

Autumn Scheme of Learning

Year 4

#MathsEveryoneCan

2020-21

White
Rose
Maths

New for 2020/21

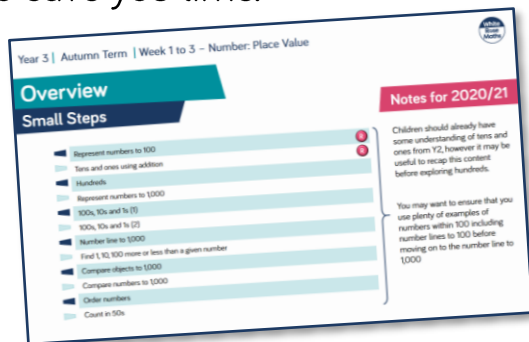
2020 will go down in history. The world has changed for all of us.

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

We have amended our schemes for 2020/21 to:

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

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



Lesson-by-lesson overviews

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

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

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

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

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

Supporting resources

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

The worksheets are provided in three different formats:

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

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

Roman numerals

1 Match the numbers to the Roman numerals.

1
5
10
50
100

L
C
V
X
I

3 Eva lives in this house.

What number does Eva live at?
Eva lives at number

4 Jack rolls 2 6-sided dice.

Roman numerals

1 Match the numbers to the Roman numerals.

1	5	10	50	100
L	C	V	X	I

2 Write each number in Roman numerals.
a) 7 b) 12 c) 23 d) 55 e) 72 f) 89 g) 17 h) 41 i) 27

3 Eva lives in this house.
What number does Eva live at?

4 Jack rolls 2 six-sided dice.
What is Jack's total score?
Alex rolls the same 2 dice and gets two different numbers.
Her score is the same as Jack's.
What numbers could Alex have rolled?

5 Write the Roman numeral in numerals and words.
a) XXXIV b) LXXI c) LXXVIII d) XCVI e) XXVIII f) XCI

6 Each diagram should show a number in numerals, words and Roman numerals. Complete the diagrams.

a) b) c) d)

7 Complete the function machines.

a) $LXI \rightarrow +1 \rightarrow \square$ e) $LIX \rightarrow -1 \rightarrow \square$
 b) $LXI \rightarrow +10 \rightarrow \square$ f) $XIV \rightarrow -10 \rightarrow \square$
 c) $XVII \rightarrow +10 \rightarrow \square$ g) $LXXVII \rightarrow +10 \rightarrow \square$
 d) $LXXV \rightarrow -1 \rightarrow \square$

8 Complete the calculation.
 $XXXIX + \square = LXI + \square$
 How many other calculations can you write that give the same total?
 Compare answers with a partner.

Roman numerals

1 Match the numbers to the Roman numerals.

1
5
10
50
100

L
C
V
X
I

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Meet the Characters

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



Teddy



Rosie



Mo



Eva



Alex



Jack



Whitney



Amir



Dora



Tommy



Dexter



Ron



Annie

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

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Autumn - Block 1

Place Value

Overview

Small Steps

Notes for 2020/21

- ▶ Represent numbers to 1,000 R
- ▶ 100s, 10s and 1s R
- ▶ Number line to 1,000 R
- ▶ 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
- ▶ Find 1, 10, 100 more or less R
- ▶ 1,000 more or less
- ▶ Compare numbers

We begin by encouraging spending time on numbers within a 1,000 to ensure they are secure on this knowledge before moving into 10,000.

Using equipment or digital manipulatives may help children increase their understanding.

Overview

Small Steps

Notes for 2020/21

- Order numbers
- Round to the nearest 1,000
- Count in 25s
- Negative numbers
- Roman numerals to 100

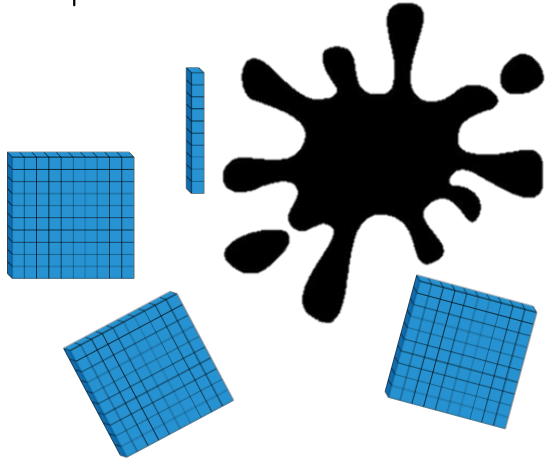
Work on Roman Numerals has been moved to the end of the block as we believe it is important for children to be secure with our own number system before exploring another.

Numbers to 1,000

Reasoning and Problem Solving



Teddy has used Base 10 to represent the number 420. He has covered some of them up.



Work out the amount he has covered up.

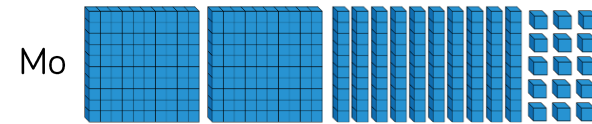
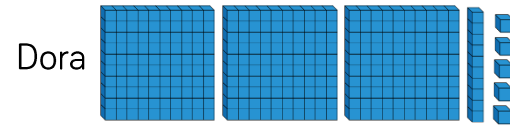
How many different ways can you make the missing amount using Base 10?

110 is the missing amount.

Possible ways:

- 1 hundred and 1 ten
- 11 tens
- 110 ones
- 10 tens and 10 ones
- 50 ones and 6 tens etc.

Which child has made the number 315?



Explain how you know.

Dora and Mo have both made the number 315, but represented it differently.

3 hundreds, 1 ten and 5 ones is the same as 2 hundreds, 10 tens and 15 ones.

100s, 10s and 1s (1)

Notes and Guidance

Children should understand that a 3-digit number is made up of 100s, 10s and 1s.

They read numbers shown in different representations on a place value grid, and write them in numerals.

They should be able to represent different 3-digit numbers in various ways such as Base 10 or numerals.

Mathematical Talk

What is the value of the number shown on the place value chart?

Why is it important to put the values into the correct column on the place value chart?

How many more are needed to complete the place value chart?

Can you make your own numbers using Base 10? Ask a friend to tell you what number you have made.

Varied Fluency

R

- What is the value of the number represented in the place value chart?

Hundreds	Tens	Ones

Write your answer in numerals and in words.

- Complete this place value chart so that it shows the number 354

Hundreds	Tens	Ones

Represent the number using a part-whole model.

- How many different ways can you make the number 452? Can you write each way in expanded form? (e.g. $400 + 50 + 2$)

Compare your answer with a partner.

100s, 10s and 1s (1)

Reasoning and Problem Solving



Hundreds	Tens	Ones

Possible answers:

I disagree because there are six hundreds, four tens and seven ones so the number is 647.

I notice that 647 and 467 have the same digits but in a different order so the digits have different values.

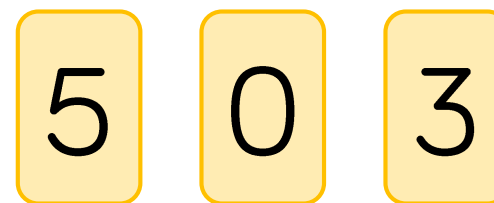
Eva



The place value grid shows the number 467

Is Eva correct? Explain your reasoning.

What do you notice about the number shown?



Using each digit card, which numbers can you make?

Use the place value grid to help.

Hundreds	Tens	Ones

Compare your answers with a partner.

The numbers that can be made are:

- 503
- 530
- 305
- 350
- (0)35
- (0)53

Number Line to 1,000

Notes and Guidance

Children estimate, work out and write numbers on a number line.

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

Children may still need Base 10 and/or place values to work with as they develop their understanding of the number line.

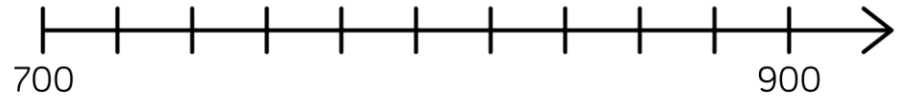
Mathematical Talk

- What is the value of each interval on the number line?
- 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 draw a number line where 600 is the starting number, and 650 is half way along?
- What do you know about the number that A is representing? A is more/less than _____
- What value can A definitely not be? How do you know?

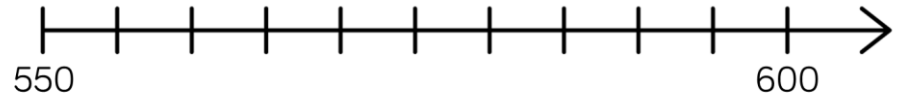
Varied Fluency



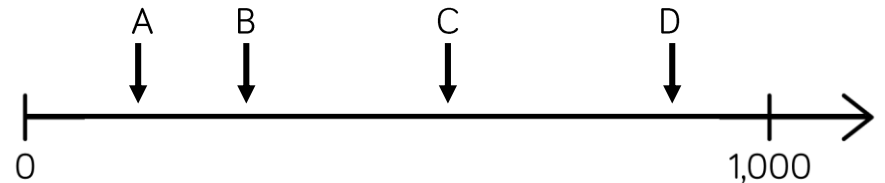
Draw an arrow to show the number 800



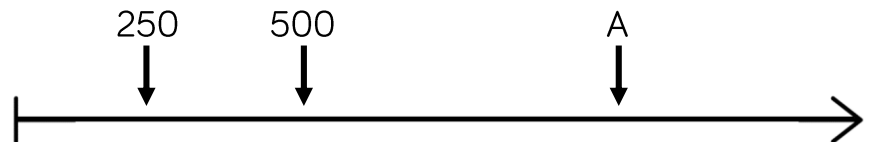
Draw an arrow to show the number 560



Which letter is closest to 250?



Estimate the value of A.

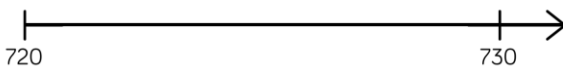
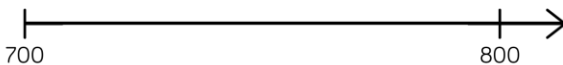
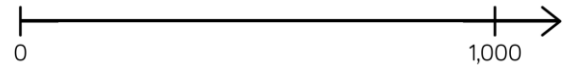


Number Line to 1,000

Reasoning and Problem Solving



Estimate where seven hundred and twenty-five will go on each of the number lines.



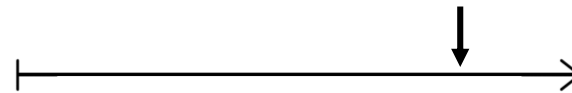
Explain why it is not in the same place on each number line.

725 is in different places because each line has different numbers at the start and end so the position of 725 changes.

All three of the number lines have different scales and therefore the difference between 725 and the starting and finishing number is different on all three number lines.

If the arrow is pointing to 780, what could the start and end numbers be?

Find three different ways and explain your reasoning.



Example answers:

Start 0 and end 1,000 because 500 would be in the middle and 780 would be further along than 500

Start 730 and end 790

Start 700 and end 800

etc.

Round to the Nearest 10

Notes and Guidance

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

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

Mathematical Talk

What is a multiple of 10?

Which multiples of 10 does ____ sit between?

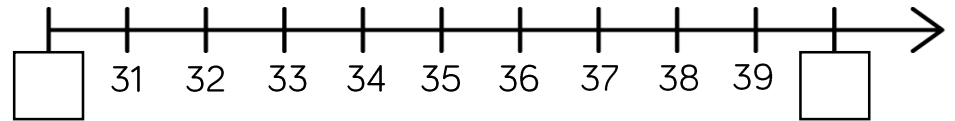
Which column do we look at when rounding to the nearest 10?

What do we do if the number in that column is a 5?

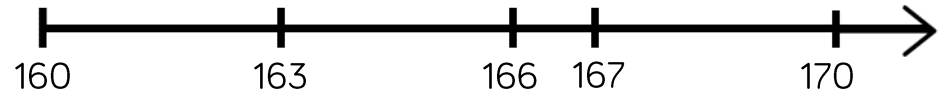
Which number is being represented? Will we round it up or not? Why?

Varied Fluency

Which multiples of 10 do the numbers sit between?



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



Round 163, 166 and 167 to the nearest 10

Complete the table:

Start number	Rounded to the nearest 10
851	
XCVIII	

Round to the Nearest 10

Reasoning and Problem Solving

A whole number is rounded to 370
 What could the number be?
 Write down all the possible answers.

370

- 365
- 366
- 367
- 368
- 369
- 370
- 371
- 372
- 373
- 374

Two different two-digit numbers both round to 40 when rounded to the nearest 10

The sum of the two numbers is 79

What could the two numbers be?

Is there more than one possibility?

- $35 + 44 = 79$
- $36 + 43 = 79$
- $37 + 42 = 79$
- $38 + 41 = 79$
- $39 + 40 = 79$

Whitney says:



847 to the nearest 10 is 840

Do you agree with Whitney?

Explain why.

I don't agree with Whitney because 847 rounded to the nearest 10 is 850. I know this because ones ending in 5, 6, 7, 8 and 9 round up.

Round to the Nearest 100

Notes and Guidance

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

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

Mathematical Talk

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

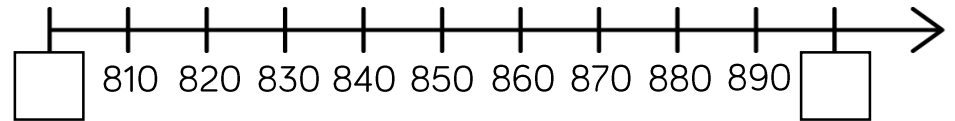
Why do numbers up to 49 round down to the nearest 100 and numbers 50 to 99 round up?

What would 49 round to, to the nearest 100?

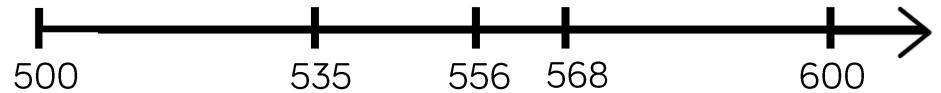
Can the answer be 0 when rounding?

Varied Fluency

- Which multiples of 100 do the numbers sit between?



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



Round 535, 556 and 568 to the nearest 100

Use the stem sentence: ____ rounded to the nearest 100 is ____.

- Complete the table:

Start number	Rounded to the nearest 100
994	
XLV	

Round to the Nearest 100

Reasoning and Problem Solving

Always, Sometimes, Never

Explain your reasons for each statement.

- A number with a five in the tens column rounds up to the nearest hundred.
- A number with a five in the ones column rounds up to the nearest hundred.
- A number with a five in the hundreds column rounds up to the nearest hundred.

Always – a number with five in the tens column will be 50 or above so will always round up.

Sometimes – a number with five in the ones column might have 0 to 4 in the tens column (do not round up) or 5 to 9 (round up).

Sometimes – a number with five in the hundreds column will also round up or down dependent on the number in the tens column.

When a whole number is rounded to the nearest 100, the answer is 200

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

What could the number be?

Is there more than one possibility?

Using the digit cards 0 to 9, can you make whole numbers that fit the following rules? You can only use each digit once.

1. When rounded to the nearest 10, I round to 20
2. When rounded to the nearest 10, I round to 10
3. When rounded to the nearest 100, I round to 700

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

To 20, it could be 15 to 24

To 10, it could be 5 to 14

To 700, it could be 650 to 749

Use each digit once: 5, 24, 679 or 9, 17, 653 etc.

Count in 1,000s

Notes and Guidance

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

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

Mathematical Talk

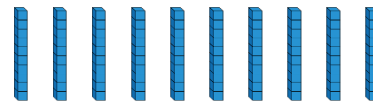
How many hundreds are there in one thousand?
 How many hundreds make ____ thousands?

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

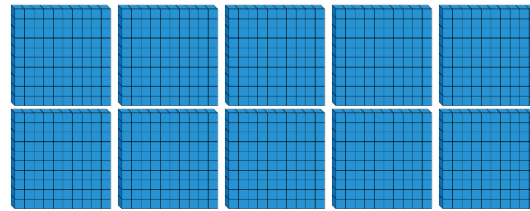
When counting in thousands, which is the only digit to change?

How many sweets would there be in ____ jars?

Varied Fluency



____ tens make ____ hundred.



____ hundreds make ____ thousand.



How many sweets are there altogether?



1,000



1,000

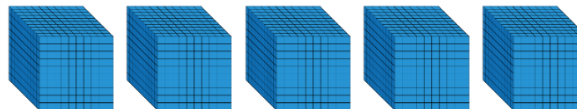


1,000

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



What numbers are represented below?



Count in 1,000s

Reasoning and Problem Solving

Always, Sometimes, Never

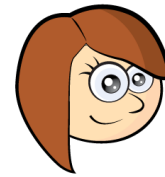
- When counting in hundreds, the ones digit changes.
- The thousands column changes every time you count in thousands.
- To count in thousands, we use 4-digit numbers.

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

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

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

Rosie says,



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

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

Mathematical Talk

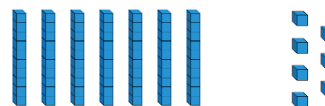
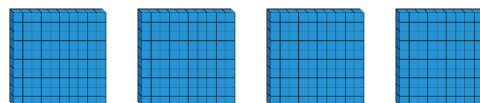
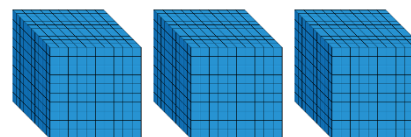
Can you represent the number on a place value grid?
How many thousands/hundreds/tens/ones are there?

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

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

Varied Fluency

Complete the sentences.

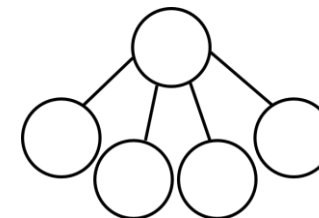
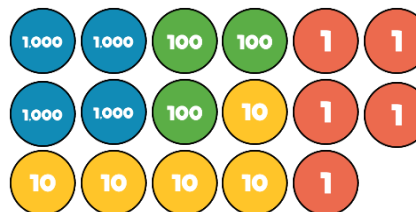


There are _____ thousands,
_____ hundreds, _____
tens and _____ ones.

The number is _____.

___ + ___ + ___ + ___ = ___

Complete the part-whole model for the number represented.



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

6,983

9,021

789

6,570

Represent each of the numbers on a place value grid.

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

Reasoning and Problem Solving

Create four 4-digit numbers to fit the following rules:

- The tens digit is 3
- The hundreds digit is two more than the ones digit
- The four digits have a total of 12

Possible answers:

3,432
5,331
1,533
7,230

Use the clues to find the missing digits.



The thousands and tens digit multiply together to make 36

The hundreds and tens digit have a digit total of 9

The ones digit is double the thousands digit.

The whole number has a digit total of 21

4,098

Partitioning

Notes and Guidance

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

They need to understand that, for example, $5000 + 300 + 20 + 9$ is equal to $4000 + 1300 + 10 + 19$

This is crucial to later work on adding and subtracting 4-digit numbers and children explore this explicitly.

Mathematical Talk

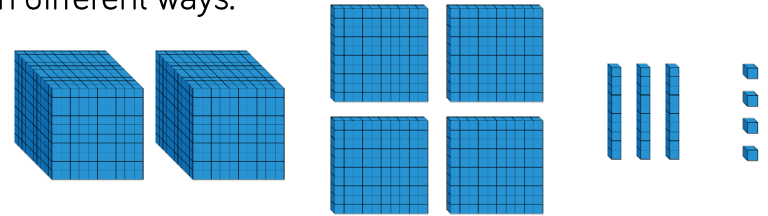
What number is being represented?

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

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

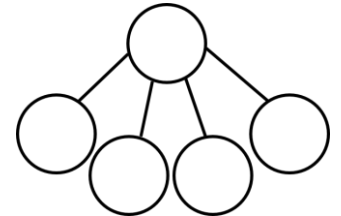
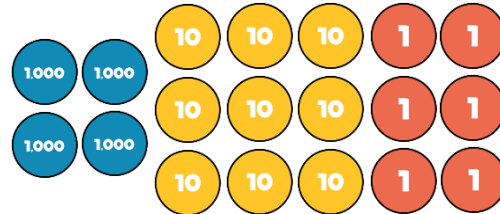
Varied Fluency

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



$$\begin{array}{r}
 2000 + 400 + \boxed{} + 4 \\
 1000 + \boxed{} + \boxed{} + 14 \\
 1000 + 1300 + \boxed{} + \boxed{}
 \end{array}$$

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



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

Partitioning

Reasoning and Problem Solving

Which is the odd one out?

3,500

3,500 ones

2 thousands
and 15 hundreds

35 tens

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

Explain how you know.

Jack says:

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



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

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

Amir says:



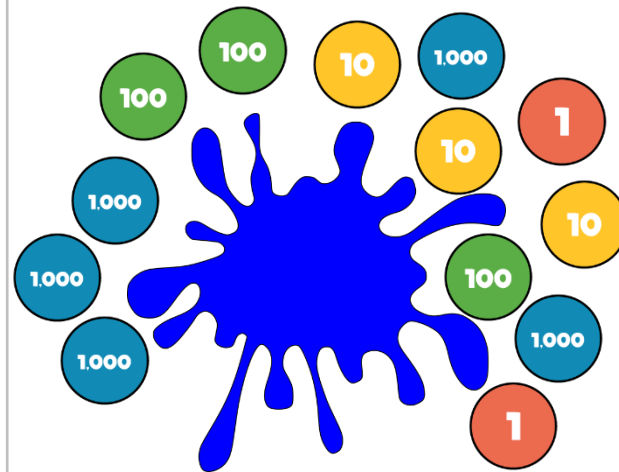
Who has the largest number?
Explain.

Some place value counters are hidden.

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

Which place value counters could be hidden?

Think of at least three solutions.



Possible answers:

One 1,000 counter and one 100 counter.

Ten 100 counters and ten 10 counters.

Eleven 100 counters.

Number Line to 10,000

Notes and Guidance

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

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

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

Mathematical Talk

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

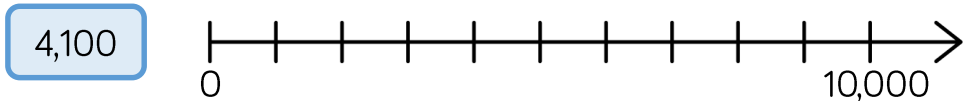
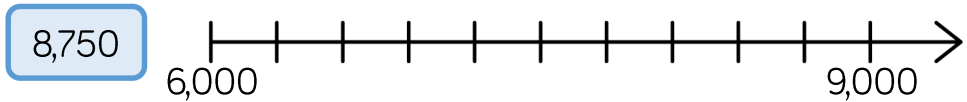
When estimating where a number should be placed, on a number line, what can help you?

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

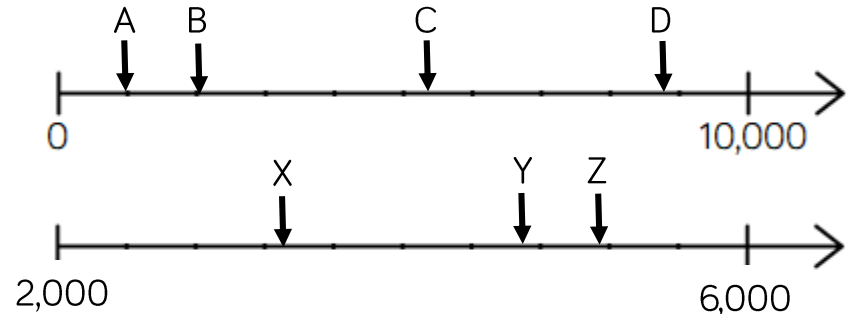
When a number line has no values at the end, what strategies could you use to help you figure out the missing value? Could there be more than one answer?

Varied Fluency

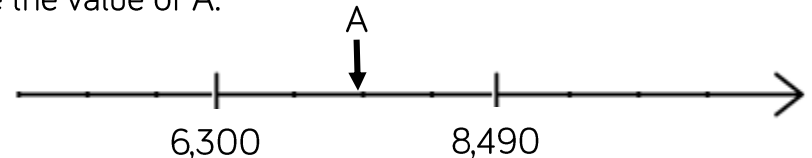
Draw arrows to show where the numbers would be on the number line.



Estimate the value of each letter.



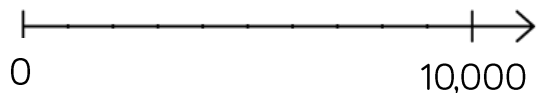
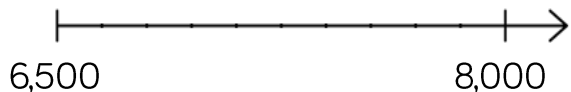
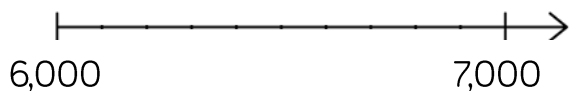
Estimate the value of A.



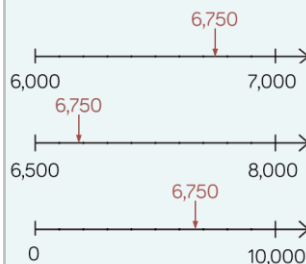
Number Line to 10,000

Reasoning and Problem Solving

Place 6,750 on each of the number lines.

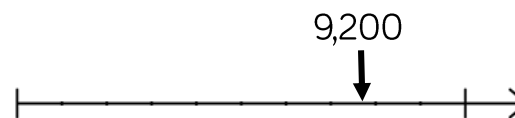


No, each line has different numbers at the start and end so the position of 6,750 changes.



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

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



Possible answers:

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

1, 10, 100 More or Less

Notes and Guidance

Building on children’s learning in Year 2 where they explored finding one more/less, children now move onto finding 10 and 100 more or less than a given number.

Show children that they can represent their answer in a variety of different ways. For example, as numerals or words, or with concrete manipulatives.

Mathematical Talk

What is 10 more than/less than ____?

What is 100 more than/less than ____?

Which column changes? Can more than one column change?

What happens when I subtract 10 from 209?

Why is this more difficult?

Varied Fluency



Put the correct number in each box.

 10 less 100 less	<div style="border: 1px solid black; width: 80px; height: 40px; margin: 0 auto;"></div> Number <div style="border: 1px solid black; width: 80px; height: 40px; margin: 0 auto;"></div> Number	 10 more 100 more
-----------------------------	--	-----------------------------

Show ten more and ten less than the following numbers using Base 10 and place value counters.

550

724

302

Complete the table.

100 less	Number	100 more

1, 10, 100 More or Less

Reasoning and Problem Solving



10 more than my number is the same as 100 less than 320

What is my number?

Explain how you know.

Write your own similar problem to describe the original number.

The number described is 210 because 100 less than 320 is 220, which means 220 is 10 more than the original number.

I think of a number, add ten, subtract one hundred and then add one.

My answer is 256

What number did I start with?

Explain how you know.

What can you do to check?

The start number was 345 because one less than 256 is 255, one hundred more than 255 is 355 and ten less than 355 is 345
To check I can follow the steps back to get 256

A counter is missing on the place value chart.

Hundreds	Tens	Ones

What number could it have been?

Possible answers:
401
311
302

1,000 More or Less

Notes and Guidance

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

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

Mathematical Talk

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

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

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

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

Varied Fluency

Fill in the missing values.

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

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

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

Complete the table.

1,000 less	Number	1,000 more

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

5,000

7,500

2,359

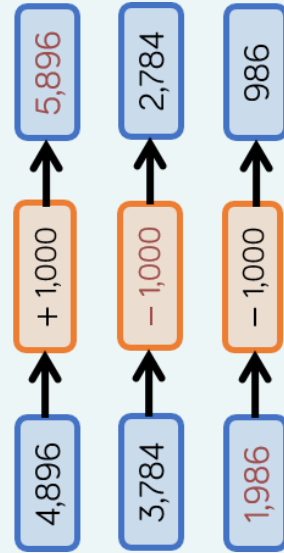
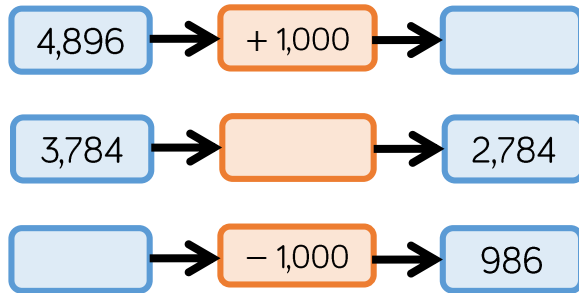
8,999

Use concrete resources to prove you are correct.

1,000 More or Less

Reasoning and Problem Solving

Complete the missing boxes:



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:

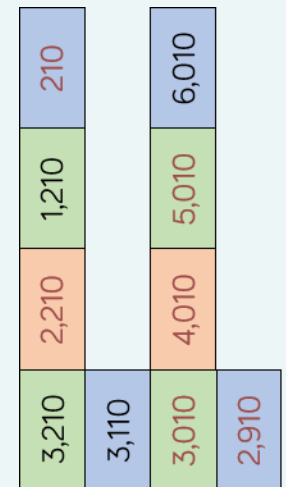
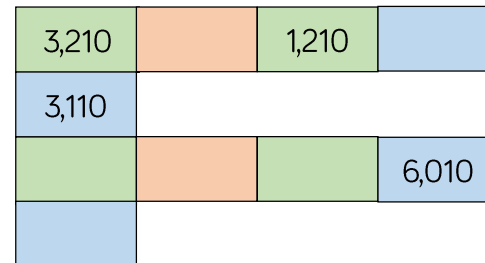


When I add 1,000 to 4,325, I only have to change 1 digit.

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/show which is greater and which is smaller.

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

Mathematical Talk

Which two numbers are being represented?

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

Which column do you start comparing from? Why?

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

How many answers can you find?

Varied Fluency

Complete the statements using $<$, $>$ or $=$

	○	
	○	
	○	
5,689		5,892

Circle the smallest amount in each pair.

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

Complete the statements.

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

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

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. They reinforce their understanding by using a variety of representations.

Children find the largest or smallest number from a set.

Mathematical Talk

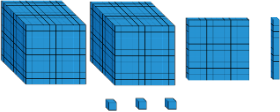
Which number is the greatest? Which number is smallest?
How do you know?

Why have you chosen to order the numbers this way?

What strategy did you use to solve this problem?

Varied Fluency

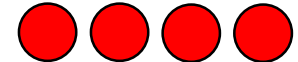
Fill in the circle using $<$, $>$ or $=$

2,764  XXVII

Here are four digit cards:

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

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



1000s	100s	10s	1s

Record all your numbers and write them in descending order.

Order Numbers

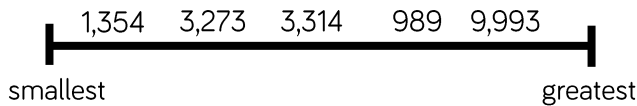
Reasoning and Problem Solving

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

All the other numbers have digit totals of 20

What could the other three numbers be?

What mistake has been made?



3,476

3,584

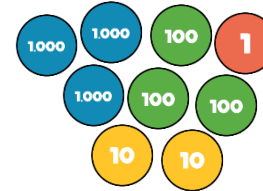
3,593

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.

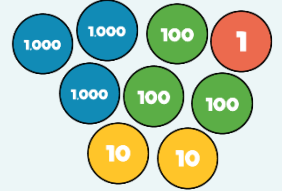
Half of 2,400

LXXXVI



LXXXVI

Half of 2,400



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

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

Can you find more than one way?

Possible answer:

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

Round to the Nearest 1,000

Notes and Guidance

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

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

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

Mathematical Talk

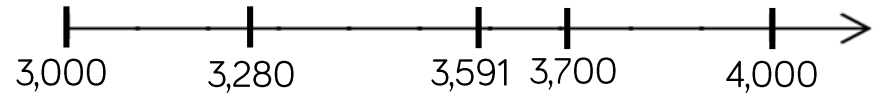
Which thousands numbers does _____ sit between?

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

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

Varied Fluency

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



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

- Round these numbers to the nearest 1,000
 - Eight thousand and fifty-six
 - 5 thousands, 5 hundreds, 5 tens and 5 ones
 -
 - LXXXII

- Complete the table.


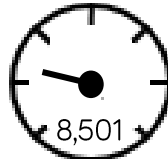

Start number	Rounded to the nearest 10	Rounded to the nearest 100	Rounded to the nearest 1,000
4,999			
LXXXII			

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>Car A</p>  <p>9,869</p> <p>Approximately 10,000 miles</p>	<p>Car B</p>  <p>8,501</p> <p>Approximately 8,000 miles</p>	<p>Car C</p>  <p>7,869</p> <p>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

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

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

Mathematical Talk

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

What digit do multiples of 25 end in?

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

Varied Fluency

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

25	50	75	100	125	150
----	----	----	-----	-----	-----

50	100	150	200	250	300
----	-----	-----	-----	-----	-----

- Complete the number tracks

25		75		125	150				250
----	--	----	--	-----	-----	--	--	--	-----

	725	700		650		600			
--	-----	-----	--	-----	--	-----	--	--	--

- Circle the mistake in each sequence.

2, 275 2,300 2,325 2,350 2,400, ...

1,000 975 925 900 875 ...

Count in 25s

Reasoning and Problem Solving

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

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

Do you agree with Whitney?
Explain why.

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

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

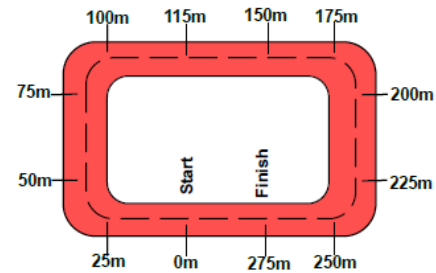
Explain your answer.

No, he will not say 725 because:

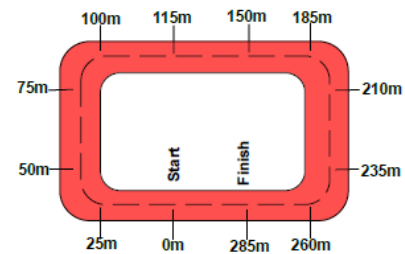
790, 765, 740, 715, 690, 665, ...

Two race tracks have been split into 25m intervals.

Race track A



Race track B



What errors have been made?

Possible answers:

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

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

Negative Numbers

Notes and Guidance

Children recognise that there are numbers below zero. It is essential that this concept is linked to real life situations such as temperature, water depth etc.

Children should be able to count back through zero using correct mathematical language of “negative four” rather than “minus four” for example. This counting can be supported through the use of number squares, number lines or other visual aids.

Mathematical Talk

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

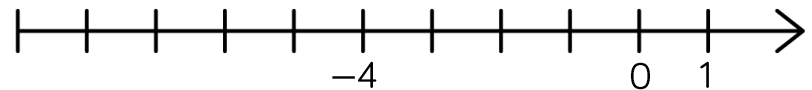
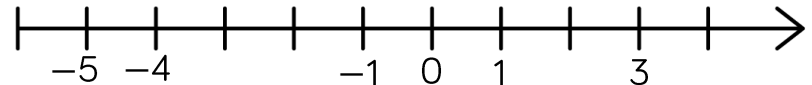
Can you use the words positive and negative in a sentence to describe numbers?

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

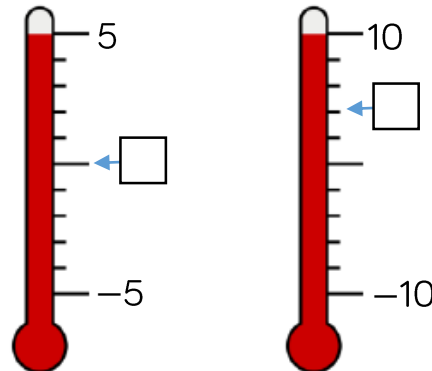
Is -1 degrees warmer or colder than -4 degrees?

Varied Fluency

Complete the number lines



Fill in the missing temperatures on the thermometers.



Dexter is counting backwards out loud.

He says,

“Two, one, negative one, negative two, negative three ...”

What mistake has Dexter made?

Negative Numbers

Reasoning and Problem Solving

Can you spot the mistake in these number sequences?

a) $2, 0, 0, -2, -4$

b) $1, -2, -4, -6, -8$

c) $5, 0, -5, -10, -20$

Explain how you found the mistake and convince me you are correct.

a) 0 is incorrect as it is written twice.

b) 1 is incorrect. The sequence has a difference of 2 each time, so the first number should be 2

c) -20 is incorrect. The sequence is decreasing by 5, so the final number should be -15

Teddy counted down in 3s until he reached -18

He started at 21, what was the tenth number he said?

-6

Ensure the first number said is 21
 $21, 18, 15, 12, 9, 6, 3, 0, -3, -6, \dots$

Roman Numerals

Notes and Guidance

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

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

Mathematical Talk

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

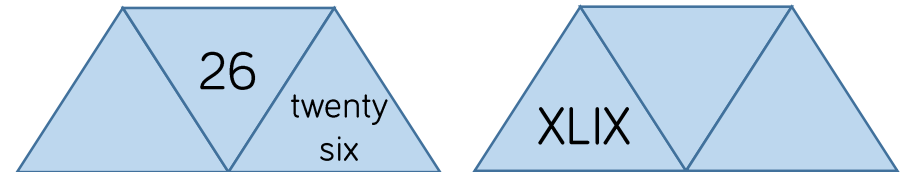
Can you spot any patterns? If 20 is XX what might 200 be?

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

Varied Fluency

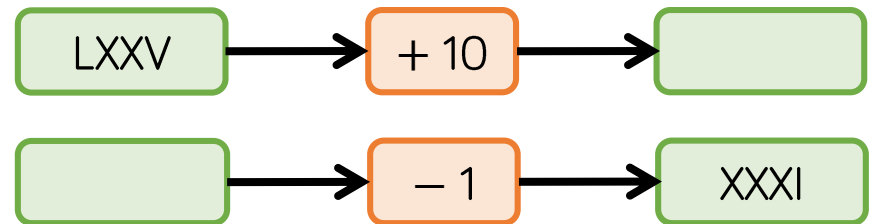
- Lollipop stick activity.
 The teacher shouts out a number and the children make it with lollipop sticks.
 Children could also do this in pairs or groups, and for a bit of fun they could test the teacher!

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



Complete the diagrams.

- Complete the function machines.



Roman Numerals

Reasoning and Problem Solving

Solve the following calculation:

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

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

Answer: L

Other possible calculations include:

$$C \div II = L$$

$$L \div I = L$$

$$X \times V = L$$

$$XXV \times II = L$$

$$LXV - XV = L$$

$$C - L = L$$

$$XX + XX + X = L$$

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 Mo is correct.

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

White

**Rose
Maths**

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

Notes for 2020/21

- ▶ Add and subtract 1s, 10s, 100s and 1,000s
- ▶ Add two 3-digit numbers - not crossing 10 or 100 R
- ▶ Add two 4-digit numbers – no exchange
- ▶ Add two 3-digit numbers - crossing 10 or 100 R
- ▶ Add two 4-digit numbers – one exchange
- ▶ Add two 4-digit numbers – more than one exchange
- ▶ Subtract a 3-digit number from a 3-digit number - no exchange R
- ▶ Subtract two 4-digit numbers – no exchange
- ▶ Subtract a 3-digit number from a 3-digit number - exchange R
- ▶ Subtract two 4-digit numbers – one exchange
- ▶ Subtract two 4-digit numbers – more than one exchange
- ▶ Efficient subtraction
- ▶ Estimate answers
- ▶ Checking strategies

As we move through the autumn term we've suggested you spend a little more time on addition and subtraction making sure children can add any 2 and 3 digit numbers, before moving into 4 digit numbers.

Ensuring children have this solid foundation will make the move into larger numbers much simpler.

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

Notes and Guidance

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

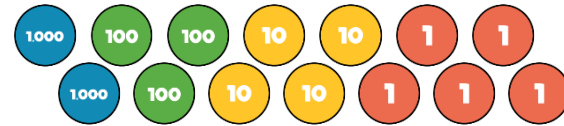
Children should use concrete representations (Base 10, place value counters etc.) before moving to abstract and mental methods.

Mathematical Talk

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

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

Varied Fluency



The number being represented is ____.

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

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

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

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



Here is a number.

Thousands	Hundreds	Tens	Ones
5	3	8	2

Add 3 thousands to the number.

Subtract 4 thousands from the answer.

Subtract 2 ones.

Add 5 tens.

What number do you have now?

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

Reasoning and Problem Solving

Which questions are easy?
Which questions are hard?

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

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

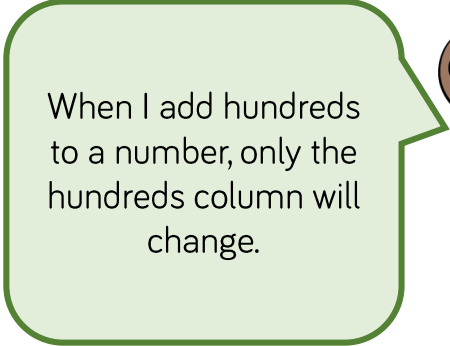
$$8,273 - 500 = \underline{\quad}$$

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

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 3-digit Numbers (1)

Notes and Guidance

Children add two 3-digit numbers with no exchange. They should focus on the lining up of the digits and setting the additions clearly out in columns.

Having exchanged between columns in recent steps, look out for children who exchange ones and tens when they don't need to.

Reinforce that we only exchange when there are 10 or more in a column.

Mathematical Talk

Where would these digits go on the place value chart? Why?

Why do we make both numbers when we add?

Can you represent ___ using the equipment?

Can you draw a picture to represent this?

Why is it important to put the digits in the correct column?

Varied Fluency



Complete the calculations.

H	T	O

___ + ___ = ___

H	T	O

___ + ___ = ___

Use the column method to calculate:

- Three hundred and forty-five add two hundred and thirty-six.
- Five hundred and sixteen plus three hundred and sixty-two.
- The total of two hundred and forty-seven and four hundred and two.

Add Two 3-digit Numbers (1)

Reasoning and Problem Solving



Jack is calculating $506 + 243$

Here is his working out.

		5	6
+	2	4	3
	2	9	9

Can you spot Jack's mistake?
Work out the correct answer.

Jack hasn't used zero as a place holder in the tens column.
The correct answer should be 749

Here are three digit cards.



Alex and Teddy are making 3-digit numbers using each card once.



Alex

I have made the greatest possible number.



Teddy

I have made the smallest possible number.

Work out the total of their two numbers.

Alex's number is 432
Teddy's number is 234

The total is 666

Add Two 4-digit Numbers (1)

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

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

1,000s	100s	10s	1s

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 3-digit Numbers (2)

Notes and Guidance

Children add two 3-digit numbers with an exchange. They start by adding numbers where there is one exchange required before looking at questions where they need to exchange in two different columns. Children may use Base 10 or place value counters to model their understanding. Ensure that children continue to show the written method alongside the concrete so they understand when and why an exchange takes place.

Mathematical Talk

How many ones do we need to exchange for one ten?

How many tens do we need to exchange for one hundred?

Can you work out how many points Eva and Ron scored each over the two games?

Why is it so important to show the exchanged digit on the column method?

Varied Fluency



Use place value counters to calculate $455 + 436$

	H	T	O
+			

	4	5	5
+	4	3	6

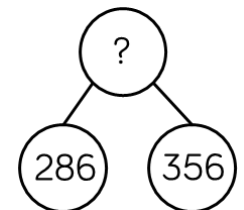
Eva and Ron are playing a game.
 Eva scores 351 points and Ron scores 478 points.
 How many points do they score altogether?
 How many more points does Ron score than Eva?

Eva and Ron play the game again.
 Eva scores 281 points, Ron scores 60 less than Eva.
 How many points do they score altogether?

Complete the models.

457	187

178	349



Add Two 3-digit Numbers (2)

Reasoning and Problem Solving



Roll a 1 to 6 die.
Fill in a box each time you roll.

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

Can you make the total:

- An odd number
- An even number
- A multiple of 5
- The greatest possible number
- The smallest possible number

Discuss the rules with the children and what they would need to roll to get them e.g. to get an odd number only one of the ones should be odd because if both ones have an odd number, their total will be even.

Complete the statements to make them correct.

$$487 + 368 \quad \bigcirc \quad 487 + 468$$

$$326 + 258 \quad \bigcirc \quad 325 + 259$$

$$391 + 600 = 401 + \underline{\quad}$$

Explain why you do not have to work out the answers to compare them.

$$\begin{aligned} < \\ = \\ 590 \end{aligned}$$

In the first one we start with the same number, so the one we add more to will be greater.

In the second 325 is one less than 326 and 259 is one more than 258, so the total will be the same.

In the last one 401 is 10 more than 391, so we need to add 10 less than 600.

Add Two 4-digit Numbers (2)

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

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

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

Th	H	T	O
3000	300	50	6
2000	400	30	5
			10

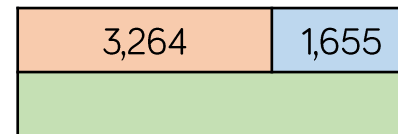
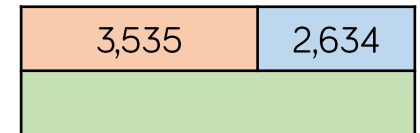
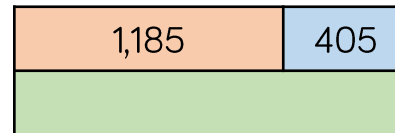
Use Rosie's method to calculate:

$3,356 + 2,437$
 $3,356 + 2,473$
 $3,356 + 2,743$

Dexter buys a laptop costing £1,265 and a mobile phone costing £492

How much do the laptop and the mobile phone cost altogether?

Complete the bar models.



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

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

Annie's Strategy

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

$$300 + 800 = 1100$$

$$70 + 20 = 90$$

$$4 + 3 = 7$$

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

Mo's Strategy

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

Alex's Strategy

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

Who is correct?

Alex is correct with 9,197

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

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

Add Two 4-digit Numbers (3)

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

Use counters and a place value grid to calculate:

	5	9	3	4		3	2	7	5		1	7	7	2
+	2	2	4	6	+	6	1	5	6	+	2	2	5	0

Find the total of 4,844 and 2,156

Th	H	T	O

	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.

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

Complete:

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

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

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

$$6, _38 + 2, _87$$

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

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

Subtract 3-digits from 3-digits (1)

Notes and Guidance

It is important for the children to understand that there are different methods of subtraction. They need to explore efficient strategies for subtraction, including:

- counting on (number lines)
- near subtraction
- number bonds

They then move on to setting out formal column subtraction supported by practical equipment.

Mathematical Talk

Which strategy would you use and why?

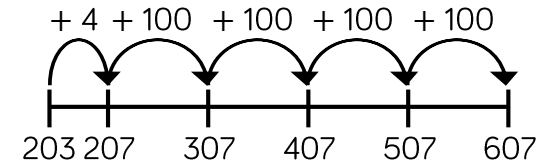
How could you check your answer is correct?

Does it matter which number is at the top of the subtraction?

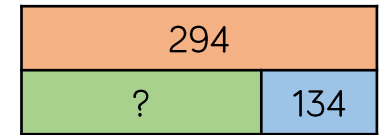
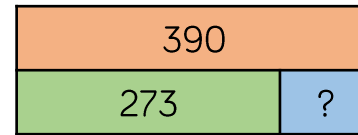
Varied Fluency



We can count on using a number line to find the missing value on the bar model. E.g.

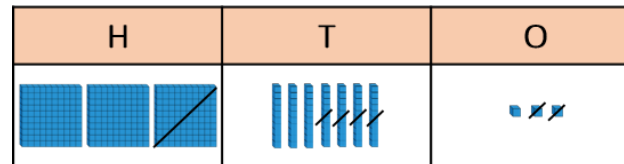


Use this method to find the missing values.



There are 146 girls and boys in a swimming club. 115 of them are girls. How many are boys?

Mo uses Base 10 to subtract 142 from 373



	3	7	3
-	1	4	2

Use Mo's method to calculate:

565 - 154 565 - 145 565 - 165

Subtract 3-digits from 3-digits (1)

Reasoning and Problem Solving



Start with the number 888
 Roll a 1-6 die three times, to make a 3-digit number.
 Subtract the number from 888
 What number have you got now?

What's the smallest possible difference?

What's the largest possible difference?

What if all the digits have to be different?

Will you ever find a difference that is a multiple of 10? Why?

Do you have more odd or even differences?

The smallest difference is 222 from rolling 111

The largest difference is 777 from rolling 666

Children will never have a multiple of 10 because you can't roll an 8 to subtract 8 ones.

Children may investigate what is subtracted in the ones column to make odd and even numbers.

Use the digit cards to complete the calculation.

The digits in the shaded boxes are odd.
 Is there more than one answer?

Possible answers include:

$987 - 647 = 340$
 $879 - 473 = 406$

Subtract Two 4-digit Numbers (1)

Notes and Guidance

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

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

Mathematical Talk

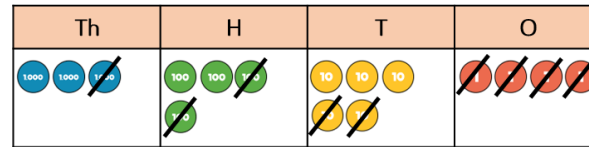
Do you need to make both numbers when you are subtracting with counters? Why?

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

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

Varied Fluency

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



	Th	H	T	O
	3	4	5	4
-	1	2	2	4
	2	2	3	0

Use Eva's method to calculate:

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

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

Use a bar model to represent each problem.

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

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

Subtract Two 4-digit Numbers (1)

Reasoning and Problem Solving

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



The larger number has a digit total of 35

The smaller number has a digit total of 2

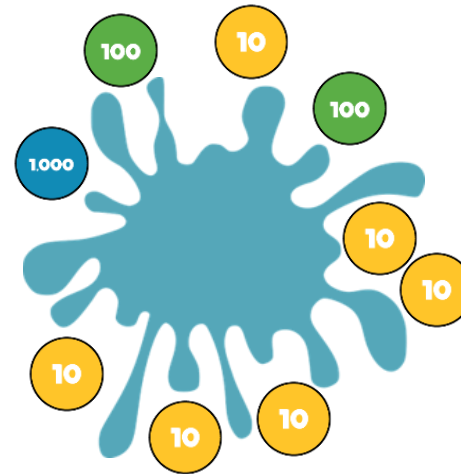
Use cards to help you find the numbers.

What could Eva's subtraction be?

How many different options can you find?

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

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



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

$$3470 - 1260 = 2210$$

Possible answers include:

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

Subtract 3-digits from 3-digits (2)

Notes and Guidance

Children explore column subtraction using concrete manipulatives. It is important to show the column method alongside so that children make the connection to the abstract method and so understand what is happening. Children progress from an exchange in one column, to an exchange in two columns. Reinforce the importance of recording any exchanges clearly in the written method.

Mathematical Talk

Which method would you use for this calculation and why?

What happens when you can't subtract 9 ones from 7 ones?
What do we need to do?

How would you teach somebody else to use column subtraction with exchange?

Why do we exchange? When do we exchange?

Varied Fluency



Complete the calculations using place value counters.

372 – 145

H	T	O

629 – 483

H	T	O

Complete the column subtractions showing any exchanges.

	H	T	O
	6	8	3
–	2	3	4

	H	T	O
	2	3	4
–	1	9	5

	H	T	O
	5	0	7
–	4	5	1

Subtract 3-digits from 3-digits (2)

Reasoning and Problem Solving



Work out the missing digits.

	H	T	O
	5	?	3
–	2	1	8
	3	1	5

	H	T	O
	?	0	?
–	2	?	8
	2	4	6

$$533 - 218 = 315$$

$$504 - 258 = 246$$

Eva is working out $406 - 289$

Here is her working out:

Step 1	Step 2
$\begin{array}{r} \overset{3}{\cancel{4}}06 \\ - 289 \\ \hline 7 \end{array}$	$\begin{array}{r} \overset{2}{\cancel{4}}\overset{1}{0}\overset{1}{6} \\ - 289 \\ \hline 027 \end{array}$

Explain her mistake.

What should the answer be?

Eva has exchanged from the hundred column to the ones so there are 106 ones in the ones column. She should have exchanged 1 hundred for 10 tens and then 1 ten for 10 ones.

$$406 - 289 = 117$$

Subtract Two 4-digit Numbers (2)

Notes and Guidance

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

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

Mathematical Talk

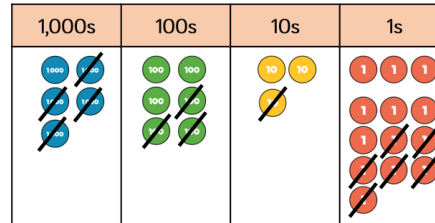
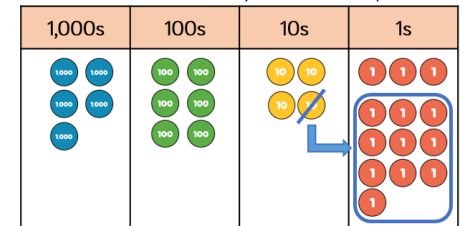
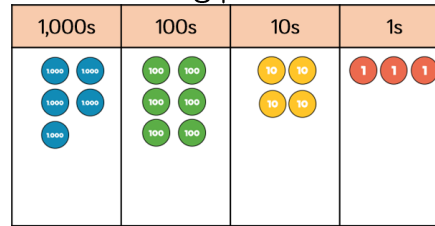
When do we need to exchange in a subtraction?
How do we indicate the exchange on the written method?

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

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

Varied Fluency

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



	Th	H	T	O
	5	6	3	4
-	4	3	1	6
	1	3	2	7

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

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

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

Subtract Two 4-digit Numbers (2)

Reasoning and Problem Solving



1,235 people go on a school trip.

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

How many parents are there?

Explain your method to a friend.

Add children and teachers together first.

$$1,179 + 27 = 1,206$$

Subtract this from total number of people.

$$1,235 - 1,206 = 29$$

29 parents.

Find the missing numbers that could go into the spaces.

Give reasons for your answers.

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

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. They can continue to use manipulatives to support their understanding. Some children may feel confident calculating with a written method.

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

Mathematical Talk

When do we need to exchange within a column subtraction?

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

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

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

Varied Fluency

Use place value counters and the column method to calculate:

$5,783 - 844$

$6,737 - 759$

$8,252 - 6,560$

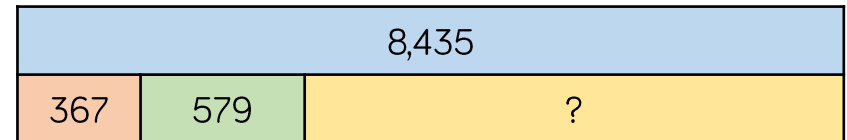
$1,205 - 398$

$2,037 - 889$

$2,037 - 1,589$

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

How many magazines are left?



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 is correct.

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



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?

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



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

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

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

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

Efficient Subtraction

Notes and Guidance

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

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

Mathematical Talk

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

Varied Fluency

Ron, Rosie and Dexter are calculating $7,000 - 3,582$

Here are their methods:

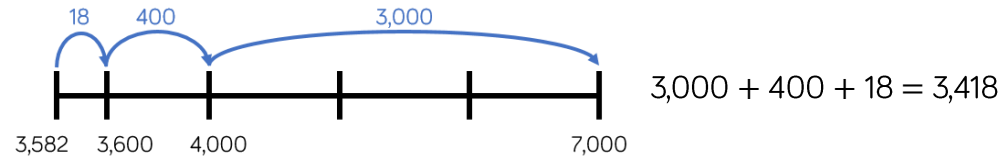
Ron

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

Rosie

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

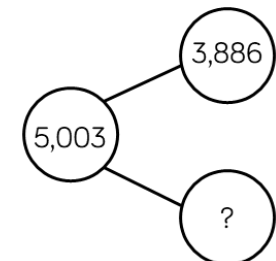
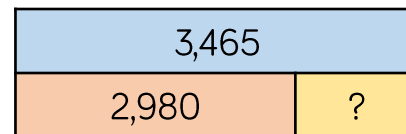
Dexter



Whose method is most efficient?

Use the different methods to calculate $4,000 - 2,831$

Find the missing numbers.
What methods did you use?



Efficient Subtraction

Reasoning and Problem Solving

Amir has £1,000



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

How much money does he have left?

Show 3 different methods of finding the answer.

Explain how you completed each one.

Which is the most effective method?

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

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

$$2,451 - 1,831$$

$$2,451 - 1,829$$

$$2,500 - 1,880$$

$$2,500 - 1,780$$

$$2,449 - 1,829$$

$$2,449 - 1,831$$

When is it useful to use difference to solve subtractions?

$$2,451 - 1,831$$

Added one to each number.

$$2,500 - 1,880$$

Added 50 to both numbers.

$$2,449 - 1,829$$

Subtracted one from each number.

The difference is 620

Estimate Answers

Notes and Guidance

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

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

Mathematical Talk

When in real life would we use an estimate?

Why should an estimate be quick?

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

Varied Fluency

Match the calculations with a good estimate.

$345 + 1,234$

$3,000 + 6,000$

$2,985 + 6,325$

$3,500 + 1,200$

$3,541 + 1,179$

$350 + 1,200$

$2,135 + 6,292$

$2,000 + 6,000$

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

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

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 to the calculations.

$4,623 + 3,421$

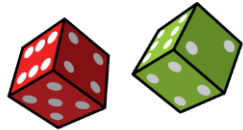
$9,732 - 6,489$

$8,934 - 1,187$

Estimate Answers

Reasoning and Problem Solving

Game



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

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

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

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

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

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

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

Possible answers include
 $2,343 + 1,089 =$
 $4,730 - 1,304 =$

$3,812 - 1,295$
 $(3,800 - 1,300 = 2,500)$
 $4,002 - 1,489$
 $(4,000 - 1,500 = 2,500)$
 $1,449 + 1,120$
 $(1,400 + 1,100 = 2,500)$

Checking Strategies

Notes and Guidance

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

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

Mathematical Talk

How can you tell if your answer is sensible?

What is the inverse of addition?

What is the inverse of subtraction?

Varied Fluency



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

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



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

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

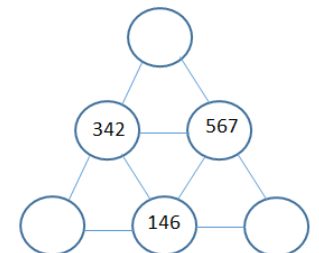
$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

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

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.

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

Notes for 2020/21

- ▶ Equivalent lengths - m and cm R
- ▶ Equivalent lengths - mm and cm R
- ▶ Kilometres
- ▶ Add lengths R
- ▶ Subtract lengths R
- ▶ Measure perimeter R
- ▶ Perimeter on a grid
- ▶ Perimeter of a rectangle
- ▶ Perimeter of rectilinear shapes

We've added extra time in autumn term to look at content children have likely missed at the end of Y3, particularly on metric units and conversion between them.

This is often a skill children find difficult to remember and grasp, so we think this extra time will be useful.

Equivalent Lengths – m & cm

Notes and Guidance

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

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

Mathematical Talk

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

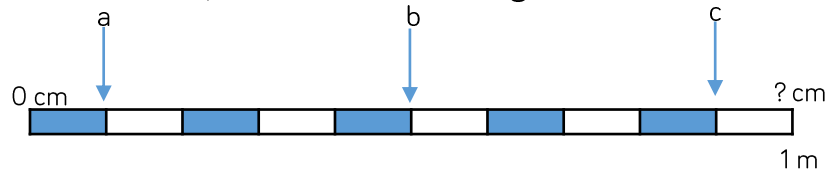
Do we need to partition 235 cm into hundreds, tens and ones to convert it to metres? Is it more efficient to partition it into two parts? What would the two parts be?

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

Varied Fluency



If $a = 10$ cm, calculate the missing measurements.



$b = \underline{\quad}$ cm $c = \underline{\quad}$ cm 1 metre = $\underline{\quad}$ cm

Can you match the equivalent measurements?

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

Eva uses this diagram to convert between centimetres and metres.

Use Eva's method to convert:

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

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

Equivalent Lengths – m & cm

Reasoning and Problem Solving



Mo and Alex each have a skipping rope.

Alex says,



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

Mo says,



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

Who is correct?

Explain your answer.

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

Three children are partitioning 754 cm

Teddy says,



75 m and 4 cm

Whitney says,



7 m and 54 cm

Jack says,



54 cm and 7 m

Who is correct?

Explain why.

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

Equivalent Lengths – mm & cm

Notes and Guidance

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

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

Mathematical Talk

What items might we measure using millimetres rather than centimetres?

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

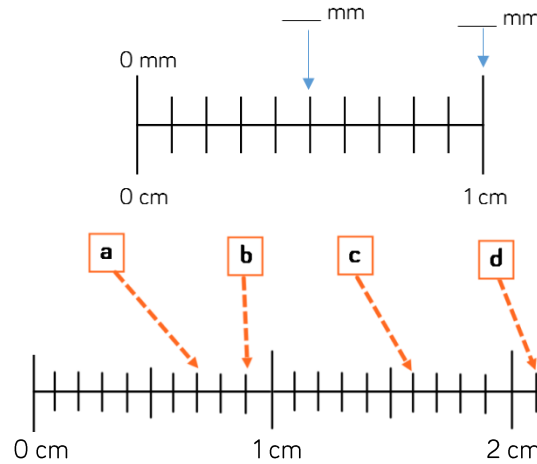
How many millimetres are in $\frac{1}{2}$ cm?

How many different ways can you partition 54 cm?

Varied Fluency



Fill in the blanks.

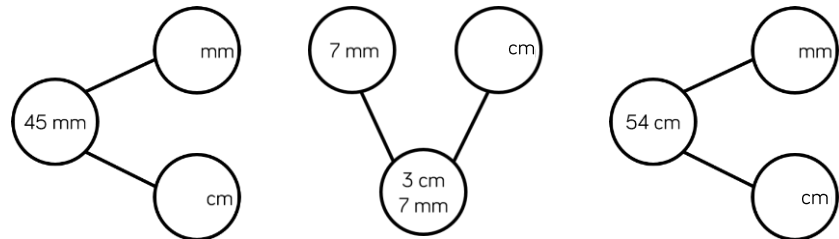


There are ___ mm in 1 cm.

- a = ___ cm ___ mm
- b = ___ cm ___ mm
- c = ___ cm ___ mm
- d = ___ cm ___ mm

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

Complete the part whole models.

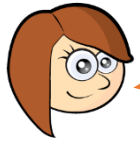


Equivalent Lengths – mm & cm

Reasoning and Problem Solving



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



The sunflower is 150 cm tall.

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

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

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



- In mm, my measurement is a multiple of 2
- It has 8 cm and some mm
- It's less than 85 mm
- In mm, the digit sum is 12

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

Kilometres

Notes and Guidance

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

Mathematical Talk

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

Varied Fluency

Complete the statements.

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

$8 \text{ km} = \underline{\quad\quad\quad} \text{ m}$

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

$3 \text{ km} + 6 \text{ km} = \underline{\quad\quad\quad} \text{ m}$

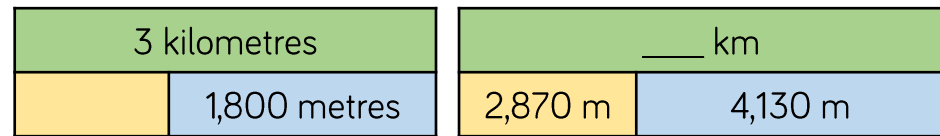
$500 \text{ m} = \underline{\quad} \text{ km}$

$250 \text{ m} = \underline{\quad\quad\quad} \text{ km}$

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

$4,500 \text{ m} - 2,000 \text{ m} = \underline{\quad\quad\quad} \text{ km}$

Complete the bar models.



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

- | | | |
|-------|-----------------------|------------------|
| 500 m | <input type="radio"/> | $\frac{1}{2}$ km |
| 7 km | <input type="radio"/> | 800 m |
| 5 km | <input type="radio"/> | 500 m |

Kilometres

Reasoning and Problem Solving

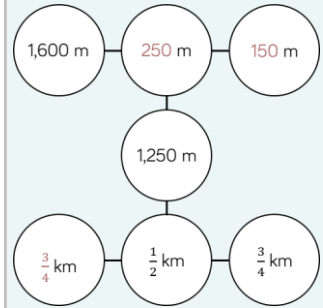
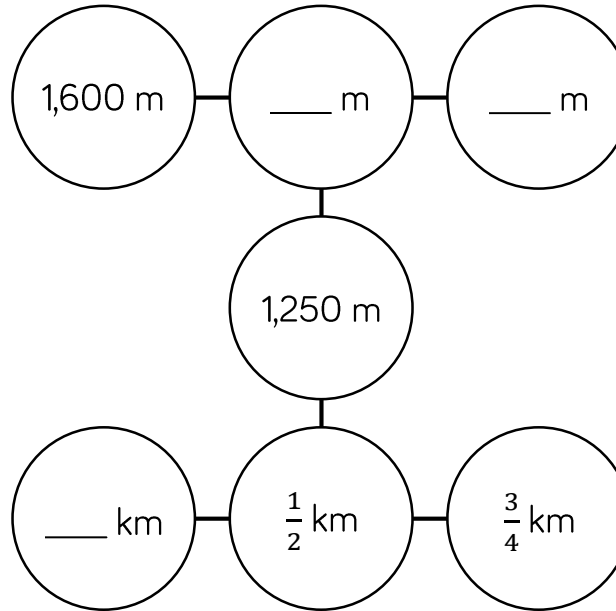
Dexter and Rosie walk 15 kilometres altogether for charity.
 Rosie walks double the distance that Dexter walks.
 How far does Dexter walk?

Rosie walks 10 km.
 Dexter walks 5 km.

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

Rosie raises £20
 Dexter raises £10

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



Add Lengths

Notes and Guidance

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

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

Mathematical Talk

How did you calculate the height of the tower?

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

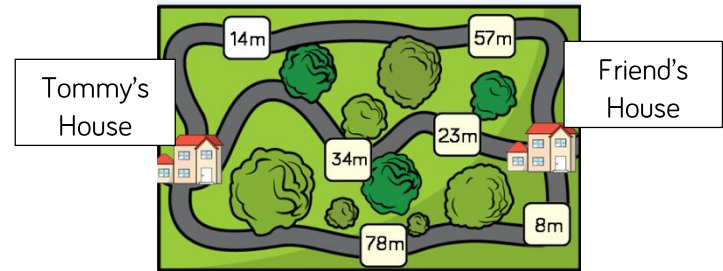
Which route is the longest?

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

Varied Fluency

R

- Ron builds a tower that is 14 cm tall. Jack builds a tower that is 27 cm tall. Ron puts his tower on top of Jack's tower. How tall is the tower altogether?
- Tommy needs to travel to his friend's house. He wants to take the shortest possible route. Which way should Tommy go?



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

95 cm

1 m and 11 cm

1 m and 50 mm

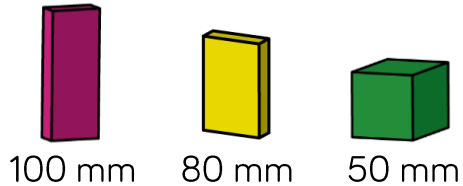
89 cm

Add Lengths

Reasoning and Problem Solving



Eva is building a tower using these blocks.



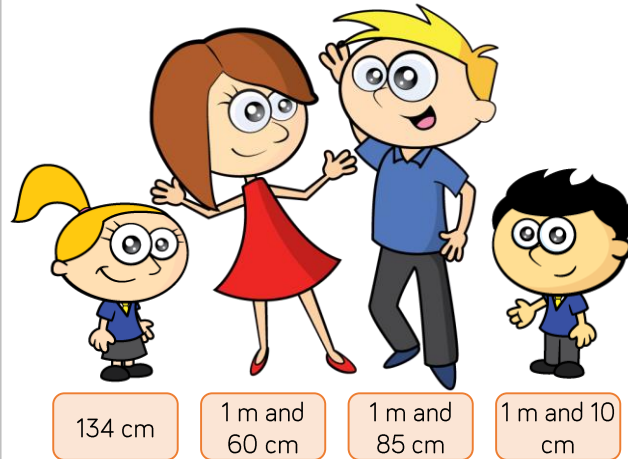
How many different ways can she build a tower measuring 56 cm?
Can you write your calculations in mm and cm?

Possible answer:

Four 100 mm blocks and two 80 mm blocks.

There are many other solutions.

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



Eva thinks their total height is 4 m and 55 cm

Jack thinks their total height is 5 m and 89 cm

Who is correct? Prove it.

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

Subtract Lengths

Notes and Guidance

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

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

Mathematical Talk

What is the difference between the length of the two objects?

How would you work it out?

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

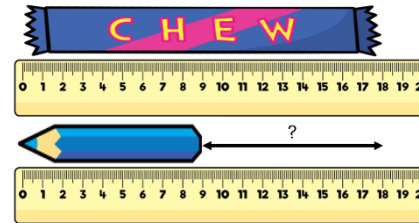
Which model do you prefer? Why?

What is the most efficient way to subtract mixed units?

Varied Fluency

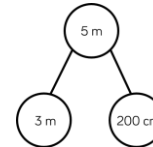
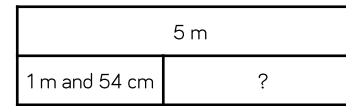


- Find the difference in length between the chew bar and the pencil.



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

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



$$5 \text{ m} - 1 \text{ m} = 4 \text{ m}$$

$$4 \text{ m} - 54 \text{ cm} = 3 \text{ m } 46 \text{ cm}$$

$$200 \text{ cm} - 154 \text{ cm} = 46 \text{ cm}$$

$$3 \text{ m} + 46 \text{ cm} = 3 \text{ m } 46 \text{ cm}$$

Use the models to solve:

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

Subtract Lengths

Reasoning and Problem Solving



A bike race is 950 m long. Teddy cycles 243 m and stops for a break.

He cycles another 459 m and stops for another break.

How much further does he need to cycle to complete the race?

Teddy needs to cycle 248 metres further.

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

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



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

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

Annie has a 3 m roll of ribbon.



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

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

Annie can cut it in to 30 lengths.

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

Measure Perimeter

Notes and Guidance

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

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

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

Mathematical Talk

What is perimeter?

Which shape do you predict will have the longest perimeter?

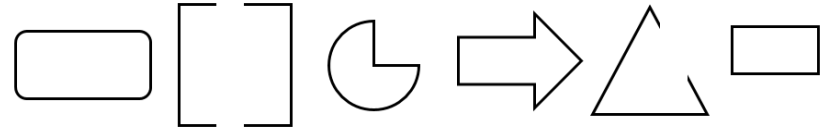
Does it matter where you start when you measure the length of the perimeter? Can you mark the place where you start and finish measuring?

Do you need to measure all the sides of a rectangle to find the perimeter? Explain why.

Varied Fluency

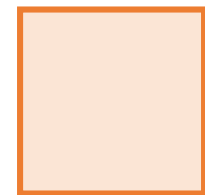
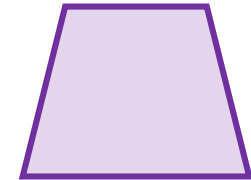
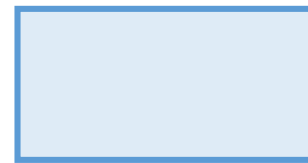
R

- Using your finger, show me the perimeter of your table, your book, your whiteboard etc.
- Tick the images where you can find the perimeter.



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

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



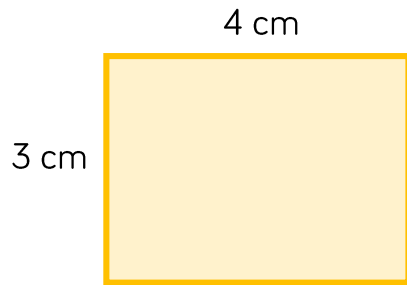
Measure Perimeter

Reasoning and Problem Solving



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

Can you spot his mistake?



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

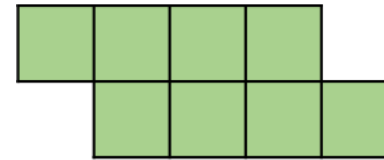
Whitney is measuring the perimeter of a square. She says she only needs to measure one side of the square.

Do you agree?
Explain your answer.

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

Here is a shape made from centimetre squares.

Find the perimeter of the shape.



Can you use 8 centimetre squares to make different shapes?

Find the perimeter of each one.

The perimeter is 14 cm.

There are various different answers depending on the shape made.

Perimeter on a Grid

Notes and Guidance

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

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

Mathematical Talk

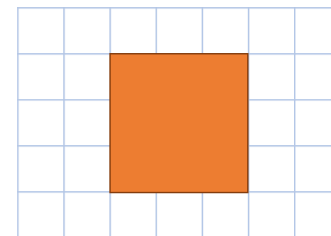
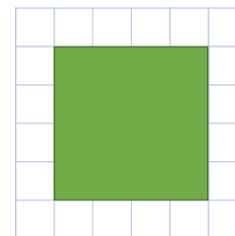
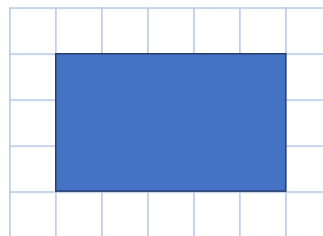
What is perimeter? How can we find the perimeter of a shape?

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

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

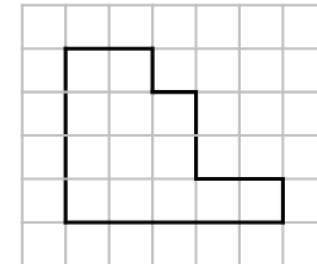
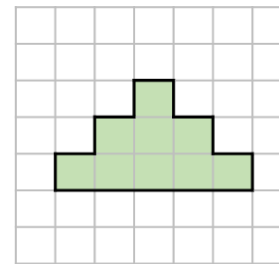
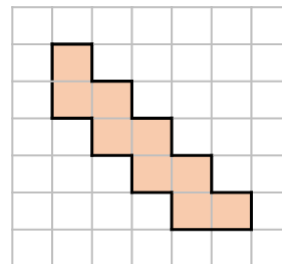
Varied Fluency

- Calculate the perimeter of the shapes.



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

- Draw each shape on centimetre square paper.

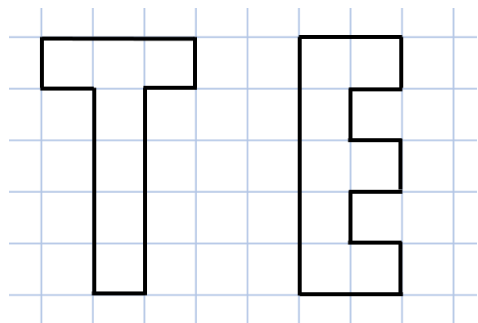


Order the shapes from smallest to largest perimeter.

Perimeter on a Grid

Reasoning and Problem Solving

Which of these shapes has the longest perimeter?



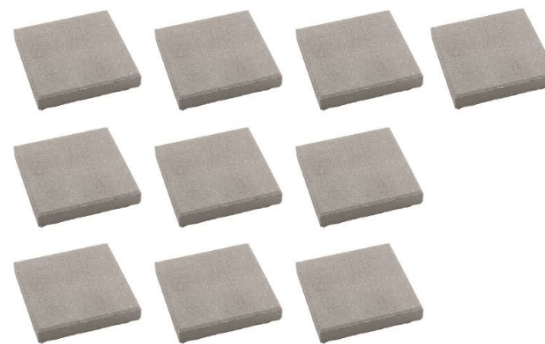
Explore other letters which could be drawn as rectilinear shapes.

Put them in order of shortest to longest perimeter.

Can you make a word?

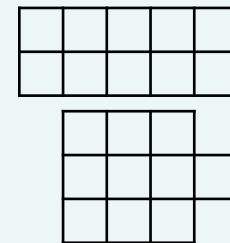
E has a greater perimeter, it is 18 compared to 16 for T.
 Open ended.
 Letters which could be drawn include:
 B C D F I J L
 O P
 Letters with diagonal lines would be omitted.
 If heights of letters are kept the same, I or L could be the shortest.

You have 10 paving stones to design a patio. The stones are one metre square.
 The stones must be joined to each other so that at least one edge is joined corner to corner.

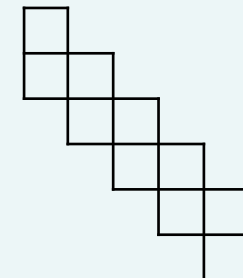


Use squared paper to show which design would give the longest perimeter and which would give the shortest.

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



The longest would be 22 m.



Perimeter of a Rectangle

Notes and Guidance

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

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

Mathematical Talk

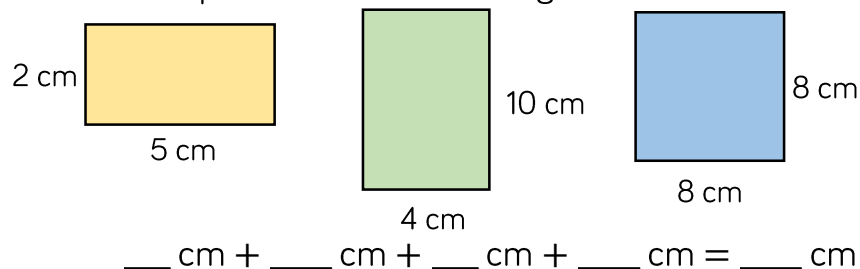
If I know the length and width of a rectangle, how can I calculate the perimeter? Can you tell me 2 different ways? Which way do you find the most efficient?

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

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

Varied Fluency

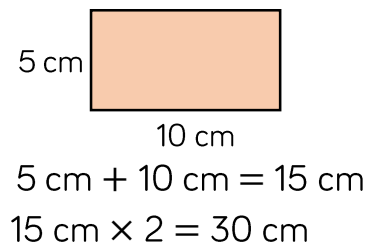
Calculate the perimeter of the rectangles.



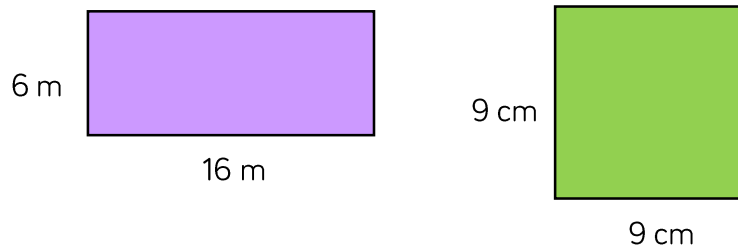
Eva is finding the perimeter of the rectangle.



I added the length and width together and then multiplied by 2

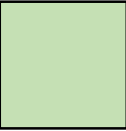




Use Eva's method to find the perimeter of the rectangles.



Perimeter of a Rectangle

Reasoning and Problem Solving

<p>The width of a rectangle is 2 metres less than the length. The perimeter of the rectangle is between 20 m and 30 m. What could the dimensions of the rectangle be? Draw all the rectangles that fit these rules. Use 1 cm = 1 m.</p>	<p>If the perimeter is: 20 m Length = 6 m Width = 4 m 24 m Length = 7 m Width = 5 m 28 m Length = 8 m Width = 6 m</p>
<p>Each of the shapes have a perimeter of 16 cm. Calculate the lengths of the missing sides.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	<p>4 cm 6 cm</p>

<p>Always, Sometimes, Never When all the sides of a rectangle are odd numbers, the perimeter is even. 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> <div style="text-align: center; margin: 10px 0;">  </div> <p>Which of these lengths could be the perimeter of the shape? 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 Sides = 6 cm 44 cm Sides = 11 cm 64 cm Sides = 16 cm They are not divisible by 4</p>

Perimeter of Rectilinear Shapes

Notes and Guidance

Children will begin to calculate perimeter of rectilinear shapes without using squared paper. They use addition and subtraction to calculate the missing sides. Teachers may use part-whole models to support the understanding of how to calculate missing sides.

Encourage children to continue to label each side of the shape and to mark off each side as they calculate the whole perimeter.

Mathematical Talk

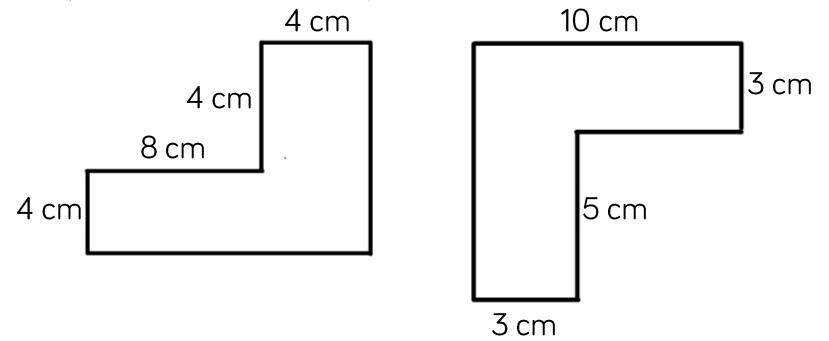
Why are opposite sides important when calculating the perimeter of rectilinear shapes?

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

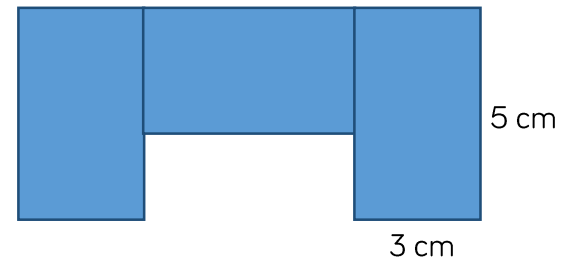
If a rectilinear shape has a perimeter of 24 cm, what is the greatest number of sides it could have? What is the least number of sides it could have?

Varied Fluency

- Find the perimeter of the shapes.



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

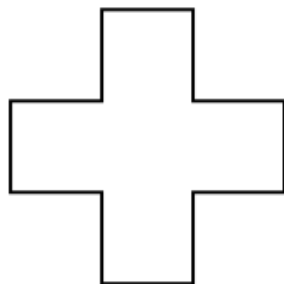


- How many different rectilinear shapes can you draw with a perimeter of 24 cm? How many sides do they each have? What is the longest side? What is the shortest side?

Perimeter of Rectilinear Shapes

Reasoning and Problem Solving

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



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

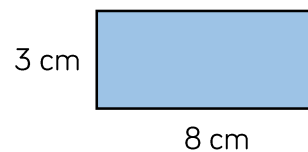
Any other answers suggested are correct if they are a multiple of 12

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

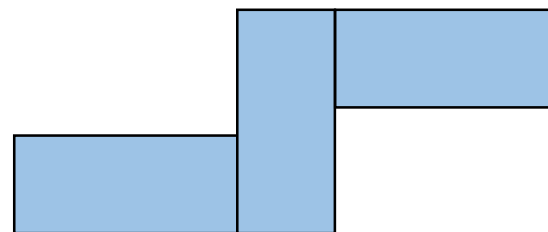
48 cm, 36 cm, 80 cm, 120 cm, 66 cm

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

Amir has some rectangles all the same size.

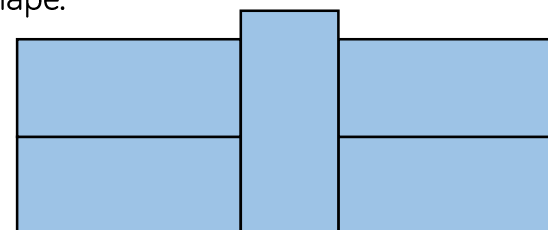


He makes this shape using his rectangles. What is the perimeter?



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

Notes for 2020/21

- ▶ Multiply by 10
- ▶ Multiply by 100
- ▶ Divide by 10
- ▶ Divide by 100
- ▶ Multiply by 1 and 0
- ▶ Divide by 1 and itself
- ▶ Multiply and divide by 3 R
- ▶ The 3 times-table R
- ▶ 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

We have added in the 3 times table steps from year 3 to help support children’s understanding of the 6 and 9 times tables and see the links between them.

We feel that it is vital that there is plenty of practice of times table facts. This will help children with their future learning in many areas of mathematics.

Multiply by 10

Reasoning and Problem Solving

Always, Sometimes, Never

If you write a whole number in a place value grid and multiply it by 10, all the digits move one column to the left.

Always.

Discuss the need for a placeholder after the new rightmost digit.

Annie has multiplied a whole number by 10

Her answer is between 440 and 540

What could her original calculation be?

How many possibilities can you find?

45×10

46×10

47×10

48×10

49×10

50×10

51×10

52×10

53×10

(or the above calculations written as 10×45 etc.).

Multiply by 100

Notes and Guidance

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

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

Mathematical Talk

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

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

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

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

Varied Fluency

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

Complete:

$3 \times \begin{array}{|c|} \hline \square \\ \hline \end{array} = \begin{array}{|c|} \hline \square \\ \hline \end{array} \begin{array}{|c|} \hline \square \\ \hline \end{array} \begin{array}{|c|} \hline \square \\ \hline \end{array} = \text{___ tens} = \text{___}$

$3 \times \begin{array}{|c|c|} \hline \square & \square \\ \hline \end{array} = \begin{array}{|c|c|} \hline \square & \square \\ \hline \end{array} \begin{array}{|c|c|} \hline \square & \square \\ \hline \end{array} \begin{array}{|c|c|} \hline \square & \square \\ \hline \end{array} = \text{___ hundreds} = \text{___}$

Use a place value grid and counters to calculate:

7×10

63×10

80×10

7×100

63×100

80×100

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

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

75×100



75×10

39×100



$39 \times 10 \times 10$

460×10

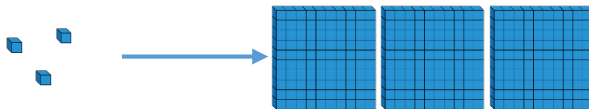
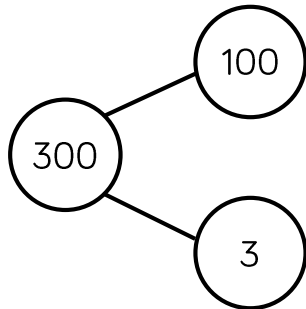


100×47

Multiply by 100

Reasoning and Problem Solving

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

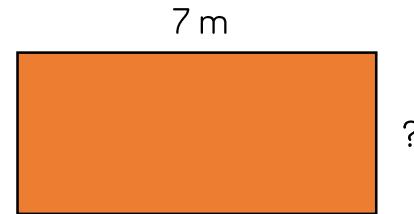


The **part-whole model** does not represent multiplying by 100

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

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

The perimeter of the rectangle is 26 m.
Find the length of the missing side.
Give your answer in cm.



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

$$6 \times 100 = 600$$

The missing length is 600 cm.

Divide by 10

Notes and Guidance

Exploring questions with whole number answers only, children divide by 10

They should use concrete manipulatives and place value charts to see the link between dividing by 10 and the position of the digits before and after the calculation.

Using concrete resources, children should begin to understand the relationship between multiplying and dividing by 10 as the inverse of the other.

Mathematical Talk

What has happened to the value of the digits?

Can you represent the calculation using manipulatives?

Why do we need to exchange tens for ones?

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

Varied Fluency

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

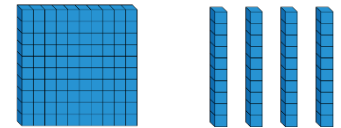


Can you use the same steps to divide a 3-digit number like 210 by 10?



Use Base 10 to divide 140 by 10

Explain what you have done.



Ten friends empty a money box. They share the money equally between them. How much would they have each if the box contained:

- 20 £1 coins?
- £120
- £24?

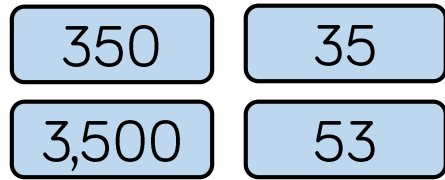
After emptying the box and sharing the contents equally, each friend has 90 p.

How much money was in the box?

Divide by 10

Reasoning and Problem Solving

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



- Alex – 53
- Jack – 350
- Dora – 35
- Mo – 3,500

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

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

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

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

Can you fill in the missing measurement?

Can you explain what Alice did wrong?

Write a calculation to help you explain each item.

Height of a door
Incorrect – Alice has multiplied by 10.

Her height
Correct

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

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

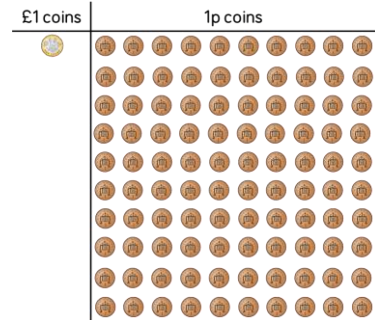
How can you use dividing by 10 to help you divide by 100?

How are multiplying and dividing by 100 related?

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

Varied Fluency

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



- Match the calculation with the correct answer.

$4,200 \div 10$

$4,200 \div 100$

$420 \div 10$

420

42

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

$3,600 \div 10$ ○ $3,600 \div 100$

$2,700 \div 100$ ○ $270 \div 10$

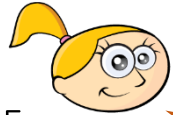
$4,200 \div 100$ ○ $430 \div 10$

Divide by 100

Reasoning and Problem Solving

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

They give some clues about their answer.



Eva

My answer has 8 ones and 2 tens.



Whitney

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

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

They started with 2,800

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

Use the digit cards to fill in the missing digits.



$$170 \div 10 = _ _$$

$$_20 \times 10 = 3,_00$$

$$1,8_0 \div 10 = 1_6$$

$$_9 \times 100 = 5,_00$$

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

$$170 \div 10 = \underline{17}$$

$$320 \times 10 = \underline{3,200}$$

$$1,860 \div 10 = \underline{186}$$

$$59 \times 100 = \underline{5,900}$$

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

Multiply by 1 and 0

Notes and Guidance

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

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

Mathematical Talk

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

What do you notice?

What does 0 mean?

What does multiplying by 1 mean?

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

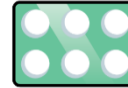
Varied Fluency

Complete the calculation shown by the number pieces.



There are ___ ones.

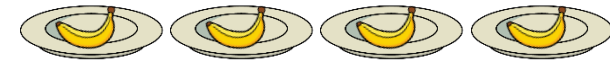
___ \times ___ = ___



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

___ = 1×7

$0 =$ ___ \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 0 as an answer.

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

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

Circle the incorrect calculations and write them correctly.

$$5 \times 0 = 50$$

$$19 \times 1 = 19$$

$$7 \times 0 = 7$$

$$1 \times 1 = 2$$

$$0 \times 35 = 0$$

$$0 \times 0 = 1$$

$$1 \times 8 = 9$$

Choose one calculation and create a drawing to show it.

The incorrect calculations are:

$$5 \times 0 = 50$$

$$7 \times 0 = 7$$

$$1 \times 1 = 2$$

$$0 \times 0 = 1$$

$$1 \times 8 = 9$$

Corrected calculations:

$$5 \times 0 = 0$$

$$7 \times 0 = 0$$

$$1 \times 1 = 1$$

$$0 \times 0 = 0$$

$$1 \times 8 = 8$$

Divide by 1

Notes and Guidance

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

Mathematical Talk

What does sharing mean? Give an example.

What does grouping mean? Give an example.

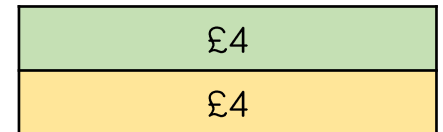
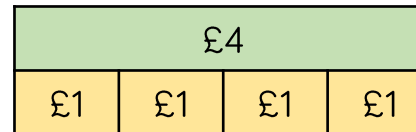
Can you write a worded question where you need to group?

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

Varied Fluency

- Use counters and hands to complete.
 - 4 counters **shared** between 4 hands $\quad _ \div _ = _$
 - 4 counters **shared** between 1 hand $\quad _ \div _ = _$
 - 9 counters **grouped** in 1s $\quad _ \div _ = _$
 - 9 counters **grouped** in 9s $\quad _ \div _ = _$

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



- Draw a bar model for each question to help you work out the answer.
 - Tommy baked 7 cookies and shared them equally between his 7 friends. How many cookies did each friend receive?
 - There are 5 sweets. Children line up and take 5 sweets at a time. How many children have 5 sweets?

Divide by 1

Reasoning and Problem Solving

Use $<$, $>$ or $=$ to complete the following:

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

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

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

$>$

$=$

$<$

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

Mo says,



25 divided by 1 is equal to 1 divided by 25

Do you agree?

Explain your answer.

No, Mo is incorrect because division is not commutative.

$$25 \div 1 = 25$$

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

Multiply by 3

Notes and Guidance

Children draw on their knowledge of counting in threes in order to start to multiply by 3

They use their knowledge of equal groups to use concrete and pictorial methods to solve questions and problems involving multiplying by 3

Mathematical Talk

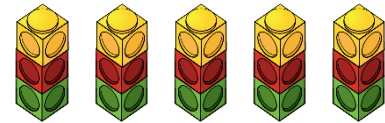
- How many equal groups do we have?
- How many are in each group?
- How many do we have altogether?
- Can you write a number sentence to show this?
- Can you represent the problem in a picture?
- Can you use concrete apparatus to solve the problem?
- How many lots of 3 do we have?
- How many groups of 3 do we have?

Varied Fluency

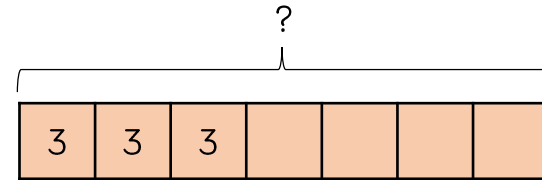


- There are five towers with 3 cubes in each tower. How many cubes are there altogether?

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



- There are 7 tricycles in a playground. How many wheels are there altogether? Complete the bar model to find the answer.



- There are 3 tables with 6 children on each table. How many children are there altogether?

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

Multiply by 3

Reasoning and Problem Solving



There are 8 children.
Each child has 3 sweets.
How many sweets altogether?

Use concrete or pictorial representations to show this problem.

Write another repeated addition and multiplication problem and ask a friend to represent it.

There are 24 sweets altogether.

Children may use items such as counters or cubes.

They could draw a bar model for a pictorial representation.

If $5 \times 3 = 15$, which number sentences would find the answer to 6×3 ?

- $5 \times 3 + 6$
- $5 \times 3 + 3$
- $15 + 3$
- $15 + 6$
- 3×6

Explain how you know.

$5 \times 3 + 3$
because one more lot of 3 will find the answer.

$15 + 3$ because adding one more lot of 3 to the answer to 5 lots will give me 6 lots.

3×6 because $3 \times 6 = 6 \times 3$ (because multiplication is commutative).

Divide by 3

Notes and Guidance

Children explore dividing by 3 through sharing into three equal groups and grouping in threes.

They use concrete and pictorial representations and use their knowledge of the inverse to check their answers.

Mathematical Talk

- Can you put the counters into groups of three?
- Can you share the number into three groups?
- What is the difference between sharing and grouping?

Varied Fluency R

Circle the counters in groups of 3 and complete the division.

$___ \div 3 = ___$

Circle the counters in 3 equal groups and complete the division.

$___ \div 3 = ___$

What's different about the ways you have circled the counters?

There are 12 pieces of fruit. They are shared equally between 3 bowls. How many pieces of fruit are in each bowl?
Use cubes/counters to represent fruit and share between 3 circles.

Bobbles come in packs of 3
If there are 21 bobbles altogether, how many packs are there?

Divide by 3

Reasoning and Problem Solving



Share 33 cubes between 3 groups.

Complete:

There are 3 groups with ____ cubes in each group.

$$33 \div 3 = \underline{\quad}$$

Put 33 cubes into groups of 3

Complete:

There are ____ groups with 3 cubes in each group.

$$33 \div 3 = \underline{\quad}$$

What is the same about these two divisions?

What is different?

The number sentences are both the same.

The numbers in each number sentence mean different things.

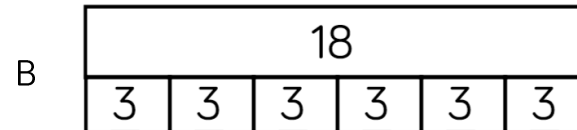
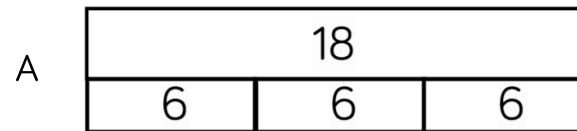
In the first question, the '3' means the number of groups the cubes are shared into because the cubes are being shared.

In the second question, the '3' means the size of each group.

Jack has 18 seeds.

He plants 3 seeds in each pot.

Which bar model matches the problem?



Explain your choice.

Bar model B matches the problem because Jack plants 3 seeds in each pot, therefore he will have 6 groups (pots), each with 3 seeds.

The 3 Times Table

Notes and Guidance

Children draw together their knowledge of multiplying and dividing by three in order to become more fluent in the three times table.

Children apply their knowledge to different contexts.

Mathematical Talk

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times table will help us with this question?

Varied Fluency R

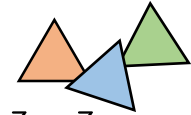
Complete the number sentences.

1 triangle has 3 sides.

3 triangles have ___ sides in total.

___ triangles have 6 sides in total.

5 triangles have ___ sides in total.



$1 \times 3 = 3$

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

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

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

Tick the number sentences that the image shows.



$12 \div 3 = 4$

$12 = 4 \times 3$

$3 \div 4 = 12$

$3 = 12 \div 4$

$3 \times 12 = 4$

$3 \times 4 = 12$

Fill in the missing number facts.

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

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

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

$9 \times 3 = \underline{\quad}$

$\underline{\quad} \times 3 = 30$

$8 \times \underline{\quad} = 24$

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

$21 = \underline{\quad} \times 3$

The 3 Times Table

Reasoning and Problem Solving



Sort the cards below so they follow round in a loop.

Start at $18 - 3$

Calculate the answer to this calculation.

The next card needs to begin with this answer.

18 - 3	21 ÷ 3	15 ÷ 3	8 - 5
5 × 2	10 × 2	20 + 1	4 × 2
14 - 2	12 ÷ 3	3 × 6	7 × 2

Order:

- $18 - 3$
- $15 \div 3$
- 5×2
- 10×2
- $20 + 1$
- $21 \div 3$
- 7×2
- $14 - 2$
- $12 \div 3$
- 4×2
- $8 - 5$
- 3×6

Start this rhythm:

Clap, clap, click, clap, clap, click.

Carry on the rhythm, what will you do on the 15th beat?

How do you know?

What will you be doing on the 20th beat?

Explain your answer.

Clicks are multiples of three.

On the 15th beat, I will be clicking because 15 is a multiple of 3

On the 20th beat, I will be clapping because 20 is not a multiple of 3

Multiply and Divide by 6

Notes and Guidance

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

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

Mathematical Talk

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

Can you write a number sentence to show this?

Can you represent the problem in a picture?

What does each number in the calculation represent?

Varied Fluency

Complete the sentences.



There are ___ lots of ___ eggs.

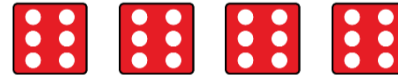
There are ___ eggs in total.

___ × ___ = ___

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

___ ÷ ___ = ___

Complete the fact family.



___ × ___ = ___

___ × ___ = ___

___ ÷ ___ = ___

___ ÷ ___ = ___

There are 9 baskets.

Each basket has 6 apples in.

How many apples are there in total?

Write a multiplication sentence to describe this word problem.

Multiply and Divide by 6

Reasoning and Problem Solving

Always, Sometimes, Never

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

Explain your answer.

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

Teddy says,

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



Is Teddy correct?
 Explain your answer.

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

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

6 Times Table & Division Facts

Notes and Guidance

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

For example, applying knowledge of the 3 times table by understanding that each multiple of 6 is double the equivalent multiple of 3

Children should also be able to apply this knowledge to multiplying and dividing by 10 and 100 (for example, knowing that $30 \times 6 = 180$ because they know that $3 \times 6 = 18$).

Mathematical Talk

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

Can you use $3 \times \underline{\quad}$ 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

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 and Division Facts

Reasoning and Problem Solving

I am thinking of 2 numbers where the sum of the numbers is 15 and the product is 54

What are my numbers?

Think of your own problem for a friend to solve?

6 and 9 because

$$9 \times 6 = 54$$

$$6 \times 9 = 54$$

$$6 + 9 = 15$$

$$9 + 6 = 15$$

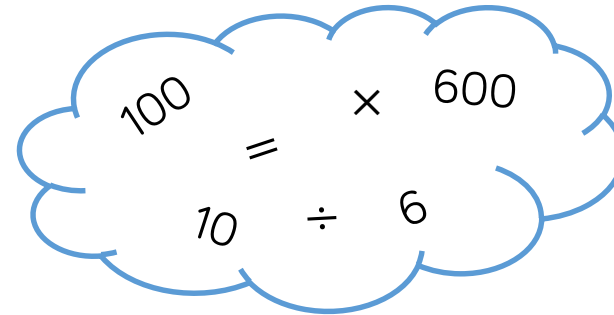
Always, Sometimes, Never

If a number is a multiple of 3 it is also a multiple of 6

Explain why you think this.

Sometimes.
Every even multiple of 3 is a multiple of 6, but the odd multiples of 3 are not multiples of 6

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



$$\underline{\quad} \div \underline{\quad} = 6$$

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

$$600 \div 100 = 6$$

$$60 = 600 \div 10$$

Multiply and Divide by 9

Notes and Guidance

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

They apply their knowledge in different contexts.

Mathematical Talk

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

What other facts can you link to this fact?

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

What does each number in the calculation represent?

How many lots of 9 do we have?

How many groups of 9 do we have?

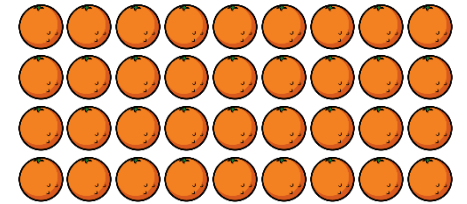
Varied Fluency

Complete the sentences to describe the oranges:

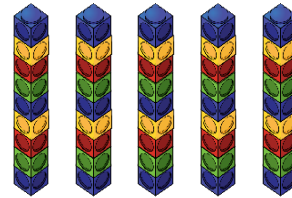
There are ___ lots of 9

There are ___ nines.

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



Complete the fact family.



___ \times ___ = ___

___ \times ___ = ___

___ \div ___ = ___

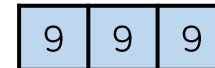
___ \div ___ = ___

Complete the sentences.

There are ___ lots of ___.

___ \times ___ = ___

___ \div ___ = ___



There are ___ lots of ___.

___ \times ___ = ___

___ \div ___ = ___



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

Multiply and Divide by 9

Reasoning and Problem Solving

True or False?

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

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

Explain your answer.

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

is true because

$$6 \times 9 = 54$$

and

$$9 \times 3 = 27$$

$$27 \times 2 = 54$$

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

9 is false because

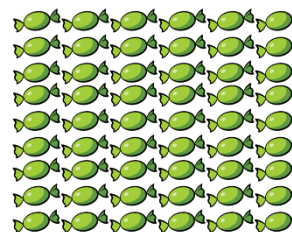
$$6 \times 9 = 54$$

and

$$3 \times 9 = 27$$

$$27 + 9 = 36$$

Amir and Whitney both receive some sweets.



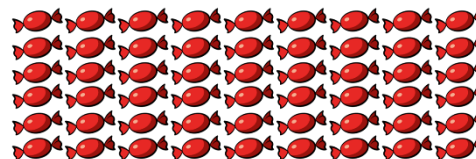
Amir

I have more sweets because I have more rows.



Whitney

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



Who has more sweets? Explain your reasoning.

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

9 Times Table & Division Facts

Notes and Guidance

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

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

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

Mathematical Talk

How did you work out the missing numbers?

What do you notice about the multiples of 9?

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

Varied Fluency

What are the missing numbers from the 9 times table?

9	18	27	___	45
54	___	72	81	90

Circle the multiples of 9.

54 108 18 24 9 67 72 37

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

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

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 and Division Facts

Reasoning and Problem Solving

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

\div 9 100
 10 900 =

___ \div ___ = 9

90 = 900 ___ 10

$900 \div 100 = 9$

$90 = 900 \div 10$

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

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

8 and 9 because
 $8 \times 9 = 72$ or
 $9 \times 8 = 72$
 and
 $8 + 9 = 17$ or
 $9 + 8 = 17$

Always, Sometimes, Never

All multiples of 9 have digits that have a sum of 9.

Always.

Multiply and Divide by 7

Notes and Guidance

Children use their knowledge of multiplication and division to multiply by 7

They count in 7s, and use their knowledge of equal groups supported by use of concrete and pictorial methods to solve multiplication calculations and problems.

They explore commutativity and also understand that multiplication and division are inverse operations.

Mathematical Talk

How many do we have altogether?

What do you notice?

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

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

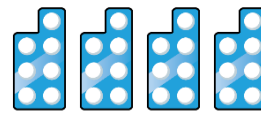
Varied Fluency

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

Write down the first five multiples of 7

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

4 sevens
4 lots of 7
 4×7



7 fours
7 lots of 4
 7×4



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

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

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

Multiply and Divide by 7

Reasoning and Problem Solving

Mrs White's class are selling tickets at £2 each for the school play.

The class can sell one ticket for each chair in the hall.

There are 7 rows of chairs in the hall. Each row contains 9 chairs.

How much money will they make?

Number of tickets (chairs):

$$7 \times 9 = 63$$

$$63 \times \text{£}2 = \text{£}126$$

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

Can you explain why?

In which other times tables will you see the same pattern?

Odd, even pattern because
 $\text{odd} + \text{odd} = \text{even}$.
Then
 $\text{even} + \text{odd} = \text{odd}$,
and this will continue throughout the whole times table.

The same pattern will occur in all other odd multiplication tables (e.g. 1, 3, 5, 9).

7 Times Table & Division Facts

Notes and Guidance

Children apply the facts from the 7 times table (and other previously learned tables) to solve calculations with larger numbers.

They need to spend some time exploring links between multiplication tables and investigating how this can help with mental strategies for calculation.

e.g. $7 \times 7 = 49$, $5 \times 7 = 35$ and $2 \times 7 = 14$

Mathematical Talk

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

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

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

Varied Fluency

Complete.

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

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

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

Use your knowledge of the 7 times table to calculate.

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

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

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

$$7 \times 500 = \underline{\quad}$$

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.

7 Times Table & Division Facts

Reasoning and Problem Solving

True or False?

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

$$7 \times 6 = 7 \times 7 + 8$$

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

True.

False, because $7 \times 6 = 42$ whereas $7 \times 7 = 49$ then $49 + 8 = 57$

Children could draw a bar model or bundles of straws.

Children were arranged into rows of seven.
There were 5 girls and 2 boys in each row.



Use your times table knowledge to show how many girls would be in 10 rows and in 100 rows.

Show as many number sentences using multiplication and division as you can which are linked to this picture.

How many children in total are there in 200 rows? How many girls? How many boys?

10 rows

$$5 \times 10 = 50 \text{ girls}$$

100 rows

$$5 \times 100 = 500 \text{ girls}$$

200 rows

$$\text{Children in total: } 7 \times 200 = 1,400$$

$$\text{Girls: } 5 \times 200 = 1,000$$

$$\text{Boys: } 2 \times 200 = 400$$