

Autumn Scheme of Learning

Year 3

#MathsEveryoneCan

2019-20

White
Rose
Maths

Contents

- Notes and Guidance 3
- Yearly Overview 11
- Autumn Blocks
 - Block 1 - Number: Place Value 12
 - Block 2 - Number: Addition and Subtraction 34
 - Block 3 - Number: Multiplication and Division 73

Welcome

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

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

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

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

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

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

Thanks from the White Rose Maths Team
[#MathsEveryoneCan](#)

White Rose Maths contact details

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 White Rose Maths

What's included?

Our schemes include:

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

Teaching notes and examples

Count Objects to 100
Notes and Guidance
To build on skills learned in Year 1, children need to be able to count objects to 100 in both numerals and words.
Problems should be presented in a variety of ways e.g. numerals, words and images. Variation should challenge children by providing them with missing numbers which are non-consecutive.

Mathematical Talk
How can you count the cars? Do you have a strategy?
What is one more/one less?
Which is the largest number? Write it in words?

Varied Fluency
Count and write the number of cars in the car park.
There are ____ cars in the car park.
What numbers are represented below?
Write your answer in numerals and words.
Match the numerals to the words.

Answers to Reasoning Questions

Is he correct?
Explain your reasoning.

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

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

Jack is incorrect. He has 16 not 6!

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

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

Small Steps Guidance

Overview
Small Steps

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

NC Objectives
Read and write numbers to at least 100 in numerals and in words.
Recognise the place value of each digit in a two digit number (tens, ones).
Identify, represent and estimate numbers using different representations including the number line.
Compare and order numbers from 0 up to 100, use < and > signs.
Use place value and number facts to solve problems.
Count in steps of 2, 3 and 5 from 0, and in tens from any number, forward and backward.

How to use the small steps

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

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

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

Teaching notes

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

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

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

Count Objects to 100

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

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

There are ____ cars in the car park.

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

Match the numerals to the words.

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

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

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

Supporting resources

NEW for 2019-20!

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

The worksheets are provided in three different formats:

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

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

The worksheets are titled 'Hundreds' and feature the following content:

- Worksheet 1 (top):**
 - Question 1: How many balloons are there? (6 balloons labeled 100). Write your answer in numerals and words. There are balloons. There are _____ balloons.
 - Question 2: How many bricks are there? (6 bricks labeled 100).
 - Question 3: Circle 800 pins. (10 tins labeled 100).
 - Question 4: What numbers are represented? (a) 2 tens blocks, (b) 1 ten block and 20 units blocks).
- Worksheet 2 (middle):**
 - Question 1: How many balloons are there? (6 balloons labeled 100). Write your answer in numerals and words.
 - Question 2: How many bricks are there? (6 bricks labeled 100).
 - Question 3: Circle 800 pins. (10 tins labeled 100).
 - Question 4: What numbers are represented? (a) 2 tens blocks, (b) 1 ten block and 20 units blocks).
 - Question 5: Jack makes this number. (Base ten blocks representing 1000). I have made ten hundred. Is Jack correct? Write the number a different way.
 - Question 6: Complete the number tracks.

200	300			600	
900	700			500	
- Worksheet 3 (bottom):**
 - Question 1: How many balloons are there? (6 balloons labeled 100). Write your answer in numerals and words. There are balloons. There are _____ balloons.

Training

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

Our popular JIGSAW package consists of five key elements:

- CPA
- Bar Modelling
- Mathematical Talk & Questioning
- Reasoning & Problem Solving
- Thinking through Variation

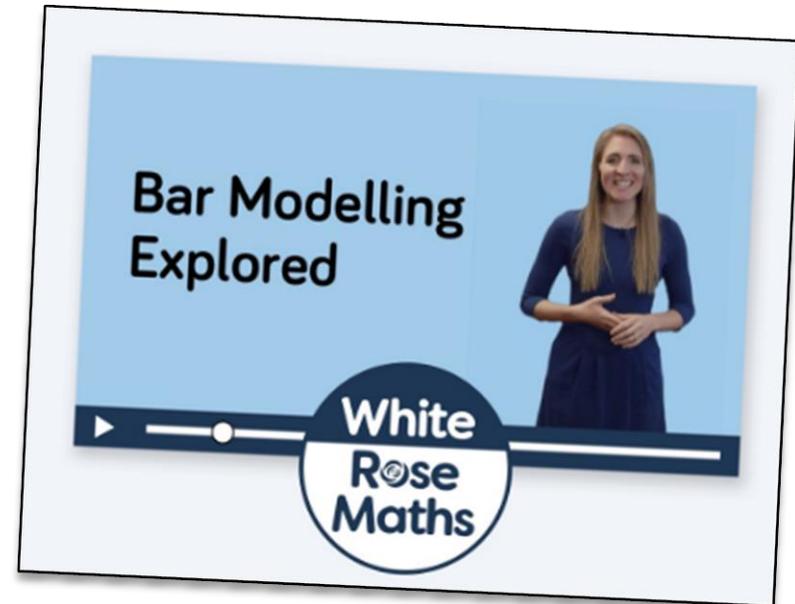
For more information and to book visit our website

www.whiterosemaths.com

NEW for 2019-20!

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

Find out more at www.resources.whiterosemaths.com



FAQs

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

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

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

Should I teach one small step per lesson?

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

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

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

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

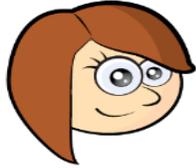
The scheme has been designed to give sufficient time for teachers to explore concepts in depth, however we also interleave prior content in new concepts. E.g. when children look at measurement we recommend that there are lots of questions that practice the four operations and fractions. This helps children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

Meet the Characters

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



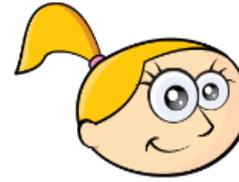
Teddy



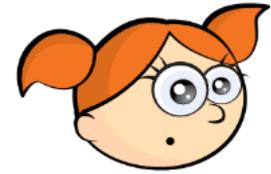
Rosie



Mo



Eva



Alex



Jack



Whitney



Amir



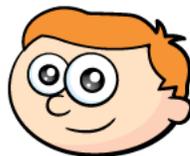
Dora



Tommy



Dexter



Ron



Annie

	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				Number: Multiplication and Division				Consolidation
Spring	Number: Multiplication and Division			Measurement: Money	Statistics		Measurement: Length and Perimeter			Number: Fractions		Consolidation
Summer	Number: Fractions			Measurement: Time			Geometry: Properties of Shape		Measurement: Mass and Capacity			Consolidation

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Autumn - Block 1

Place Value

Overview

Small Steps

- ▶ Hundreds
- ▶ Represent numbers to 1,000
- ▶ 100s, 10s and 1s (1)
- ▶ 100s, 10s and 1s (2)
- ▶ Number line to 1,000
- ▶ Find 1, 10, 100 more or less than a given number
- ▶ Compare objects to 1,000
- ▶ Compare numbers to 1,000
- ▶ Order numbers
- ▶ Count in 50s

NC Objectives

Identify, represent and estimate numbers using different representations.

Find 10 or 100 more or less than a given number.

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

Compare and order number up to 1,000.

Read and write numbers up to 1,000 in numerals and in words.

Solve number problems and practical problems involving these ideas.

Count from 0 in multiples of 4, 8, 50 and 100

Hundreds

Notes and Guidance

Children build on their understanding of tens and link this to 100
 This is the first time they explore 100 explicitly. It is crucial children understand that ten tens make 100 and a hundred ones make 100
 They use a variety of concrete equipment to see this relationship. Once children understand the concept of 100, they will count objects and numbers in multiples of 100 up to 1,000

Mathematical Talk

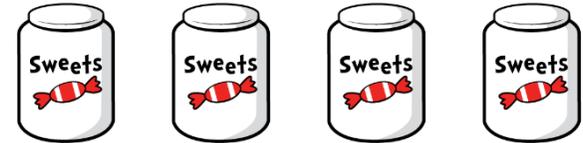
- How many tens have you made? How else can we say this?
- What do these digits represent?
- How many ones have you made? How else can you say this?
- If we continue counting in tens, what do we say after 100?
- What numbers wouldn't we say?

Varied Fluency

Use bundles of straws in tens, bead strings and Base 10 to explore how many tens make a hundred. Children use the equipment to count up and down in tens to make 100

*There are 3 tens this is thirty.
 There are _____ this is _____ .
 There are _____ tens in one hundred.*

There are 100 sweets in each jar.



How many sweets are there altogether?
 Write your answer in numerals and words.

Complete the number tracks.

200	300		500			800	
-----	-----	--	-----	--	--	-----	--

	900	800			500		
--	-----	-----	--	--	-----	--	--

Hundreds

Reasoning and Problem Solving

True or False?

If I count in 100s from zero, all of the numbers will be even.
Convince me.

True, because if you start with zero and add 100 you get an even number, and you are adding another even so the number will always be even.

Sort these statements into always, sometimes or never.

- When counting in hundreds, the ones column changes.
- When counting in hundreds, the hundreds column changes.
- To count in hundreds we use 3-digit numbers.

- Never
- Always
- Sometimes

Whitney thinks the place value grid is showing the number eight.

Hundreds	Tens	Ones
● ● ●		
● ●		
● ● ●		

Do you agree? Explain why.

Using all of the counters, what is the smallest number you can make?

What other numbers could you make?

Whitney is incorrect because there are eight counters in the hundreds column so they represent eight hundreds. The number is 800

The smallest number that can be made is 8

Other possible numbers include:
80
170
350
etc.

Numbers to 1,000

Notes and Guidance

In this small step, children will primarily use Base 10 to become familiar with any number up to 1,000

Using Base 10 will emphasise to children that hundreds are bigger than tens and tens are bigger than ones.

Children need to see numbers with zeros in different columns, and show them with concrete and pictorial representations.

Mathematical Talk

Does it matter which order you build the number in?

Can you have more than 9 of the same type of number e.g. 11 tens?

Can you create a part-whole model using or drawing Base 10 in each circle?

Varied Fluency

Write down the number represented with Base 10 in each case.

Representation				Number

Use Base 10 to represent the numbers.

700 120 407 999

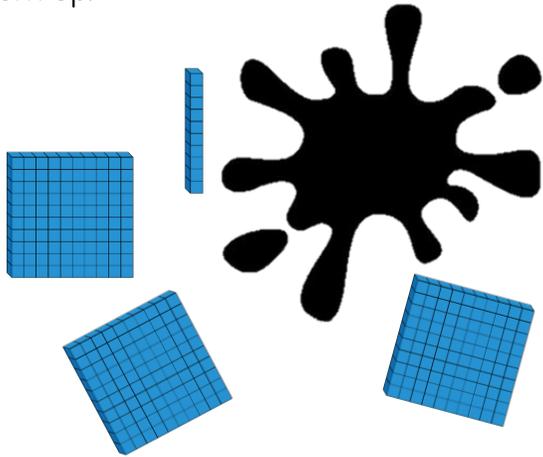
Mo is drawing numbers. Can you complete them for him?

246 390 706

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.



110 is the missing amount.

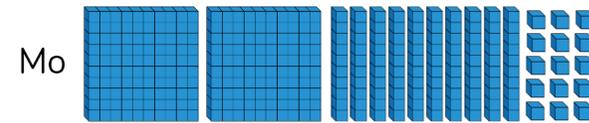
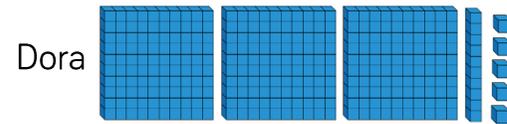
Possible ways:

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

Work out the amount he has covered up.

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

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

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

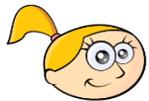
Hundreds	Tens	Ones

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.

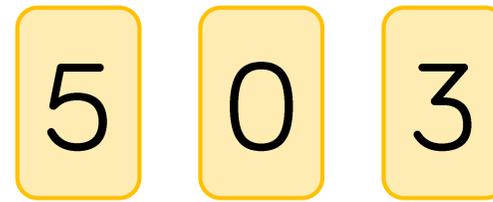
Eva



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

100s, 10s and 1s (2)

Notes and Guidance

Children use place value counters to represent different numbers and understand how a number is made.

Their work with Base 10 should help them understand that the hundreds counter is worth more than the tens counter and the tens counter is worth more than the ones counter.

Mathematical Talk

What is the same and what is different about Base 10 and place value counters?

Why do we not call this number 300506?

What number would be shown if 1/10/100 was added?

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

What do we need to do if there is a zero in the number we are representing?

Varied Fluency

What number is shown on the place value chart?

Hundreds	Tens	Ones

If one more 10 is added, what number would be shown?

Use place value counters and a place value grid to represent the numbers:

615

208

37

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

100s	10s	1s

○

100s	10s	1s

○

100s	10s	1s

100s, 10s and 1s (2)

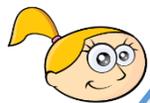
Reasoning and Problem Solving

Using place value counters, how many different ways can you make four hundred and fifty?

Show your solutions as a calculations.

e.g. four hundreds counters and 5 tens counters. As a calculation this would be:
 $450 = 100 + 100 + 100 + 100 + 10 + 10 + 10 + 10 + 10$

Eva



The number in the place value grid is the greatest number you can make with 8 counters.

100s	10s	1s
● ● ● ● ●	●	●
● ●		

Do you agree? Explain your answer.

Eva is incorrect because you could make 800 which is greater than 611. She thinks you need to have at least one counter in each column.

100s	10s	1s
● ●		● ●
● ●		● ●
● ●		● ● ●

Dora



The place value chart shows 607

Jack

I think it shows 670



Who is correct? Explain your reasoning.

Dora is correct because there are six counters in the hundreds column, none in the tens column and seven in the ones column.

If it was 670 there would be seven counters in the tens column and none in the ones column.

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.

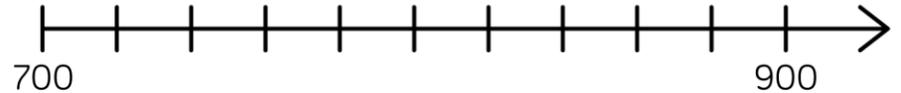
Children may still need Base 10 and/or place values to work with as they develop their understanding of the number line.

Mathematical Talk

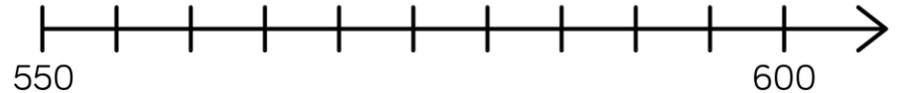
- What is the value of each interval on the number line?
- Which side of the number line did you start from? Why?
- When estimating where a number should be placed, what facts can help you?
- Can you draw a number line where 600 is the starting number, and 650 is half way along?
- What do you know about the number that A is representing? A is more/less than _____
- What value can A definitely not be? How do you know?

Varied Fluency

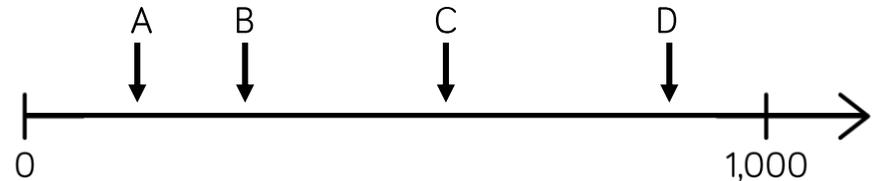
Draw an arrow to show the number 800



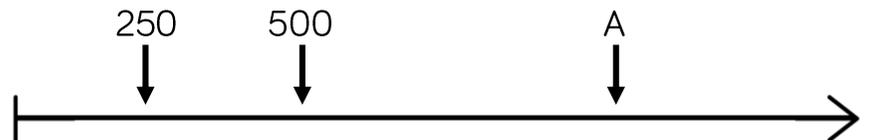
Draw an arrow to show the number 560



Which letter is closest to 250?



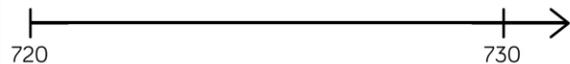
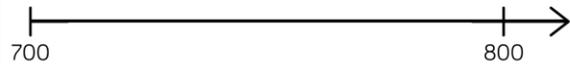
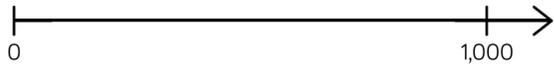
Estimate the value of A.



Number Line to 1,000

Reasoning and Problem Solving

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



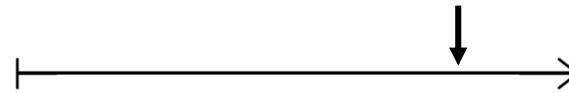
Explain why it is not in the same place on each number line.

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.

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 ____?

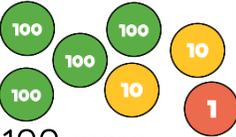
Which column changes? Can more than one column change?

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: 30px; margin: 0 auto;"></div> Number <div style="border: 1px solid black; width: 80px; height: 30px; 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

Compare Objects

Notes and Guidance

Children use objects to represent numbers to 1,000. When given two numbers represented by objects, they use comparative language and symbols to determine which is greatest/smallest. Children can make the numbers using concrete manipulatives and draw them pictorially. Use stem sentences to ensure the correct vocabulary is being used e.g. _____ is greater than _____.

Mathematical Talk

- How do you know which number is greater?
- Do you start counting hundreds, tens or ones first? Why?
- What strategy did you use to compare the two numbers?
- Is this the same or different to your partner?
- Are the Base 10 and place value counters showing the same amount? How do you know?
- Is there only one answer?

Varied Fluency

Represent and compare the numbers using place value counters.

100s	10s	1s

452 542
 _____ is greater than _____

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

○

○

○

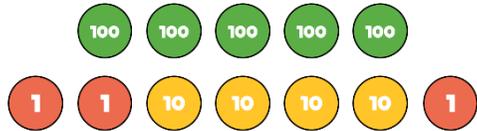
Draw objects to make the statement true.

<

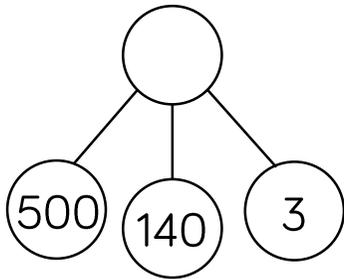
Compare Objects

Reasoning and Problem Solving

Which image is the odd one out?



539	540	541	542	543	544
-----	-----	-----	-----	-----	-----

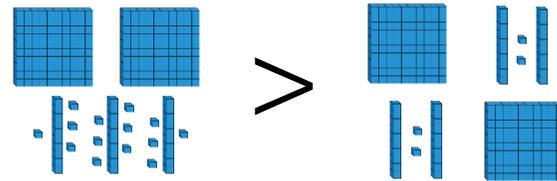


Explain why.
How else can you represent the number?

The part-whole model is the odd one out because it shows 643 whereas all the other images show 543

Children could show 543 in a part-whole model correctly, in Base 10 a different way or with place value counters in a different way.

True or False?



Explain your answer.

The image is not correct because the number 244 is represented on both sides of the inequality symbol.

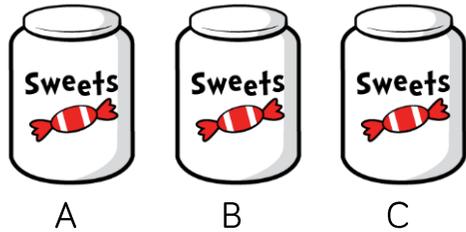
An equal sign should have been used.

The number on the left must be made larger or the number on the right must be made smaller, to make this true.

Compare Numbers

Reasoning and Problem Solving

Amir has 3 jars of sweets.



Jar A contains 235 sweets.

Jar C contains 175 sweets.



Jar A has the most sweets in.
Jar C has the least sweets in.

How many sweets could be in jar B?
Explain how you know.

Jar B could contain any number of sweets between 176 and 234 inclusive.

Discussion point:
Could B contain 175 or 235 sweets? Why?

I am thinking of a number.

It is between 300 and 500

The digits add up to 14

The difference between the greatest digit and the smallest digit is 2

What could my number be?

Is there only one option?

Explain each step of your working.

446 or 464

The only possibilities to go in the hundreds column are 3 and 4

If it was 3, the other two digits would have to total 11 and none of these pairs give the correct difference between the greatest and smallest digit, so the number has to have 4 in the hundreds column.

Order Numbers

Notes and Guidance

Children explore ordering a set of numbers from smallest to greatest and greatest to smallest. They need to be able to explain their reasoning throughout. They could still use Base 10 or other concrete materials to help them to make decisions about ordering.

At this point, children are introduced to the words ascending and descending.

Mathematical Talk

How do you know you have created the greatest/smallest number?

What number is being represented by the place value counters/Base 10?

What does the word ascending/descending mean?

Can you find more than one way to order your numbers?

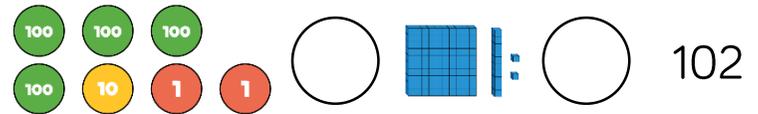
Varied Fluency

Here are three digit cards.



What is the greatest number you can make?
What is the smallest number you can make?

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



Here is a list of numbers.

312, 321, 123, 132, 213, 231

Place the numbers in ascending order.
Now place them in descending order.
What do you notice?

Order Numbers

Reasoning and Problem Solving

Whitney has six different numbers.

She put them in ascending order then accidentally spilt some ink onto her page. Two of her numbers are now covered in ink.

214,  243, 256,  289

What could the hidden numbers be?
Explain how you know.

The first number could be anything between 215 and 242

The second hidden number could be anywhere between 257 and 288

True or False?

When ordering numbers you only need to look at the place value column with the highest value.

False.
For example, if you are ordering numbers in the hundreds you should start by looking at the hundreds column, but sometimes two numbers will have the same number of hundreds and so you will also need to look at other columns.

Count in 50s

Notes and Guidance

Children use their knowledge of the patterns in the 5 times table to count in steps of 50

They should start from any given multiple of 50 and be able to count both forwards and backwards.

Mathematical Talk

What is the same and what is different between counting in 5s and counting in 50s?

Hence, what is the connection between the 5 times table and the 50 times table?

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

Can you correct the mistakes in each?

Varied Fluency

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

5	10	15	20	25	30
50	100	150	200	250	300

- Complete the number tracks.

50		150	200			350		450	
	750	700	650			500			350

- Circle and explain the mistake in each sequence.

50, 100, 105, 200, 250, 300 ...

990, 950, 900, 850, 800 ...

Count in 50s

Reasoning and Problem Solving

Odd One Out

100, 150, 200, 215, 300

Circle the odd one out. Explain how you know.

215 is the odd one out because it is not a multiple of 50

If we were counting up in 50s from 100, it should have been 250 not 215

Which is quicker: counting to 50 in 10s or counting to 150 in 50s?

Explain your answer.

It is quicker to count to 150 in 50s as it would only be 3 steps whereas counting to 50 in 10s would be 5 steps.

Always, Sometimes, Never

Sort the statements into always, sometimes or never.

- When counting in 50s starting from 0, the numbers are all even.
- There are only two digits in a multiple of 50
- Only the hundreds and tens column changes when counting in 50s.

- Always
- Sometimes
- Sometimes

White

**Rose
Maths**

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

NC Objectives

- ▶ Add and subtract multiples of 100
- ▶ Add and subtract 3-digit and 1-digit numbers – not crossing 10
- ▶ Add 3-digit and 1-digit numbers – crossing 10
- ▶ Subtract a 1-digit number from a 3-digit number – crossing 10
- ▶ Add and subtract 3-digit and 2-digit numbers – not crossing 100
- ▶ Add 3-digit and 2-digit numbers – crossing 100
- ▶ Subtract a 2-digit number from a 3-digit number – crossing 100
- ▶ Add and subtract 100s
- ▶ Spot the pattern – making it explicit
- ▶ Add and subtract a 2-digit and 3-digit numbers – not crossing 10 or 100
- ▶ Add a 2-digit and 3-digit numbers – crossing 10 or 100
- ▶ Subtract a 2-digit number from a 3-digit number – crossing 10 or 100
- ▶ Add two 3-digit numbers – not crossing 10 or 100
- ▶ Add two 3-digit numbers – crossing 10 or 100
- ▶ Subtract a 3-digit number from a 3-digit number – no exchange

Add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds.

Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.

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

Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Overview

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Add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds.

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

Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

- ▶ Subtract a 3-digit number from a 3-digit number – exchange
- ▶ Estimate answers to calculations
- ▶ Check answers

Add & Subtract Multiples of 100

Notes and Guidance

Children are introduced to adding numbers greater than 100

They will apply their prior knowledge of adding and subtracting ones and tens to adding and subtracting multiples of 100

Using concrete manipulatives and pictorial representations throughout is important so the children can see the value of the digits.

Mathematical Talk

What is the same and what is different about 2 ones and 3 ones, 2 tens and 3 tens and 2 hundreds and 3 hundreds?

What is ___ hundreds and ___ hundreds equal to?

How many different ways can you represent $200 + 300$?

Varied Fluency

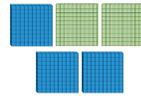
Complete:



2 ones and 3 ones is equal to ___ ones.



2 tens and 3 tens is equal to ___ tens.

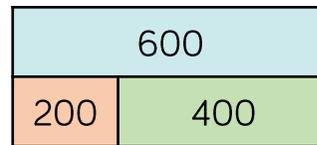


2 hundreds and 3 hundreds is equal to ___ hundreds.

Complete each box for $400 + 500$

Draw It	Write It	Part-Whole	Number Sentence
	___ hundreds and ___ hundreds is equal to ___ hundreds		___ + ___ = ___

Use the bar model to complete the number sentences.



___ + ___ = 600	600 = ___ - ___
___ + ___ = 600	600 = ___ - ___
___ - ___ = 400	400 = ___ - ___
___ - ___ = 200	200 = ___ - ___

Add & Subtract Multiples of 100

Reasoning and Problem Solving

$\underline{\quad\quad} + \underline{\quad\quad} = 800$ Each of the missing numbers are multiples of 100 Find all the possible missing numbers.	$0 + 800$ $100 + 700$ $200 + 600$ $300 + 500$ $400 + 400$ $500 + 300$ $600 + 200$ $700 + 100$ $800 + 0$
If I know $700 - 500 = 200$, what else do I know? Show me using concrete and pictorial representations.	Children may write all the related facts and link it to a bar model. They may also show $70 - 50$ or $7 - 5$

Odd One Out

Which is the odd one out?

Explain why.

Possible answers:
 The odd one out could be $300 + 500 = 800$ because it does not have the number 200 in the calculation.

The odd one out could also be $200 + 700 = 900$ because the answer is not 800

3-digit & 1-digit Numbers

Notes and Guidance

During this small step, children add and subtract ones from a 3-digit number without an exchange. They consider which digits are affected when adding ones. For example, if a child is completing $214 - 3$ and $214 + 3$ they see that they just need to focus on the ones column. Therefore, all they need to do is $4 + 3$ and $4 - 3$ respectively.

The use of the column method can be used but mental arithmetic is the best strategy.

Mathematical Talk

Which column do I need to focus on?

What is the same about the subtractions? What changes each time? Write the number sentence that would come next in each list. Can you write the number sentence that would come before?

Can you use $<$ and $>$ to compare Jack and Tommy's team points?

Varied Fluency

Hundreds	Tens	Ones

Use the place value grid to complete the calculations.

$214 - 3 = \underline{\quad}$

$214 + 3 = \underline{\quad}$

Complete:

$356 - 5 =$
$357 - 5 =$
$358 - 5 =$
$359 - 5 =$

$356 - 5 =$
$356 - 4 =$
$356 - 3 =$
$356 - 2 =$

$356 - 5 =$
$366 - 5 =$
$376 - 5 =$
$386 - 5 =$

Jack has 534 team points and gets four more. Tommy has 534 team points and loses four of his. How many team points does each person have? Who has the most?

3-digit & 1-digit Numbers

Reasoning and Problem Solving

Rosie has added or subtracted ones to get this answer.

Hundreds	Tens	Ones

What could her calculation have been?

Her starting numbers are between and include 340 and 350

Did you use a strategy?

Do you see a pattern?

Possible answers

$340 + 2$

$341 + 1$

$342 + 0$

$343 - 1$

$344 - 2$

$345 - 3$

$346 - 4$

$347 - 5$

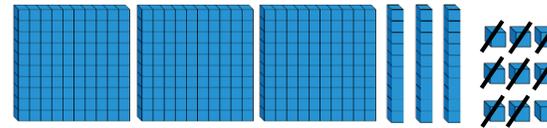
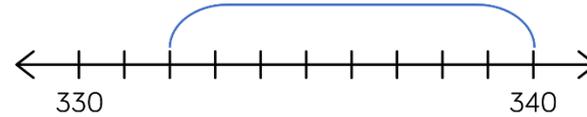
$348 - 6$

$349 - 7$

$350 - 8$

When the ones digit in the 3-digit number increases, the ones we subtract decreases.

Which image does not represent $339 - 8$?



Alex thinks the chart shows $456 - 4$. Do you agree?

Hundreds	Tens	Ones

Explain why.

The number line does not, because it starts at 340 not 339

No, I disagree. Alex has subtracted 4 tens not 4 ones.

Add 3-digit & 1-digit Numbers

Notes and Guidance

Children add ones to a 3-digit number, with an exchange. They discover that when adding ones it can affect the ones column and the tens column.

Children learn that we can only hold single digits in each column, anything over must be exchanged.

The use of 0 e.g. $145 - 5$ is important so they know to use zero as a place holder.

Mathematical Talk

When you add ones to a number does it always, sometimes or never affect the tens column?

What is the largest digit you can have in each column? Why?

How does using the number line support partitioning the number? What number bonds help us with this method?

Varied Fluency

■ We can use Base 10 to solve $245 + 7$



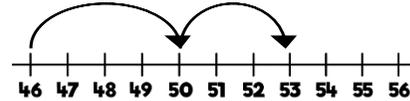
Use this method to calculate:

$357 + 8$

$286 + 5$

$419 + 1$

■ We can use a number line to calculate $346 + 7$



$$46 + 4 = 50 \quad 50 + 3 = 53$$

so $346 + 7 = 353$

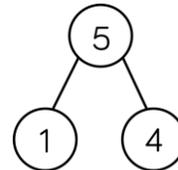
Use this method to calculate:

$564 + 8$

$716 + 9$

$327 + 5$

■ We can partition our 1-digit number to calculate $379 + 5$



$379 + 1 = 380$

$380 + 4 = 384$

Use this method to calculate:

$178 + 9$

$826 + 7$

$359 + 8$

Add 3-digit & 1-digit Numbers

Reasoning and Problem Solving

Always, Sometimes, Never

When 7 and 5 are added together in the ones column, the digit in the ones column of the answer will always be 2

What other digits would always give a 2 in the ones column? Prove it.

Always

$$1 + 1$$

$$2 + 0$$

$$9 + 3$$

$$8 + 4$$

$$6 + 6$$

will also always give a 2 in the ones column.

Which questions are harder to calculate?

$$234 + 3 =$$

$$506 + 8 =$$

$$455 + 7 =$$

$$521 + 6 =$$

Explain your answer.

The second and third are harder as an exchange needs to be made.

Subtract 1-digit from 3-digits

Notes and Guidance

Children subtract a 1-digit number from a 3-digit number using an exchange.

Children need to be secure in the fact that 321 is 3 hundreds, 2 tens and 1 one but that it is also 3 hundreds, 1 ten and 11 ones.

If children are not secure with regrouping, it is important to revisit this before subtracting.

Mathematical Talk

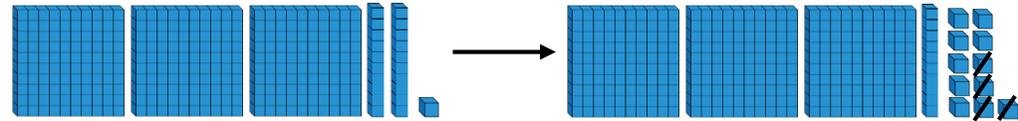
How many ones do we exchange for one ten?

Why do all these subtractions require an exchange? When do we not need to exchange?

Which method do you prefer? Can you calculate the subtractions mentally?

Varied Fluency

- Teddy uses Base 10 to calculate $321 - 4$



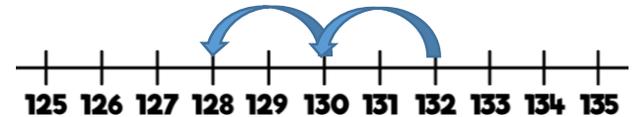
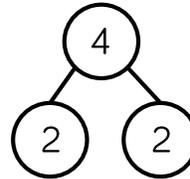
Use this method to calculate:

$322 - 4$

$322 - 7$

$435 - 7$

- Dora uses the part-whole model and number line to solve $132 - 4$



Use this method to calculate:

$132 - 8$

$123 - 8$

$123 - 5$

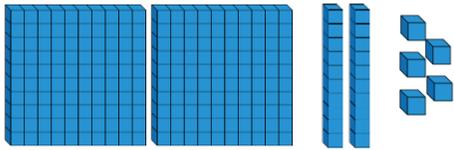
- Red team have 672 points.
Blue team have 7 fewer points than red team.
How many points do blue team have?

Subtract 1-digit from 3-digits

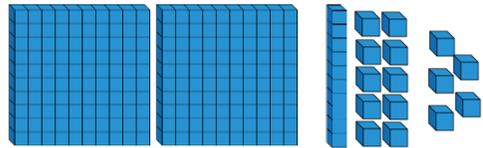
Reasoning and Problem Solving

Ron and Jack use Base 10 to solve $225 - 8$

Ron's method:



Jack's method:



Explain which method you would use and why.

Both methods can get the answer of 217 but I would choose Jack's because he has already exchanged one of his tens for ten ones.

Whitney has 125 stickers. She gives less than 10 stickers to Eva. She has an odd number of stickers left. How many stickers might Whitney have given away?

What do you notice is the same about your answers?
If Whitney had an even number of stickers left, how many might she have given away?

Whitney might have given Eva 2, 4, 6 or 8 stickers.
All the answers are even.

If Whitney had an even number of stickers left she might have given 1, 3, 5, 7 or 9 away.

Explain how you would solve these calculations:

$$564 - \underline{\quad} = 558$$

$$\underline{\quad} - 8 = 725$$

$$352 = 361 - \underline{\quad}$$

Children explain their methods, they may count on or back, use a number line, part-whole model or Base 10

3-digit & 2-digit Numbers

Notes and Guidance

Children look at what happens to a 3-digit number when a multiple of 10 is added or subtracted.

Different representations such as Base 10, arrow cards, place value charts should be used.

The use of the column method is exemplified in this example, but children should explore whether or not this is needed and explain why. Mental methods should be encouraged throughout.

Mathematical Talk

How many tens can we add to 352 without exchanging?

How many tens can we subtract from 352 without exchanging?

What patterns can you see between the additions and subtractions?

Can you see links between the columns?

Can you compare the calculations without finding the answer?

Varied Fluency



Hundreds	Tens	Ones

Use place value counters to complete the number sentences.

$352 + 4 \text{ tens} = \underline{\quad}$

$352 - 2 \text{ tens} = \underline{\quad}$



Complete:

$793 - 60 =$	$793 - 60 =$	$733 + 60 =$
$793 - 70 =$	$783 - 60 =$	$723 + 60 =$
$793 - 80 =$	$773 - 60 =$	$713 + 60 =$
$793 - 90 =$	$763 - 60 =$	$703 + 60 =$



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

$773 + 1$ $773 + 10$

$653 + 10$ $653 - 10$

$647 + 10$ $657 - 10$

$721 + 10$ $653 + 10$

3-digit & 2-digit Numbers

Reasoning and Problem Solving

Spot the Mistake



589 – 70 is equal to 582

Amir

What should the answer be?

Write **one** calculation that could complete **all** of the statements.

$456 - 10 < \boxed{}$

$466 + 1 > \boxed{}$

$466 + 0 = \boxed{}$

Amir has subtracted 7 ones instead of 7 tens. The answer should be 519

Possible answers include:

$496 - 30$

$406 + 60$

$416 + 50$

(Any calculation with an answer of 466)

When I calculated 392 subtract 20 I used my known fact that $9 - 2 = 7$



Rosie

Explain Rosie's method.

Rosie was able to use this fact because 9 tens subtract 2 tens is like doing 9 ones subtract 2 ones. We do not need to subtract any ones or hundreds so those columns will stay the same.

Add 3-digit & 2-digit Numbers

Notes and Guidance

Children add multiples of 10, to a 3-digit number with an exchange.

They recognise that when adding tens, it can change the tens and hundreds column. Encourage children to count in tens rather than use column addition.

Draw on knowledge of inverse to work out missing number problems.

Mathematical Talk

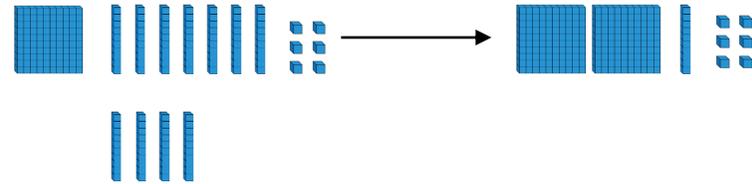
How many tens do we have? How many tens do we need to exchange for 100?

If we know how to count in tens, do we always need to use the column method or other methods?

Would it be easier for us to just count up in our heads?

Varied Fluency

Mo uses Base 10 to calculate $176 + 40$



Use Mo's method to calculate:

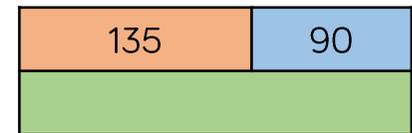
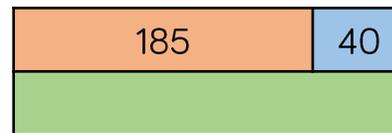
$276 + 40$

$266 + 40$

$266 + 70$

Miss Wilson has 237 marbles in a box. She adds 8 more bags of 10 marbles. How many marbles does she have now? Write the calculation for this problem.

Complete the bar models.

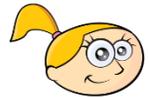


What do you notice?

Add 3-digit & 2-digit Numbers

Reasoning and Problem Solving

Eva and Amir are calculating $783 + 90$



793, 803, 813, 823,
833, 843, 853, 863,
873

$783 + 100 = 883$
 $883 - 10 = 873$



Amir's method is a more efficient method of adding 90. Give children time to discuss each method and try them out with different numbers.

Whose method do you prefer?
Explain why.

Sort these calculations into two groups.
Justify your answer.

- $257 + 60$
- $70 + 637$
- $40 + 234$
- $20 + 391$

Compare your groups with a friend. Are they the same?

Possible ways to sort:
Odds and evens
Over and under 500
Exchanging and not exchanging

Which is the odd one out? Why?

- $336 + 80$
- $453 + 60$
- $347 + 70$
- $285 + 80$

$285 + 80$ is the odd one out because in all the others the tens columns add up to 11 tens.

Subtract 2-digits from 3-digits

Notes and Guidance

Children subtract multiples of 10 from a 3-digit number, with an exchange. The examples show different ways this concept could be taught using number lines and part-whole models.

The column method could be used, however, it is not the most efficient method.

Counting backwards in tens or using 100 to help will support mental strategies.

Mathematical Talk

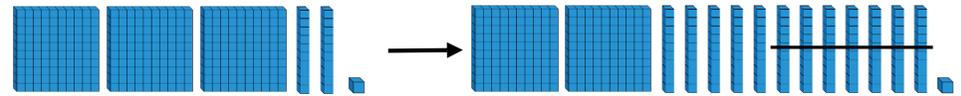
How many tens do we exchange one hundred for?

How can we partition 70 to subtract it from 240 more efficiently? Show this on the number line.

Can you model Amir's method using a number line?

Varied Fluency

Rosie uses Base 10 to subtract 70 from 321



$$321 - 70 = 251$$

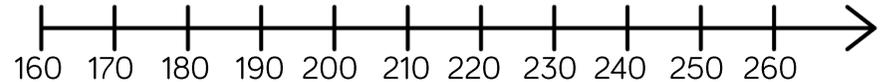
Use Rosie's method to calculate:

$$321 - 80$$

$$421 - 6 \text{ tens}$$

$$451 - 60$$

Count back in tens to solve $240 - 70$



Amir calculates $425 - 90$ by subtracting 100 and then adding 10

$$425 - 100 = 325$$

$$325 + 10 = 335$$

Use Amir's method to solve:

$$386 - 90$$

$$574 - 90$$

$$212 - 90$$

Subtract 2-digits from 3-digits

Reasoning and Problem Solving

<p>Complete the missing digits.</p> $13 \square - 50 = 85$ $334 - \square 0 = 294$ $545 = 6 \square 5 - 70$	<p>135 40 615</p>						
<p>Whitney thinks the rule for the function machine is subtract 60 Is she correct? Explain why.</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Input</td> <td style="text-align: center;">Rule</td> <td style="text-align: center;">Output</td> </tr> <tr> <td style="text-align: center;">567</td> <td style="text-align: center;">?</td> <td style="text-align: center;">497</td> </tr> </table>	Input	Rule	Output	567	?	497	<p>She is wrong because 567 subtract 60 is 507</p> <p>The rule is subtract 70</p>
Input	Rule	Output					
567	?	497					

<p>How many different methods could you use to solve $837 - 90$?</p> <p>Share your methods with a partner.</p>	<p>Possible methods:</p> $837 - 100 = 737$ $737 + 10 = 747$ $90 = 37 \text{ and } 53$ <p>(could show in part-whole model)</p> $837 - 37 = 800$ $800 - 53 = 747$ $837 - 30 = 807$ $807 - 60 = 747$ <p>Expanded or formal written methods.</p>
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Add & Subtract 100s

Notes and Guidance

Children build on their knowledge of adding 100s together e.g. $300 + 500$, by adding ones and tens to solve calculations such as $234 + 500$

It is important to develop flexibility and ask the children why the column method isn't always the most effective method. Highlight that when adding and subtracting 100s, the ones and tens columns are not affected.

Mathematical Talk

What do you notice when we add and subtract 100s from a 3-digit number?

Do I need to add or subtract £200 to solve the worded problem? Can you show this on a number line or a bar model?

Is there more than one way to complete the boxes?

Varied Fluency

- Use the place value grid and Base 10 to help you calculate two hundred and thirty-four add three hundred.

Hundreds	Tens	Ones

- Eva has saved £675
She saved £200 more than Tommy.
How much has Tommy saved?
- Complete the boxes with a calculation that either adds or subtracts 100s.

$401 + 300$		$961 - 200$
Smallest	→	Greatest
	$105 + 100$	$393 - 200$
Smallest	→	Greatest

Add & Subtract 100s

Reasoning and Problem Solving



$306 + 300 = 906 - 300$

Alex

Is she correct?
Explain how you know.

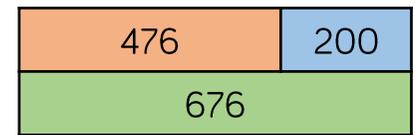
She is correct because both give an answer of 606

Teddy starts with the number 356
He adds a multiple of 100
His new number is greater than 500 but less than 800
Complete the table.

He couldn't have added 100, 500 or 600 but he could have added 200, 300 or 400

Numbers he couldn't have added	Numbers he could have added

Complete the scenarios so they match the bar model.



Ron has ____ altogether.
He spends _____ and has £476 pounds left.

Jack has _____
Eva has £200
They have ____ altogether.

Amir has £200 more than Rosie.
Amir has _____
Rosie has _____

Draw your own bar model where one of the parts is a multiple of 100
Write scenarios to match the bar model.

Ron has £676 altogether.
He spends £200 and has £476 pounds left.

Jack has £476
Eva has £200
They have £676 altogether.

Amir has £200 more than Rosie.
Amir has £676
Rosie has £476

Children will then draw their own bar models to match the numbers they have chosen.

Pattern Spotting

Notes and Guidance

Children consolidate adding ones, tens and hundreds to 3-digit numbers.

Drawing the previous steps together, children look for patterns between calculations to enable them to predict answers and to develop their number sense.

Ensure children reflect on the similarities and differences between calculations to highlight the patterns.

Mathematical Talk

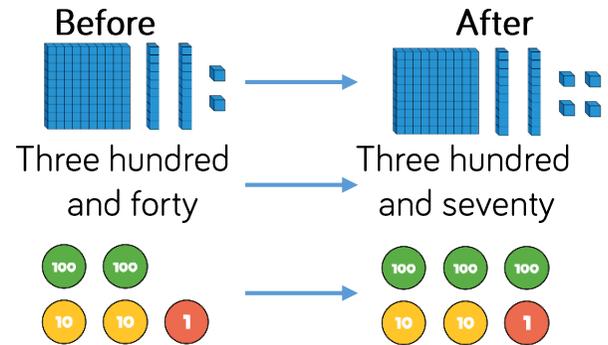
What do you notice? Which strategy can we use to add these numbers?

Do we need to write a zero in the hundreds column when there are no hundreds left?

If I know $7 + 8 = 15$, what else do I know?

Varied Fluency

What has happened to each starting number? How do you know?



Calculate:

$253 + 2$	$253 + 20$	$253 + 200$
$253 - 2$	$253 - 20$	$253 - 200$

What is the same and what is different about each calculation?

If we know $250 + 40 = 290$, what else do we know? Show your findings in part-whole models or bar models and write number sentences to match.

Pattern Spotting

Reasoning and Problem Solving

Dora uses column addition to solve $251 + 4$

	2	5	1
+			4
	2	5	5

Is this the most efficient method?

Explain what Dora could have done.

Tell Dora how she can use your strategy to solve $241 + 40$ and $241 + 400$

The best strategy is to complete $1 + 4$, which is 5 and the 2 hundreds and 5 tens stay the same.

When adding 40 it is the tens column which Dora needs to look at because 40 is 4 tens.

When adding 400, she needs to look at the hundreds column because 400 is 4 hundreds.

Investigate

Does adding and subtracting ones to a 3-digit number only affect the ones column?

Does adding and subtracting tens to a 3-digit number only affect the tens column?

No, the ones can change the ones column and any column to the left e.g. $123 + 9$ and $402 - 4$

The tens column can change itself and the hundreds column e.g.

$456 + 50$ and $456 - 60$

When adding and subtracting from any column, it can only affect its own column and columns to the left.

2-digit & 3-digit Numbers

Notes and Guidance

Children focus on the position of numbers and place value to add and subtract 2-digit and 3-digit numbers.

They represent numbers using Base 10 and line up the place value columns.

In this step, children add numbers without an exchange.

Mathematical Talk

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

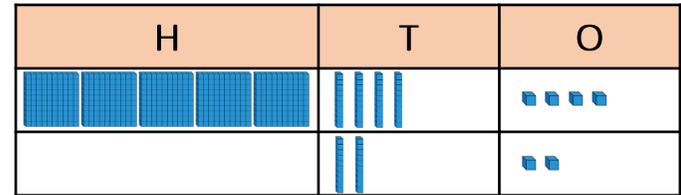
When we subtract, why do we not make both numbers?
Why do we make both numbers when we add?

What is the same about the additions and subtractions? What changes?

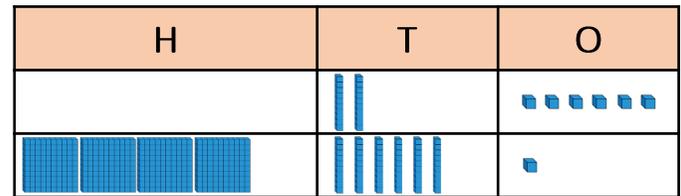
Varied Fluency

Match the calculation to the correct representation and solve.

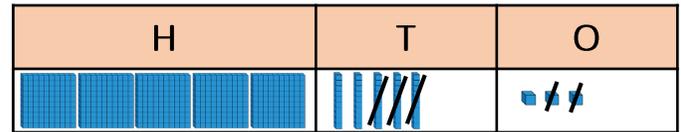
$26 + 461$



$553 - 32$



$544 + 22$



Represent the calculations using Base 10 and solve them.

$388 - 44$

$167 + 32$

$265 - 43$

Calculate:

$$\begin{array}{r} 365 \\ + 23 \\ \hline \end{array}$$

$$\begin{array}{r} 365 \\ - 23 \\ \hline \end{array}$$

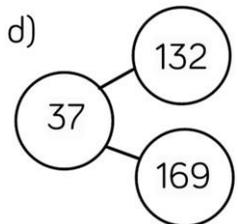
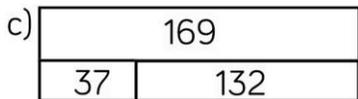
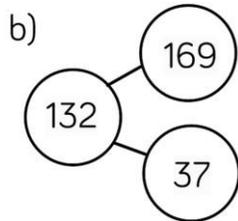
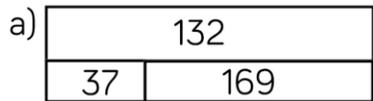
$$\begin{array}{r} 365 \\ + 32 \\ \hline \end{array}$$

$$\begin{array}{r} 365 \\ - 32 \\ \hline \end{array}$$

2-digit & 3-digit Numbers

Reasoning and Problem Solving

Eva has 169 sweets in a jar. She gives 37 sweets to Mo. Which model represents this problem?



C is correct because $37 + 132 = 169$

37 is a part, 132 is a part and 169 is the whole.

Explain the mistake Jack has made.

$$\begin{array}{r} \text{H T O} \\ 231 \\ + 63 \\ \hline \\ \hline \end{array}$$

Jack has put 63 in the wrong place value columns.

Rosie has 77 sweets. Mo has 121 sweets. Which addition will find how many sweets they have altogether?

$$\begin{array}{r} 121 \\ + 77 \\ \hline \\ \hline \end{array} \quad \begin{array}{r} 77 \\ + 121 \\ \hline \\ \hline \end{array}$$

Both are correct because addition is commutative and the numbers can be added either way round.

Explain your answer.

Add 2-digit & 3-digit Numbers

Notes and Guidance

Children deepen their understanding of adding 2-digit and 3-digit numbers in this step. They start adding numbers where there is an exchange from ones to tens, they then move on to exchanging tens to hundreds before adding numbers where there are exchanges in both columns.

Highlight the links between the concrete representations and the column method to support children in understanding how the column method works.

Mathematical Talk

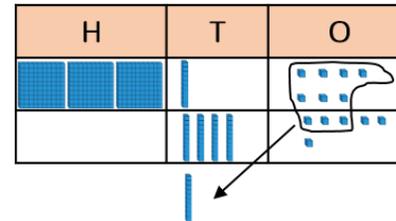
What happens when we have 10 ones in a column? How many tens do we exchange 10 ones for? How do we show the exchange in the column method?

What happens when we have 10 tens in a column? How many hundreds do we exchange 10 tens for? How do we show the exchange in the column method?

What do you notice about the additions in the models? How many exchanges do we need to make?

Varied Fluency

Annie uses Base 10 to calculate $317 + 46$



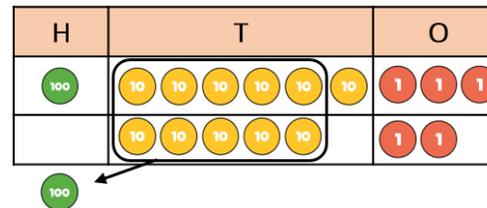
	3	1	7
+		4	6
	3	6	3



Use Annie's method to calculate:

$327 + 46$ $537 + 36$ $538 + 32$ $267 + 24$

Dexter uses place value counters to calculate $163 + 52$



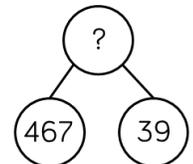
	1	6	3
+		5	2
	2	1	5



Use Dexter's method to calculate:

$372 + 64$ $537 + 82$ $537 + 72$ $248 + 70$

Complete the models using column addition.



Add 2-digit & 3-digit Numbers

Reasoning and Problem Solving



Eva

$265 + 27 = 282$

Here is her working out:

	2	6	5
+		2	7
	2	8	2

Is she correct? Explain why.

Eva is incorrect because she has not exchanged ten ones for one ten or shown this in the column method.

She should have added an extra ten to the tens column. The correct answer is 292

Sort the additions into the table.

No exchange	Exchange 10 ones	Exchange 10 tens

375 + 18 456 + 72 912 + 79
 910 + 79 456 + 27 342 + 35

Can you write 2 more additions in each column?

Choose one 2-digit and one 3-digit number.
 Write additions that have an exchange in the ones and the tens columns.

23 35
 81 56

756 467
 487 619

No exchange:
 910 + 79
 342 + 35

Exchange 10 ones
 375 + 18
 456 + 27
 912 + 79

Exchange 10 tens
 456 + 72

23 + 487
 35 + 467
 56 + 756
 619 + 81

Subtract 2-digits from 3-digits

Notes and Guidance

Children focus on the position of numbers and place value to subtract 2-digits from 3-digits using the column method. Children start by exchanging one ten for ten ones. Next they exchange one hundred for ten tens before subtracting numbers where there are exchanges in both columns. Encourage children to use Base 10 and place value counters so they can physically exchange and see the link between the concrete and the written column method.

Mathematical Talk

How does the concrete representation match the written column method?

How do you know that you need to exchange?

What do you notice about the subtractions to find the missing numbers? How many exchanges are there?

Varied Fluency

Teddy uses Base 10 to subtract 28 from 255

	2	4	1	5
-		2	8	
	2	2	7	

Use Teddy's method to calculate:

$365 - 48$ $492 - 38$ $722 - 16$

Alex uses place value counters to calculate $434 - 72$

	3	1	3	4
-		7	2	
	3	6	2	

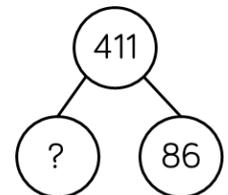
Use Alex's method to calculate:

$248 - 67$ $247 - 67$ $354 - 92$

Calculate the missing number in each model.

526	
78	?

?	69
332	



Subtract 2-digits from 3-digits

Reasoning and Problem Solving

Rosie thinks $352 - 89 = 337$

	H	T	O
	3	5	2
-		8	9
	3	3	7

Is she correct?
Explain why.

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

$234 - 47$ ○ $234 - 57$

$472 - 84$ ○ $473 - 84$

$406 - 89$ ○ $416 - 99$

Rosie is incorrect because she has subtracted the digits in a different order instead of exchanging.

The answer should be 263

$>$

$<$

$=$

Alex, Teddy and Dora are trying to work out $300 - 57$

Who has the most efficient way of working it out?
Explain how you know.



Alex

I know that take away means difference, so I can do 299 take away 56 and get the right answer.

I can count on from 57 to 100, and then count on to 300



Teddy



Dora

I can use the column method to work it out and exchange when I need to.

Accept different answers as long as they are justified. Children might even suggest subtracting 60 and then adding 3

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 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

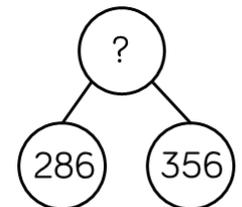
Eva and Ron are playing a game.
 Eva scores 351 points and Ron scores 478 points.
 How many points do they score altogether?
 How many more points does Ron score than Eva?

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.

<
=
590

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.

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

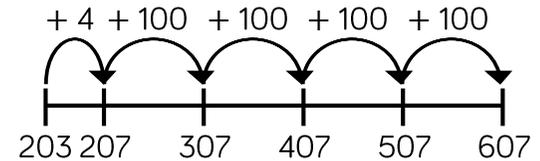
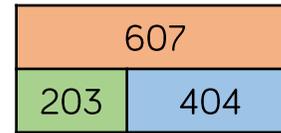
Which strategy would you use and why?

How could you check your answer is correct?

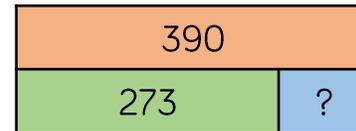
Does it matter which number is at the top of the subtraction?

Varied Fluency

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

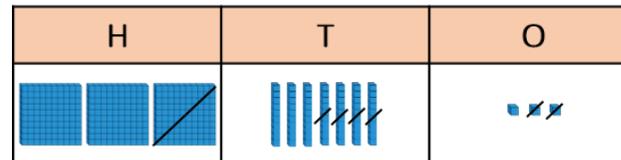


Use this method to find the missing values.



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.

0 3 4 4 6
7 7 8 9

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

Possible answers include:

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

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.

$$406 - 289 = 117$$

Estimate Answers

Notes and Guidance

Children check how reasonable their answers are. While rounding is not formally introduced until Year 4, it is helpful that children can refer to ‘near numbers’ to see whether an estimate is sensible.

Discuss why estimations are important. Consider real life situations where children or adults need to estimate. Encourage children to estimate calculations before working out precisely to help to check working.

Mathematical Talk

What would you estimate this to be?

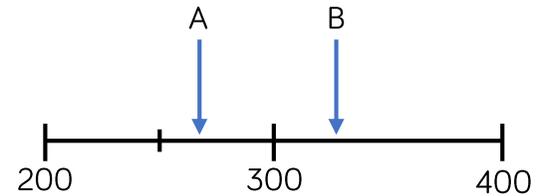
Why did you choose this number?

Why is/isn't this a sensible estimation to an answer?

How does estimating answers help us in real life?

Varied Fluency

Estimate the position of arrows A and B on the number line. Use your estimations to estimate the difference between A and B.



Match each number to its ‘near number’.

497	304	52	27
30	500	50	300

Use the near numbers to estimate the answers to the calculations:

$497 + 304$	$304 - 27$	$27 + 52 + 304$
$27 + 304$	$497 - 52$	$304 - 52 - 27$
$52 + 497$	$497 - 304$	$304 + 52 - 27$

Estimate Answers

Reasoning and Problem Solving



Tommy

I estimate $143 - 95$ will be 50 because I will subtract 100 from 150

Is this a good estimate? Why?

Are there any other ways he could have estimated?

Yes, because he found two numbers close to the original numbers.

He could have rounded to the nearest 10 and calculated.

$$140 - 100 (= 40)$$

Use the number cards to make different calculations with an estimated answer of 70



Possible answers:

$$121 - 48$$

$$(120 - 50)$$

$$41 + 33$$

$$(40 + 30)$$

$$398 - 328$$

$$(400 - 330)$$

Check Answers

Notes and Guidance

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

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

Mathematical Talk

How can you tell if your answer is sensible?

Does knowing if a number is close to a multiple of 100 help when adding and subtracting 3-digit numbers?
How does it help?

Does it help to check your answer if you spot which numbers are near to multiples of 10?

How does counting in 10s, 50s and 100s help?

Varied Fluency

- Use a subtraction to check the answer to the addition.

$$134 + 45 = 179$$

- Alex has baked 145 cakes for a bun sale. She sells 78 cakes. How many does she have left?

Show your answer using a bar model and check your answer using an addition.

- Write all the calculations you could make using these cards.

660	120	540	+	-	=
-----	-----	-----	---	---	---

Check Answers

Reasoning and Problem Solving



Mo

If I add two numbers together, I can check my answer by using a subtraction of the same numbers after e.g. to check $23 + 14$, I can do $14 - 23$

Do you agree? Explain why.

No, because you cannot have “part subtract part”.

You need to find the whole and this needs to be at the start of the subtraction then you subtract a part to check the remaining part.

I completed an addition and then used the inverse to check my calculation.

When I checked my calculation, the answer was 250.

One of the other numbers was 355.

What could the calculation be?

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

$$\underline{\quad} - \underline{\quad} = 250$$

Possible answers:

$$355 - 105 = 250$$

$$605 - 355 = 250$$

So the calculation could have been:

$$250 + 105 = 355$$

$$250 + 355 = 605$$

White

**Rose
Maths**

Autumn - Block 3

Multiplication & Division

Overview

Small Steps

- ▶ Multiplication – equal groups
- ▶ Multiply by 3
- ▶ Divide by 3
- ▶ The 3 times table
- ▶ Multiply by 4
- ▶ Divide by 4
- ▶ The 4 times table
- ▶ Multiply by 8
- ▶ Divide by 8
- ▶ The 8 times table

NC Objectives

Count from 0 in multiples of 4, 8, 50 and 100

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

Write and calculate mathematical statements for multiplication and division using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.

Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Multiplication – Equal Groups

Notes and Guidance

Children recap their understanding of recognising, making and adding equal groups. This will allow them to build on prior learning and prepare them for the next small steps.

Mathematical Talk

What is the same and what is different between each of the groups?

What does the 3 represent?

What does the 8 represent?

How can we represent the groups?

Varied Fluency

Describe the equal groups.



___ equal groups of ___



___ equal groups of ___

How many different ways can you represent:
Six equal groups with 4 in each group?
Six 4s?

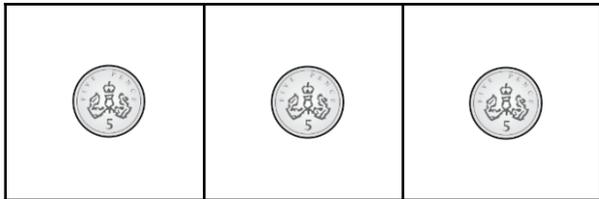
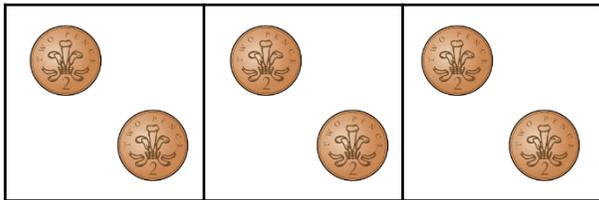
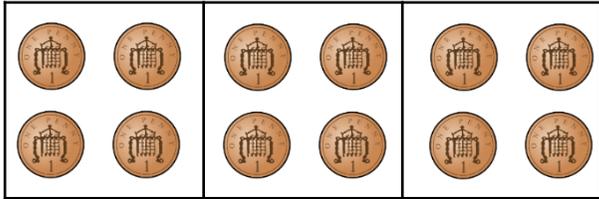
Complete:

	<p>Add It</p>
<p>Say it</p> <p>There are ___ equal groups with ___ in each group. There are ___ altogether.</p>	<p>Multiply it</p>

Multiplication – Equal Groups

Reasoning and Problem Solving

Which row of money is the odd one out?



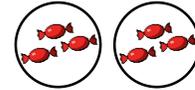
Explain why.

The first two rows have 4p in each group, and 12p in total.

The third row has 5p in each group, so 15p in total.

The third group is therefore the odd one out.

Match the equal groups together.



Three 5s



Two 10s



Two 3s

Sweets, squares, two 3s

Dice, cubes, three 5s

Coins, number pieces, two 10s.

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

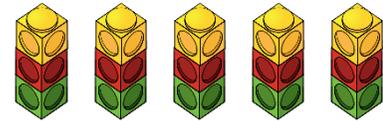
- How many equal groups do we have?
- How many are in each group?
- How many do we have altogether?
- Can you write a number sentence to show this?
- Can you represent the problem in a picture?
- Can you use concrete apparatus to solve the problem?
- How many lots of 3 do we have?
- How many groups of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

Varied Fluency

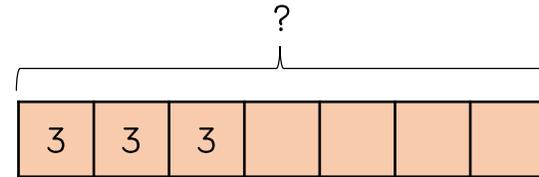
- There are five towers with 3 cubes in each tower. How many cubes are there altogether?

___ + ___ + ___ + ___ + ___ = ___

___ × ___ = ___



- 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?

___ lots of ___ = ___

___ × ___ = ___

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

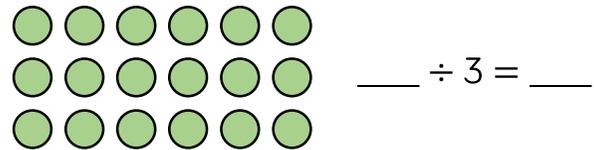
Can you put the counters into groups of three?

Can you share the number into three groups?

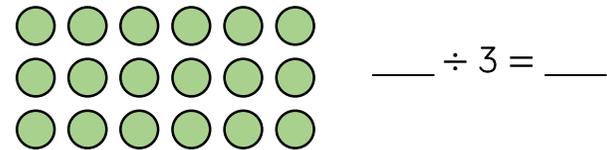
What is the difference between sharing and grouping?

Varied Fluency

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

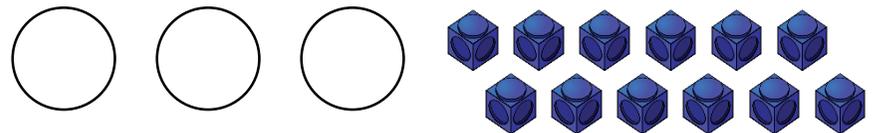


Circle the counters in 3 equal groups and complete the division.



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.

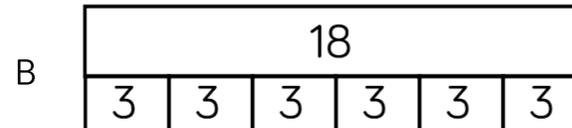
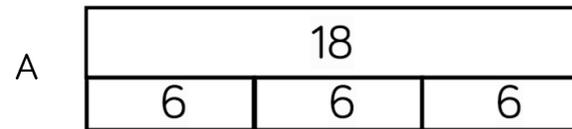
In the first question, the '3' means the number of groups the cubes are shared into because the cubes are being shared.

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

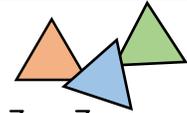
Complete the number sentences.

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 by 4

Notes and Guidance

Building on their knowledge of the two times table, children multiply by 4
 They link multiplying by 4 to doubling then doubling again.
 Children connect multiplying by 4 to repeated addition and counting in 4s.
 To show the multiplication of 4, children may use number pieces, cubes, counters, bar models etc.

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 4 do we have?
- How many groups of 4 do we have?

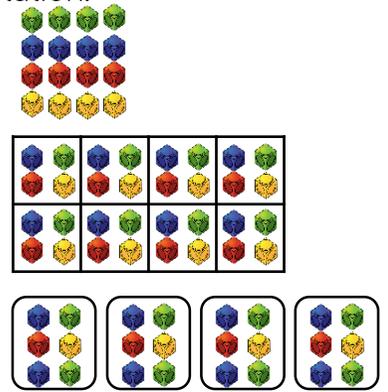
Varied Fluency

Match the multiplication to the representation.

4×4

4×6

8×4



How many dots are there altogether?



There are ___ dice with ___ dots on each.

There ___ fours.

___ \times ___ = ___ dots.

There are 4 pens in a pack.
 How many pens are there in 7 packs?

Multiply by 4

Reasoning and Problem Solving

Tommy has four bags with five sweets in each bag.

Annie has six bags with four sweets in each bag.

Who has more sweets?

How many more sweets do they have?

Draw a picture to show this problem.

Annie has more sweets.

She has four more sweets than Tommy.

Here is a blue strip of paper.



An orange strip is four times as long.



The strips are joined end to end.



How long is the blue strip?

How long is the orange strip?

Explain how you know.

The blue strip is 4 cm long.

The orange strip is 16 cm long.

The orange strip is 4 times as long as the blue strip, so there are 5 equal parts in total, and the length of each part is:

$$20 \div 5 = 4 \text{ cm long.}$$

To find the length of the orange part:

$$4 \times 4 = 16 \text{ cm.}$$

Divide by 4

Notes and Guidance

Children explore dividing by 4 through sharing into four equal groups and grouping in fours.

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

Mathematical Talk

Can you put the buttons into groups of fours?

Can you share the number into four groups?

What is the difference between sharing and grouping?

Varied Fluency

Circle the buttons in groups of 4.

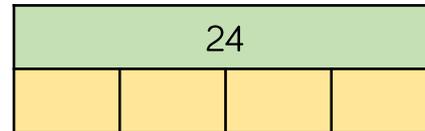


Can you also split the buttons into 4 equal groups?
How is this the same? How is it different?

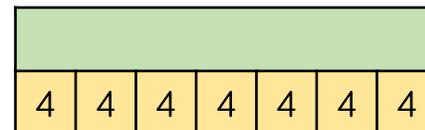
There are some cars in a car park.
Each car has 4 wheels.
In the car park there are 32 wheels altogether.
How many cars are there?

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

Complete the bar models and the calculations.



$$24 \div 4 = \underline{\quad}$$



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

Divide by 4

Reasoning and Problem Solving

Which of the word problems can be solved using $12 \div 4$?

There are 12 bags of sweets with 4 sweets in each bag.
How many sweets are there altogether?

A rollercoaster carriage holds 4 people.
How many carriages are needed for 12 people?

I have 12 crayons and share them equally between 4 people.
How many crayons does each person receive?

I have 12 buns and I give 4 to my brother.
How many do I have left?

Explain your reasoning for each.

No, the calculation is $12 \times 4 = 48$ sweets

Yes, 12 is being grouped into 4s.

Yes, 12 is being shared equally into 4 groups.

No, the calculation is $12 - 4 = 8$ buns

Five children are playing a game.

They score 4 points for every bucket they knock down.



Mo	16
Eva	28
Tommy	12
Amir	32
Dora	8

How many buckets did they knock down each?

How many buckets did they knock down altogether?

How many more buckets did Eva knock down than Mo?

Mo = 4 buckets.

Eva = 7 buckets.

Tommy = 3 buckets.

Amir = 8 buckets.

Dora = 2 buckets.

They knocked down 24 buckets altogether.

Eva knocked 3 more buckets down than Mo.

The 4 Times Table

Notes and Guidance

Children use knowledge of known multiplication tables (2, 3, 5 and 10 times tables) and understanding of key concepts of multiplication to develop knowledge of the 4 times table.

Children who have learnt $3 \times 4 = 12$ can use understanding of commutativity to know that $4 \times 3 = 12$

Mathematical Talk

What do you notice about the pattern?

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

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

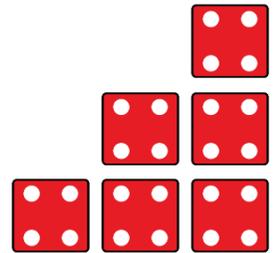
Varied Fluency

Use the pictorial representations to complete the calculations.

$1 \times 4 = \underline{\quad}$

$2 \times 4 = \underline{\quad}$

$3 \times 4 = \underline{\quad}$



Continue the pattern.

2 cars have eight wheels. How many wheels do four cars have?

$2 \times 4 = 8$ $4 \times 4 = \underline{\quad}$

Three cows have 12 legs. How many legs do six cows have?

$3 \times \underline{\quad} = 12$ $6 \times \underline{\quad} = \underline{\quad}$

Colour in the multiples of 4
What pattern do you notice?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

The 4 Times Table

Reasoning and Problem Solving

I have forgotten what 4×4 is.



$$\begin{aligned}
 4 \times 4 &= 3 \times 4 + 4 \\
 &= 12 + 4 \\
 &= 16
 \end{aligned}$$

Jack says,
“The answer is more than 3×4 ”

Complete the calculation to prove this.
 $4 \times 4 = 3 \times 4 + \underline{\quad}$

$$\begin{aligned}
 4 \times 4 &= 5 \times 4 - 4 \\
 &= 20 - 4 \\
 &= 16
 \end{aligned}$$

Mo says,
“The answer is 4 less than 5×4 ”

Complete the calculation to prove this.
 $4 \times 4 = \underline{\quad} \times 4 - \underline{\quad}$

$$\begin{aligned}
 4 \times 4 &= 2 \times 4 \times 2 \\
 &= 16
 \end{aligned}$$

Teddy says,
“The answer is double 2×4 ”

Complete the calculation to prove this.
 $4 \times 4 = \underline{\quad} \times 4 \times \underline{\quad}$

Whose idea do you prefer? Why?

Which part below does not show counting in fours?

$4 + 4 + 4 + 4$				
	<table border="1"> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> </tr> </table>	4	4	4
4	4	4		

Explain why.

The place value counters do not show counting in fours because each part has 3 in so it is counting in threes.

Multiply by 8

Notes and Guidance

Building on their knowledge of the 4 times table, children start to multiply by 8, understanding that each multiple of 8 is double its equivalent multiple of 4. They link multiplying by eight to previous knowledge of equal groups and repeated addition. Children explore the concept of multiplying by 8 in different ways, when 8 is the multiplier (first number in the multiplication calculation) and where 8 is the multiplicand (second number).

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 8 do we have?
- How many groups of 8 do we have?
- We have 8 groups, how many are in each group?

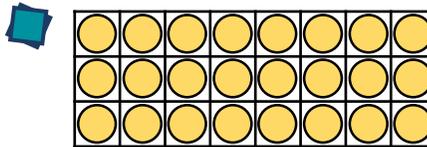
Varied Fluency



How many legs altogether do four spiders have?
There are ___ legs on each spider.

___ + ___ + ___ + ___ = ___
___ × 8 = ___

If there are ___ spiders, there will be ___ legs altogether.



Arrange 24 counters in an array as shown and complete the calculations.

___ + ___ + ___ = ___ × ___
___ + ___ + ___ + ___ + ___ + ___ + ___ + ___ = ___ × ___

Fill in the table to show that multiplying by 8 is the same as double, double and double again.

6	6	6	6	6	6	6	6
6 × 2 = ___		6 × 2 = ___		6 × 2 = ___		6 × 2 = ___	
___ × 2 = ___				___ × 2 = ___			
___ × 2 = ___							

Multiply by 8

Reasoning and Problem Solving

<p> $8 \times 3 = \underline{\quad}$ $2 \times 4 \times 3 = \underline{\quad}$ $2 \times 2 \times 2 \times 3 = \underline{\quad}$ </p> <p> What do you notice? Why do you think this has happened? </p>	<p> All of the answers are equal. 8 has been split (factorised) into 2 and 4 in the second question and 2, 2 and 2 in the third. </p>
<p> Jack calculates 8×6 by doing 5×6 and 3×6 and adding them. $\underline{\quad} + \underline{\quad} = \underline{\quad}$ </p> <p> Ron calculates 8×6 by doing $4 \times 6 \times 2$ $\underline{\quad} \times 2 = \underline{\quad}$ </p> <p> Whose method do you prefer? Explain why. </p>	<p> Possible answers: I prefer Jack's method because I know my 5 and 3 times tables. I prefer Ron's method because I know my 4 times table and can double numbers. </p>

Start each function machine with the same number.

Each time the final number is 8 times greater than the starting number.
 Tommy should use the yellow row because he can double each multiple of 4 to calculate a number multiplied by 8 e.g. $4 \times 6 = 24$ so 8×6 is double that (48).

What do you notice about each final answer?
 Tommy knows the 4 times table, but is still learning the 8 times table.
 Which colour row should he use? Why?

Divide by 8

Notes and Guidance

Children explore dividing by 8 through sharing into eight equal groups and grouping in eights.

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

Mathematical Talk

What concrete/pictorial representations might help you?

Can you group the numbers in eights?

Can you share the number into eights groups?

Can you use any prior knowledge to check your answer?

Varied Fluency

- There are 32 children in a PE lesson. They are split into 8 equal teams for a relay race. How many children are in each team? Use counters or multi-link to represent each child.

There are ___ teams with ___ children in each team.

- Crayons are sold in packs of 8. Year 3 need 48 crayons. How many packs should be ordered?



They should order ___ packs of crayons.

- Complete:

$$80 \div 8 = \underline{\quad}$$

$$8 = 72 \div \underline{\quad}$$

$$64 \div 8 = \underline{\quad}$$

$$8 \times \underline{\quad} = 40$$

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

$$\underline{\quad} \div 8 = 7$$

Divide by 8

Reasoning and Problem Solving

$$48 \div 2 = \underline{\quad}$$

$$48 \div 4 = \underline{\quad}$$

$$48 \div 8 = \underline{\quad}$$

The answers (quotients) halve and the divisors double.

What do you notice about the answers to these questions?

Can you predict what $48 \div 16$ would be?

3

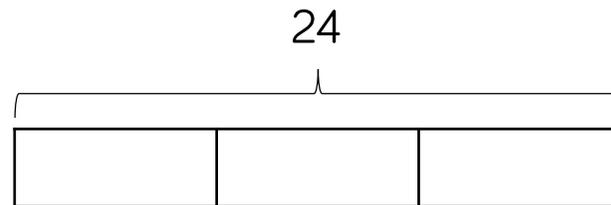
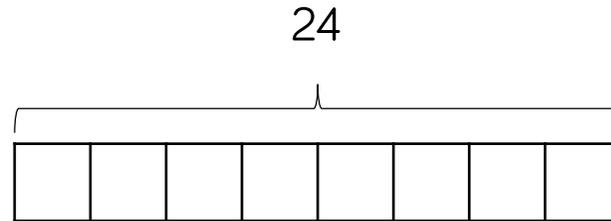
Which numbers can be divided by 8 without a remainder?

64	32	800
18	200	42

64, 32, 800, 200

Amir shares 24 sweets equally between 8 friends.

How many do they get each? Which bar model would you use to represent this problem? Why?



Although both can represent $24 \div 8 = 3$, the first bar model fits this word problem best, because 24 has been split into 8 parts, 1 part shows 1 friend.

The 8 Times Table

Notes and Guidance

Children use prior knowledge of multiplication facts for 2, 3, 4 and 5 times tables along with the distributive law in order to calculate unknown multiplication facts.

Mathematical Talk

Why is it helpful to partition the number you are multiplying by?

Can you use concrete or pictorial representations to help you?

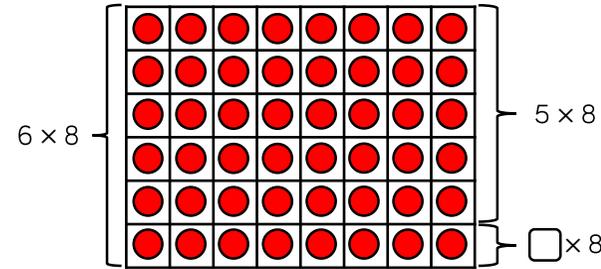
What other facts can you link to this one?

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

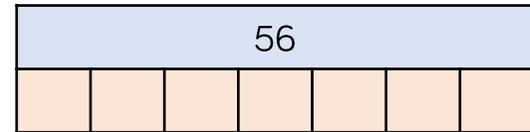
Varied Fluency

Complete the diagram using known facts.

$$\begin{array}{r}
 6 \times 8 < \begin{cases} 5 \times 8 = \square \\ \square \times 8 = \square \end{cases} \\
 \hline
 \text{altogether } \square
 \end{array}$$



Complete the bar model.



Complete the table.

×	2	4	8
3	6		
	10	20	
			72

Can you spot a pattern in the numbers?

The 8 Times Table

Reasoning and Problem Solving



All the numbers in the 8 times table are even.

Explain why

When you add an even number to an even number you always make an even number. The 8 times table is repeated addition so keeps adding an even number each time.

On a blank hundred square, colour multiples of 8 red and multiples of 4 blue.

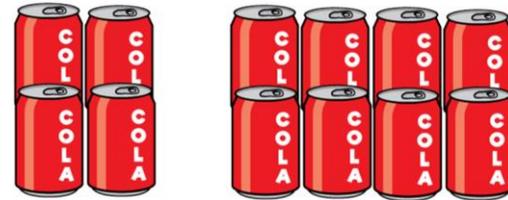
Always, Sometimes, Never

- Multiples of 4 are also multiples of 8
- Multiples of 8 are also multiples of 4

- 1) Sometimes, every other multiple of 4 is also a multiple of 8. The ones in between aren't because the jumps are smaller than 8
- 2) Always – 8 is a multiple of 4 therefore all multiples of 8 will be multiples of 4

Rosie has some packs of cola which are in a box.

Some packs have 4 cans in them, and some packs have 8 cans in them.



Rosie's box contains 64 cans of pop.

How many packs of 4 cans and how many packs of 8 cans could there be?

Find all the possibilities.

Possible answers:

- 2 packs of 4, 7 packs of 8
- 4 packs of 4, 6 packs of 8
- 6 packs of 4, 5 packs of 8
- 8 packs of 4, 4 packs of 8
- 10 packs of 4, 3 packs of 8
- 12 packs of 4, 2 packs of 8
- 14 packs of 4, 1 pack of 8