Autumn Scheme of Learning

Year 2

#MathsEveryoneCan

2019-20

White Rose Maths

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Welcome

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

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

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

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

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

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

Thanks from the White Rose Maths Team
#MathsEveryoneCan

White Rose Maths contact details

support@whiterosemaths.com

@WhiteRoseMaths

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What’s included?

Our schemes include:

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

How to use the small steps

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

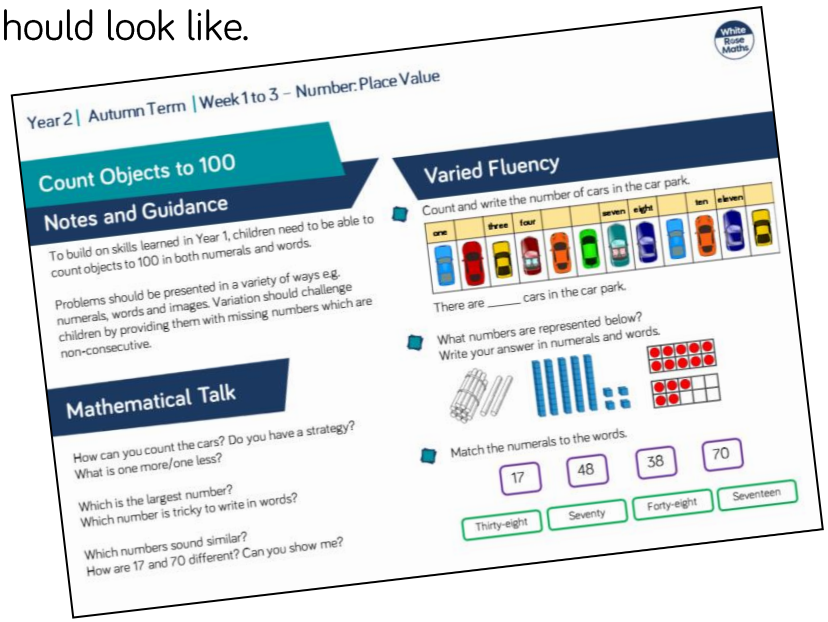
We know that breaking the curriculum down into small manageable steps should help children understand concepts better. Too often, we have noticed that teachers will try and cover too many concepts at once and this can lead to cognitive overload. In our opinion, it is better to follow a small steps approach.

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

Teaching notes

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

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


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

Count Objects to 100

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

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

one		three	four			seven	eight		ten	eleven	

There are ____ cars in the car park.

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

Match the numerals to the words.

17 48 38 70

Thirty-eight Seventy Forty-eight Seventeen

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.

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Supporting resources

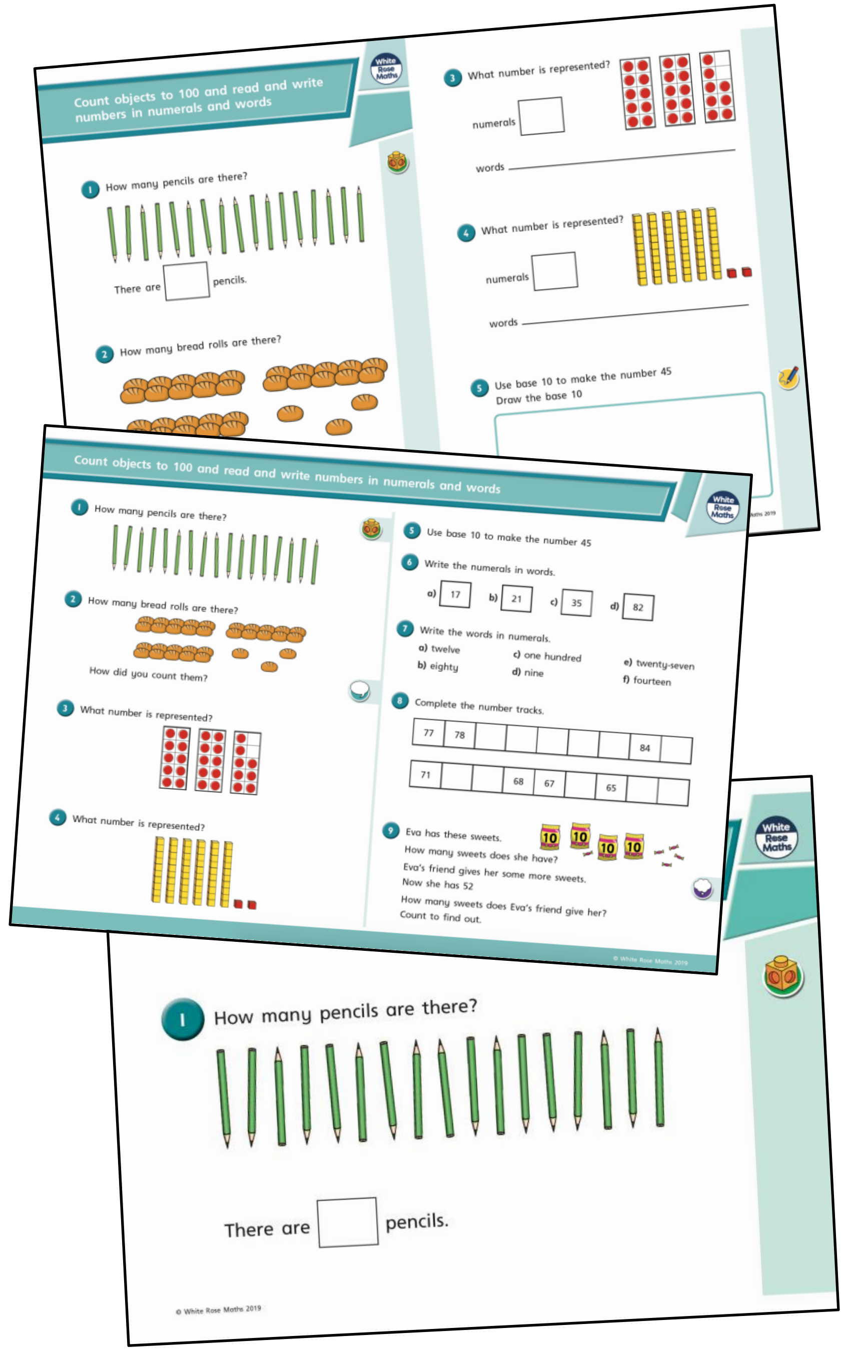
NEW for 2019-20!

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

The worksheets are provided in three different formats:

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

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



Training

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

Our popular JIGSAW package consists of five key elements:

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

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

NEW for 2019-20!

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

Find out more at www.resources.whiterosemaths.com

FAQs

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

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

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

Should I teach one small step per lesson?

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

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

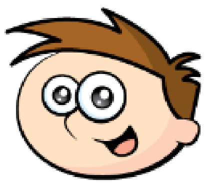
The questions are designed to be used by the teacher to help them understand the key teaching points that need to be covered. They should be used as inspiration and ideas to help teachers plan carefully structured lessons.

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

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

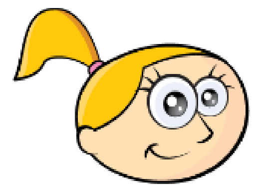
Meet the Characters

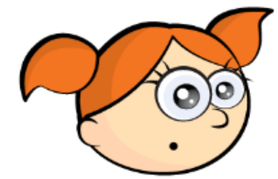
Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?

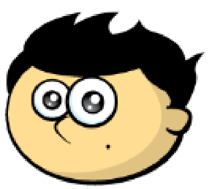

Teddy


Rosie

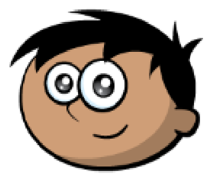

Mo

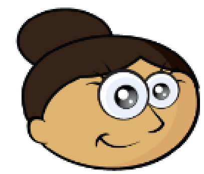

Eva


Alex


Jack


Whitney


Amir


Dora


Tommy


Dexter


Ron


Annie

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value			Number: Addition and Subtraction					Measurement: Money		Number: Multiplication and Division	
Spring	Number: Multiplication and Division		Statistics		Geometry: Properties of Shape			Number: Fractions			Measurement: Length and Height	Consolidation
Summer	Geometry: Position and Direction			Problem solving and efficient methods		Measurement: Time		Measurement: Mass, Capacity and Temperature			Investigations	

Autumn - Block 1

Place Value

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, forwards and backwards.

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 words and represent these numbers in numerals.

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

Mathematical Talk

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

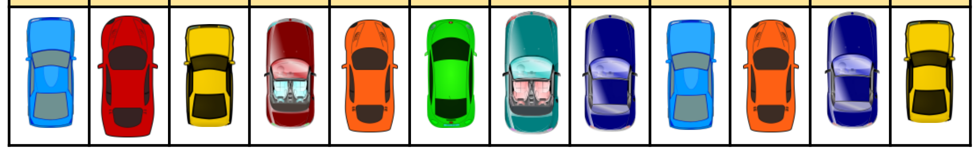
Which is the largest number?
Which number is tricky to write in words?

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

Varied Fluency

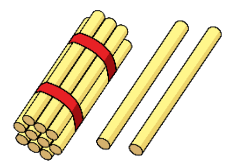
- Count and write the number of cars in the car park.

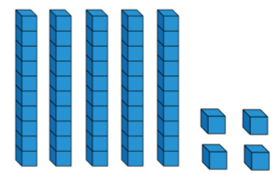
one		three	four			seven	eight		ten	eleven	

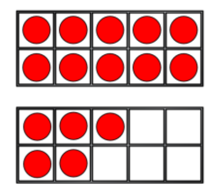


There are ______ cars in the car park.

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







- Match the numerals to the words.

17 48 38 70

thirty-eight seventy forty-eight seventeen

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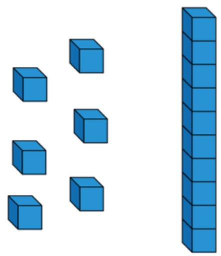
Count Objects to 100

Reasoning and Problem Solving

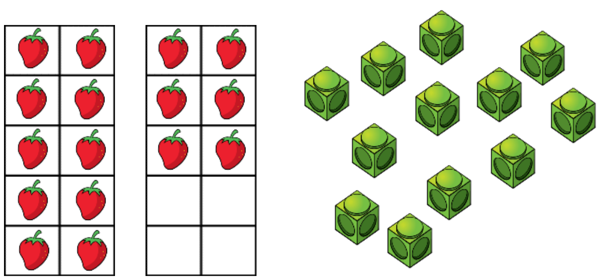
Jack says he has 61
Is he correct?



Explain your reasoning.

Jack is incorrect.
He has 16 not 61

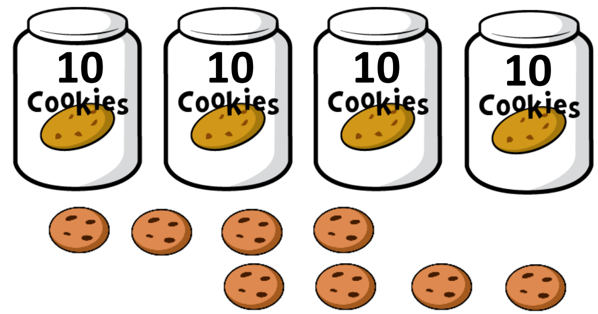
Here are two sets of objects.



Which are easier to count?
Explain your answer.

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

Each jar contains 10 cookies.



How many cookies are there altogether?

Write your answer in numerals and words.

What strategy did you use?

Did your partner use a different method?

What is the best strategy to use?

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.

Represent Numbers to 100

Notes and Guidance

Children need to be able to represent numbers to 100 using a range of concrete materials, such as bead strings, straws, Base 10 equipment etc.

Children should also be able to state how a number is made up. For example, they can express 42 as 4 tens and 2 ones or as 42 ones.

Mathematical Talk

How have the beads been grouped? How does this help you count?

Can you show me the tens/ones in the number?

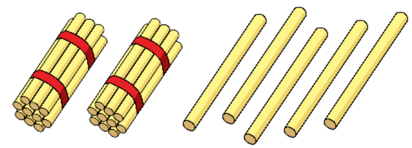
Which resource do you prefer to use for larger numbers? Which is quickest? Which would take a long time?

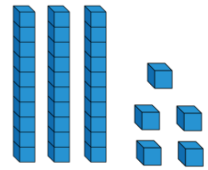
Varied Fluency

- Here is part of a bead string.

Complete the sentences.
There are ______tens and ______ones.
The number is ______.
Represent 45 on a bead string and complete the same sentence stems.

- Match the number to the correct representation.





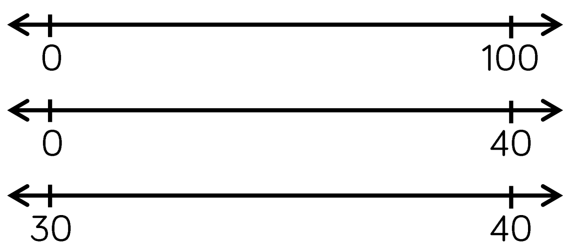
One ten and five ones
Thirty-five
25

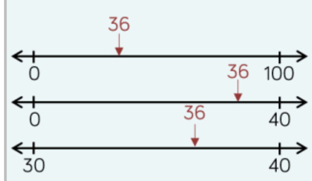
- Represent 67 in **three different** ways.

Represent Numbers to 100

Reasoning and Problem Solving

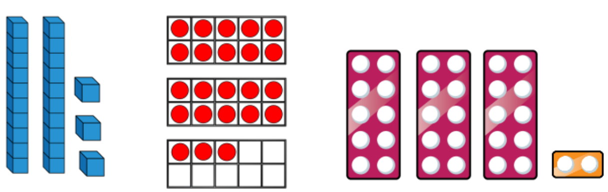
Where would 36 go on each of the number lines?





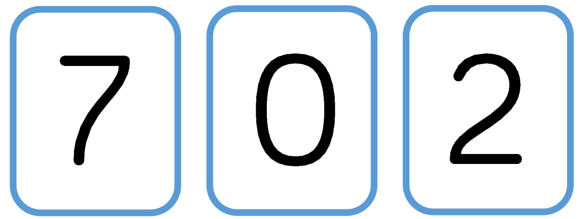
One of these images **does not** show 23
Can you explain the mistake?

A B C



C does not show 23, it shows 32
They have reversed the tens and ones.

How many two digit numbers can you make using the digit cards?



70, 20, 72, 27

What is the largest number?
Prove it by using concrete resources.

The largest number is 72

What is the smallest number?
Prove it by using concrete resources.

The smallest number is 20

Why can't the 0 be used as a tens number?

Because it would make a 1 digit number.

Tens and Ones (1)

Notes and Guidance

Children should have an understanding of what each digit represents when partitioning a number.

It is important that children can partition numbers in a variety of ways, not just as tens and ones. For example, 58 is made up of 5 tens and 8 ones or 4 tens and 18 ones, or 2 tens and 38 ones, etc.

Mathematical Talk

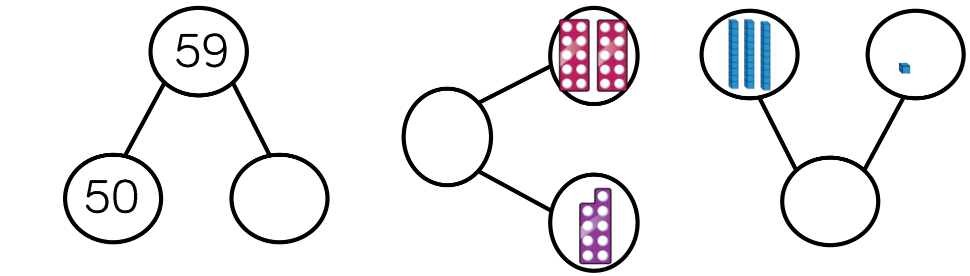
Which part do we know? How can we use the whole and part to work out the missing part?

Can you use concrete resources/draw something to help you partition?

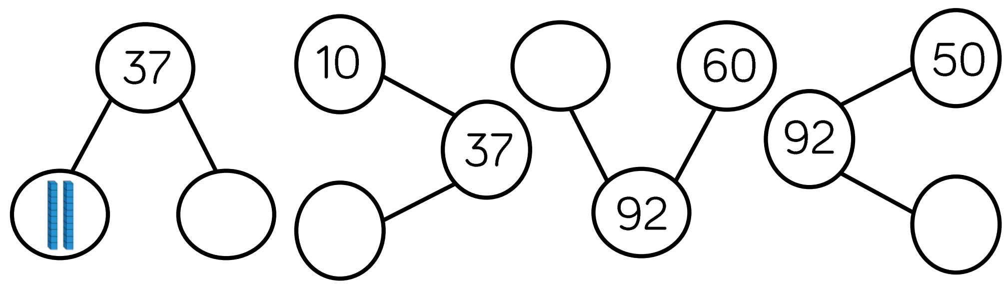
How can you rearrange the counters to help you count the lemon and strawberry cupcakes?

Varied Fluency

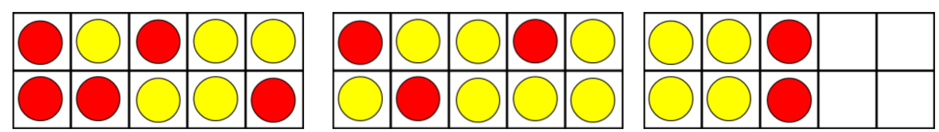
Complete the part-whole models.



Complete the part-whole models.



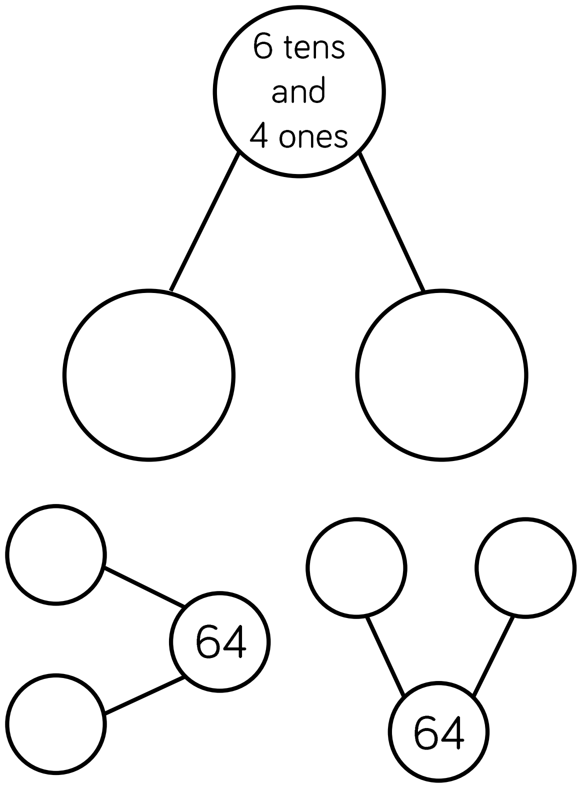
The ten frames represent lemon and strawberry cupcakes. Draw a part-whole model to show how many cupcakes there are altogether.

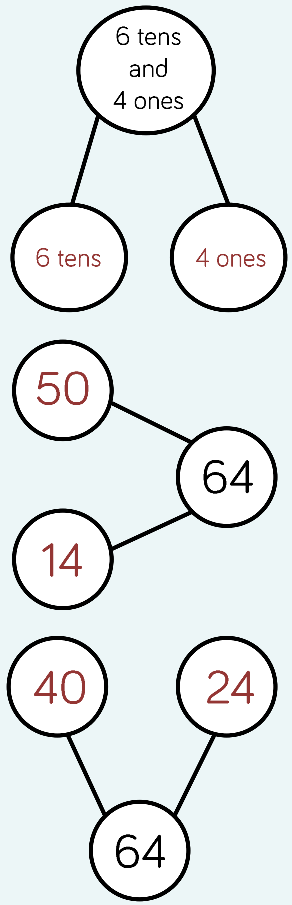


Tens and Ones (1)

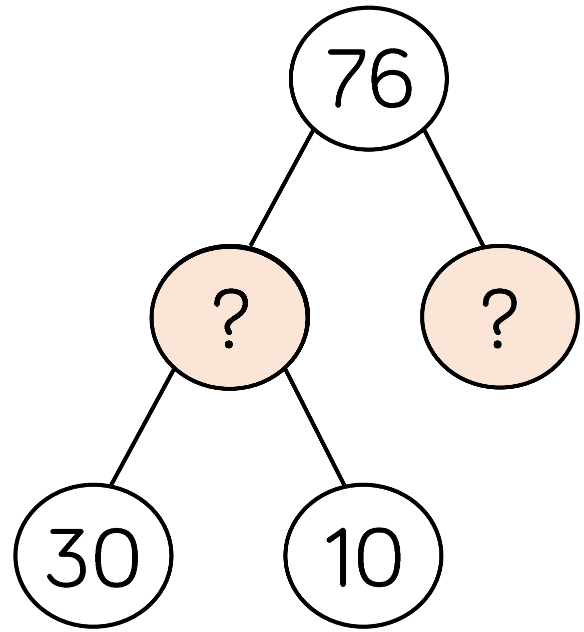
Reasoning and Problem Solving

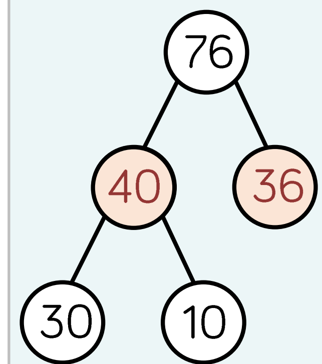
Complete each part-whole model in a **different** way.





Complete the extended part-whole model.





Tens and Ones (2)

Notes and Guidance

Children continue to use a part-whole model to explore how tens and ones can be partitioned and recombined to make a total.
Children will see numbers partitioned in different ways. For example, 39 written as 20 + 19
This small step will focus on using the addition symbol to express numbers to 100. For example, 73 can be written as 70 + 3 = 73

Mathematical Talk

What clues are there in the calculations? Can we look at the tens number or the ones number to help us?

What number completes the part-whole model?

What is the same/different about the calculations?

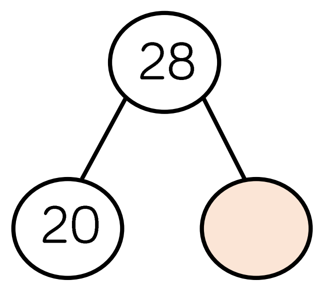
What are the key bits of information? Can you draw a diagram to help you?

Varied Fluency

- Match the number sentence to the correct number.

20 + 19	10 + 4	40 + 0	80 + 1
40	14	81	39

- Complete the part-whole model and write four number sentences to match.



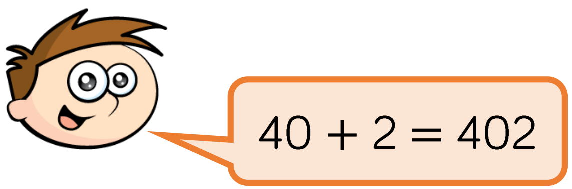
_____ + _____ = _____
_____ + _____ = _____
_____ = _____ + _____
_____ = _____ + _____

- Dora has 20 sweets and Amir has 15 sweets.
  Represent the total number of sweets:
  - With concrete resources.
  - In a part-whole model.
  - As a number sentence.

Tens and Ones (2)

Reasoning and Problem Solving

Teddy thinks that,



Explain the mistake he has made.

Can you show the correct answer using concrete resources?

40 + 2 = 42
Teddy has just combined the numbers to make 402 without thinking about their place value.

Fill in the missing numbers.

1 ten + 3 ones = 13

2 tens + ___ ones = 23

3 tens + 3 ones = _____

___ tens + 3 ones = 43

What would the next number in the pattern be?

1 ten + 3 ones = 13
2 tens + 3 ones = 23
3 tens + 3 ones = 33
4 tens + 3 ones = 43

5 tens + 3 ones = 53

Place Value Charts

Notes and Guidance

Children should formally present their work in the correct place value columns to aid understanding of place value.

It is important for children to use concrete, pictorial and abstract representations in their place value chart.

Mathematical Talk

How many tens are there?

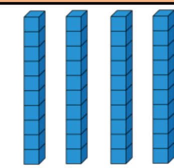
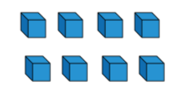
How many ones are there?

What is different about using Base 10 to using place value counters?

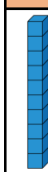
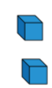
Can you write any other number sentences about the place value chart?

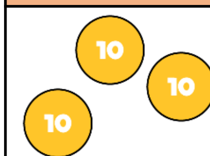
Varied Fluency

- What number is represented in the place value chart?

Tens	Ones
	

- Complete the place value chart using Base 10 and place value counters to represent the number 56

Tens	Ones
	

Tens	Ones
	

- What number is represented in the place value chart?

Tens	Ones
9	1

Write two different number sentences for this number.

_____ + _____ = _____

_____ = _____ + _____

Place Value Charts

Reasoning and Problem Solving

How many two digit numbers can you make that have the same number of tens and ones?

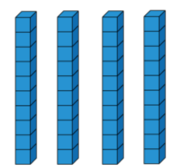
Show each one on a place value chart.

Tens	Ones

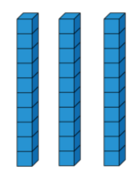
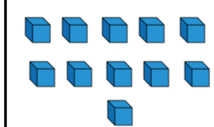
There are nine possibilities:
11, 22, 33, 44, 55, 66, 77, 88, 99

Do both place value charts show the same value?

A

Tens	Ones
	

B

Tens	Ones
	

What is the same?

What is different?

Yes, they both have the same value of 41

$40 + 1 = 41$

$30 + 11 = 41$

Same: Both A and B show 41

Different: There are a different number of tens and ones in each place value chart.

Compare Objects

Notes and Guidance

Comparing objects is introduced once children have a secure understanding of numbers in a place value chart.

Children are expected to compare a variety of objects using the vocabulary ‘more than’, ‘less than’ and ‘equal to’ and the symbols <, >, =

Mathematical Talk

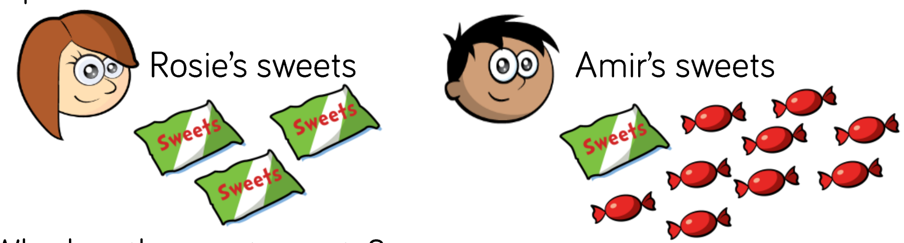
How can you arrange the objects to make them easy to compare?

Do groups of ten help you count? Why?

Do groups of ten help you compare? Why?

Varied Fluency

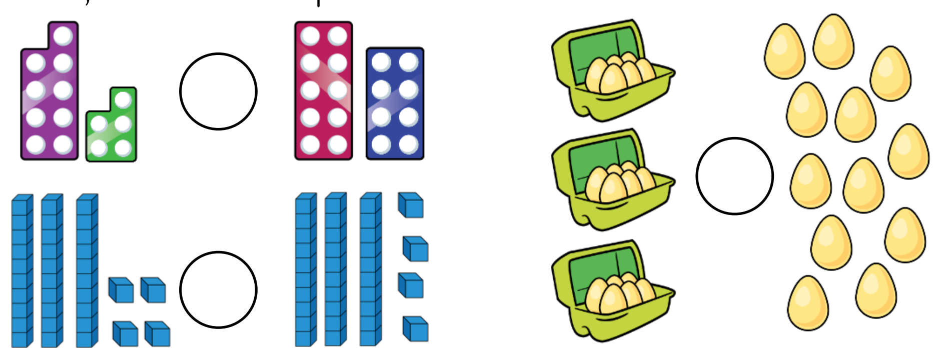
- A packet of sweets contain 10 sweets.



Who has the most sweets?

- Use cubes to show that:
  - Eleven is less than fifteen
  - 19 is greater than 9
  - 2 tens is equal to 20

- Use <, > or = to complete.

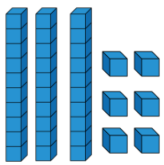


Compare Objects

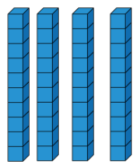
Reasoning and Problem Solving

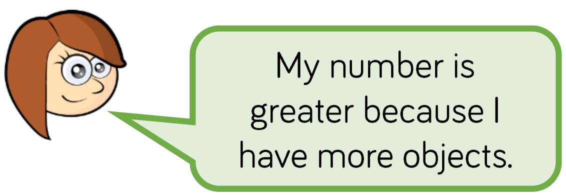
Rosie and Amir are comparing numbers they have made.

Rosie's number



Amir's number



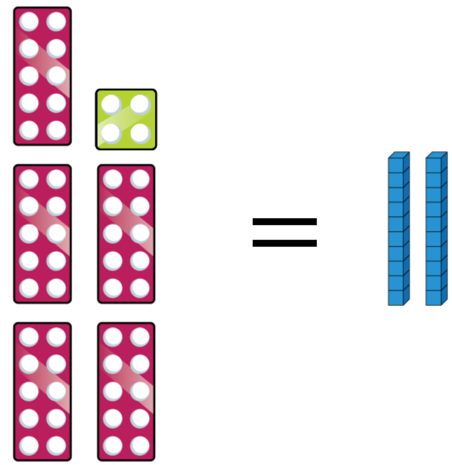


Is Rosie correct?

Explain your answer.

Rosie is incorrect because Amir has 4 tens which makes 40 and Rosie has 3 tens and 6 ones which makes 36, therefore Amir has more.

Add more Base 10 to make the number shapes and the Base 10 equal.



How much did you add in total to make them equal?

What is the smallest amount you could add if the symbol changed to <?

Children should add 3 tens and 4 ones to make 54 on both sides.

If the symbol changed to < the smallest amount they could add is 3 tens and 5 ones.

Compare Numbers

Notes and Guidance

Children compare numbers using the language greater than, less than, more than, fewer, most, least and equal to.

They are able to use the symbols <, > and = to write number sentences.

Children should have access to concrete resources to help them justify their answers.

Mathematical Talk

Can you prove your answers using concrete resources?

Can you prove your answers by drawing a diagram?

Is there more than one answer?

Do you need to work the number sentences out to decide which is greater?

Varied Fluency

- Complete the statements using **more than**, **less than** or **equal to**.

  42 is ________________ 46

  81 is ________________ 60 + 4

  30 + 8 is _____________ thirty-eight

- Complete the number sentences.

  4 tens and 9 ones > ________________

  ______________ < 70 + 5

  ______________ = eight tens

- Put <, > or = in each circle to make the statements correct.

  28 ◯ 30

  90 ◯ 70 + 28

  30 + 23 ◯ 40 + 13

  20 + 14 ◯ 24

Compare Numbers

Reasoning and Problem Solving

How many different numbers can go in the box?

$$13 < \boxed{} < 20$$

There are six different numbers: 14, 15, 16, 17, 18, 19

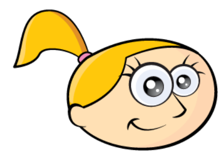
True or False?

One ten and twelve ones is bigger than 2 tens.

Explain how you know.

True
One ten and twelve ones = 22
Two tens = 20

Eva says,



When comparing numbers, the number with the highest number of ones is always the bigger number.

Do you agree?
Give some examples to support your answer.

Disagree, for example 19 is smaller than 21

Order Objects and Numbers

Notes and Guidance

Children order numbers and objects from smallest to greatest or greatest to smallest.
They should be encouraged to use concrete or pictorial representations to prove or check their answers.
Children use the vocabulary 'smallest' and 'greatest' and may also use the < or > symbols to show the order of their numbers.

Mathematical Talk

How does the number line help you order the numbers?

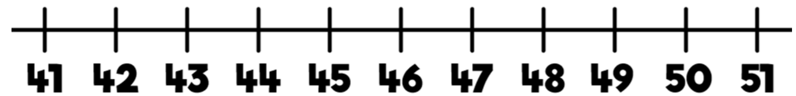
How does Base 10 prove that your order is correct?

How did you know which of the diagrams represented the smallest/greatest number?

Did you look at the tens or ones?

Varied Fluency

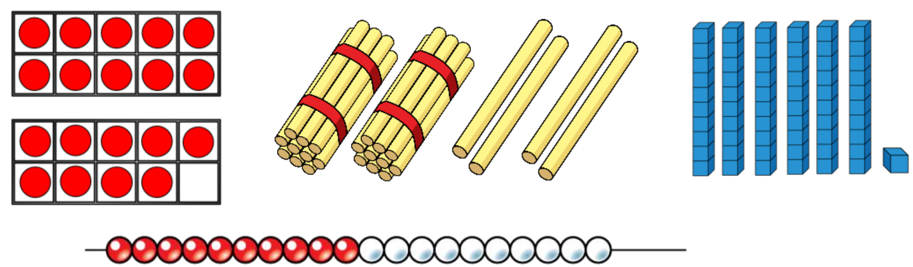
- Circle the numbers 48, 43 and 50 on the number line.



Put the numbers 48, 43 and 50 in order starting with the smallest.

- Use Base 10 to make the numbers sixty, sixteen and twenty-six. Write the numbers in order starting with the greatest number.

- The diagrams represent different numbers.



Circle the greatest number.
Circle the smallest number.
Complete the number sentence _____ > _____

Order Objects and Numbers

Reasoning and Problem Solving

Order the numbers below.
Which would be the fourth number?

33 53 37

29 34 43

Explain how you ordered them.

If I ordered them from smallest to largest:
29, 33, 34, 37, 43, 53 then 37 would be the fourth number.

Alternatively, if I order the numbers from largest to smallest:
53, 43, 37, 34, 33, 29 then 34 would be the fourth number.

Mo has written a list of 2-digit numbers.

The digits of each number add up to five.
None of the digits are zero.

Can you find all the numbers Mo could have written?

Write the numbers in order from smallest to largest.

What strategy did you use?

14, 23, 32, 41

Count in 2s, 5s and 10s

Notes and Guidance

Children count forwards and backwards in 2s, 5s and 10s.
It is important that children do not always start from zero, however they should start on a multiple of 2 or 5 when counting in 2s and 5s but can start from any number when counting in 10s. For example when counting in 2s they should not start at 3.
Encourage children to look for patterns as they count.

Mathematical Talk

What do you notice? Are the numbers getting larger or smaller?

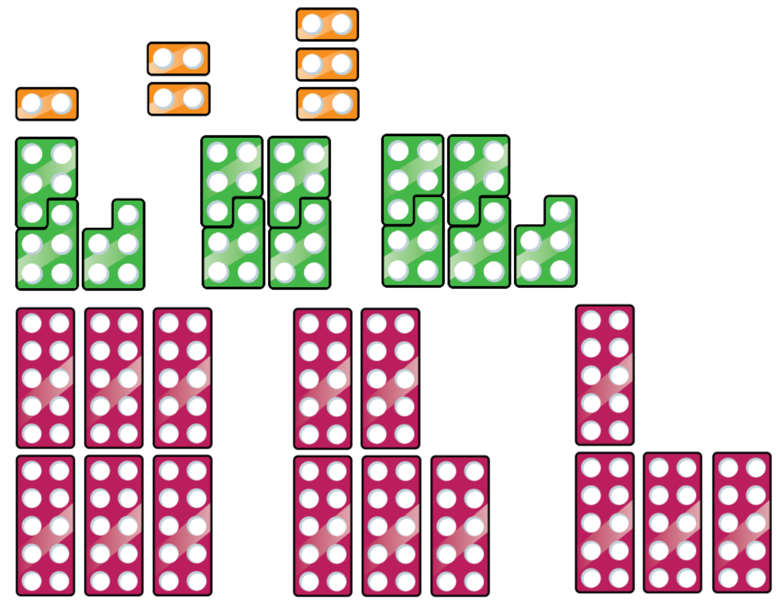
Are the numbers getting bigger or smaller each time? By how many?

Can you spot a pattern?

Why is it the odd one out? Can you correct the mistake?

Varied Fluency

Continue each number sequence.



Circle the odd one out in each number sequence.

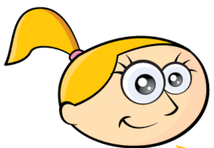
- 2, 4, 6, 8, 9, 10, 12……
- 0, 5, 10, 20, 30, 40……
- 35, 30, 25, 20, 12, 10……

Count forwards and backwards in jumps of 10 from fifty-seven.

Count in 2s, 5s and 10s

Reasoning and Problem Solving

<table>
<tr>
<td>
Eva says,



> If you count in 5s from any number in the five times table, your numbers will end in 5 or 0

Do you agree with Eva?

Prove it.
</td>
<td>
Agree.
Each number in the 5 times table does end in a 5 or 0
5, 10, 15, 20, 25, 30, 35, 40, 45, 50 etc.
</td>
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<td>

Always, Sometimes, Never

- When counting in 2s from zero the numbers are even.
- When counting in 5s from zero the numbers are even.
- When counting in 10s from zero the numbers are even.
</td>
<td>

- Always
- Sometimes
- Always
</td>
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<tr>
<td>
Teddy and Whitney are both counting from zero to twenty.

- Teddy is counting in 2s.
- Whitney is counting in 5s.

Will they say any of the same numbers?
What do you notice about your answer?
</td>
<td>
Yes they will both say 10 and 20

The numbers that are the same are the tens.
</td>
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</table>

White Rose Maths

Count in 3s

Notes and Guidance

Children count forwards and backwards in 3s from any multiple of 3

Encourage children to look for patterns as they count and use resources such as a number track, a counting stick and concrete representations.

Mathematical Talk

What do you notice about the numbers?

Are the numbers in the sequence getting larger or smaller?

Can you spot a pattern?

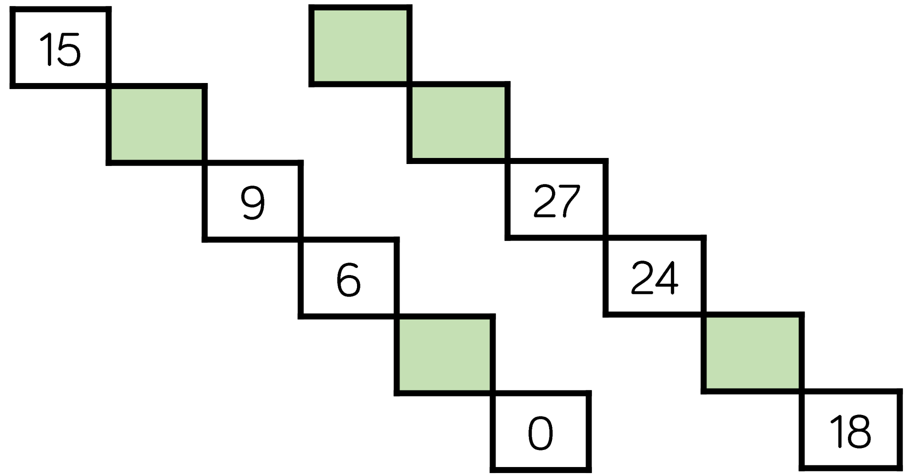
What are you counting up in?

Varied Fluency

- What do you notice about the numbers that are circled? Continue the pattern.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

- Complete the number sequences.



- Amir has 15 stickers. He collects 3 more each day. Complete the number track to show how many he will have in six days.

15						

Count in 3s

Reasoning and Problem Solving

True or False?

I start at 0 and count in 3s
I say the number 14

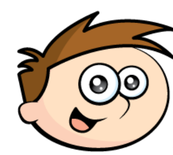
Explain your answer.

False.
If I count in 3s I say 3, 6, 9, 12, 15....

Teddy is counting in 2s and Jack is counting in 3s.

Teddy	2	4	6	8
Jack	3	6	9	12
+				

Teddy says,



If we add our numbers together as we count we can make a new number pattern.

What pattern do they make?
What happens if both Teddy and Jack count in 5s and they add them together to make a new pattern?

If Teddy and Jack add their numbers together they will be counting in 5s.

If Teddy and Jack both count in 5s their new pattern would be counting in 10s.

White Rose Maths

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

- Fact families – addition and subtraction bonds to 20
- Check calculations
- Compare number sentences
- Related facts
- Bonds to 100 (tens)
- Add and subtract 1s
- 10 more and 10 less
- Add and subtract 10s
- Add a 2-digit and 1-digit number – crossing ten
- Subtract a 1-digit number from a 2-digit number – crossing ten
- Add two 2-digit numbers – not crossing ten – add ones and add tens
- Add two 2-digit numbers – crossing ten – add ones and add tens
- Subtract a 2-digit number from a 2-digit number – not crossing ten
- Subtract a 2-digit number from a 2-digit number – crossing ten – subtract ones and tens
- Bonds to 100 (tens and ones)
- Add three 1-digit numbers

NC Objectives

Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.

Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers.

Show that the addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.

Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and written methods.

Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Fact Families

Notes and Guidance

Children apply their understanding of known addition and subtraction facts within 20 to identify all related facts.
This will include an understanding of the relationship between addition and subtraction, and knowing the purpose of the equals sign, as well as the addition and subtraction signs.
Showing the link between representations, such as part-whole models and bar models can support and deepen the children's understanding.

Mathematical Talk

What if we took away the red flowers? What are the parts? What is the whole?

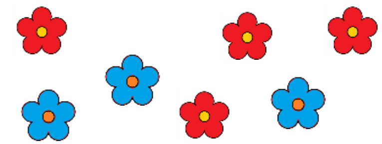
Does it change the answer if we add the blue and red flowers in a different order?

What does each circle represent on the part-whole model?

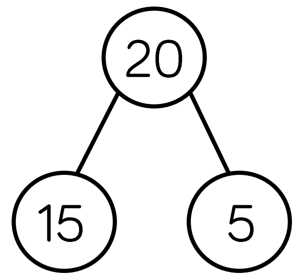
How many different number sentences are there in the fact family?

Varied Fluency

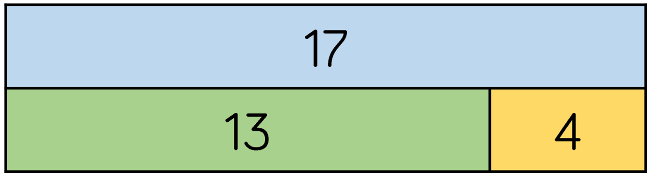
- Using concrete apparatus, can you talk about the relationships between the different flowers?



- One relationship shown by this part-whole model is $15 + 5 = 20$
Can you write all associated number sentences in the fact family?



- Look at the bar model below.
Can you write all of the number sentences in the fact family?



Fact Families

Reasoning and Problem Solving

Here is an incomplete bar model.
The total is greater than 10 but less than 20
What could the missing numbers be?
How many different combinations can you find?

7 and 11
8 and 12
9 and 13
10 and 14
11 and 15
12 and 16
13 and 17
14 and 18
15 and 19

$8 - 5 = 3$

$8 - 3 = 5$

$8 = 5 - 3$

$3 = 8 - 5$

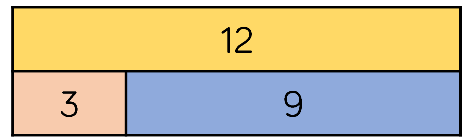
Rosie says,

I think that all of these facts are correct because the numbers are related

Ron disagrees.
Who is correct? Can you prove it?

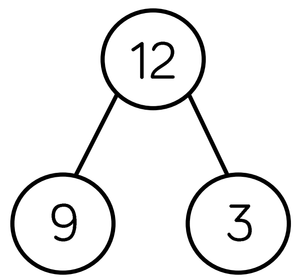
Ron is correct because 8 is not equal to $5 - 3$

Which of the representations are equivalent to the bar model?



$12 = 9 + 3$

There are 9 cars in a car park, 3 cars leave.



$9 - 3 = 12$

The number line, the part-whole model and $12 = 9 + 3$

Check Calculations

Notes and Guidance

It is essential that children have the opportunity to discuss and share strategies for checking addition and subtraction calculations.
Checking calculations is not restricted to using the inverse. Teachers should discuss using concrete resources, number lines and estimating as part of a wide range of checking strategies.

Mathematical Talk

What resources could you use to check your calculation?

Can you check it in more than one way?

Why do we need to check our calculation?

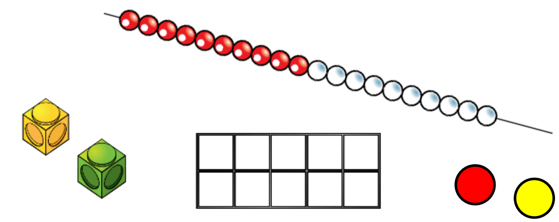
Is there another way you could represent this?

Varied Fluency

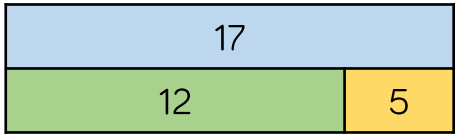
- Use concrete objects to check and prove whether the calculations are correct.

  $12 - 4 = 8$

  $7 + 8 = 15$

- Can you use inverse operations to check $5 + 12 = 17$?

  How many possible inverse calculations are there?

- Eva writes this calculation: $18 - 5 = 13$
  Which of the following could she use to check her work?

  $13 + 5$ $13 - 5$

  $18 - 13$ $5 + 13$

Check Calculations

Reasoning and Problem Solving

Eva did the following calculation: $12 - 8 = 4$ She checked it by using the inverse. She did $12 + 8 = 20$ and said that her first calculation was wrong. What advice would you give her?	It should have been $8 + 4 = 12$ or $4 + 8 = 12$
Teddy is checking Dora's work but doesn't do an inverse calculation.  $24 + 6 = 84$ $25 - 23 = 12$ $18 - 3 = 21$ How might he know? What errors have been made in each calculation?	All of the calculations involve errors: 6 has been added to the tens instead of the ones. 25 and 23 are very close in value and therefore can't result in such a large difference. 18 and 3 have been added instead of subtracted.

Compare Number Sentences

Notes and Guidance

Children should be encouraged to examine number sentences to find missing values using structure rather than calculation. Using numbers within 20 to explore mathematical relationships will give the children confidence and allow them to spot patterns because they are working within the context of familiar numbers.
Children should compare similar calculations using greater than, less than and equal to symbols.

Mathematical Talk

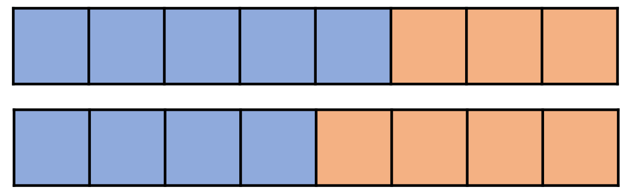
What other numbers make the same total?

Do we need to calculate the answer to work out the missing symbol?

Do you notice a pattern? What would come next?

Varied Fluency

- How can we use the following representation to prove that $5 + 3 = 4 + 4$?



- Fill in the circles with either $<$, $>$ or $=$

$6 + 4 \bigcirc 6 + 5$

$6 + 4 \bigcirc 3 + 6$

$11 - 4 \bigcirc 12 - 5$

$11 - 4 \bigcirc 12 - 4$

- Complete the missing numbers.

$5 + 3 = 6 +$ _____

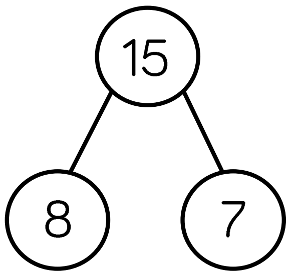
$5 + 3 =$ _____ $+ 6 = 7 +$ _____

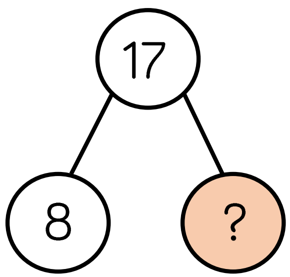
_____ $+ 3 =$ _____ $+ 4 = 5 + 5$

Compare Number Sentences

Reasoning and Problem Solving

Rosie thinks she knows the missing number without calculating the answer.





Can you explain how this could be possible?

17 is two more than 15, so the missing number must be two more than 7

The missing number must be 9

Both missing numbers are less than 10

$$7 + \square < 7 + \square$$

How many different possible answers can you find?

Lots of different combinations, the left number has to be smaller than the right.

Possible answers:
1 and 2
1 and 3
1 and 4
1 and 5
1 and 6
1 and 7
1 and 8
1 and 9
2 and 3
Etc.

Related Facts

Notes and Guidance

Children should have an understanding of calculations with similar digits. For example, $2 + 5 = 7$, so $20 + 50 = 70$
This involves both addition and subtraction. It is important to highlight the correct vocabulary and help children to notice what is the same and what is different between numbers and calculations.
'Tens' and 'ones' should be used to aid understanding.
Using Base 10 can also help the children to see relationships.

Mathematical Talk

What is the same? What is different?

How does Base 10 help us to see the relationships between the different numbers and calculations?

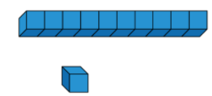
What do you notice about the part-whole models?

Is there a relationship between the numbers that are represented?

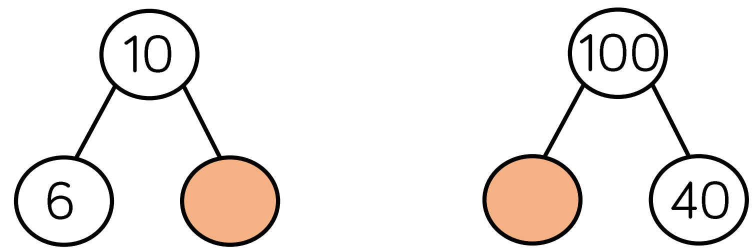
Varied Fluency

- I have 3 blue pens and 4 black pens. Altogether I have 7 pens. Tommy has 30 blue pens and 40 black pens. How many pens does he have in total?

  Use concrete apparatus to show your thinking.



- Complete the part-whole models below:



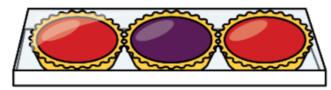
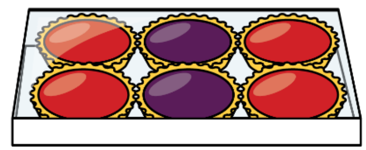
- Find the missing numbers in the related facts.

$5 + 4 = 9$	$8 = 3 + 5$	$4 = 10 - 6$
$50 + 40 =$ _____	$80 = 30 +$ _____	$40 =$ _____ $- 60$

Related Facts

Reasoning and Problem Solving

Continue the pattern. 90 = 100 – 10 80 = 100 – 20 70 = 100 – 30 What are the similarities and difference between this pattern and the following one? 9 = 10 – 1 8 = 10 – 2 7 = 10 – 3	60 = 100 – 40 50 = 100 – 30 Etc. The digits are the same but the place value changes.
Alex says,  Find the missing number and explain how Alex knows.	10 All the numbers are ten times greater.

Whitney has 3 jam tarts.

Tommy has 6 jam tarts.

Altogether they have 9 jam tarts.
 	
3 + 6 = 9
So
___ + ___ = 90
 	
What if all of the red jam tarts are eaten?
 	
What if all of the purple jam tarts are eaten?
	30 + 60 = 90
	
	If all of the red tarts are eaten then
	1 + 2 = 3
	so
	10 + 20 = 30
	
	If all of the purple tarts are eaten then
	2 + 4 = 6
	so
	20 + 40 = 60

Bonds to 100 (Tens)

Notes and Guidance

Teachers should focus at this stage on multiples of 10 up to and within 100

Links should be made again between single digit bonds and tens bonds.

Using a 10 frame to represent 100 would be a useful resource to make this link.

Mathematical Talk

What does the word multiple mean?

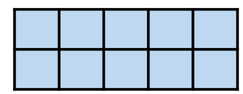
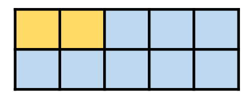
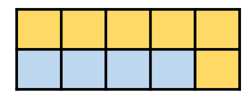
What does the blue represent? What does the yellow represent?

Why is it different to a normal 10 frame?

What patterns can you see? How does this help us to make up our own?

Varied Fluency

- Match the 10 frames to the sentences below:

One hundred equals eighty plus twenty

$100 = 100 + 0$

$40 + 60 = 100$

- Fill in the missing numbers. Use Base 10 to represent the numbers..

$2 + 6 = 8$

$20 + 60 =$ ______

2___ + ___0 = 80

80 = ___0 + 6___

- Continue the pattern

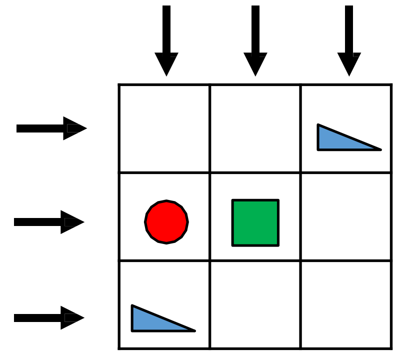
$90 = 100 - 10$
$80 = 100 - 20$

Can you make up a similar pattern starting with the numbers 60, 30 and 90?

Bonds to 100 (Tens)

Reasoning and Problem Solving

Eva thinks there are 10 different number bonds to 90 using multiples of 10 Amir thinks there are only 5 Who is correct? Can you help the person who is wrong to understand their mistake?	Amir because 0 + 90 is the same as 90 + 0 Eva has repeated her answers – the multiples have been written the opposite way around.
Using multiples of 10, how many number bonds are there for the following numbers? 20 30 40 50 What do you notice about the amount of bonds for each number? If 80 has 5 bonds, predict how many 90 would have.	20 and 30 both have 2. 40 and 50 both have 3. When the tens digit is odd it has the same number of bonds as the previous tens number. 90 would also have 5.

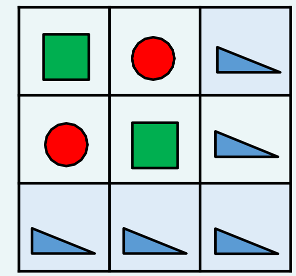


Squares are worth 10
Triangles are worth 20
Circles are worth 30

Can you complete the grid above so that all horizontal and vertical lines equal 60?

Can children create another pattern on an empty grid where each line equals 60?
How many possible ways are there to solve this?

Solution



Lots of possible solutions available.

Add and Subtract 1s

Notes and Guidance

Children should start seeing the pattern when we add and subtract 1 and comment upon what happens.

This is the step before finding ten more than or ten less than, as bridging beyond a 10 should not be attempted yet.

The pattern should be highlighted also by adding 2 (by adding another one) and then adding 3

Mathematical Talk

What happens when we add 2?

What is the link between adding 1 and adding 2?

What about if we want to add 3?

How can a bead string help when we are adding 1, 2, 3 etc.?

Where will be the best place to start on each number track? Why?

Varied Fluency

Create sentences based on the picture.

Example
There are 4 children playing in a park. One more child joins them so there will be 5 children playing together.

Continue the pattern

$22 = 29 - 7$
$22 = 28 - 6$

Can you create an addition pattern by adding in ones and starting at the number 13?

Continue the number tracks below.

31			34		

		45			48

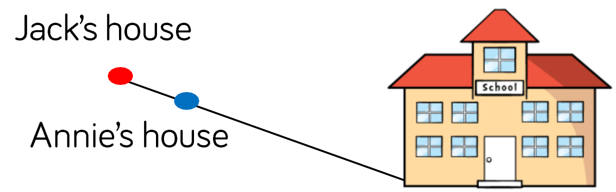
				67	

	13				

Add and Subtract 1s

Reasoning and Problem Solving

True or False? These four calculations have the same answer. 1 + 4 + 2 4 + 2 + 1 2 + 4 + 1 4 + 1 + 2	True, because they all equal 7 and addition is commutative.
These four calculations have the same answer. 7 – 3 – 2 2 – 3 – 7 3 – 2 – 7 7 – 2 – 3	False, because subtraction isn't commutative.



Jack lives 5 km from school. Annie lives 4 km from school in the same direction. What is the distance between Jack and Annie's houses?	1 km
After travelling to and from school, Jack thinks that he will walk 1 km more than Annie. Is he correct? Explain your answer.	No, he will walk 2 km further. 1 km on the way to school and 1 km on the way home.
What will be the difference in distance walked after 2 school days?	4 km

10 More and 10 Less

Notes and Guidance

Teaching needs to focus on the importance of the tens digit.
Using a 100 square, explore with the children what happens to the numbers in the columns.
Draw attention to the idea that the tens digit changes while the ones digit remains the same.
Children will need to see how the number changes with concrete materials before moving onto more abstract ideas.

Mathematical Talk

What's the same? What's different?

Will you start with 35 or 55? Why?

When you look at a hundred square, what do you notice about the numbers that are ten more and ten less than 27?

Which direction will your finger move on a hundred square if you are finding ten more/ten less?

Varied Fluency

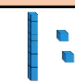
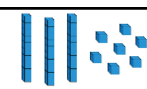
- Continue the number tracks below.

10	20	30			

			35	45	55			

- Using a 100 square, circle the number that is 10 more than 27
Circle the number that is 10 less than 27
Repeat in different colours for different numbers.
What do you notice?

- Using concrete materials, complete the missing boxes.

10 less	Number	10 more
		
2	12	22
		
	37	

10 More and 10 Less

Reasoning and Problem Solving

SALE

15 p 22 p 35 p 68 p

The cost of each piece of fruit is reduced by 10 p.

What are the new prices?

Red Apple 5 p

Green Apple 12 p

Banana 25 p

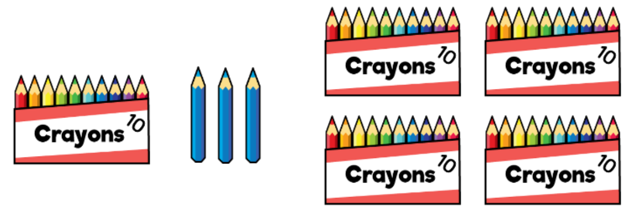
Lemon 58 p

Mo says,

I know that 10 more than 72 is 82 because I only have to look at the tens digit.

Is he correct?
Explain your reasoning.

Yes, because when you add ten you aren't adding ones.



Class 3 gives one of their full packets of crayons away.

How many crayons do they have left?

Explain your reasoning.

43

They will have four full packs left which is four tens, and three crayon which represents three ones.

Rosie is counting backwards in 10s.
She says forty-nine, thirty-nine, twenty-nine and then stops.
What numbers comes next and why?

19 because you take one ten away from 29, then 9

Add and Subtract 10s

Notes and Guidance

Children should make use of place value to add and subtract 10s from a given number within 100
The key teaching point again is the importance of the tens digit within the given numbers, and children should be encouraged to see the relationship.

For example $64 + 20 = 84$

Mathematical Talk

What is the number sentence that will help us to find the first missing number in the number track?

What is the same/different about the next number sentence?

Why is there a blank ones box?

Which column changes?

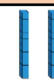
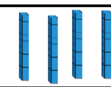
Which column stays the same?

Varied Fluency

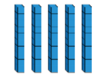
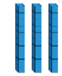
- Continue the number track by adding 20 each time.

23				

- Use the place value charts and concrete materials to complete the calculations.

Tens	Ones
	
	

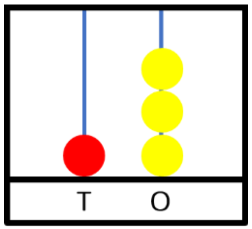
$$\begin{array}{r} 2\ 3 \\ +\ 4\ 0 \\ \hline \\ \hline \end{array}$$

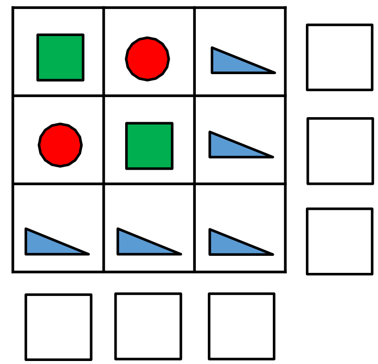
Tens	Ones
	
	

$$\begin{array}{r} 5\ 6 \\ -\ 3\ 0 \\ \hline \\ \hline \end{array}$$

Add and Subtract 10s

Reasoning and Problem Solving

 Tommy has three spare red beads. What numbers could he make? Explain your answer.	23 33 43 He doesn't have to use all of the beads.
Here are Class 2's crayons.  They are given a new box of 10 each day for a week. How many crayons do they have at the end of the week?	Discussion could be had about whether it's a full week or a school week. Answers would be 96 or 76 respectively.

 Circles represent 20 Triangles represent 10 Squares represent 50 What is the value of each row and column?	Rows (top to bottom) 80 80 30 Columns (left to right) 80 80 30

Add 2-digits and 1-digit

Notes and Guidance

Before crossing the 10 with addition, children need to have a strong understanding of place value. The idea that ten ones are the same as one ten is essential here. They need to be able to count to 20 and need to be able to partition two-digit numbers in order to add them. They need to understand the difference between one-digit and two-digit numbers and line them up in columns. In order to progress to using the number line more efficiently, children need to be secure in their number bonds.

Mathematical Talk

Using Base 10, can you partition your numbers?

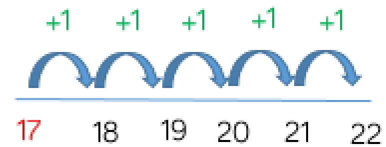
Can we exchange 10 ones for one ten?

How many ones do we have? How many tens do we have?

Can you draw the Base 10 and show the addition pictorially?

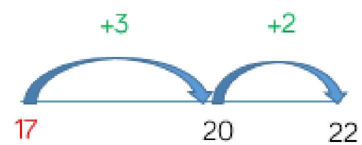
Varied Fluency

17 + 5 =

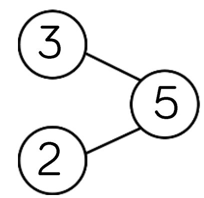


Can you put the larger number in your head and count on the smaller number? Start at 17 and count on 5

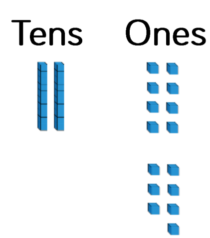
Can we use number bonds to solve the addition more efficiently?



We can partition 5 into 3 and 2 and use this to bridge the 10



Find the total of 28 and 7



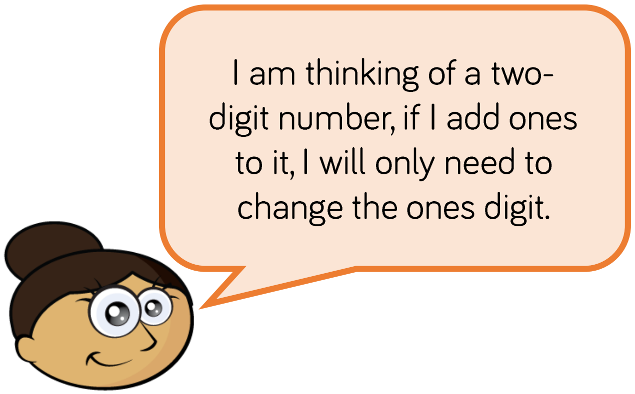
$$\begin{array}{r} 2\ 8 \\ +\ \ \ 7 \\ \hline 3\ 5 \\ \hline 1\ \ \ \end{array}$$

- Partition both the numbers.
- Add together the ones.
- Have we got 10 ones?
- Exchange 10 ones for 1 ten.
- How many ones do we have?
- How many tens do we have?

Add 2-digits and 1-digit

Reasoning and Problem Solving

Always, Sometimes, Never



Explain your answer.

Sometimes, because if your ones total 10 or more you will have to exchange them which will change the tens digit.

Here are three digit cards.

6 7 8

Place the digit cards in the number sentence.

How many different totals can you find?

☐☐ + ☐ =

What is the smallest total?

What is the largest total?

$67 + 8 = 75$
$68 + 7 = 75$
$76 + 8 = 84$
$78 + 6 = 84$
$86 + 7 = 93$
$87 + 6 = 93$

75 is the smallest total.

93 is the largest total.

White Rose Maths

Subtract 1-digit from 2-digits

Notes and Guidance

Just as with addition, children need to have a strong understanding of place value for subtraction. Children need to be able to count to 20 and need to be able to partition two-digit numbers in order to subtract from them. They need to understand the difference between one-digit and two-digit numbers and line them up in columns.
In order to progress to using the number line more efficiently, children need to be secure in their number bonds.

Mathematical Talk

Are we counting backwards or forwards on the number line?

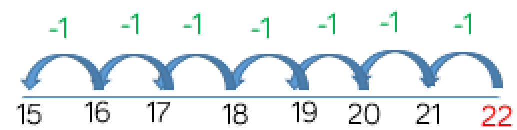
Have we got enough ones to subtract?

Can we exchange a ten for ten ones?

How can we show the takeaway? Can we cross out the cubes?

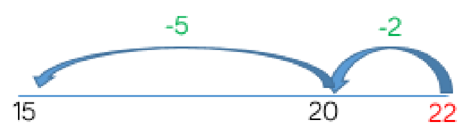
Varied Fluency

- $22 - 7 =$

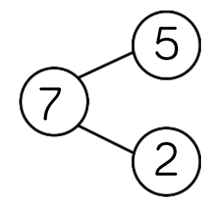


Can you put the larger number in your head and count back the smaller number? Start at 22 and count back 7

- Can we use number bonds to subtract more efficiently?

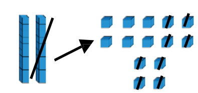


We can partition 7 into 5 and 2 and use this to bridge the 10



- Subtract 8 from 24

Tens Ones



$$\begin{array}{r} \overset{1}{\cancel{2}}\,{}^{1}4 \\ -\quad 8 \\ \hline 1\;\,6 \\ \hline \end{array}$$

- Do we have enough ones to take 8 ones away?
- Exchange one ten for ten ones.
- Take away 8 ones.
- Can you write this using the column method?

Subtract 1-digit from 2-digits

Reasoning and Problem Solving

Jack and Eva are solving the subtraction 23 – 9

Here are their methods:

I put 9 in my head and counted on to 23

Jack

I put 23 in my head and counted back 9

Eva

Who's method is the most efficient?

Can you explain why?

Can you think of another method to solve the subtraction.

Eva's method is most efficient because there are less steps to take. The numbers are quite far apart so Jack's method of finding the difference takes a long time and has more room for error.

Mo is counting back to solve 35 – 7

He counts

35, 34, 33, 32, 31, 30, 29

Is Mo correct?

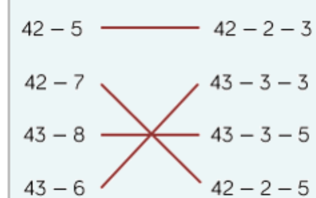
Explain your answer.

Mo is not correct as he has included 35 when counting back.

This is a common mistake and can be modelled on a number line.

Match the number sentences to the number bonds that make the method more efficient.

42 – 5	42 – 2 – 3
42 – 7	43 – 3 – 3
43 – 8	43 – 3 – 5
43 – 6	42 – 2 – 5



Add 2-digit Numbers (1)

Notes and Guidance

This step is an important pre-requisite before children add two-digit numbers with an exchange.
Focus on the language of tens and ones and look at different methods to add the numbers including the column method.
It is important that teachers always show the children to start with the ones when adding using the column method.

Mathematical Talk

Can you partition the number into tens and ones?

Can you count the ones? Can you count the tens?

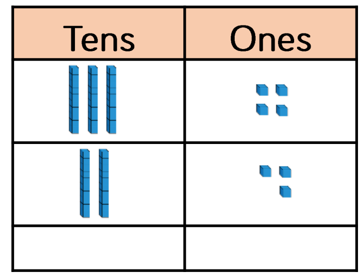
Can you show your addition by drawing the Base 10 to help?

How could you represent the problem?

Varied Fluency

- Find the sum of 34 and 23

+



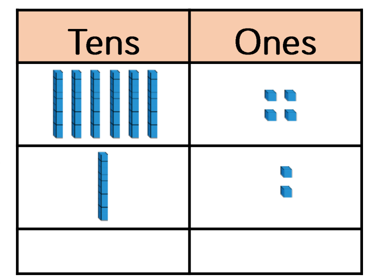
- 64 + 12 = _____

  4 ones + 2 ones = _____

  6 tens + 1 ten = _____

  _____ tens + _____ ones = _____

+



- Mo has 41 sweets. Whitney has 55 sweets.

  How many sweets do they have altogether?

Add 2-digit Numbers (1)

Reasoning and Problem Solving

Annie has 12 marbles.

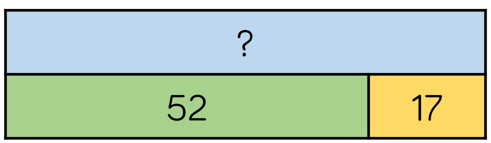
Ron has 13 marbles more than Annie.

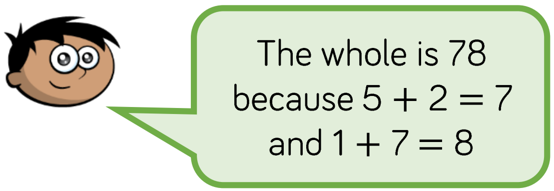
How many marbles do they have altogether?

Ron has 25 marbles.

Altogether they have 37 marbles.

Amir has been asked to complete the bar model.





Explain to Amir what he has done wrong. How could you help him work out the correct total?

Amir has found the digit totals and put the digits together to make 78

The correct answer is 69 and this could be shown by using Base 10 and a place value chart.

What digits could go in the boxes?

$$\boxed{}2 + \boxed{}5 = 87$$

Possible answers:
1 and 7
2 and 6
3 and 5
4 and 4
5 and 3
6 and 2
7 and 1

Interesting discussion could be had around is 1 and 7 different to 7 and 1?
Etc.

Add 2-digit Numbers (2)

Notes and Guidance

Children use Base 10 and partitioning to add together 2-digit numbers including an exchange. They could be encouraged to draw the Base 10 alongside recording any formal column method.

They have already seen what happens when there are more than 10 ones and should be confident in exchanging 10 ones for one 10.

Mathematical Talk

Can you represent the ones and tens using Base 10?
What is the value of the digits?
How many ones do we have altogether?
How many tens do we have altogether?
Can we exchange ten ones for one ten?
What is the sum of the numbers?
What is the total?
How many have we got altogether?

Varied Fluency

- $64 + 17 =$ ____

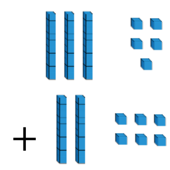
  4 ones + 7 ones = ____

  6 tens + 1 ten = ____

  ____ tens + ____ ones = ____

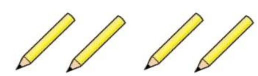
$$\begin{array}{r} 64 \\ \underline{+\ 17} \\ 11 \\ \underline{+\ 70} \\ 81 \end{array}$$

- Find the sum of 35 and 26



  - Partition both the numbers.
  - Add together the ones. Have we got 10 ones?
  - Exchange 10 ones for 1 ten.
  - How many ones do we have?
  - Add together the tens. How many do we have altogether?

- Class 3 has 37 pencils.
  Class 4 has 43 pencils.



  How many pencils do they have altogether?

Add 2-digit Numbers (2)

Reasoning and Problem Solving

Can you create a calculation where there will be an exchange in the ones and your answer will have two ones and be less than 100?	There are lots of possible solutions. E.g. $33 + 29 = 62$
How many different ways can you solve $19 + 11$? Explain your method to a partner. Use concrete or pictorial resources to help explain your method.	Children might add the ones and then the tens. Children should notice that 1 and 9 are a number bond to 10 which makes the calculation easier to complete mentally.

Find all the possible pairs of numbers that can complete the addition. $\begin{array}{r} \boxed{1}\boxed{} \\ +\ \boxed{2}\boxed{} \\ \hline \boxed{4}\boxed{2} \\ {\scriptstyle 1} \end{array}$ How do you know you have found all the pairs? What is the same about all the pairs of numbers?	$13 + 29$ $19 + 23$ $14 + 28$ $18 + 24$ $15 + 27$ $17 + 25$ $16 + 26$ All the pairs of ones add up to 12

Subtract with 2-digits (1)

Notes and Guidance

This step is an important step before children start to look at subtraction where they cross a tens boundary. Children need to use concrete materials but also draw images of the Base 10 so they can independently solve problems. Some children might think that they need to ‘build’ both numbers in the calculation, unpicking this misconception through modelling and discussion will help develop their understanding.

Mathematical Talk

Do we need to make both numbers in the subtraction before we take away?

Which number do we need to make? The larger number or the smaller?

What are the numbers worth? Tens or ones?

What happens if we have nothing left in a column? Which number do we write?

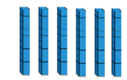
Varied Fluency

78 minus 34 = _____

8 ones – 4 ones = _____

7 tens – 3 tens = _____

We have _____ tens and _____ ones.

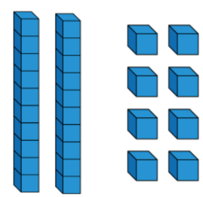
Tens	Ones
	

34 – 13 = _____

34
30 4
–10 –3
20 1

- Partition the number 34.
- Partition 13 and subtract the ones and the tens.
- Place the partitioned number back together.

Subtract 13 from 28



$$\begin{array}{r} 2\ 8 \\ -\ 1\ 3 \\ \hline 1\ 5 \end{array}$$

Subtract with 2-digits (1)

Reasoning and Problem Solving

Annie has 33 stickers. Dexter has 54 stickers. How many more stickers does Dexter have? What method did you use to solve the problem?	Here the children are working out the difference. Children might use subtraction to solve the problem or they might count on to find the difference. Dexter has 21 more stickers than Annie.

Find the missing numbers. $\begin{array}{r} \boxed{6}\boxed{} \\ -\ \boxed{2}\boxed{} \\ \hline \boxed{4}\boxed{2} \end{array}$ Is this the only possible solution? Explain your answer. Make the numbers using Base 10 to help you find your answer.	9 and 7 8 and 6 7 and 5 6 and 4 5 and 3 4 and 2 3 and 1 2 and 0

Subtract with 2-digits (2)

Notes and Guidance

Children use their knowledge that one ten is the same as ten ones to exchange when crossing a ten in subtraction.

Continue to use concrete manipulatives (such as Base 10) and pictorial representations (such as number lines and part-whole models) to develop the children's understanding.

The skill of flexible partitioning is useful here when the children are calculating with exchanges.

Mathematical Talk

Have we got enough ones to take away?
Can we exchange one ten for ten ones?
How many have we got left?
What is the difference between the numbers?
Do we always need to subtract the ones first? Why do we always subtract the ones first?
Which method is the most efficient to find the difference, subtraction or counting on?

Varied Fluency

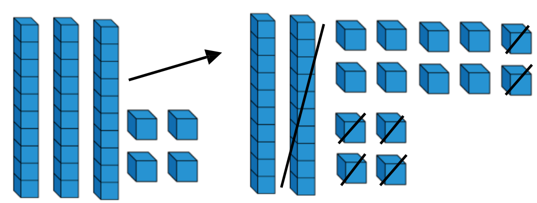
- Use the number line to subtract 12 from 51

Can you subtract the ones first and then the tens?
Can you partition the ones to count back to the next ten and then subtract the tens?

- $42 - 15 =$

42	We can't subtract the ones. Can we partition differently?	42	Now we can subtract the ones and then subtract the tens.
40, 2		30, 12	$42 - 15 = 27$
-10, -5		-10, -5	
		20, 7	

- Take 16 away from 34

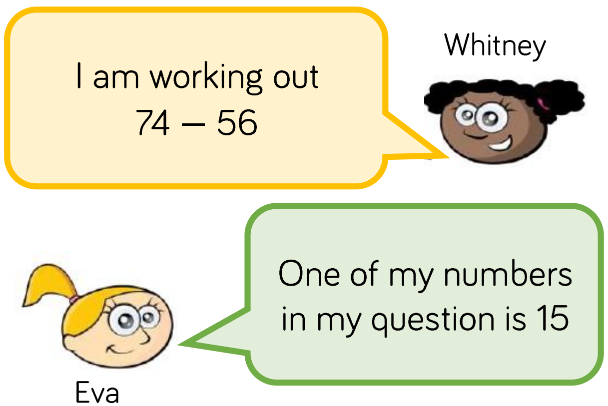


$$\begin{array}{r} \overset{2}{\cancel{3}}\ {}^{1}4 \\ -\ 1\ \ 6 \\ \hline 1\ \ 8 \\ \hline \end{array}$$

Subtract with 2-digits (2)

Reasoning and Problem Solving

Eva and Whitney are working out some subtractions.



Whitney's answer is double Eva's answer.

What could Eva's subtraction be?

Whitney's answer is 18

Eva's answer is 9

Eva's question could be 15 – 6 or 24 – 15

Find the greatest whole number that can complete each number sentence below.

$45 - 17 > 14 + \_\_\_$

$26 + 15 < 60 - \_\_\_$

Explain your answer.

13

18

White Rose Maths

Bonds to 100 (Tens and Ones)

Notes and Guidance

Here children build on their earlier work on number bonds to 100 with tens together with number bonds to 10 and 20

They use their new knowledge of exchange to find number bonds to 100 with tens and ones.

Using hundred squares, Base 10, bead strings etc. will help the children develop their understanding.

Mathematical Talk

How many more do we need to make 100?

How many tens are in 100?

If I have 35, do I need 7 tens and 5 ones to make 100? Explain why.

Can you make the number using Base 10?

Can you add more Base 10 to the number to make 100?

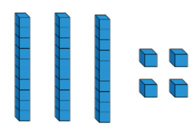
Varied Fluency

Use a 100 square. If:

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
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- 40 squares are shaded, how many are not shaded?
- 45 squares are shaded, how many are not shaded?
- 54 squares are shaded, how many are not shaded?

Tommy is making 100 with Base 10
How much more does he need if he has:

- 
- 5 tens and 3 ones
- 37

Children could place their Base 10 on top of a 100 piece to help them calculate.

25 + ___ = 100

100 – 84 = ___

___ + 69 = 100

100 – ___ = 11

Bonds to 100 (Tens and Ones)

Reasoning and Problem Solving

Teddy has completed the missing number sentence.

46 + 64 = 100

Is Teddy correct?
Explain your answer.

Teddy is incorrect. He has seen number bonds to 10 but forgotten that he would need to exchange ten ones for one ten.
46 + 64 = 110

Each row and column adds up to 100.

Complete the grid.

45	45	
	35	
15		65

45	45	10
40	35	25
15	20	65

Complete the pattern.

15 + 85 = 100
20 + 80 = 100
25 + 75 = 100
30 + ___ = 100
___ + ___ = 100

Can you explain the pattern?

30 + 70 = 100
35 + 65 = 100
The first numbers are going up in fives and the second numbers are going down in fives. All of the number sentences are number bonds to 100

Add Three 1-digit Numbers

Notes and Guidance

Children need to use their knowledge of commutativity to find the most efficient and quick way to add the three one-digit numbers.

They look for number bonds to 10 to help them add more efficiently.

Mathematical Talk

Can we change the order of the numbers to make the calculation easier?

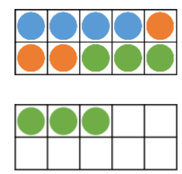
Why are we allowed to change the order of the numbers?

Which two numbers did you add first? Why?

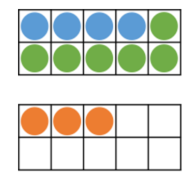
What if you added a different two numbers first, would your answer be the same?

Varied Fluency

Use ten frames and counters to add the numbers $4 + 3 + 6$



Can you add the numbers in a different way to find a number bond to 10?



$4 + 6 = 10$

$10 + 3 = 13$

Find the totals of each row and column.

5	4	2	
3	7	8	
5	7	3	

Use <, > or = to compare the number sentences.

$5 + 4 + 6$ ◯ $6 + 5 + 4$

$7 + 3 + 8$ ◯ $7 + 7 + 3$

$9 + 2 + 5$ ◯ $8 + 3 + 5$

$8 + 4 + 2$ ◯ $2 + 5 + 8$

Add Three 1-digit Numbers

Reasoning and Problem Solving

Always, Sometimes, Never odd + odd + odd = odd Use one-digit numbers to test if this is true e.g. 3 + 5 + 7	Always, children may recognise that two odds make an even so three odds make an odd.
Which numbers would you add together first in the following number sentences? Why would you add those first? 3 + 5 + 7 = 8 + 2 + 6 = 4 + 3 + 4 = Is there always an easier order to add three one-digit numbers?	3 and 7 first – number bond to 10 8 and 2 first – number bond to 10 4 and 4 first – double a number. No, e.g. 5 + 6 + 7

Take 3 consecutive one-digit numbers, e.g. 4, 5 and 6. Add them together. What do you notice? Choose different groups of 3 consecutive one-digit numbers and see if there is a pattern.	1 + 2 + 3 = 6 2 + 3 + 4 = 9 3 + 4 + 5 = 12 4 + 5 + 6 = 15 5 + 6 + 7 = 18 6 + 7 + 8 = 21 7 + 8 + 9 = 24 If we order the groups, we can see that the totals go up by 3 each time. This is because we are adding one to each number each time so we are adding 3 extra altogether.

White Rose Maths

Autumn - Block 3

Money

Overview

Small Steps

- Count money – pence
- Count money – pounds (notes and coins)
- Count money – notes and coins
- Select money
- Make the same amount
- Compare money
- Find the total
- Find the difference
- Find change
- Two-step problems

NC Objectives

Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value.

Find different combinations of coins that equal the same amounts of money.

Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.

Count Money - Pence

Notes and Guidance

This block introduces the £ and p symbols for the first time.

Children will count in 1 p, 2 p, 5 p and 10 p coins. Children can also use related facts to count in 20 p coins.

Children do not convert between pounds and pence, therefore children will need to recognise the 50 p coin but they will not count up in 50 p coins.

Mathematical Talk

What is different about the coins you have counted?

Is the group with the most coins always the biggest amount? Why?

What do you notice about the totals?

Are silver coins always worth more than copper coins?

What different ways can you count the coins? Which is the quickest way?

Varied Fluency

Count the money.

 = ___ p

 = ___ p

 = ___ p

___ p = 

___ p = 

Use <, > or = to compare the money.

Count the money.

 = ___ p

 = ___ p

Count Money - Pence

Reasoning and Problem Solving

Jack selects four of these coins.

He can use the coins more than once.

What total could he make?

What is the lowest total?

What is the greatest total?

Example answers:

20 p, 10 p, 10 p and 1 p makes 41 p.

5 p, 5 p, 5 p and 5 p makes 20 p.

1 p, 20 p, 5 p and 2 p makes 28 p.

The lowest total would be 1 p, 1 p, 1 p and 1 p, makes 4 p.

The greatest total would be 20 p, 20 p, 20 p and 20 p makes 80 p.

Draw coins to make the statements correct.

 >

< 

For the first one, any answer showing less than 30 p on the right is correct. E.g. two 10 p coins.

For the second one, any answer showing less than 25 p on the left. E.g. three 2 p coins.

Count Money - Pounds

Notes and Guidance

Children will continue counting but this time it will be in pounds, not pence. The £ symbol will be introduced.
Children must be aware that both coins and notes are used to represent amounts in pounds.
Children will count in £1, £2, £5, £10 and £20s.
In this year group, children work within 100, therefore they will not count in £50s.

Mathematical Talk

Do the notes have a greater value than the coins?

Which is the hardest to count? Which is the easiest? Why?

What do you notice about the amounts?

Does it matter which side the equals sign is?

Can you find the total in a different way?

Varied Fluency

- Count the money.

 = £____

£____ = 

 = £____

£____ = 

- Complete the bar models.

£30		

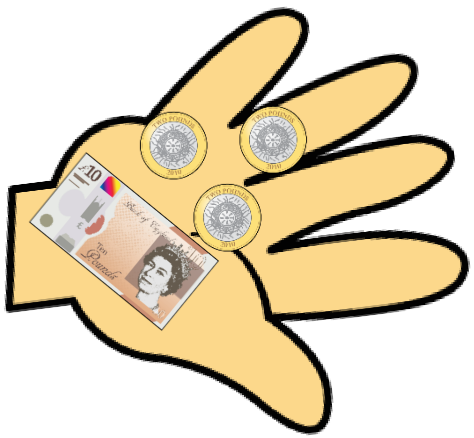
- Match the money to the correct total.

£25 £60 £10

Which is the odd one out? Explain why.

Count Money - Pounds

Reasoning and Problem Solving

Ron thinks he has £13  Is he correct? Explain your answer.	No, because three £2 coins make £6 £10 and £6 is equal to £16 He has mistaken his £2 coins for £1 coins.	Explain the mistake. £2, £4, £6, £7, £8, £10	£7 is the mistake. It is an odd number. The 2 times table are all even. When counting in £2s, we would say £2, £4, £6, £8, £10

Count Money – Notes & Coins

Notes and Guidance

In this step, children will build on counting by bringing pounds and pence together.

Decimal notation is not used until KS2 therefore children will write the total using 'and' e.g. £5 and 30 p rather than £5.30

Children will not count across £1. They will count the pounds and pence separately before putting them together.

Mathematical Talk

How did you work out the total amount of money?

What strategy did you use to count the money when there is pounds and pence?

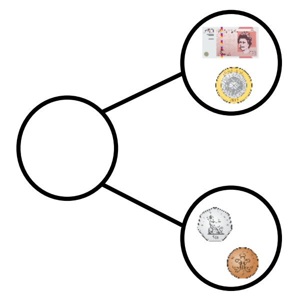
Explain what to do when the pounds and pence are mixed up.

Varied Fluency

How much money is there altogether?

There is £____ and ____p.

Complete the part-whole model.



What's the same and what's different about the parts?

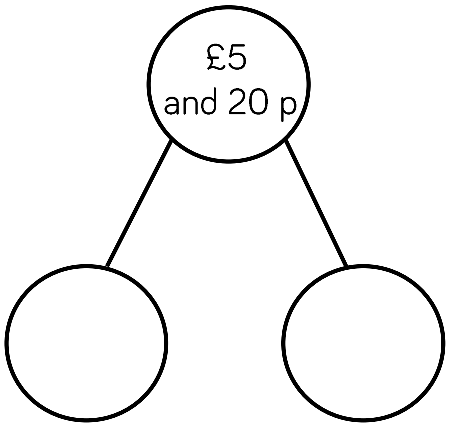
Fill in the gaps to make the statements correct.

- £10 + £5 + 50 p = £_____ and _____p
- £20 + £2 + 10 p + 10 p + 2 p = £_____ and _____p
- £5 + £___ + 50 p + 20 p + 20 p + 1 p = £10 and ____p

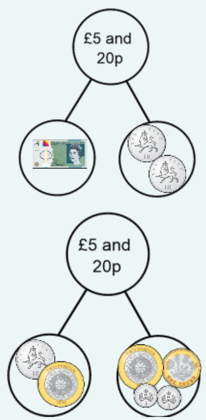
Count Money – Notes & Coins

Reasoning and Problem Solving

How many ways can you complete the part-whole model by drawing money?



Example answers:



Mo has the following coins.

He thinks he has 51 p.

Explain his mistake.

Mo thinks the 5 p is a 50 p coin. He has 6 p. Alternatively, he has combined the 5 and 1 from each coin.

Here are some coins and a note.

Amir says, "There is 10 p".

Dexter says, "There is £10".

Are either of them correct?

Explain why.

No, Amir and Dexter have taken the digits 2, 2, 5 and 1 and added them together.

The coins are a mix of pounds and pence so need to be counted separately.

Select Money

Notes and Guidance

Children select coins to make an amount, from a set of coins given to them. They will use these practically, draw them and write the abstract amounts.
They will continue to use both pounds and pence to embed previous learning.
Children are continuing to work on recognising money by selecting the correct coins or notes from a wide range.

Mathematical Talk

How do you know you have made 56 p?
Is your answer the same as your partner?
Can you find any other ways to make this amount?

Does it matter if you say pence or pounds first?

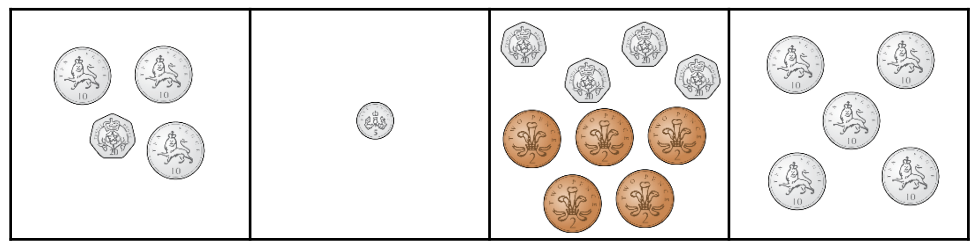
Does this change the total?

Can you show this amount in a different way?

Varied Fluency

- Circle 56 p.

- Which does **not** show 50 p?



- Draw money on the purses to match the amounts.

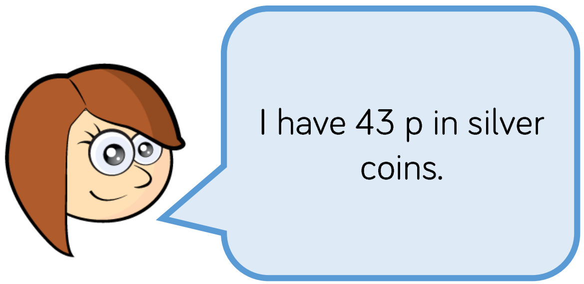
£21 and 32 p

£13 and 40 p

Select Money

Reasoning and Problem Solving

Rosie says,



Do you agree?

Explain why.

No, because 3 pence can only be made with copper coins.

Annie and Ron both claim to have 90 p.

Annie has 3 coins and Ron has 4 coins.

Could they be correct?

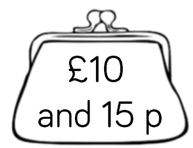
Which coins could they have?

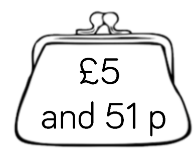
Yes, they can because:
Annie = 50 p, 20 p, 20 p.
Ron = 50 p, 20 p, 10 p, 10 p.

Use the money to fill the purses.

You can only use each coin or note once.

Cross them out once you have used them.





Example answer:

£10 and 15 p

£5 and 51 p

Circle the odd one out.

23 p = 20 p, 2 p, 1 p
25 p = 20 p, 5 p
28 p = 20 p, 8 p

Explain your answer.

28 p = 20 p, 8 p is because if you are using coins there is not an 8 p coin. Children may give other answers.

Make the Same Amount

Notes and Guidance

Children explore the different ways of making the same amount. As before, they will not count pence over into pounds.

Examples need to be modelled where pounds and pence are together but children need to continue to be encouraged to count the pounds and pence separately.

Mathematical Talk

Can the same amount be made using different coins?
How did you compare the amounts?
How is your way different to a partner?

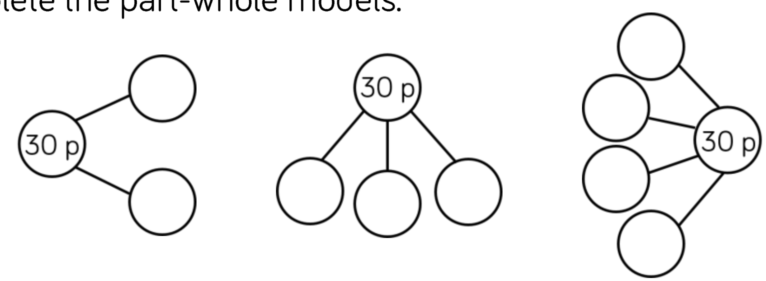
Can you swap a coin/note for others and still make the same amount?

What is the smallest amount of coins you can use to make ____?

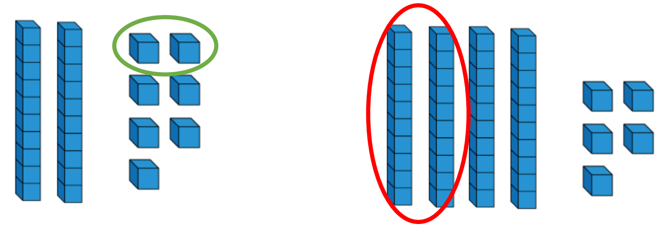
Varied Fluency

- Match the amounts.

- Complete the part-whole models.



- The Base 10 represents money. What coin is represented by each circle?



Make the Same Amount

Reasoning and Problem Solving

Make 50 p three ways using the coins below. You can use the coins more than once. 	Example answers: 20 p, 20 p, 10 p 10 p, 10 p, 10 p, 10 p, 5 p, 5 p 1 p (50 times)
How many ways can you make 10 p using only copper coins? Did you use a strategy?	Example answers: 2 p, 2 p, 2 p, 2 p, 2 p 2 p, 2 p, 2 p, 2 p, 1 p, 1 p

Compare Money

Notes and Guidance

Children compare two different values in either pounds or pence.
Children will see examples with both pounds and pence, but they will only focus on one of these - the other must be the same e.g. £3 and 10 p > £2 and 10 p where 10 p is the constant.
Children recap comparing vocabulary such as greater/less than and use the inequality symbols.

Mathematical Talk

What do you notice about the amounts you have compared?

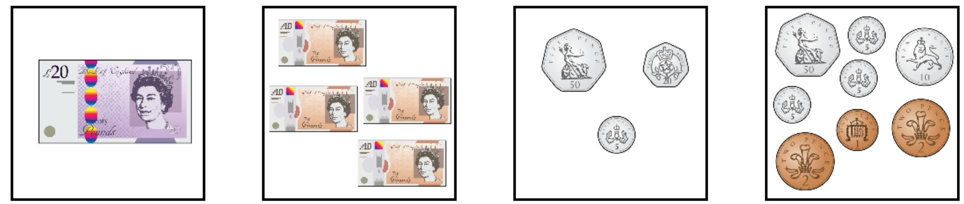
What's the same? What's different?

How do you know who has the most, when they both have 64?

Can you add a value that will go in between the greatest and the least?

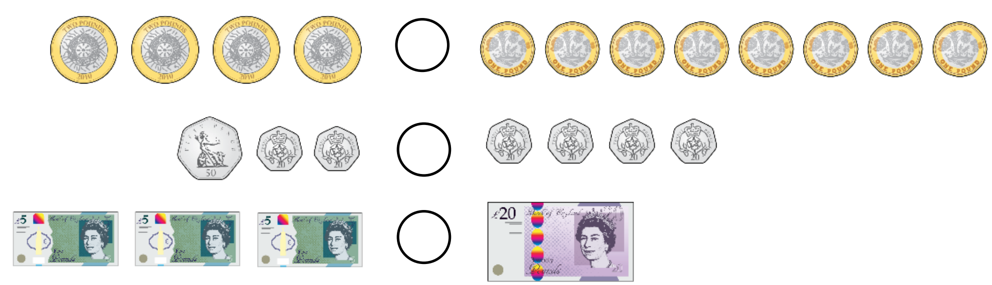
Varied Fluency

- Circle the box with the greatest amount.



- Who has the most? Who has the least? How do you know?

- Use <, > or = to compare the amounts.

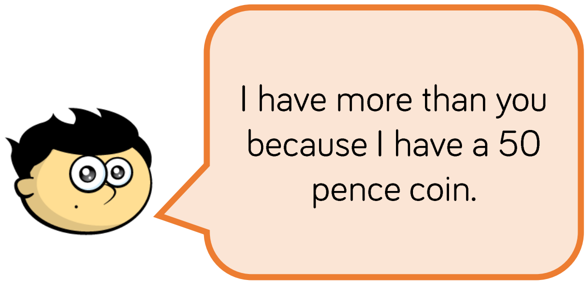


Compare Money

Reasoning and Problem Solving

Annie has three coins in her hand.

Jack says,



Is he correct?

Explain why.

It depends on the coins Annie has.

Children explore and show e.g.

20 p, 20 p, 20 p > 50 p

5 p, 2 p, 2 p < 50 p

True or False?

5 copper coins can be worth more than 1 silver coin.

Only true when 5 p is the silver coin.

Children should explore different true and false answers.

Four 5 pence coins are worth more than two 10 pence coins.

Do you agree? Explain why.

No, they are equal to each other. They both make 20 p.

Find the Total

Notes and Guidance

Children will build on their knowledge of addition to add money including:

- 2-digit and 2-digit
- 2-digit and ones
- 2-digit and tens
- 3-single digits

Children will be encouraged to use different methods to add the amounts of money, such as count on, partitioning and regrouping.

Mathematical Talk

How did you find the missing amounts? Share your strategies with a friend.
Was your method different to a friend?

What is the most efficient method? Why?

Can you write a worded question for a friend?

What was the greatest amount you found?

Varied Fluency

Complete the table.

Pounds	Pence	Total
£4	25 p	£____ and ____p
£2		£2 and 40 p
	65 p	£20 and 65 pence
		£15 and 20 p
	55 pence	

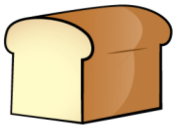
Complete the bar models.

7 p	5 p	9 p

£6	£4	£2

Amir buys bread and eggs.

49 p



30 p

How much does he spend?

Find the Total

Reasoning and Problem Solving

Dexter has these coins and notes.

He makes an amount greater than £20 but less than £30

Draw the money he could have used. You can use each coin or note more than once.

How many different ways can you find?

Possible answers:

£10, £10 and £5 makes £25

£10, £5, £5, £2 makes £22

Etc.

Here is a shopping list.

Item	Price
Rubber	20 p
Ruler	18 p
Pencil	32 p
Crayon	27 p
Pen	45 p
Glue	36 p

- I spend exactly 50 p. Which two items did I buy?
- I bought two of the same item and it cost me 90 p. What was the item?
- Choose two items. How many different amounts can you make?
- What is the closest you can get to 65 p?

The ruler and the pencil as 18 p and 32 p makes 50 p.

Two pens as 45 p and 45 p makes 90 p.

Children to explore the totals that can be made by adding two items together.

The rubber and the pen would cost 65 p as 20 p and 45 p sum to 65 p.

Find the Difference

Notes and Guidance

Children expand their knowledge of addition and subtraction strategies by specifically finding the difference between two amounts.

In this step, children should see both counting on and counting back being modelled to them.
They need to discuss which is the most efficient for different questions.

Mathematical Talk

Which costs more? How do you know?
How can you work out how much more?

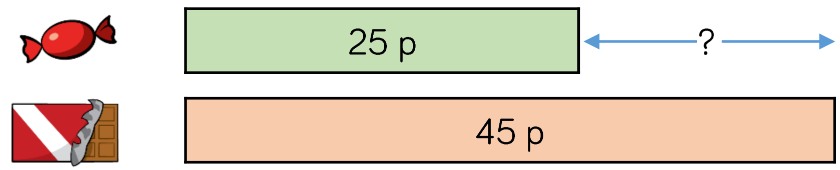
What's the difference?

How much less?/How many fewer?

What method did you use to work this out?

Varied Fluency

- Work out the difference between the cost of a bag of sweets and a bar of chocolate.



- Find the difference between the amounts of money Amir and Mo have.

Amir Mo

- Alex has £2 and 15 p.
Rosie has £2 and 40 p.

How much more money does Rosie have than Alex?

Find the Difference

Reasoning and Problem Solving

I have 57 p.

Whitney

I have 2 silver coins and 1 bronze coin.

Mo

What could Mo have?

Work out the difference between the amounts.

How many different answers can you find?

Example answers:

Mo could have more by:

- 50 p, 2 0p, 1 p
- 50 p, 20 p, 2 p

Mo could have the same by:

- 50 p, 5 p, 2 p

Mo could have less by:

- 5 p, 5 p, 1 p
- 20 p, 10 p, 2 p

Jack has 2 p.

Eva has 10 p.

Both of them have a 2 p coin.

What **other** coins could Eva have?

4 × 2 p
3 × 2 p and 2 × 1 p
2 × 2 p and 4 × 1 p
1 × 2 p and 6 × 1 p
8 × 1 p
5 p and 2 p and 1 p
5 p and 3 × 1 p

Find Change

Notes and Guidance

Children build on their subtraction skills by finding change from a given amount. They need to identify amounts from the coins given, write the calculations and choose efficient methods.

In this step, children will be introduced to converting £1 to 100 p to be able to subtract from £1. This links to their number bond knowledge to 100.

Mathematical Talk

How much does Dora have? How do you know?
Can you write a calculation to work out how much she will have left?

Why is it important to use the £ or p symbol?

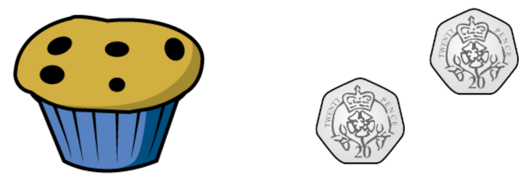
What strategy did you use to find the change?
Did you use concrete objects to help?

Varied Fluency

- Dora has these coins.

She spends 53 p.
What money will she have left? What coins could it be?

- Write the calculation and find the amount of change.



32 p

____ − ____ = ____

- Ron spends 65 p in the shop.
He pays with a £1 coin.

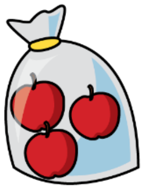
How much change will he receive?

Find Change

Reasoning and Problem Solving

I have 20 p. My change is more than 5 p but less than 10 p. What could I have bought?	Example answers: Chocolate bar or a sweet and banana.

Sweet: 7 p



Apples: 18 p

Chocolate: 12 p

Banana: 4 p

I paid for my shopping with one coin. Here is my change. What could I have paid with and how much would the item have been?	Could have paid with a 20 p coin and it would have cost 3 p. Could have paid with a 50 p coin and it would have cost 33 p. Could have paid with a £1 coin and it would have cost 83 p. Could have paid with a £2 coin and it would have cost £1 and 83 p.

Two-step Problems

Notes and Guidance

Children draw together all of the skills they have used in this block and consolidate their previous addition and subtraction learning.
Children may need some scaffolding to see the different steps.
Bar modelling is really useful to see the parts and wholes, and supports children in choosing the correct calculation.

Mathematical Talk

Where does the £33 go in the bar model?
How can you find the total?

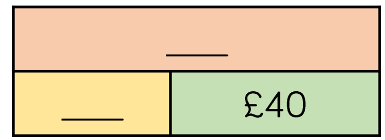
Here is a one step problem. Can you think of a second step?

Can you write your own two step word problem?

Did you use a concrete or pictorial representation to help you?

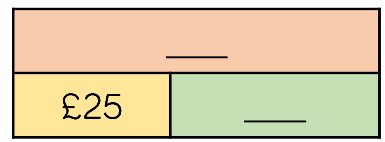
Varied Fluency

- Rosie has £33 in her money bank, and gets £40 more.
Fill in the bar model and write a calculation to show her total.



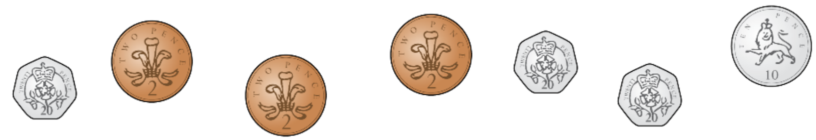
___ + ___ = ___

She then buys a top for £25. Complete the bar model and write a calculation to show what she has left.



___ – ___ = ___

- Amir has these coins.

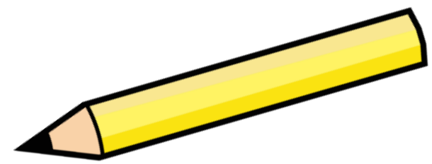


He spends 54 p. How much does he have left?

- A scarf is £12 and a bag is £25
Whitney buys one of each and pays with a £50 note.
How much change will she receive?

Two-step Problems

Reasoning and Problem Solving

Ghost Train: 90 p Annie finds a 20 p coin. She puts it with her other three 20p coins. Does Annie have enough to ride the ghost train? Explain why.	No, because she only has 80 p. She would need 10 p more. 90 p > 80 p
Alex has 90 pence. She bought a rubber for 30 pence and wants to buy a pencil.  **Pencil:** 70 p The shopkeeper will not sell her the pencil. Explain why.	90 p – 30 p = 60 p 70 p > 60 p She does not have enough money to buy the pencil.

White Rose Maths

Autumn - Block 4

Multiplication & Division

Overview

Small Steps

- Recognise equal groups
- Make equal groups
- Add equal groups
- Multiplication sentences using the × symbol
- Multiplication sentences from pictures
- Use arrays
- 2 times-table
- 5 times-table
- 10 times-table

NC Objectives

Recall and use multiplication and division facts for the 2, 5 and 10 times-tables, including recognising odd and even numbers.

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) sign.

Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts.

Show that the multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

Recognise Equal Groups

Notes and Guidance

Children describe equal groups using stem sentences to support them. It is important that children know which groups are equal and unequal, and why they are equal or unequal. The addition and multiplication symbols are not used within this small step but use of the language of addition and multiplication will support them in understanding repeated addition and multiplication. The examples included refer to the times tables facts that Year 2 children need to know.

Mathematical Talk

What does the 2 represent? What does the 3 represent?

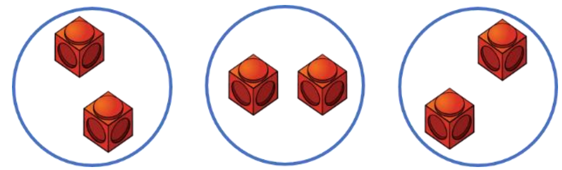
What does the 5 represent? What does the 2 represent?

I have ___ equal groups, with ___ in each group. Which image am I describing?

Why are these groups equal/unequal?

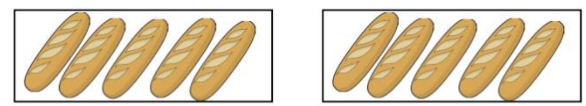
Varied Fluency

- Complete the stem sentences.



There are ____ equal groups with ____ in each group.

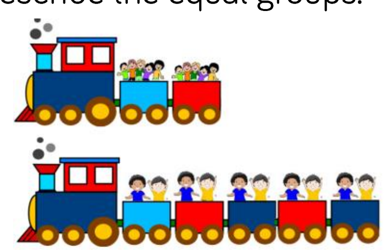
- Complete the sentences.



There are ____ equal groups with ____ in each group.

There are ________ baguettes altogether.

- Describe the equal groups.

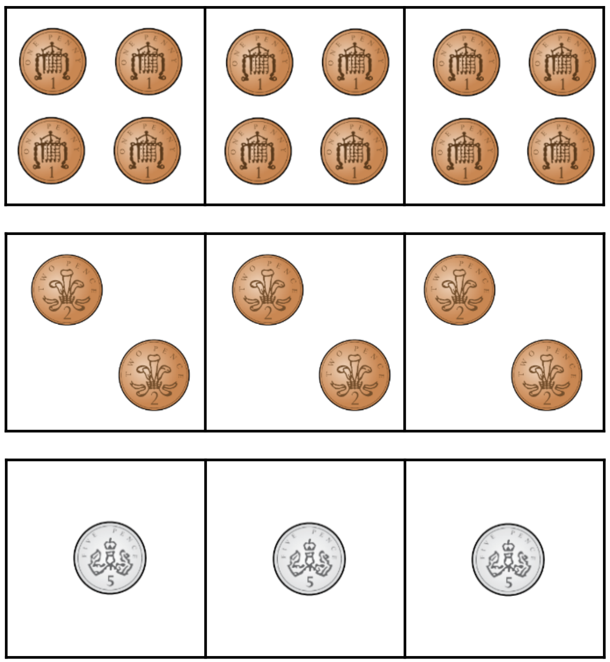


What is the same and what is different in each group?

Recognise Equal Groups

Reasoning and Problem Solving

Which group of money is the odd one out?

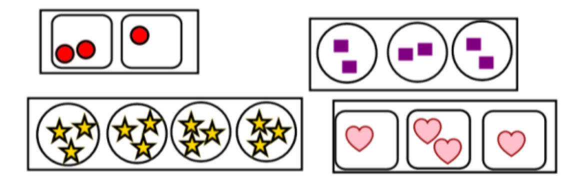


Explain why.

The bags with 5 p in each because the 2 ps and 1 ps have 4 p in each group.

Sort into equal and unequal groups.

Equal Groups	Unequal Groups

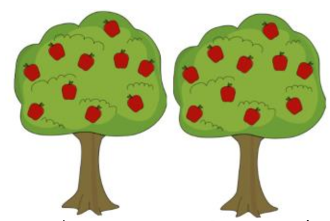


Create your own picture to go in each column.

Hearts and dots in unequal groups.

Stars and squares in equal groups.

Spot the mistake.



Alex says, "There are 10 equal groups with 2 in each group. There are ten 2s."

There are 2 equal groups with 10 in each group

There are two 10s.

Make Equal Groups

Notes and Guidance

Children should be able to make equal groups to demonstrate their understanding of the word 'equal'.

With the examples provided to the children, it is important that they are exposed to numerals and words, as well as multiple representations.

Mathematical Talk

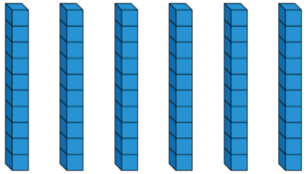
How else could you represent these in equal groups?

How many ways can you represent this?

How have you grouped your items?

Varied Fluency

- The Base 10 shows six equal groups with ten in each group. There are six tens.



How else can you represent these as equal groups?

- How many ways can you represent 'four equal groups with three in each group'?

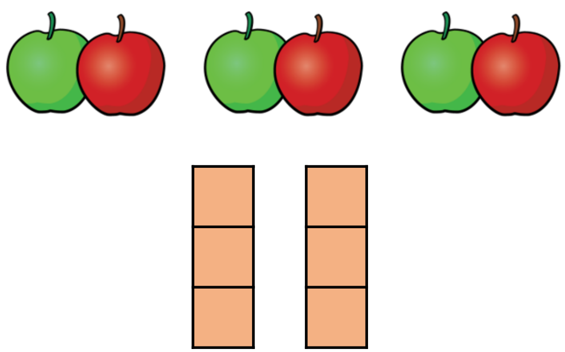
- What else do we need to show 'five 3s'?

How else can we show five equal groups with 3 in each group? Compare your answer with a partner.

Make Equal Groups

Reasoning and Problem Solving

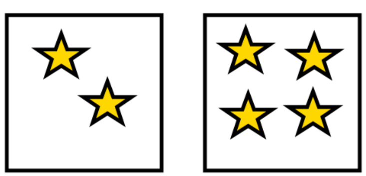
Has Eva shown the equal groups correctly?



Draw or use cubes to show what Eva should have done.

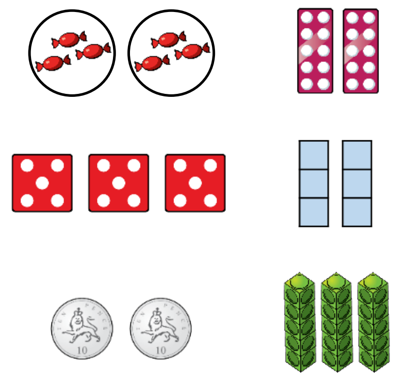
Children to draw or make 3 towers with 2 in each tower.

How can you make the groups equal?



Various answers e.g. move one star from right to left box. Any answer that makes them equal.

Match the equal groups.



Three 5s

Two 10s

Two 3s

Sweets, squares, two 3s.

Dice, cubes, three 5s.

Coins, number pieces, two 10s.

Add Equal Groups

Notes and Guidance

Children begin to connect equal groups to repeated addition.

At this point children have added 3 one digit numbers together, therefore they can add up to 3 equal groups when each group is any one digit number.

If there are more than 3 equal groups, the examples must be limited to 2s, 5s, 10s and 3s.

Mathematical Talk

What do the two 3s represent?

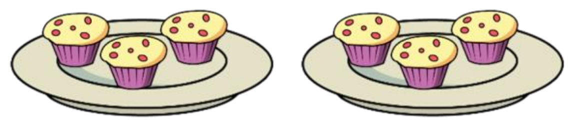
Why are we using the addition symbol?

How else can we show the equal groups?

What is the total?

Varied Fluency

Complete:



There are ____ equal groups with ____ in each group.
There are ____ 3s.
____ + ____ = 6

Complete:

There are ____ equal groups with ____ in each group.
There are three ____s.
____ + ____ + ____ = 12

Complete the table.

	Draw It	Say It	Add It

Add Equal Groups

Reasoning and Problem Solving

True or False?

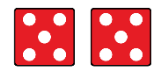
$5 + 5 = 2 + 2 + 2 + 2 + 2$

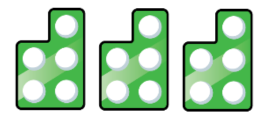
Draw an image or use cubes to help you explain your answer.

This is true because they are both equal to 10 but the groups look different.

To the left of the 'equal to' sign are 2 equal groups of 5, and to the right of the 'equal to' sign are 5 equal groups of 2.

Which one does not belong?





Two 5s

Ten

$5 + 5$

What do we need to change to make them all represent the same?

The three 5s do not belong. We would have to take away one five.

The Multiplication Symbol

Notes and Guidance

Children are introduced to the multiplication symbol for the first time. They should link repeated addition and multiplication together, using stem sentences to support their understanding.
They should also be able to interpret mathematical stories and create their own involving multiplication.
The use of concrete resources and pictorial representations is still vital for understanding.

Mathematical Talk

What does the 3 represent? What does the 6 represent?

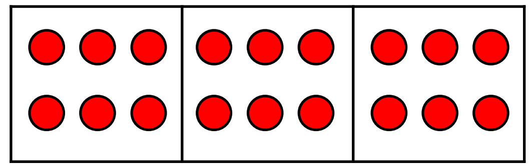
What does 'lots of' mean?

Does $18 = 3 \times 6$ mean the same?

How is $6 + 6 + 6$ the same as 3×6? How is it different?

Varied Fluency

Complete the sentences to describe the equal groups.



____ + ____ + ____ = 18

____ × ____ = 18

There are ___ equal groups with ____ in each group.
There are three ____.

Complete:

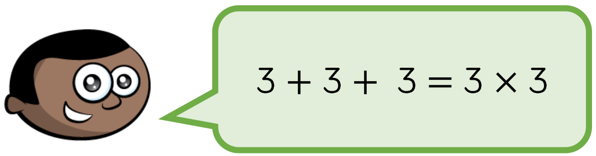
Three 2s	Draw It	Addition	Multiplication
There are 3 equal groups with 2 in each group.			

Complete:

Addition	Multiplication	Story
$10 + 10 + 10$		
	6×5	

The Multiplication Symbol

Reasoning and Problem Solving



Is Mo correct? Explain why. Draw an image to help you.	He is correct because $3 + 3 + 3 = 9$ and $3 \times 3 = 9$
Use <, > or = to make the statements correct. 3×5 ◯ $5 + 5 + 5 + 5$ 2×2 ◯ $2 + 2$ 10×2 ◯ $5 + 5 + 5$	$3 \times 5 < 5 + 5 + 5 + 5$ $2 \times 2 = 2 + 2$ $10 \times 2 > 5 + 5 + 5$

Think of a multiplication to complete: $6 + 6 + 6 > \_\_ \times \_\_$	Any two numbers which multiply together to give an answer of less than 18
The total is 12, what could the addition and multiplication be?	$6 + 6 = 2 \times 6$ $2 + 2 + 2 + 2 + 2 + 2 = 6 \times 2$ $3 + 3 + 3 + 3 = 4 \times 3$ $4 + 4 + 4 = 3 \times 4$ $12 = 1 \times 12$ $1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 12 \times 1$

Multiplication from Pictures

Notes and Guidance

Children will use the multiplication symbol and work out the total from pictures.

They should also be able to interpret a multiplication word problem by drawing images to help them solve it.

Coins could be used within this small step too.

Mathematical Talk

What does the 4 represent?

What does the 3 represent?

What does the 12 represent?

Can you think of your own story for 3 × 4 = 12?

Varied Fluency

Complete:

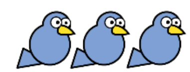
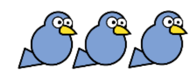
___ × ___ = ___

___ lots of 3 = ___

___ multiplied by ___ = 12

Complete:

 ○ 

4 lots of 3 ○  

 = 1 × ___

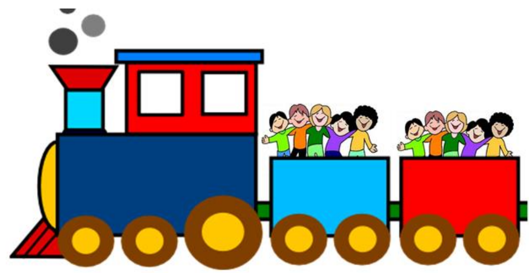
Complete the table.

Picture	Multiplication	Sentence
	4 × 10 = 40	4 lots of 10 is equal to 40
	35 = 7 × 5	
		6 lots of 3 is equal to 18

Multiplication from Pictures

Reasoning and Problem Solving

There are four baskets. There are three dolls in each basket. How many dolls are there altogether? Draw an image and write a calculation to represent the problem.	The image could be 4 circles with 3 dots in each. The calculation: $4 \times 3 = 12$
Write a story for the calculation 4×10 Draw an image to illustrate your story.	Stories with 4 groups and 10 in each group, for example: Four tables with ten children on each table. Four purses with 10p in each purse.

 2×5 $5 + 5$ 5×2 Each calculation could explain the image. Explain why.	There are 2 groups with 5 people in each group. There are 5 people in one group and 5 in the other. There are 5 lots of 2 people.

Use Arrays

Notes and Guidance

Children explore arrays to see the commutativity of multiplication facts e.g. $5 \times 2 = 2 \times 5$

The use of the array could be used to help children calculate multiplication statements.

The multiplication symbol and language of 'lots of' should be used interchangeably.

Mathematical Talk

Where are the 2 lots of 3?

Where are the 3 lots of 2?

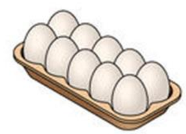
What do you notice?

What can we use to represent the eggs?

Can you draw an image?

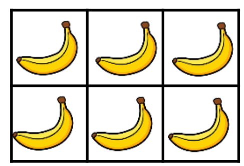
Varied Fluency

- On the image, find 2×5 and 5×2

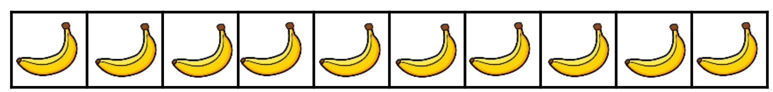


Can you represent this array using another object?

- Complete the number sentences to describe the arrays.



2×3 and ___ × ___



___ × ___ and ___ × ___

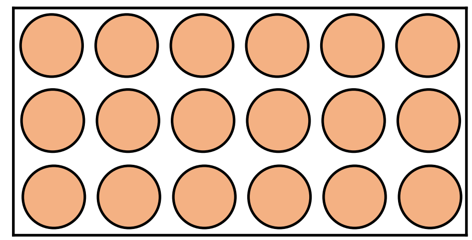
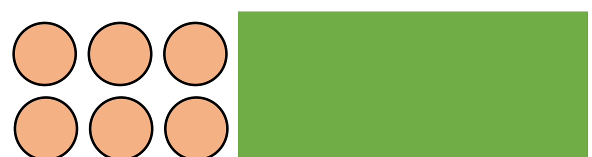
- Draw an array to show:

$4 \times 5 = 5 \times 4$
3 lots of 10 = 10 lots of 3

Use Arrays

Reasoning and Problem Solving

With 12 cubes, how many different arrays can you create? Once you have created your array complete: ___ × ___ = ___ × ___	$1 \times 12 = 12 \times 1$ $2 \times 6 = 6 \times 2$ $3 \times 4 = 4 \times 3$

Find different ways to solve six lots of three. 	Count in 3s 3 lots of 3 add 3 lots of 3 5×3 add 1×3 etc.
Part of this array is hidden.  The total is less than 16 What could the array be?	4×2 5×2 6×2 7×2

The 2 Times-Table

Notes and Guidance

Children should be comfortable with the concept of multiplication so they can apply this to multiplication tables.

Images, as well as number tracks, should be used to encourage children to count in twos.

Resources such as cubes and number pieces are important for children to explore equal groups within the 2 times-table.

Mathematical Talk

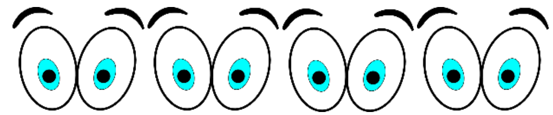
If 16 p is made using 2 p coins, how many coins would there be?

How many 2s go into 16?

How can the images of the 5 bicycles help you to solve the problems?

Varied Fluency

- Count in 2s to calculate how many eyes there are.



There are ____ eyes in total.

____ × ____ = ____

- Complete the number track.

2	4		8		12

14	16	18			24

	2	4	6	8	

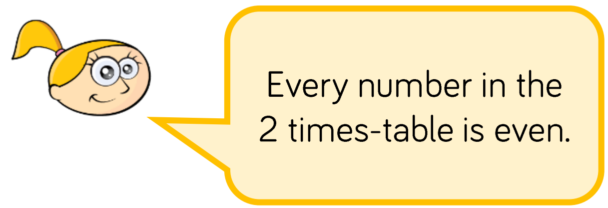
- How many wheels are there on five bicycles?

If there are 14 wheels, how many bicycles are there?

The 2 Times-Table

Reasoning and Problem Solving

Fill in the blanks. $3 \times \_\_\_ = 6$ $\_\_\_ \times 2 = 20$ $\_\_\_ = 8 \times 2$	2 10 16
Tommy says that $10 \times 2 = 22$ Is he correct? Explain how you know.	No Tommy is wrong because $10 \times 2 = 20$ Children could draw an array or a picture to explain their answer.

Eva says,  Is she correct? Explain your answer.	Yes, because 2 is even, and the 2 times-table is going up in 2s. When you add two even numbers the answer is always even.

The 5 Times-Table

Notes and Guidance

Children can already count in 5s from any given number. They will also have developed understanding of the 2 times-table.

This small step is focused on the 5 times table and it is important to include the use of zero. Children should see the = sign at both ends of the calculation to understand that it means 'equals to'.

Mathematical Talk

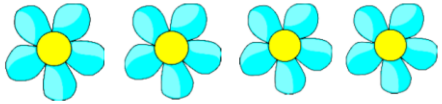
If there are 30 petals, how many flowers? Can you count in 5s to 30? How many 5s go into 30?

How many 5s go into 35?

What does each symbol mean?

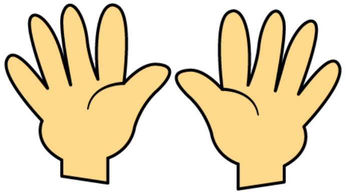
Varied Fluency

- How many petals altogether?



Write the calculation.

- There are 35 fingers.
How many hands?



$\_\_\_ \times 5 = 35$

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

2×5 ◯ 5×2

3×2 ◯ 4×5

10×5 ◯ 5×5

The 5 Times-Table

Reasoning and Problem Solving

Is Mo correct?

Every number in the 5 times table is odd.

Explain your answer.

Mo is incorrect because some of the multiples of the five times-table are even, e.g. 10, 20, 30

Tubes of tennis balls come in packs of 2 and 5

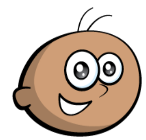
Whitney has 22 tubes of balls.

How many of each pack could she have?

How many ways can you do it?

Whitney could have:
4 packs of 5 and 1 pack of 2,
11 packs of 2 and 0 packs of 5,
2 packs of 5 and 6 packs of 2

Tommy and Rosie have both drawn bar models to show 7×5



35						
5	5	5	5	5	5	5

35				
7	7	7	7	7

What's the same and what is different about their bar models?

Draw your own bar model to represent 4×5

The total shown is the same.
Tommy's bar shows seven lots of 5 whereas Rosie's bar show five lots of 7

Children can choose either way to represent 4×5

The 10 Times-Table

Notes and Guidance

Children have counted in 10s from any given whole number. This small step is focused on the 10 times-table and it is important to include the use of zero.

Children should see the = sign at both ends of the calculation to understand what it means.

Mathematical Talk

What if there were 10 packs of crayons?

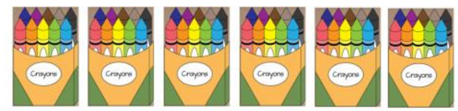
If there are 50 crayons altogether, how many packets are there? How do you know?

How many tens go into 30? Can you count in 10s to 30?

What does greater than mean? What does less than mean?

Varied Fluency

- How many crayons are there altogether?



There are ____ crayons altogether.

____ × 10 = ____

- Altogether there are 30 bottles, how many walls are there?

__ × 10 = 30

- Think of a multiplication fact for 10s to go in each box.

2 × 10		9 × 10
smallest		greatest

0 × 10		2 × 10
smallest		greatest

	1 × 10	6 × 10
smallest		greatest

	5 × 10	
smallest		greatest

The 10 Times-Table

Reasoning and Problem Solving

On sports day, Jack runs 10 metres, 7 times.

Which of these calculations do **not** describe this word problem?

$10 + 7$

7×10

$7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7$

$10 + 10 + 10 + 10 + 10 + 10 + 10$

Explain why.

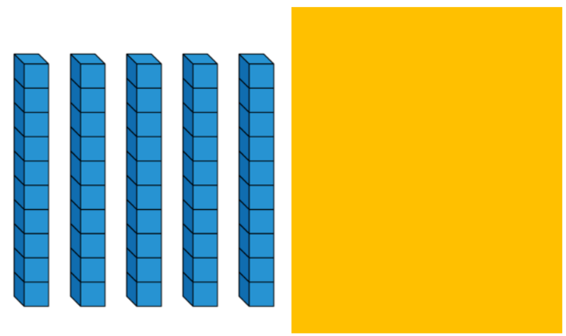
$10 + 7$ is incorrect because he has run 10 metres, 7 times, not 10 metres then 7 metres.

$7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7$ is incorrect because he does not run 7 metres each time but 10 metres.

Some Base 10 is hidden.

The total is less than 100

What could the calculation be?



___ × 10 = ___

Tim says it could be 10×10
Is he correct? Explain your answer.

It could be
$6 \times 10 = 60$
$7 \times 10 = 70$
$8 \times 10 = 80$
$9 \times 10 = 90$

It can't be 10×10 because 100 is not less than 100, it is equal to 100.