

New

Primary
Schemes of learning

Sample

White
Rose
Maths

#MathsEveryoneCan

The White Rose Maths schemes of learning

Teaching for mastery

Our research-based schemes of learning are designed to support a mastery approach to teaching and learning and are consistent with the aims and objectives of the National Curriculum.

Putting number first

Our schemes have number at their heart. A significant amount of time is spent reinforcing number in order to build competency and ensure children can confidently access the rest of the curriculum.

Depth before breadth

Our easy-to-follow schemes support teachers to stay within the required key stage so that children acquire depth of knowledge in each topic. Opportunities to revisit previously learned skills are built into later blocks.

Working together

Children can progress through the schemes as a whole group, encouraging students of all abilities to support each other in their learning.

Fluency, reasoning and problem solving

Our schemes develop all three key areas of the National Curriculum, giving children the knowledge and skills they need to become confident mathematicians.

Concrete – Pictorial – Abstract (CPA)

Research shows that all children, when introduced to a new concept, should have the opportunity to build competency by following the CPA approach. This features throughout our schemes of learning.

Concrete

Children should have the opportunity to work with physical objects/concrete resources, in order to bring the maths to life and to build understanding of what they are doing.



Pictorial

Alongside concrete resources, children should work with pictorial representations, making links to the concrete. Visualising a problem in this way can help children to reason and to solve problems.



Abstract

With the support of both the concrete and pictorial representations, children can develop their understanding of abstract methods.

An abstract representation of the addition 5 + 7. The equation $5 + 7$ is written inside a yellow rectangular box.

If you have questions about this approach and would like to consider appropriate CPD, please visit www.whiterosemaths.com to find a course that's right for you.

Teacher guidance

Every block in our schemes of learning is broken down into manageable small steps, and we provide comprehensive teacher guidance for each one. Here are the features included in each step.

Notes and guidance that provide an overview of the content of the step and ideas for teaching, along with advice on progression and where a topic fits within the curriculum.

Things to look out for, which highlights common mistakes, misconceptions and areas that may require additional support.

Year 5 | Autumn Term | Block 1 – Place Value | Step 1

Roman numerals to 1,000

Notes and guidance

In Year 4, children learned about Roman numerals to 100. In this small step, they explore Roman numerals to 1,000, and the symbols D (500) and M (1,000) are introduced. Children explore further the similarities and differences between the Roman number system and our number system, learning that the Roman system does not have a zero and does not use placeholders. Children use their knowledge of M and D to recognise years using Roman numerals. Asking children to write the date in Roman numerals is one way to reinforce the concept daily.

Things to look out for

- Children may mix up which letter stands for which number.
- Children may add the individual values together instead of interpreting the values based on their position, for example interpreting CD as 600 instead of 400
- It is often more difficult to convert numbers that require large strings of Roman numerals.
- Children may think that numbers such as 990 can be written as XM instead of CMXC.

Key questions

- What patterns can you see in the Roman number system?
- What rules do we use when converting numbers to Roman numerals?
- What letters are used in the Roman number system? What does each letter represent?
- How do you know what order to write the letters when using Roman numerals?
- What is the same and what is different about representing the number “five hundred and three” in the Roman number system and in our number system?

Possible sentence stems

- The letter _____ represents the number _____
- I know _____ is greater than _____ because _____

National Curriculum links

- Read Roman numerals to 1,000 (M) and recognise years written in Roman numerals

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Key questions that can be posed to children to develop their mathematical vocabulary and reasoning skills, digging deeper into the content.

Possible sentence stems to further support children’s mathematical language and to develop their reasoning skills.

National Curriculum links to indicate the objective(s) being addressed by the step.




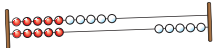
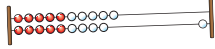




Teacher guidance

A **Key learning** section, which provides plenty of exemplar questions that can be used when teaching the topic.

Year 2 | Autumn Term | Block 1 - Place Value | Step 1

Numbers to 20

Key learning

- Complete the number tracks.
 - 0 1 2
 - 10 11 12
 - 7 8 13
- What numbers are shown?
 -   
 - Give your answers in numerals and words.
- What number is shown on each Rekenrek?
 -  
 - Give your answers in numerals and words.
- What numbers are shown?
 -    
 - Give your answers in numerals and words.
- Use words to complete the sentences.
 - The number after four is _____
 - The number before eight is _____
 - The number after nine is _____

Make each number in three different ways.

19 fifteen 16 eleven

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Activity symbols that indicate an idea can be explored practically

Reasoning and problem-solving activities and questions that can be used in class to provide further challenge and to encourage deeper understanding of each topic.

Year 3 | Autumn Term | Block 1 - Place Value | Step 4

Hundreds

Reasoning and problem solving

Dora: I am going to count in 100s from zero.

Write two numbers that Dora will say.

any two multiples of 100

No

Mo is counting in hundreds.

... 8 hundred, 9 hundred, 10 hundred

How should Mo have said the last number?

Mo should have said 1 thousand, 10 hundreds is equal to 1 thousand.

Balloons come in bags of 10

Rosie has 300 balloons.

Rosie has 30 bags of balloons.

Tiny: Dora will say the number 160

Is Tiny correct? How do you know?

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Answers provided where appropriate

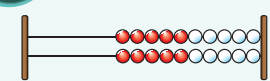
Activities and symbols

Key Stage 1 activities

Key Stage 1 includes more hands-on activities alongside questions.


An activity to be led by the teacher


 Use a Rekenrek in the ready position.



Ask children to show a number on their Rekenrek.


An outside activity or one that uses resources from nature

 Find some seeds and leaves to represent Autumn.




Ask children to sort the objects in three different ways and then compare their answers with a partner.

An activity introduced by a reading from an appropriate fiction or non-fiction book


 Read *The Button Box* by M Reid.

Give children a selection of buttons and ask them to sort the buttons in as many different ways as they can.

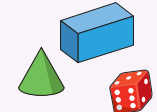


Encourage them to think about size, shape, colour and number of holes.

An investigation

 Give children a selection of 3D shapes.

Ask children to sort the objects into two groups and then challenge a partner to say how the objects have been sorted.



Key Stage 1 and 2 symbols

The following symbols are used to indicate:



concrete resources might be useful to help answer the question



a bar model might be useful to help answer the question



drawing a picture might help children to answer the question



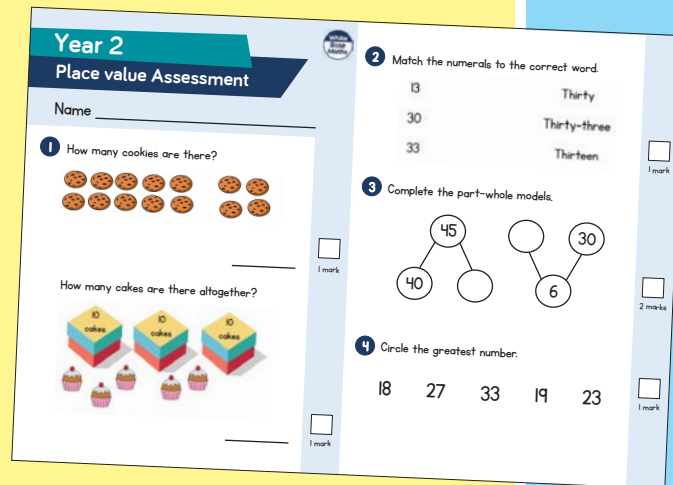
children talk about and compare their answers and reasoning



a question that should really make children think. The question may be structured differently or require a different approach from others and/or tease out common misconceptions.


Free supporting materials


End-of-block assessments to check progress and identify gaps in knowledge and understanding.



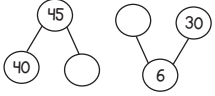
Year 2
Place value Assessment

Name _____

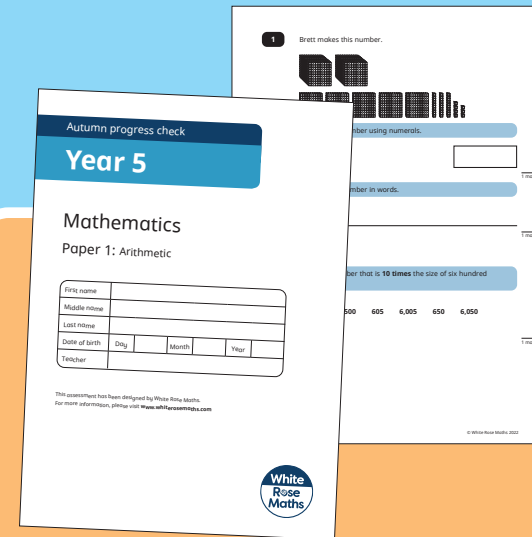
1 How many cookies are there?

_____ 1 mark

How many cakes are there altogether?

_____ 1 mark

2 Match the numerals to the correct word.
13 Thirty
30 Thirty-three
33 Thirteen
_____ 1 mark


3 Complete the part-whole models.

_____ 2 marks

4 Circle the greatest number.
18 27 33 19 23
_____ 1 mark



Autumn progress check
Year 5
Mathematics
Paper 1: Arithmetic

First name _____
Middle name _____
Last name _____
Date of birth Day _____ Month _____ Year _____
Teacher _____

1 Brett makes this number.

_____ 1 mark

2 _____
number using numerals.
_____ 1 mark

3 _____
number in words.
_____ 1 mark

4 _____
bar that is 10 times the size of six hundred
500 605 6,005 650 6,050
_____ 1 mark

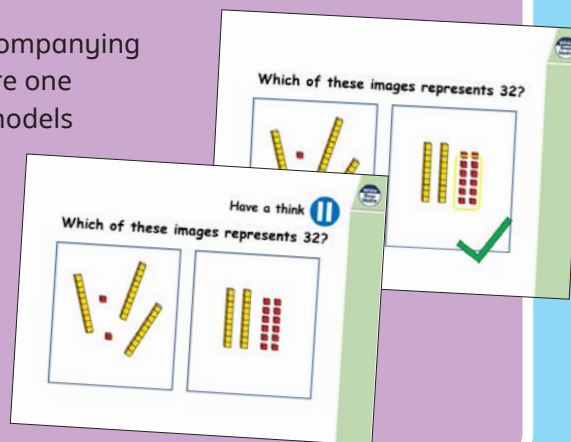
This assessment has been designed by White Rose Maths.
For more information, please visit www.whiterosemaths.com


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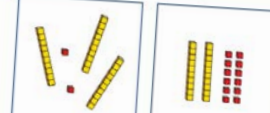
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End-of-term assessments for a more summative view of where children are succeeding and where they may need more support.

Each small step has an accompanying **home learning video** where one of our team of specialists models the learning in the step. These can also be used to support students who are absent or who need to catch up content from earlier blocks or years.



Which of these images represents 32?


Have a think 
Which of these images represents 32?


Free supporting materials

Primary Progression – Place Value						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value Counting	<ul style="list-style-type: none"> count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number Count numbers to 100 in numerals; count in multiples of twos, fives and tens 	<ul style="list-style-type: none"> count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward 	<ul style="list-style-type: none"> count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number 	<ul style="list-style-type: none"> count in multiples of 6, 7, 9, 25 and 1000 count backwards through zero to include negative numbers 	<ul style="list-style-type: none"> count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 count forwards and backwards with positive and negative whole numbers, including through zero 	
	Autumn 1 Autumn 4 Spring 2 Summer 4	Autumn 1	Autumn 1 Autumn 3	Autumn 1 Autumn 4	Autumn 1	

National Curriculum progression to indicate how the schemes of learning fit into the wider picture and how learning progresses within and between year groups.

Skill: Add three 1-digit numbers

Year: 2

When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

This supports children in their understanding of commutativity.

Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

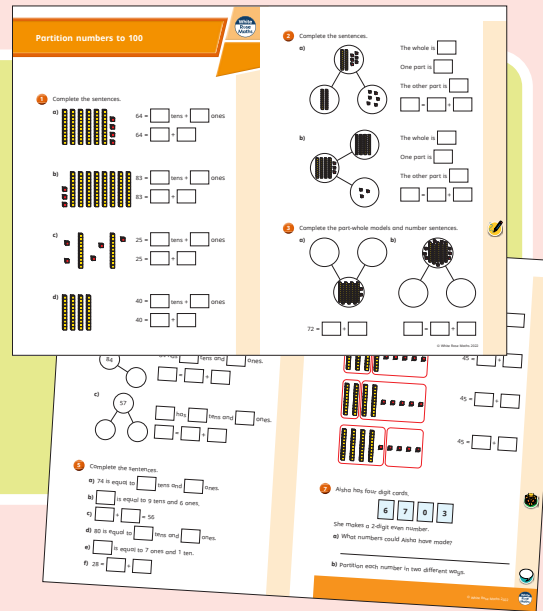
Calculation policies that show how key approaches develop from Year 1 to Year 6.

Ready to Progress – Number Facts Year 3			
	3NF-1	3NF-2	3NF-3
RTP Criteria	Secure fluency in addition and subtraction facts that bridge 10, through continued practice.	Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.	Apply place-value knowledge to know additive and multiplicative number facts (scaling facts by 10).
White Rose Maths Small Steps	Autumn 2 Addition and Subtraction <ul style="list-style-type: none"> Add 3-digit and 1-digit numbers - crossing 10 Subtract a 1-digit number from a 3-digit number - crossing 10 Add 3-digit and 2-digit numbers - crossing 100 Subtract a 2-digit number from a 3-digit number - crossing 100 	Autumn 3 Multiplication and Division <ul style="list-style-type: none"> 2 times-table 5 times-table Divide by 2 Divide by 5 Divide by 10 Multiply by 4 Divide by 4 The 4 times-table Multiply by 8 Divide by 8 The 8 times-table 	Spring 1 Multiplication and Division <ul style="list-style-type: none"> Related calculations Scaling Spring 4 Measurement: Length and Perimeter <ul style="list-style-type: none"> Equivalent lengths (m and cm) Equivalent lengths (mm and cm)

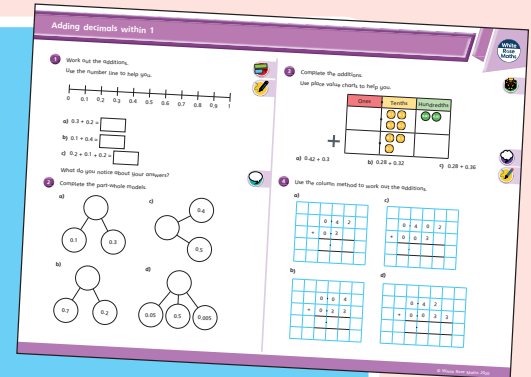
Ready to progress mapping that shows how the schemes of learning link to curriculum prioritisation.

Premium supporting materials

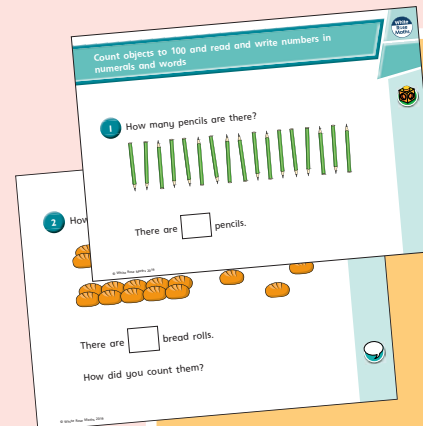
Worksheets to accompany every small step, providing relevant practice questions for each topic that will reinforce learning at every stage.



Display versions of the worksheet questions for front of class/whole class teaching.

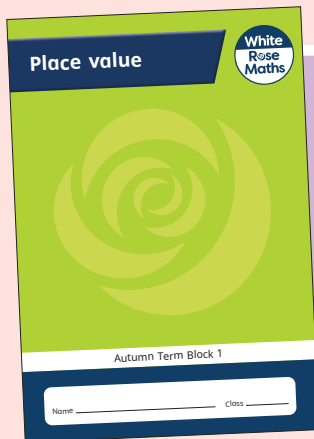


PowerPoint™ versions of the worksheet questions to incorporate them into lesson planning.



Answers to all the worksheet questions.

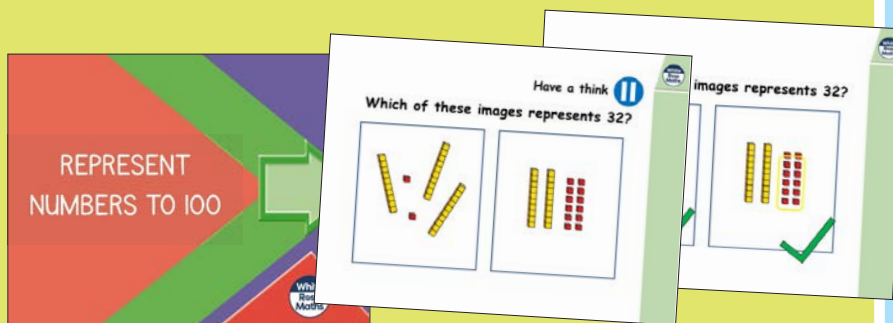
Question	Answer
1	There are 17 pencils.
2	There are 14 bread rolls. Children may have counted 3 tens and 1 roll.
3	twenty-eight
4	sixty-two
5	4 tens and 5 ones
6	a) seventeen b) twenty-one c) thirty-five d) eighty-two
7	a) 12 b) 80 c) 100 d) 9 e) 27 f) 14
8	79, 80, 81, 82, 83, 85 70, 79, 66, 64, 63
9	Eric has 20 sweets. Ed's friend gives her 7 sweets.



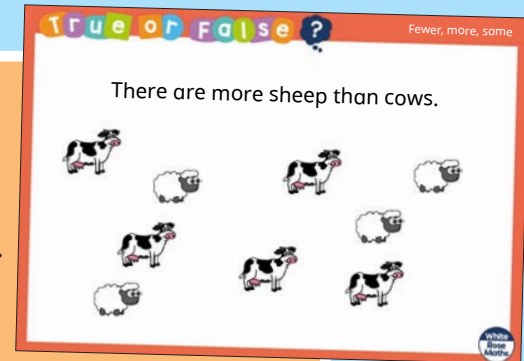
Also available as printed **workbooks**, per block.

Premium supporting materials

Teaching slides that mirror the content of our home learning videos for each step. These are fully animated and editable, so can be adapted to the needs of any class.



A **true or false** question for every small step in the scheme of learning. These can be used to support new learning or as another tool for revisiting knowledge at a later date.



Flashback 4 starter activities to improve retention. Q1 is from the last lesson; Q2 is from last week; Q3 is from 2 to 3 weeks ago; Q4 is from last term/year. There is also a bonus question on each one to recap topics such as telling the time, times-tables and Roman numerals.

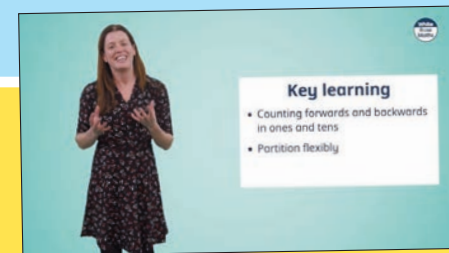
Flashback 4 Year 4 | Week 5 | Day 1

1) Round 6,495 to the nearest 10, 100 and 1,000 5×2
6,500 6,500 6,000

2) Round 38 to the nearest 10 40

3) Complete the part-whole model.
7,631
7,000 600 31

4) Multiply 38 by 4 152



Topic-based CPD videos

As part of our on-demand CPD package, our maths specialists provide helpful hints and guidance on teaching topics for every block in our schemes of learning.

Meet the characters

Our class of characters bring the schemes to life, and will be sure to engage learners of all ages and abilities. Follow the children and their class pet, Tiny the tortoise, as they explore new mathematical concepts and ideas.

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Yearly overview

The yearly overview provides suggested timings for each block of learning, which can be adapted to suit different term dates or other requirements.

	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				Geometry Shape			
Spring	Measurement Money		Number Multiplication and division				Measurement Length and height		Measurement Mass, capacity and temperature			
Summer	Statistics		Number Fractions			Geometry Position and direction		Problem solving		Measurement Time		

Sort objects

Notes and guidance

In this small step, children learn that collections of objects can be sorted into sets based on attributes such as colour, size or shape. Sorting enables children to consider what is the same about all the objects in one set and how they differ from the objects in other sets.

Children need to understand that the same collection of objects can be sorted in different ways and should be encouraged to come up with their own criteria for sorting objects into sets.

Practical activities should be used to support the learning in this step and ideas are suggested in Key learning. The concept of sorting can also be reinforced during daily activities such as lining up. Children could be asked to line up based on certain criteria, for example whether they have a sister.

Things to look out for

- Children may think that a group of objects can only be sorted in one way.
- Children may not focus on a single similarity, but instead on different attributes, leading to incorrect placement of objects in some sets.

Key questions

- What is the same about all the objects in the set?
- What is different about the sets?
- Can you find an object that belongs to this set?
- Can you find an object that does not belong to this set? Why does it not belong?
- Can you think of a different way to sort the objects?

Possible sentence stems

- This set of objects has been sorted by _____
- I could also sort the objects by _____
- _____ does belong in the set because ...
- _____ does not belong in the set because ...

National Curriculum links

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Sort objects

Key learning



Find some seeds and leaves to represent Autumn.

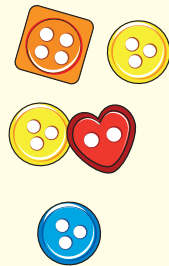


Ask children to sort the objects in three different ways and then compare their answers with a partner.



Read *The Button Box* by M Reid.

Give children a selection of buttons and ask them to sort the buttons in as many different ways as they can.

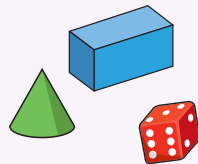


Encourage them to think about size, shape, colour and number of holes.

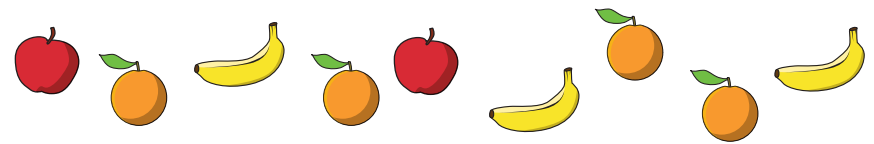


Give children a selection of 3-D shapes.

Ask children to sort the objects into two groups and then challenge a partner to say how the objects have been sorted.

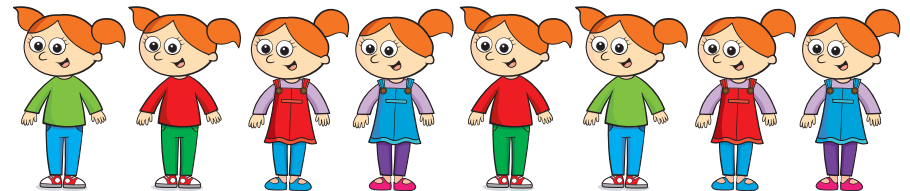


- Sort the fruit into groups.



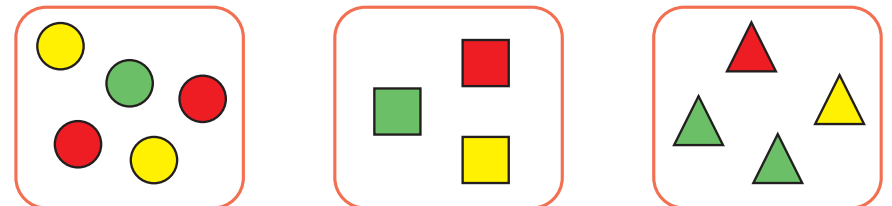
Explain how you have sorted them.

- Look at the pictures of Alex.



How many different ways can you find to sort them?

- How have the shapes been sorted?



How else could you sort them?

Sort objects

Reasoning and problem solving



Begin with a large pile of objects such as buttons.

Tell the children you have a sorting rule, and they need to work out what it is.

One at a time, place an object into your set that fits the rule.

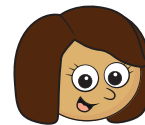
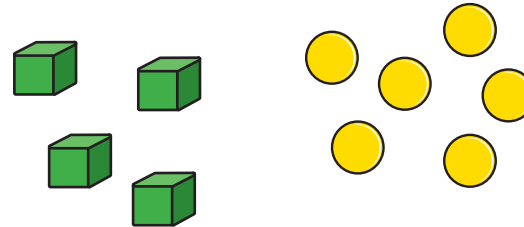
What do children notice first?
How long does it take them to work out the sorting rule?

When they think they know your sorting rule, ask the children to choose an object that belongs in your set. Tell them if they are correct or incorrect.

Challenge the children to create their own sorting rule for you to work out.

Answers will vary depending on the rule chosen.

Kim and Mo are trying to find the sorting rule.



Kim

The objects are sorted into cubes and counters.



Mo

The objects are sorted into green and yellow.

Who is correct? How do you know?

Kim and Mo could both be correct, as all the cubes are green and all the counters are yellow.

Numbers to 20

Notes and guidance

In this small step, children revisit learning from Year 1 on numbers to 20. While children have already gone beyond this, the numbers from 11 to 15 often prove more difficult to understand, so this step provides an opportunity to revisit these numbers explicitly before moving on to look at numbers to 100 later in the block. If further consolidation is needed of numbers to 20, content from the previous year could be used.

In Year 1, children mainly focused on being able to recognise numerals written as words. In this small step, they shift their focus to independently writing numerals as words and vice versa, which will be built upon later in the block.

Things to look out for

- Numbers such as 11, 12, 13 and 15 can often be sticking points for children as the word does not make specific reference to the number of ones as it does later in the number system.
- Children may write, for example, 12 as “ten-two” in words rather than “twelve”.
- Children may mix up the tens and ones digits when writing 2-digit numbers.

Key questions

- How many _____ are there?
- How did you count them?
- What number comes before/after _____?
- How do you write _____ in words?
- How do you write _____ in numerals?
- What number is made up of 1 ten and _____ ones?

Possible sentence stems

- There is 1 ten and _____ ones. The number is _____
- The number after _____ is _____
- The number before _____ is _____
- _____ in words is _____
- _____ in numerals is _____

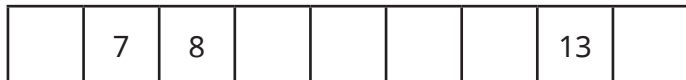
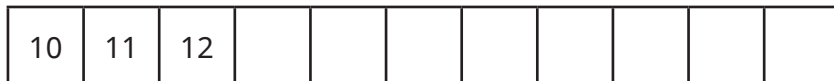
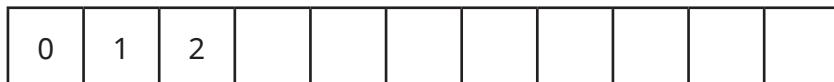
National Curriculum links

- Read and write numbers from 1 to 20 in numerals and words (Y1)
- Read and write numbers to at least 100 in numerals and in words

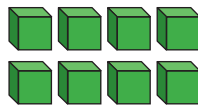
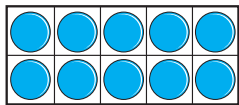
Numbers to 20

Key learning

- Complete the number tracks.



- What numbers are shown?



Give your answers in numerals and words.

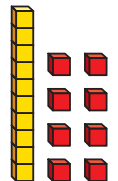
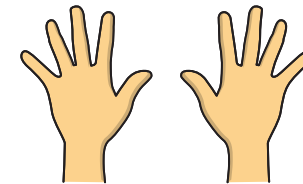
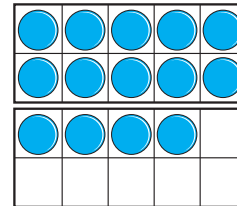
- Use words to complete the sentences.

The number after four is _____

The number before eight is _____

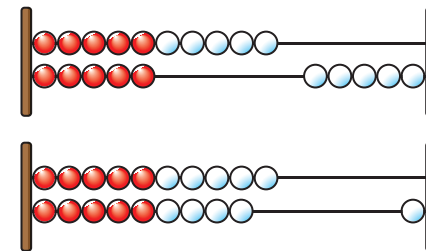
The number after nine is _____

- What numbers are shown?



Give your answers in numerals and words.

- What number is shown on each Rekenrek?



Give your answers in numerals and words.



Make each number in three different ways.

19

fifteen

16

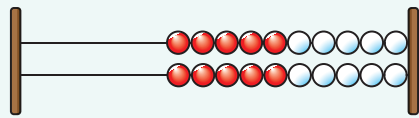
eleven

Numbers to 20

Reasoning and problem solving



Use a Rekenrek in the ready position.



Ask children to show a number on their Rekenrek.

Can they write the number in numerals?

Can they write the number in words?

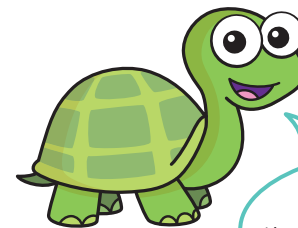
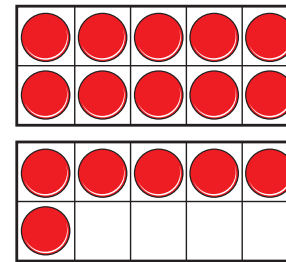
Can they say the number out loud?

Get children to work with a partner to make numbers and write them in both numerals and words.

Encourage them to talk about how they have made the number, for example to make 13, they need to push 1 whole ten and then 3 more.

Answers will vary, depending on the number chosen.

Tiny uses counters and ten frames to make a number.



I have made the number ten-six.

No
Tiny has made sixteen.

Do you agree with Tiny?

Talk about it with a partner.



Hundreds

Notes and guidance

In Year 2, and previous small steps, children have counted in tens within 100. This small step provides the opportunity to explore 100 explicitly for the first time. Children should be able to confidently count in 100s before looking at the structure of 100

By the end of this small step, children should understand that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10. They will then use this knowledge to explore other multiples of 100 within 1,000

By unitising the hundred, children should be able to state the number of tens that make up any 3-digit multiple of 100. Base 10 can be used to support understanding, allowing children to see the tens making up each hundred.

Things to look out for

- Children may not recognise or distinguish between a 10 piece and a 100 piece in base 10, and count each piece as “1”
- Children may not be using the most efficient method of counting.
- Children may not be using placeholders when writing numbers in numerals.

Key questions

- When counting in 10s, what number comes after 90?
- If you count from zero in 100s, will you say 40?
- When counting in 100s, what comes after 500?
How do you know?
- How many tens are there in 100?
- If there are 10 tens in 100, how many tens are there in 200?
- How does the base 10 show that 100 is 10 times the size of 10?

Possible sentence stems

- There are _____ tens in 100 and _____ hundreds in _____
This means there are _____ tens in _____

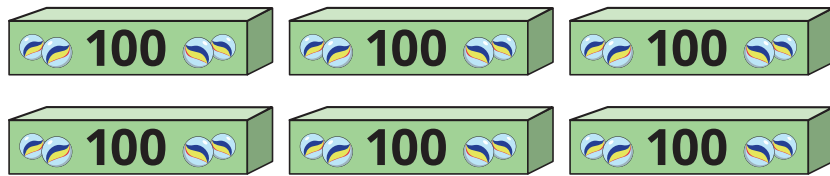
National Curriculum links

- Count from zero in multiples of 4, 8, 50 and 100
- Identify, represent and estimate numbers using different representations
- Read and write numbers up to 1,000 in numerals and words

Hundreds

Key learning

- How many marbles are there?



Write your answer in numerals and in words.

- Complete the number track.

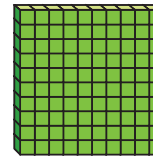


- How many cupcakes are there?

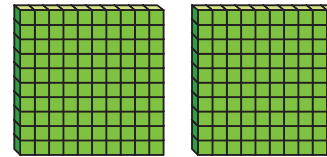


Write your answer in numerals and in words.

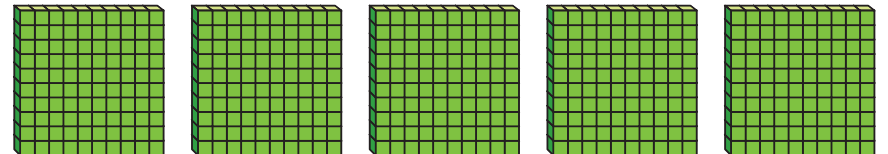
- How many tens are there in 100?



- How many tens are there in 200?



- Complete the sentences to describe the number.



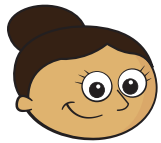
There are _____ tens in 100

There are _____ hundreds in 500

There are _____ tens in 500

Hundreds

Reasoning and problem solving

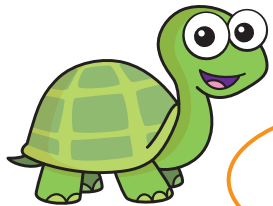


I am going to count in 100s from zero.

Dora

Write two numbers that Dora will say.

any two multiples of 100



Dora will say the number 160

Tiny

Is Tiny correct?

How do you know?



Mo is counting in hundreds.

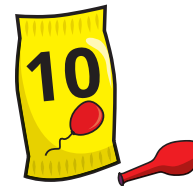


... 8 hundred, 9 hundred, 10 hundred

How should Mo have said the last number?

Mo should have said 1 thousand. 10 hundreds is equal to 1 thousand.

Balloons come in bags of 10
Rosie has 300 balloons.



How many bags does she have?

Rosie has 30 bags of balloons.

Partition numbers to 1,000

Notes and guidance

In this small step, children partition numbers up to 1,000 into hundreds, tens and ones.

Children represent numbers in a part-whole model and identify missing parts and wholes. They write numbers in expanded form, using the part-whole model as support where needed, and identify the number of hundreds, tens and ones in a 3-digit number. Particular attention should be paid to numbers that include zero as a placeholder, to build on learning from the previous step.

Base 10 and place value counters can continue to be used to support children's understanding.

Things to look out for

- Children may not correctly assign place value to each digit of a number. For example, they may write $423 = 4 + 2 + 3$
- Children may not recognise a number represented by a part-whole model, where the parts are not given in value order.
- Children may say that 423 has 20 tens rather than 2 tens, because they confuse place value language.

Key questions

- How many hundreds/tens/ones are there in 465?
- How do you write a number that has zero tens?
- How do you write a number that has zero ones?
- What number is equal to $300 + 70 + 9$?
- What is the value of the missing part? How do you know?
- What is the value of the digit _____ in the number _____?

Possible sentence stems

- _____ has _____ hundreds, _____ tens and _____ ones.
_____ = _____ + _____ + _____
- The number that is made up of _____ hundreds, _____ tens and _____ ones is _____

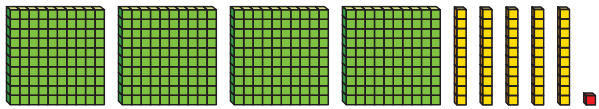
National Curriculum links

- Identify, represent and estimate numbers using different representations
- Recognise the place value of each digit in a 3-digit number (hundreds, tens, ones) (Y3)

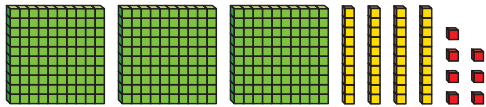
Partition numbers to 1,000

Key learning

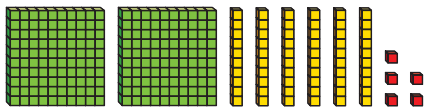
- Use the base 10 to help you complete the number sentences.



$$451 = 400 + \underline{\quad} + \underline{\quad}$$



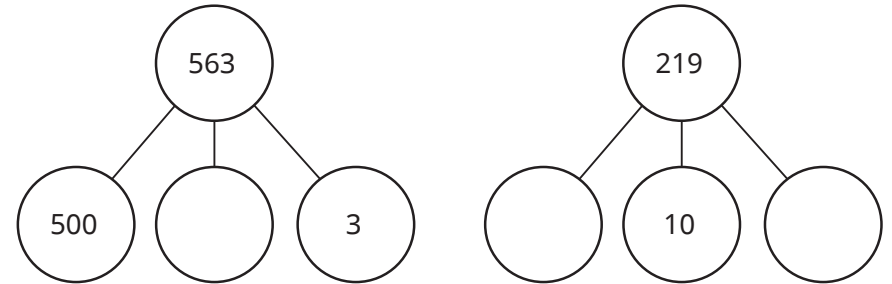
$$347 = \underline{\quad} + \underline{\quad} + \underline{\quad}$$



$$265 = \underline{\quad} + \underline{\quad} + \underline{\quad}$$

- Complete the number sentences.
 - ▶ $982 = \underline{\quad} + \underline{\quad} + \underline{\quad}$
 - ▶ $980 = \underline{\quad} + \underline{\quad}$
 - ▶ $902 = \underline{\quad} + \underline{\quad}$

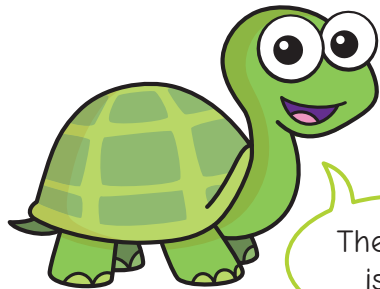
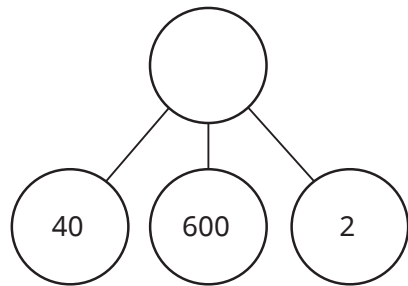
- Complete the part-whole models.



- Complete the sentences.
 - ▶ 259 has _____ hundreds, _____ tens and _____ ones.
 - ▶ 813 has 8 _____, 1 _____ and 3 _____
 - ▶ 106 has _____ hundred, _____ tens and _____ ones.
 - ▶ _____ has 5 hundreds, 1 ten and 0 ones.
- How many hundreds does the number 907 have?
How many ones does the number 36 have?
How many tens does the number 680 have?
- Write in numerals the number that has 7 hundreds, 1 one and 2 tens.

Partition numbers to 1,000

Reasoning and problem solving



The whole is 462

Tiny has not recognised that the parts are not in order.

642

Explain the mistake that Tiny has made.

What is the whole?

Dexter is thinking of a number.

My number is a 3-digit number.



It has the same number of tens as ones.

The digit sum is 10

$$244 = 200 + 40 + 4$$

$$433 = 400 + 30 + 3$$

$$622 = 600 + 20 + 2$$

$$811 = 800 + 10 + 1$$

What could Dexter's number be?

Find each possibility and partition it.

Roman numerals to 1,000

Notes and guidance

In Year 4, children learned about Roman numerals to 100. In this small step, they explore Roman numerals to 1,000, and the symbols D (500) and M (1,000) are introduced.

Children explore further the similarities and differences between the Roman number system and our number system, learning that the Roman system does not have a zero and does not use placeholders.

Children use their knowledge of M and D to recognise years using Roman numerals. Asking children to write the date in Roman numerals is one way to reinforce the concept daily.

Things to look out for

- Children may mix up which letter stands for which number.
- Children may add the individual values together instead of interpreting the values based on their position, for example interpreting CD as 600 instead of 400
- It is often more difficult to convert numbers that require large strings of Roman numerals.
- Children may think that numbers such as 990 can be written as XM instead of CMXC.

Key questions

- What patterns can you see in the Roman number system?
- What rules do we use when converting numbers to Roman numerals?
- What letters are used in the Roman number system? What does each letter represent?
- How do you know what order to write the letters when using Roman numerals?
- What is the same and what is different about representing the number “five hundred and three” in the Roman number system and in our number system?

Possible sentence stems

- The letter _____ represents the number _____
- I know _____ is greater than _____ because _____

National Curriculum links

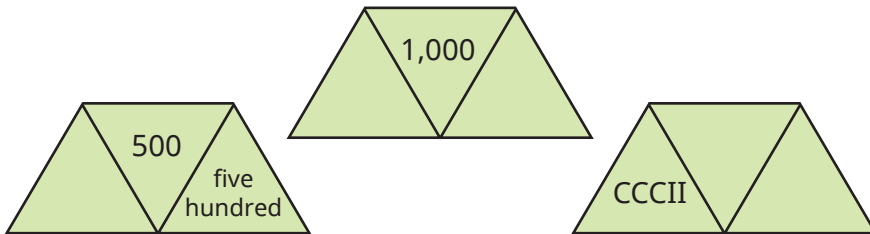
- Read Roman numerals to 1,000 (M) and recognise years written in Roman numerals

Roman numerals to 1,000

Key learning

- Each diagram should show a number in Roman numerals, digits and words.

Complete the diagrams.



- Match the Roman numerals to the numbers.

DC	460
CD	950
CCCXX	400
DXC	590
CML	600
CDLX	320

- Here is a date written in Roman numerals.

XXI / IX / MMXV

What day of the month is shown?

What month is shown?

What year is shown?

- Here are the end credits of two films.

The Roman numerals show the year the films were made.



In what year was the older film made?

In what year was the more recent film made?

How long was there between the making of the two films?

Give your answer in Roman numerals.

Roman numerals to 1,000

Reasoning and problem solving

Work out CCCL + CL.

Give your answer in Roman numerals.

Write five calculations, using Roman numerals, that give the same answer.

Compare answers with a partner.

D

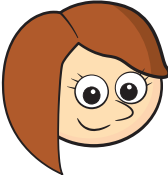
multiple possible answers, e.g.

CD + C

M ÷ II

C + CC + CC

C × V



XL - X = L

Do you agree with Rosie?

Explain your answer.

No

Is the statement true or false?

In Roman numerals,
400 is CD,
so 800 is CDCD.

False

The numbers in the sequence are increasing by CXX each time.

, , , ,

Work out the missing numbers in the sequence.

DL, DCLXX,
CMX, MXXX

Numbers to 1,000,000

Notes and guidance

In preparation for the next step (Numbers to 10,000,000), children recap their Year 5 learning by exploring numbers up to 1,000,000

Understanding that place value columns follow consistent patterns – ones, tens, hundreds, then (one) thousands, ten thousands, hundred thousands, before reaching millions – is key. Place value charts, Gattegno charts and place value counters can be used to support understanding of the relationships between columns and the construction of numbers.

Children also revise partitioning, exploring both standard and non-standard ways of composing numbers.

Writing numbers in words follows in Step 3

Things to look out for

- Children may find it difficult to conceptualise such large numbers, as they cannot easily be represented concretely and lie outside their experience.
- Children may think that place value columns go in the order ones, tens, hundreds, thousands, millions.
- Children may find numbers with several placeholders (for example, 500,020) difficult.

Key questions

- Where do the commas go when you write one million in figures?
- If 1,000,000 is the whole, what could the parts be?
- How else can you partition the number?
- What is the value of each digit in the number?
- Which columns will change if you add/subtract 10, 100, 1,000, ... to/from the number?
- When do you use placeholders in numbers?

Possible sentence stems

- The value of the _____ in _____ is _____
- The column before/after the _____ column is the _____ column.

National Curriculum links

- Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit
- Solve number and practical problems that involve the above

Numbers to 1,000,000

Key learning

- What is the value of the digit 4 in each of the numbers in the place value chart?

Thousands			Ones		
H	T	O	H	T	O
		4	3	2	7
	3	5	4	0	2
2	4	7	1	9	8
8	1	2	5	4	3

- Complete the number sentences.
 - ▶ $604,821 = 600,000 + \underline{\hspace{1cm}} + \underline{\hspace{1cm}} + 20 + 1$
 - ▶ $\underline{\hspace{1cm}} = 300,000 + 4,000 + 700 + 4$
 - ▶ $2,000 + 8 + 60,000 + 500 + 700,000 = \underline{\hspace{1cm}}$
- Count up in 10,000s from 74,000 to 204,000
 Count down in 100,000s from 1,000,000 to zero.
 Count down in 100s from 9,312 to 7,812

- What number is shown in the place value chart?

Thousands			Ones		
H	T	O	H	T	O
●●	●●●●	●	●●●●	●●	●●●●
	●●●●		●●●●	●	●●●●
	●●		●●●●		●
			●●		

What will the number be if you add four counters to the:

- tens column
 - ten-thousands column
 - hundreds column?
- Annie is using place value counters.
 She has 4 ten-thousands counters, 12 thousands counters, 8 hundreds counters, 3 tens counters and 25 ones counters.
 What is the greatest number she can make?
 - Fill in the missing numbers.
 $1 \text{ million} = 900,000 + \underline{\hspace{1cm}} = 990,000 + \underline{\hspace{1cm}} = \underline{\hspace{1cm}} + 999,000$

Numbers to 1,000,000

Reasoning and problem solving

100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

What number is shown in the Gattegno chart?

Decrease the number shown by 30,000

Increase the number shown by 100,500

Challenge a partner to find other increases and decreases of the number.



463,528 433,528 564,028

Are the statements true or false?

Adding ten thousand to a number only ever changes the digits in exactly one column.

False

The number consisting of 70 thousands and 400 ones is 700,400

False

3 ten-thousands is the same as 30 thousands.

True

400 hundreds is the same as 4 ten-thousands.

True

A large number added to a large number is always a large number.

True

A large number subtracted from a large number is always a large number.

False



**White
Rose
Maths**