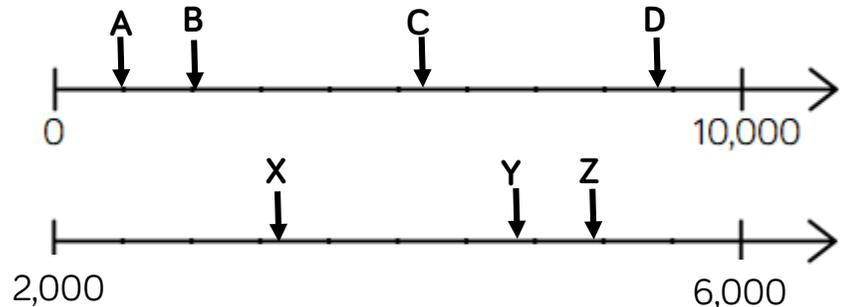
8,750



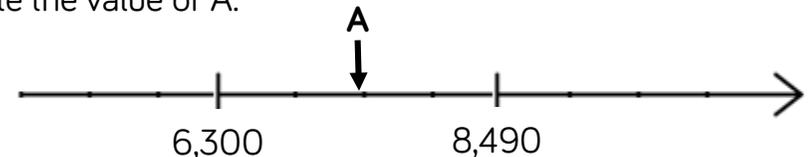
4,100



Estimate the value of each letter.



Estimate the value of A.



Number Line to 10,000

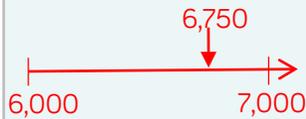
Reasoning and Problem Solving

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 ways.



Possible answers:

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

1,000 More or Less

Notes and Guidance

Building on Year 3, where they explored finding 1, 10 and 100 more or less, children now move onto 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 numerals or Base 10

Mathematical Talk

What is 1,000 more than/less than a number? Which column changes?

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.

$$9,523 + 10 = \square$$

$$\square + 3,589 = 3,689$$

$$3,891 + \square = 4,891$$

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

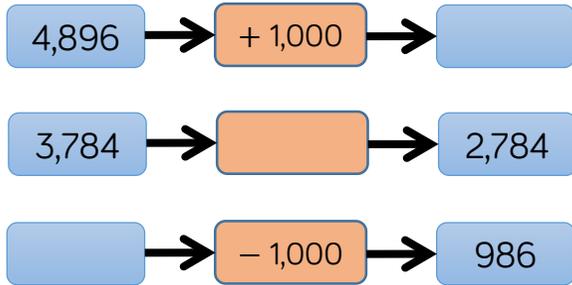
8,999

Use concrete resources to prove you are correct.

1,000 More or Less

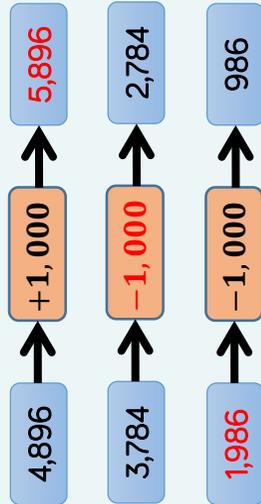
Reasoning and Problem Solving

Complete the missing boxes:



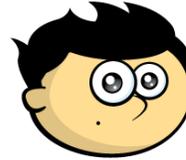
10 less than my number is 1,000 more than 5,300. What is my number?

Can you write your own problem similar to this?



6,310

Jack says:

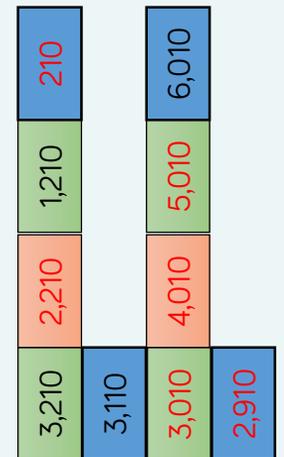
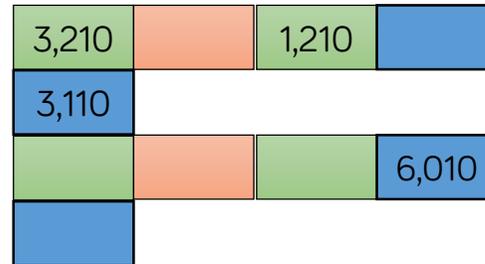


When I add 1,000 to 4,325, I only have to change 1 digit.

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:



Compare 4-digit Numbers

Notes and Guidance

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

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

Mathematical Talk

Which numbers are being presented?

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

Fill in the circle using $<$, $>$ or $=$

	○	
	○	
5,689	○	5,892

Circle the smallest amount.

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.

$$1,985 > \underline{\quad}$$

$$4,203 < 4,000 + \underline{\quad} + 4$$

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.

Children find the largest or smallest number from a set.

Mathematical Talk

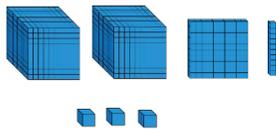
Which number is the greatest? Which number is smallest?
How do you know?

Why have you chosen to order the numbers this way?

What strategy did you use to solve this problem?

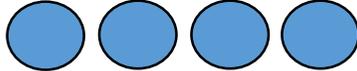
Varied Fluency

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

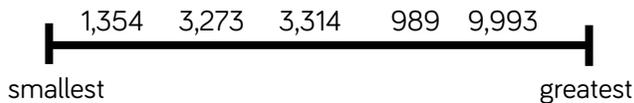
Reasoning and Problem Solving

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

All the other numbers have digit totals of 20

What could the other three numbers be?

Explain the mistake.



3,476

3,584

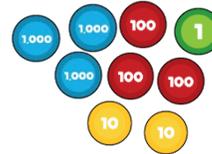
3,593

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.

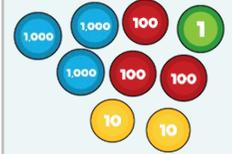
Half of 2,400

LXXXVI



LXXXVI

Half of 2,400



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

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	
1	3	5	9
1	3	8	4
1	4	1	5

Round to the Nearest 1,000

Notes and Guidance

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

Children must understand which thousands number a number sits between.

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

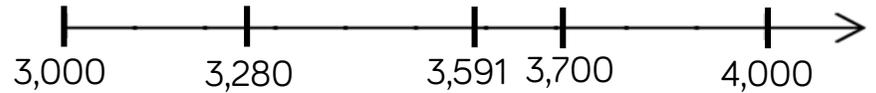
Mathematical Talk

Which thousands numbers does _____ sit between?

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.

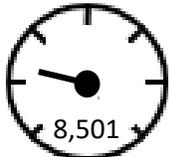
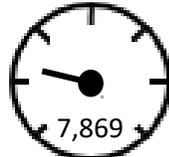
Start number	Rounded to the nearest 10	Rounded to the nearest 100	Rounded to the nearest 1,000
4,999			
LXXXII			

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:

<p style="text-align: center;">Car A</p>  <p style="text-align: center;">9,869</p> <p style="text-align: center;">Approximately 10,000 miles</p>	<p style="text-align: center;">Car B</p>  <p style="text-align: center;">8,501</p> <p style="text-align: center;">Approximately 8,000 miles</p>	<p style="text-align: center;">Car C</p>  <p style="text-align: center;">7,869</p> <p style="text-align: center;">Approximately 8,000 miles</p>
--	--	--

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

Count in 25s

Notes and Guidance

Focusing on patterns, children count in 25s. They use their knowledge of counting in 50s and 100s to become fluent in 25s.

Children should recognise and use the fact that there are four 25s in 100

Mathematical Talk

What should the correct number be?

Can you notice a pattern as the numbers increase/decrease?

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

Hayley 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 Hayley? Explain why.

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

Explain your answer.

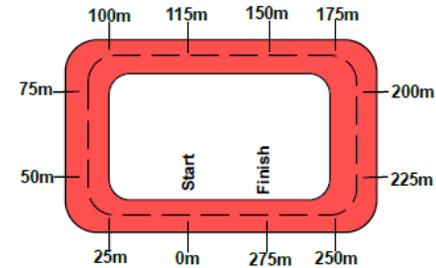
I don't agree. Multiples of 1,000 are multiples of 25 because 25 goes into 1,000 exactly, but not all multiples of 25 are multiples of 1,000 e.g. 1,075

No, he will not say 725 because:

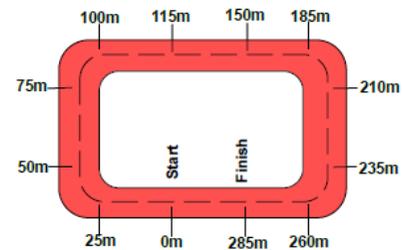
790, 765, 740, 715, 690, 665, ...

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 25m to 100m. After this they have continued to count in 25s correctly from 150

Race track B has miscounted when adding 25m to 150m. They have then added 25m 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, money etc.

Children should be able to count back through zero. This can be supported through the use of number squares, number lines or other visual aids.

Mathematical Talk

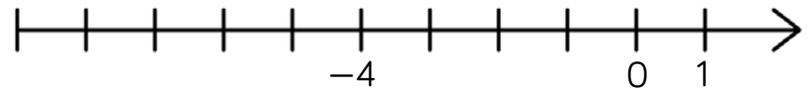
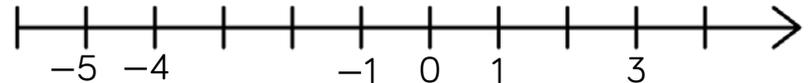
Can you use the words positive and negative in a sentence to describe numbers?

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

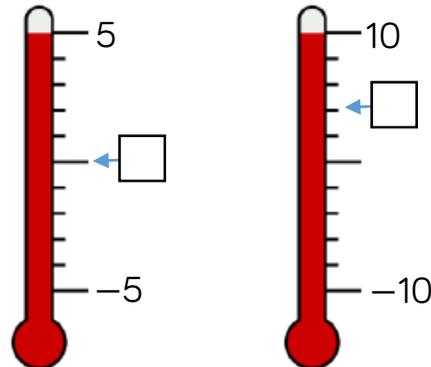
Is -1 degrees warmer or colder than -4 degrees?

Varied Fluency

Complete the number lines



Fill in the missing temperatures on the thermometers.



Zak is counting backwards out loud.

He says,

“two, one, minus one, minus two, minus three ...”

What mistake has Zak 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

Sami 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

NC Objectives

- ▶ 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

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 make the same number using Base 10?

If we are adding tens, is it only the tens column that changes?

$5382 + 5 \text{ tens}$ – Will only the tens column change?

Which other column will 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?

$$8,7273 + 4 = \underline{\quad}$$

$$8,273 + 4 \text{ tens} = \underline{\quad}$$

$$8,273 - 500 = \underline{\quad}$$

$$8,273 - 5 \text{ thousands} = \underline{\quad}$$

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,

When I add hundreds to a number, only the hundreds column will change.



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

When we add, what happens in the ones column? The tens? The hundreds?

Which is the larger number?

How is the question different when we add a 4-digit number to a 3-digit number?

Varied Fluency

- Use counters and a place value grid to calculate $243 + 326$
- Use counters and a place value grid to calculate $3,242 + 2,213$

1,000s	100s	10s	1s

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

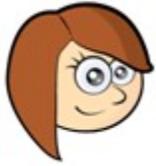
- Work out the missing numbers.

	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

What is the maximum number of counters you can have in each place value column?

What happens in a place value column when there are more than nine counters?

What happens when we exchange?

Which counters are exchanged? What are they exchanged for? Where do they move to?

How does this work when exchanging ten 1s? Ten 10s? Ten 100s?

Varied Fluency



Use the place value grid to calculate $3,357 + 2,434$

1,000s	100s	10s	1s



Use a place value grid and counters to solve:

$$2,362 + 1,453$$

$$4,023 + 2,548$$



Daniel buys a new laptop costing £1,265
He also buys a new mobile phone costing £492
What is the total cost?

Daniel's friend, Paul, buys a smart watch costing £342

How much money have they spent altogether?

Add Two 4-digit Numbers (2)

Reasoning and Problem Solving

What is the missing 4-digit number?

2,554

	Th	H	T	O
	—	—	—	—
+	6	3	9	5
	8	9	4	9

Anne, Beth and Alex are working out the solution to the calculation $6,374 + 2,823$

Anne's Strategy

$$6,000 + 2,000 = 8,000$$

$$300 + 800 = 1100$$

$$70 + 20 = 90$$

$$4 + 3 = 7$$

$$8,000 + 1100 + 90 + 7 = 9,197$$

Beth'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

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

Beth has forgotten to show and add on the exchanged thousand.

Add Two 4-digit Numbers (3)

Notes and Guidance

Building on adding two 4-digit numbers with one exchange, children explore multiple exchanges as they occur in different place value columns and look for similarities/differences.

Mathematical Talk

Compare the place value counters method with the numeric representation – how do they relate?

What interesting thing happens with this question?

Can you explain what is happening?

Varied Fluency



Use counters and a place value grid to calculate $4,844 + 2,156$

1,000s	100s	10s	1s

Complete the column addition alongside your working.

	4	8	4	4
+	2	1	5	6



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

- | | | |
|-----------------|-----------------------|-----------------|
| $3,456 + 789$ | <input type="radio"/> | $1,810 + 2,436$ |
| $2,829 + 1,901$ | <input type="radio"/> | $2,312 + 2,418$ |
| $7,542 + 1,858$ | <input type="radio"/> | $902 + 8,496$ |
| $1,818 + 1,999$ | <input type="radio"/> | $3,110 + 707$ |

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.

Luke 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

Greg 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.

$$6, _38 + 2, _87$$

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

Possible answer:
 $6,338 + 2,987$

Subtract Two 4-digit Numbers (1)

Notes and Guidance

Building on Year 3, children use their knowledge of subtracting using the formal column method to subtract 2 four-digit numbers.

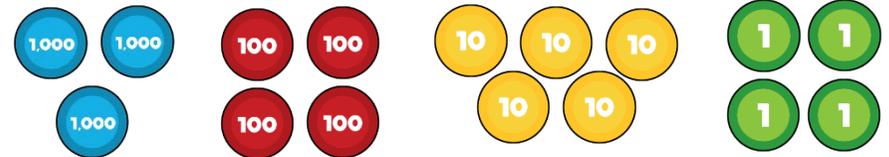
Children will focus on no exchange, concentrating on the correct place value.

Mathematical Talk

Why is it important that we start subtracting the ones first?
 What could happen if we didn't?
 Can you use place value counters to make this number? Can you use pictorial representations? Does this help you?
 What happens when we take away all of the hundreds? Thousands? How does the number change?
 What happens when we do not subtract anything from the value?

Varied Fluency

Subtract 2,332 from the number shown.



Complete the subtraction.

	Th	H	T	O
	7	6	4	6
–	4	3	3	5

Use a place value grid to calculate:

$$2,348 - 235 = \underline{\quad\quad\quad} \qquad \underline{\quad\quad\quad} = 4,572 - 2,341$$

$$6,582 - 582 = \underline{\quad\quad\quad} \qquad \underline{\quad\quad\quad} = 7,262 - 7,151$$

Subtract Two 4-digit Numbers (1)

Reasoning and Problem Solving

Chloe 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

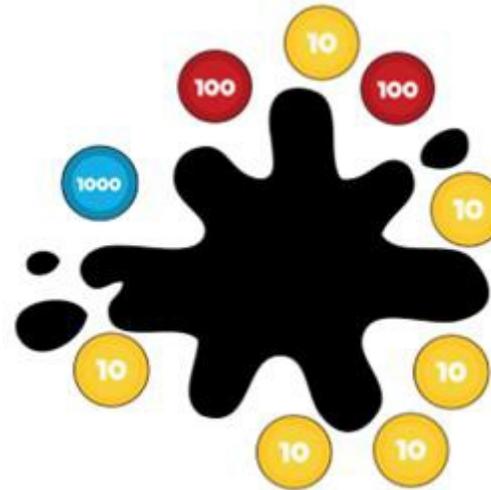
Use cards to help you find the numbers.

What could Chloe'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.



How many different ways can you make the missing amounts?

$$3470 - 1260 = 2210$$

Possible answers:

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

There are more possible answers.

Subtract Two 4-digit Numbers (2)

Notes and Guidance

Building on Year 3, children use their knowledge of subtracting using the formal column method to subtract 2 four-digit numbers.

Children will be learning how to carry out this calculation with one exchange taking place within any column.

Mathematical Talk

What happens when the digit we are subtracting from is smaller?

What are the strategies we use?

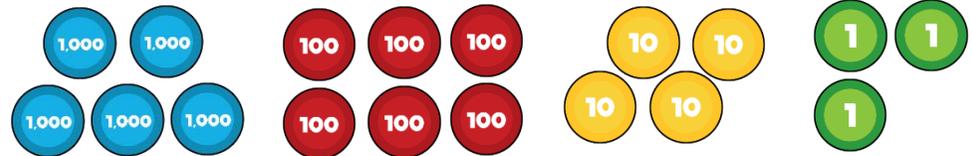
Which number do we exchange?

Can you use concrete or pictorial representations to help?

Varied Fluency



Here is a number.



Subtract 4,345

Show your answer in a number sentence.

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$



Complete the calculation.

	Th	H	T	O
	4	5	7	8
–	3	6	4	3



Find the difference between 6,528 and 469 using column subtraction.

Subtract Two 4-digit Numbers (2)

Reasoning and Problem Solving



Three primary schools join together to go on a school visit to The Deep in Hull. 1,235 people go on the trip.

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

How many parents are there?

What do you need to do first?

Which operation do you use?

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.

$$\underline{\quad} - 1,345 = 4\underline{\quad}6$$

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

Subtract Two 4-digit Numbers (3)

Notes and Guidance

Children explore what happens when a subtraction has more than one exchange.

Here it is important that children focus on when an exchange is and isn't needed.

Mathematical Talk

What happens when the digit we are subtracting from is smaller? What are the strategies we use? Which number do we exchange?

What happens when we have to exchange from more than one number?

Can we use the inverse to check our calculation?

Varied Fluency

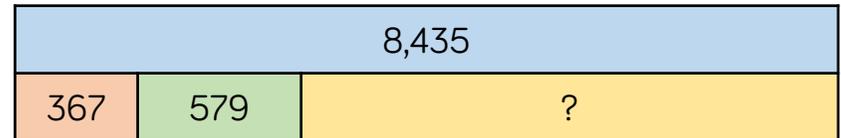
- Use place value counters to complete the subtractions. Remember to exchange when you cannot subtract easily.

$$5,783 - 894$$

$$6,737 - 759$$

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

How many magazines are left?



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

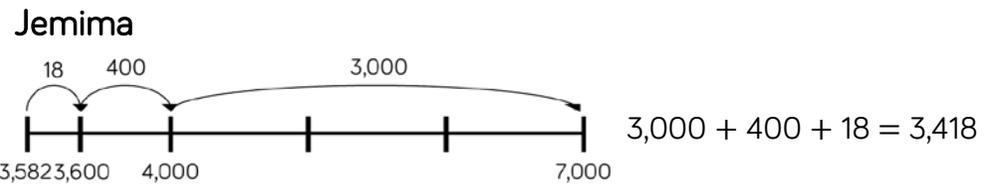
Sam, Lucas and Jemima are calculating $7,000 - 3,582$
Here are their methods:

Sam

	Th	H	T	O
	6	9	9	10
-	3	5	8	2
	3	4	1	8

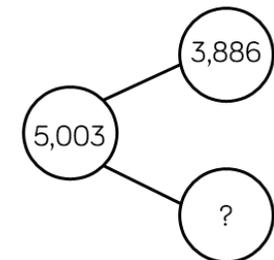
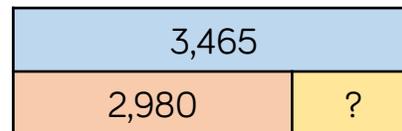
Lucas

	Th	H	T	O
	6	9	9	9
-	3	5	8	1
	3	4	1	8



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

Jamal 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.

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.

$345 + 1,234$

$3,000 + 6,000$

$2,985 + 6,325$

$3,500 + 1,200$

$3,541 + 1,179$

$350 + 1,200$

$2,135 + 6,292$

$2,000 + 6,000$

Sita 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: $3,625 + 4,277 = \underline{\quad}$

Round to nearest thousands: $4,000 + 4,000 = \underline{\quad}$

Round to nearest hundreds: $3,600 + \underline{\quad} = \underline{\quad}$

Round to nearest tens: $\underline{\quad} + \underline{\quad} = \underline{\quad}$

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

$4,623 + 3,421$

$9,732 - 6,489$

$8,934 - 1,187$

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.

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?

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

Children find any pair of numbers that round to the nearest hundred to make 3,400 altogether e.g.

$$2,343 + 1,089 =$$

$$4,730 - 1,304 =$$

3,812 – 1,295 can be estimated as 3,800 – 1,300 = 2,500.

4,002 – 1,489 can be estimated as 4,000 – 1,500 = 2,500.

1,449 + 1,120 can be estimated as 1,400 + 1,100 = 2,500.

Checking Strategies

Notes and Guidance

Children explore ways of checking to see if an answer is reasonable.

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?

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

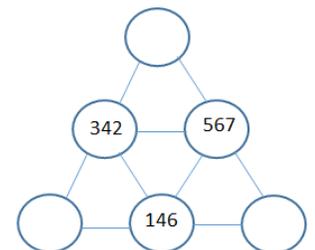
$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

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.

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?

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = 3,800$$

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.

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.

Possible answers:
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

White

**Rose
Maths**

Autumn - Block 3

Length & Perimeter

Overview

Small Steps

NC Objectives

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

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 use their new knowledge of four-digit numbers to convert metres to kilometres in a real life context. These contexts should include running, swimming, cycling etc.

Mathematical Talk

If you were to walk for 1 km along the road from your school, where would you be?
 How can you tell if your answer is sensible?
 Explain to a friend how to convert km to m and vice versa?
 How far do you travel to school? Do you travel more or less than 1 km?
 Visualise 1 km – can we measure it out on the school field or the playground?

Varied Fluency



Complete the statements.

$$3,000 \text{ m} = \underline{\quad} \text{ km}$$

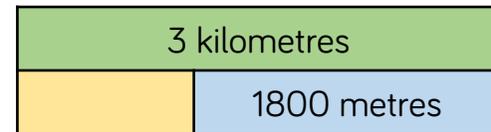
$$5 \text{ km} = \underline{\quad} \text{ m}$$

$$500 \text{ m} = \underline{\quad} \text{ km}$$

$$9,500 \text{ m} = \underline{\quad} \text{ km}$$



Complete the bar model.



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

$$500 \text{ m} \quad \bigcirc \quad \frac{1}{2} \text{ km}$$

$$7 \text{ km} \quad \bigcirc \quad 800 \text{ m}$$

$$5 \text{ km} \quad \bigcirc \quad 500 \text{ m}$$

Kilometres

Reasoning and Problem Solving

James and Sita do a sponsored walk for charity.



They walk 15 km altogether.

James walks double the amount that Sita walks.

How far does Sita walk?

They each raise £1 for every 500 m they walk.

How much money do they each make?

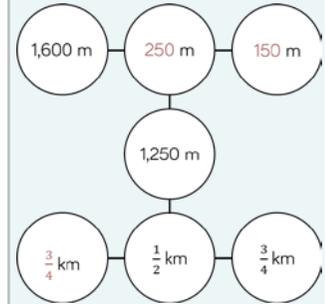
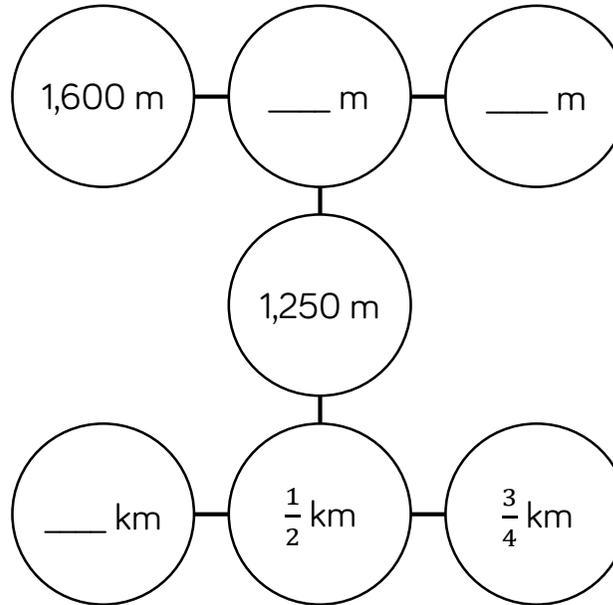
James walks 10 km.

Sita walks 5 km.

James raises £20

Sita 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. They can use cm squares or work in pairs and groups on larger grids.

They should be encouraged to explore which arrangements lead to longer perimeters and begin to see patterns linked to the way the squares are arranged.

Mathematical Talk

What is perimeter?

How do you decide where to start counting when working out the perimeter?

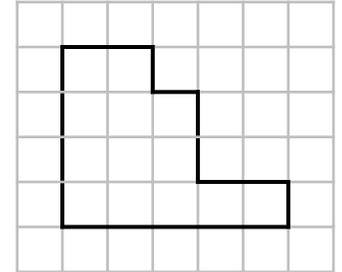
Can you make a shape with half/double the perimeter of shape x?

When do you need to find the perimeter of a shape in real life?

Varied Fluency



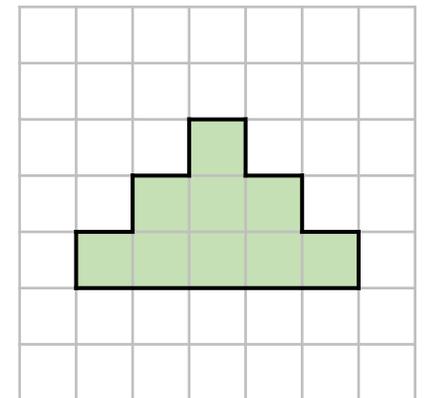
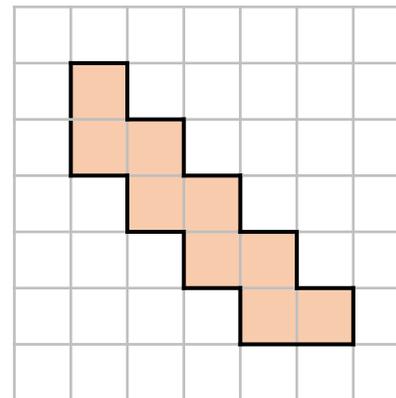
- Work out the perimeter of the shape. Can you draw a different shape with :
- the same perimeter
 - a perimeter which is 5 cm longer
 - a perimeter which is double/half the length of this one.



- Using squared paper draw two rectilinear shapes, each with a perimeter of 28 cm. What's the same and what's different about these shapes?



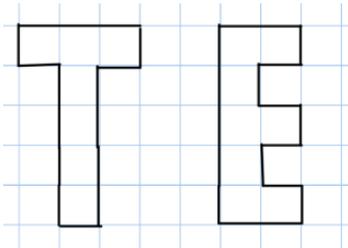
- Draw and find the perimeter of these shapes in cm.



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.

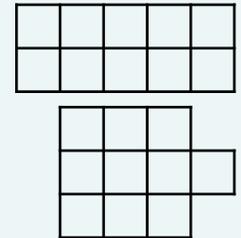
You have 10 paving stones to design a patio. The stones are one metre square.

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

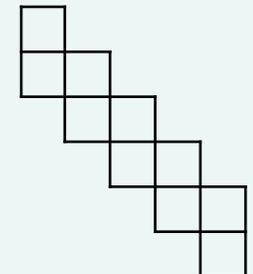


Use squared paper to show which design would give the longest perimeter and which would give the shortest.

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 look at rectangles that are not on a square grid where some values may be missing.

They explore different ways of expressing the calculation using known number facts including multiplication and division.

Mathematical Talk

What do you need to know to work out the perimeter?

How do you know the value of each side?

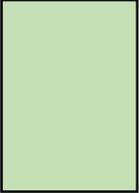
What shape is this? (square) If you only have the length of one side, how can you calculate the perimeter?

What is a more efficient way of calculating the perimeter?

Varied Fluency

Work out the perimeter of the rectangles.


 $2 \text{ cm} + \underline{\quad} \text{ cm} + 2 \text{ cm} + \underline{\quad} \text{ cm} = \underline{\quad} \text{ cm}$
 5 cm

$10 \text{ cm} + \underline{\quad} \text{ cm} + 4 \text{ cm} + \underline{\quad} \text{ cm} = \underline{\quad} \text{ cm}$

 10 cm
 4 cm

Work out the perimeter of the square.

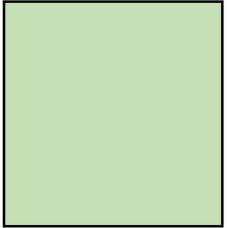

 8 cm

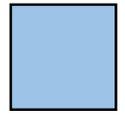
The perimeter of the rectangle is 36 m. What is the length of the longest side?


 6 cm

Perimeter of a Rectangle

Reasoning and Problem Solving

<p>The width of a rectangle is 2 metres less than the length.</p> <p>The perimeter of the rectangle is between 20 m and 30 m.</p> <p>What could the dimensions of the rectangle be?</p> <p>Draw all the rectangles that fit these rules.</p> <p>Use 1 cm = 1 m.</p>	<p>If the perimeter is:</p> <p>20 m Length = 6 m Width = 4 m</p> <p>24 m Length = 7 m Width = 5 m</p> <p>28 m Length = 8 m Width = 6 m</p>
<p>The perimeter of a square is 16 cm. How long is each side?</p> 	<p>4 cm</p>

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

Perimeter of Rectilinear Shapes

Notes and Guidance

Children will begin to calculate perimeter of rectilinear shapes from diagrams without grids.

They need to apply their knowledge of missing numbers to work out dimensions by finding the difference.

Children need to have experience of drawing their own shapes in this step.

Mathematical Talk

Which measures are missing from the diagram?

Explain to your partner why you think the line is ____ cm long.

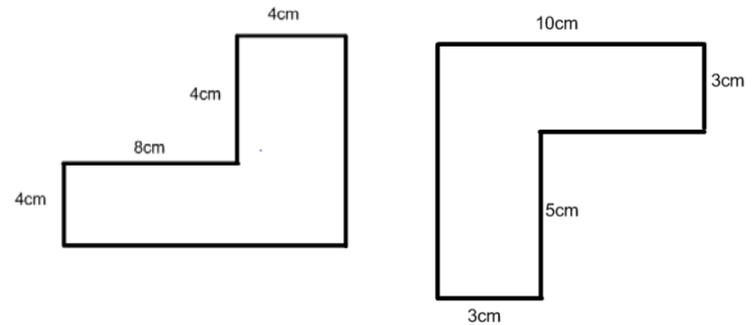
Can you prove it?

Can you make a rectilinear shape where your partner can work out the perimeter if you miss off the length of one of the sides?

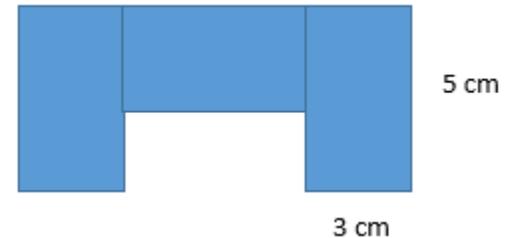
If you know the length of one side and part of the opposite side is known. Could you use a bar model to help?

Varied Fluency

Find the perimeter of the shapes.



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

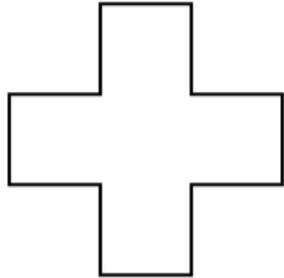


How many different shapes can you make with a perimeter of 24 cm? How many sides do they have?

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.



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

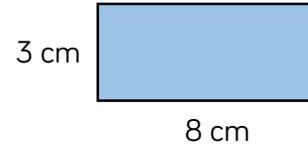
Any other answers suggested are correct if they are a multiple of 12

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

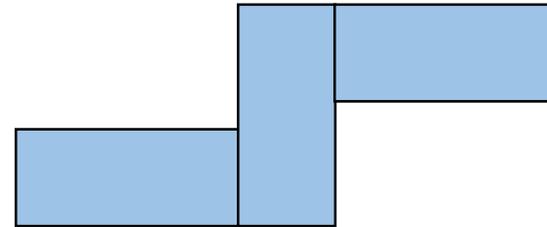
48 cm, 36 cm, 80 cm, 120 cm, 66 cm

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

Bob has some rectangles all the same size.

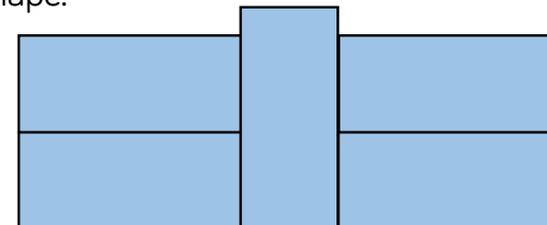


He makes this shape using his rectangles. What is the perimeter?



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

NC Objectives

- ▶ Multiply by 10
- ▶ Multiply by 100
- ▶ Divide by 10
- ▶ Divide by 100
- ▶ Multiply by 1 and 0
- ▶ Divide by 1
- ▶ 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

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

Count in multiples of 6, 7, 9, 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.

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

Multiply by 10

Notes and Guidance

Children need to focus on and visualise making a number ten times bigger. 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 are related.

Mathematical Talk

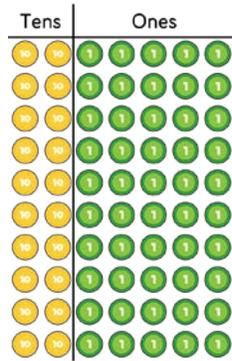
Can you represent these calculations with concrete objects or a drawing?

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 ___ \times ___ = ___.



Use place value counters to calculate:

10×3

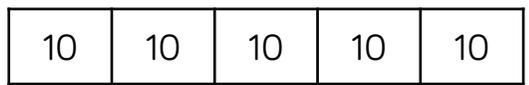
4×10

12×10

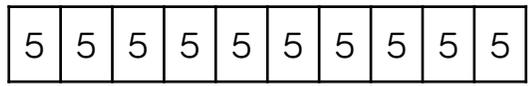


Match the statement to the correct bar model.

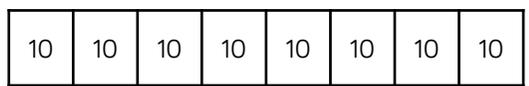
5 buses have ten passengers.



8 pots each have ten pencils.



10 chickens lay 5 eggs each.



Multiply by 10

Reasoning and Problem Solving

Always, sometimes, never.

If you draw a number in a place value grid and multiply it by 10, everything moves one column to the left.

Always.

Katya 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

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 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

$3 \times \square = \square \square \square = 3 \text{ ones} = 3$

Complete:

$3 \times \text{rod} = \text{rod} \text{rod} \text{rod} = \text{___ tens} = \text{___}$

$3 \times \text{grid} = \text{grid} \text{grid} \text{grid} = \text{___ hundreds} = \text{___}$

Use a place value grid and counters to calculate:

7×10	63×10	80×10
7×100	63×100	80×100

What do you notice? Write an explanation of this rule.

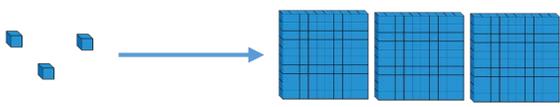
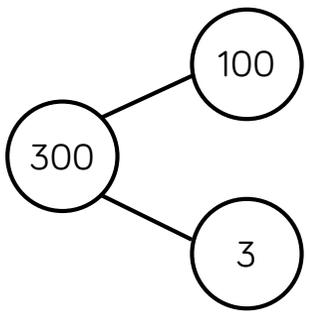
Use $<$, $>$ or $=$ to make the statements correct.

75×100	<input type="radio"/>	75×10
100×47	<input type="radio"/>	47×100
39×100	<input type="radio"/>	$39 \times 10 \times 10$

Multiply by 100

Reasoning and Problem Solving

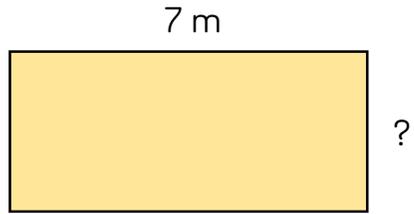
Which image does **not** show multiplying by 100?
Explain your answer.



The part-whole model does not represent multiplying by 100. It is used for addition and subtraction so there should be 100 parts with 3 in each.

The whole is wrong in the part-whole model, it should be 103

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

Using 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.

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, which direction do the digits move?

Varied Fluency



Use place value counters to show the steps that you would take to divide 30 by 10

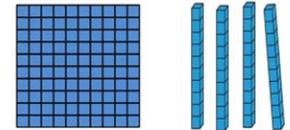


Can you do this for a 3-digit number like 210?



Use Base 10 to divide 140 by 10

Explain what you have done.



Ten friends empty a money box that had lots of £1 coins in it. They share the money between them. How much would they have each if the box had:

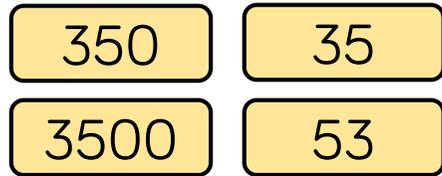
- 20 £1 coins
- 24 £1 coins
- £100

If each person had 90p, how much money would have been in the box?

Divide by 10

Reasoning and Problem Solving

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



Can you work out which clue matches to which child?

- Jack's number is ten times smaller than Rio's.
- Emma's number is not ten times smaller than Jack's or Anya's or Rio's.
- Anya's number is ten times smaller than Jack's.

Emma - 53

Jack - 350

Anya - 35

Rio - 3500

Alice in Wonderland 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	1200 cm	12 cm
Her height	160 cm	1600 cm
Length of a book	310 mm	31 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.

Height of a door: wrong; should be 120 cm; Alice has divided by 100

Her height: wrong; should be 16 cm; Alice has multiplied by 10

Length of a book: correct.

Height of a mug: 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 support you dividing by 100?

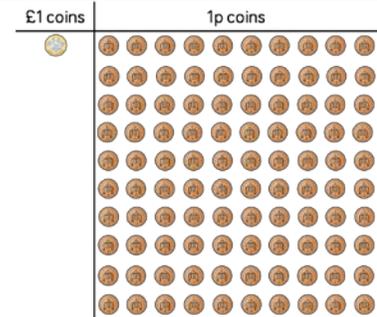
How are multiplying and dividing by 100 related?

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

Varied Fluency



Is it possible for £1 to be shared between 100 people?
How does this picture explain it?



Match the calculation with the correct answer.

$4,200 \div 10$

$4,200 \div 100$

$420 \div 10$

420

42



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

$3,600 \div 10$	<input type="radio"/>	$3,600 \div 100$
$2,700 \div 100$	<input type="radio"/>	$270 \div 10$
$1,500 \div 100$	<input type="radio"/>	$150 \div 10$

Divide by 100

Reasoning and Problem Solving

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

Both of them give some clues about their answer.



Eva

My number has 8 ones and 2 tens

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



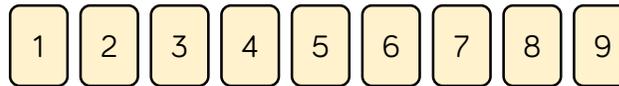
Whitney

What number did they start with?
 Who divided by what?
 Prove it.

They started with 2,800

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

Use the number cards to fill in the missing digits.



$$170 \div 10 = _ _ _$$

$$_ _ 20 \times 10 = 3, _ _ 00$$

$$1,8 _ 0 \div 10 = 1 _ 6$$

$$_ _ 9 \times 100 = 5, _ _ 00$$

$$6 _ = 6,400 \div 100$$

$$170 \div 10 = 17$$

$$320 \times 10 = 3,200$$

$$1860 \div 10 = 186$$

$$59 \times 100 = 5,900$$

$$64 = 6,400 \div 100$$

Multiply by 1 and 0

Notes and Guidance

Children explore what happens when you multiply by one using concrete equipment. Linking to this, they look at multiplying by 0 and use stem sentences to describe what has happened.

Mathematical Talk

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

What do you notice?

What does zero mean?

What does multiplying by 1 mean?

Write a word problem to show multiplying by 1 and multiplying by 0

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

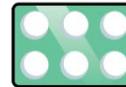
Varied Fluency

Complete the calculation shown by the number pieces.



There are ___ ones.

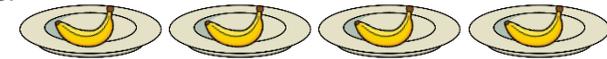
$$__ \times __ = __$$



There is ___ six.

$$__ \times __ = __$$

Complete the sentences.



There are ___ plates. There is ___ banana on each plate.

Altogether there are ___ bananas.

$$__ \times __ = __$$

Complete:

$$4 \times __ = 4$$

$$__ = 1 \times 7$$

$$0 = __ \times 42$$

$$63 \times 1 = __$$

$$__ \times 27 = 0$$

$$50 \times __ = 50$$

Multiply by 1 and 0

Reasoning and Problem Solving

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

$$3 + 0 = \underline{\quad}$$

$$3 - 0 = \underline{\quad}$$

$$3 \times 0 = \underline{\quad}$$

Explain why the answer is different.

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

Addition and subtraction have an answer of 3 because they started with that amount and added or subtracted nothing.

3×0 is 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 to illustrate.

The incorrect ones are:

$$5 \times 0 = 50$$

$$7 \times 0 = 7$$

$$1 \times 1 = 2$$

$$0 \times 0 = 1$$

$$1 \times 8 = 9$$

Example:

$5 \times 0 = 0$
because 5 lots of nothing total zero.

I have 5 bowls, each with nothing in them.

Divide by 1

Notes and Guidance

Children explore what happens to a number when you divide it by 1 or by itself. Using concrete and pictorial representations, children demonstrate how both sharing and grouping can be used to divide by 1 or the number 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 $\underline{\quad} \div \underline{\quad} = \underline{\quad}$
- 4 counters **shared** between 1 hand $\underline{\quad} \div \underline{\quad} = \underline{\quad}$
- 9 counters **grouped** in 1s $\underline{\quad} \div \underline{\quad} = \underline{\quad}$
- 9 counters **grouped** in 9s $\underline{\quad} \div \underline{\quad} = \underline{\quad}$



Choose the correct bar model for the worded question.
Patsy 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 and work out the answer.

- Alan baked 7 cookies and shared them 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 convince me 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.

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 to use concrete and pictorial methods to solve multiplication.

Mathematical Talk

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

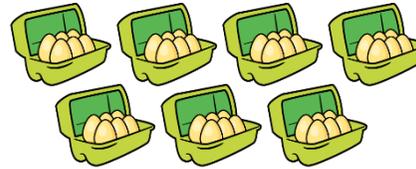
Can you write a number sentence to show this?

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.

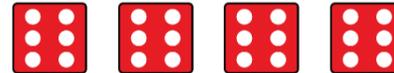
There are ___ eggs in total.

___ × ___ = ___

At 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 and division sentence to describe the 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 odd \times even and even \times even will always give an even product.

Gary says,



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

Is Gary correct?
 Explain your answer.

Gary is not correct because $12 \div 6$ is equal to 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, knowing that the six times tables are double the sum of the three times tables and knowing their derived division facts.

Children should also be able to apply this knowledge to multiplying and dividing by 10 and 100

Mathematical Talk

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

Can you use $3 \times \underline{\quad}$ to work out $6 \times \underline{\quad}$?

Can you use 7×5 to work out 7×6 ?

Which known fact did you use?

Varied Fluency

Complete the number sentences.

$1 \times 3 = \underline{\quad}$

$1 \times \underline{\quad} = 6$

$2 \times \underline{\quad} = 6$

$2 \times 6 = \underline{\quad}$

$3 \times 3 = \underline{\quad}$

$3 \times 6 = \underline{\quad}$

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

Can you use your knowledge of the 6 times table to complete the missing values?

$6 \times 2 = \underline{\quad}$

$\underline{\quad} \times 6 = 12$

$6 \times 2 \times 10 = \underline{\quad}$

$\underline{\quad} \times 20 = 120$

$20 \times \underline{\quad} = 120$

$6 \times 2 \times \underline{\quad} = 1,200$

$6 \times \underline{\quad} = 1,200$

$200 \times 6 = \underline{\quad}$

$10 \times \underline{\quad} \times 6 = 120$

6 Times Table & Division Facts

Reasoning and Problem Solving

<p>I am thinking of 2 numbers where the sum of the numbers is 15 and the product is 54</p> <p>What are my numbers?</p> <p>Can you think of your own problem for a friend to solve?</p>	$9 \times 6 = 54$ $6 \times 9 = 54$ $6 + 9 = 15$ $9 + 6 = 15$
<p>Always, sometimes, never?</p> <p>If a number is a multiple of 6 it will always be a multiple of 3</p> <p>What do you think?</p> <p>Convince me.</p>	<p>Always, because the 6 times table is double the 3 times table.</p> <p>Children may list the times tables.</p>

Choose the correct number or symbol from the cloud to fill in the boxes.

$\underline{\quad} \div \underline{\quad} = 6$
 $60 = 600 \underline{\quad} 10$

$600 \div 10 = 6$
 $60 = 600 \div 10$

Multiply and Divide by 9

Notes and Guidance

Children use their previous knowledge of multiplying and dividing to become more fluent in the nine times table. They apply their knowledge in different contexts.

Mathematical Talk

Can you use concrete or pictorial representations to help you solve the fact?

What other facts can you link to this one?

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

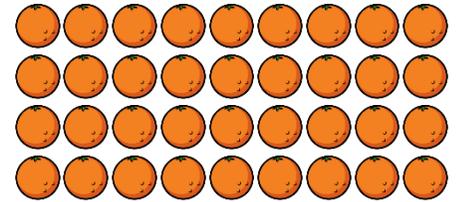


Complete the sentences to describe the oranges:

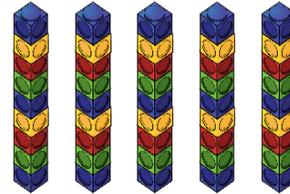
There are ___ lots of 9

There are ___ nines.

$4 \times \underline{\quad} = \underline{\quad}$



Complete the fact family.



$\underline{\quad} \times \underline{\quad} = \underline{\quad}$

$\underline{\quad} \times \underline{\quad} = \underline{\quad}$

$\underline{\quad} \div \underline{\quad} = \underline{\quad}$

$\underline{\quad} \div \underline{\quad} = \underline{\quad}$

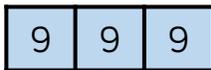


Complete the sentences.

There are ___ lots of ___.

$\underline{\quad} \times \underline{\quad} = \underline{\quad}$

$\underline{\quad} \div \underline{\quad} = \underline{\quad}$



There are ___ lots of ___.

$\underline{\quad} \times \underline{\quad} = \underline{\quad}$

$\underline{\quad} \div \underline{\quad} = \underline{\quad}$



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

$$9 \times 3 = 27$$

$$27 \times 2 = 54$$

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

9 is false because

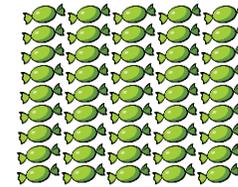
$$6 \times 9 = 54$$

and

$$9 \times 3 = 27$$

$$27 + 9 = 36$$

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 the same amount of sweets they are just arranged in a different way.

9 Times Table & Division Facts

Notes and Guidance

Children use known times table facts to become fluent in the nine times table. For example, knowing that the nine times table is one less than the ten times table 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.

$1 \times 9 = \underline{\quad}$	$\underline{\quad} \times 1 = 9$	$1 \times 9 \times \underline{\quad} = 90$
$\underline{\quad} \times 9 = 90$	$100 \times \underline{\quad} = 900$	$9 \times 1 \times 10 = \underline{\quad}$
$9 \times \underline{\quad} = 900$	$4 \times 9 = \underline{\quad}$	$9 \times 1 \times \underline{\quad} = 900$

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 & Division Facts

Reasoning and Problem Solving

Can you complete the calculations using some of the symbols or numbers in the box?

÷	9	100	=
10	900		

___ ÷ ___ = 9

90 = 900 ___ 10

$900 \div 100 = 9$

$90 = 900 \div 10$

I am thinking of two numbers.
The sum of the numbers is 17.
The product of the numbers is 72.
What are my secret numbers?

8 and 9

Can you choose your own two secret numbers from the 9 times table and create clues for your partner?

Always, sometimes, never?

All multiples of 9 have digits that have a sum of 9. Prove it!

Always:
Proof by exhaustion
e.g.
 $2 \times 9 = 18$
 $1 + 8 = 9$
 $3 \times 9 = 27$
 $2 + 7 = 9$
 $25 \times 9 = 225$
 $2 + 2 + 5 = 9$

Multiply and Divide by 7

Notes and Guidance

Children use their knowledge of multiplication and division to multiply by 7. They count in 7s, use their knowledge of equal groups and use 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?

Varied Fluency

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

Write down the first five multiples of 7

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

4 sevens		7 fours	
4 lots of 7		7 lots of 4	
4×7		7×4	

Use Gemima's method to represent 7 times 6 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):

$$7 \times 9 = 63$$

$$63 \times \text{£}2 = \text{£}126$$

What do you notice about the pattern when counting in 7s from 0?
Does this continue beyond 7 times 12?

Can you explain why?

Odd, even pattern because
odd + odd = even.
Then
even + odd = odd,
and this will continue throughout the whole times table.

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.

$$3 \times 7 = \underline{\quad}$$

$$30 \times 7 = \underline{\quad}$$

$$300 \times 7 = \underline{\quad}$$



Use your knowledge of the 7 times table to calculate.

$$80 \times 7 = \underline{\quad}$$

$$60 \times 7 = \underline{\quad}$$

$$70 \times 7 = \underline{\quad}$$

$$50 \times 7 = \underline{\quad}$$



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

There are $\underline{\quad}$ days in one week.

$$\underline{\quad} \times 10 = \underline{\quad}$$

There are $\underline{\quad}$ days in 10 weeks.

$$\underline{\quad} \times 5 = \underline{\quad}$$

There are $\underline{\quad}$ days in 5 weeks.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

There are $\underline{\quad}$ days in 15 weeks.

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Reasoning and Problem Solving

True or False?

$$7 \times 6 = 7 \times 3 \times 2$$

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

Explain your answer to a friend. Prove using a drawing.

True.

False.

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 in 100 rows?
How many girls? How many boys?

Possible answers:

$$2 \times 10$$

$$5 \times 10$$

$$7 \times 10$$

$$2 \times 100$$

$$5 \times 100$$

$$7 \times 100$$

Etc.