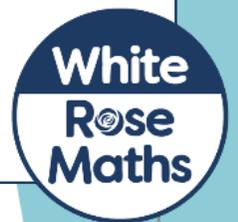


Scheme of Learning

Year 5

#MathsEveryoneCan



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Welcome

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

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

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

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

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

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

White Rose Maths Team

[#MathsEveryoneCan](#)

White Rose Maths contact details

 support@whiterosemaths.com

 @WhiteRoseMaths

 White Rose Maths

What's included?

Our schemes include:

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

Teaching notes and examples

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

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

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

Answers to Reasoning Questions

Is he correct?
Explain your reasoning.

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

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

Jack is incorrect. He has 16 not 61.

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

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

Small Steps Guidance

Overview
Small Steps

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

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

Meet the Team

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



Caroline Hamilton



Beth Smith



Kelsey Brown



Julie Matthews



Faye Hirst



Emma Davison



Mary-Kate Connolly



Kate Henshall



Sam Shutkever



Rachel Otterwell



Jenny Lewis



Stephen Monaghan

Special Thanks

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

Year 2 Team

Chris Gordon
Beth Prottey
Rachel Wademan
Emma Hawkins
Scott Smith
Valda Varadinek-Skelton
Chloe Hall
Charlotte James
Joanne Stuart
Michelle Cornwell

Year 3 Team

Becky Stanley
Nicola Butler
Laura Collis
Richard Miller
Claire Bennett
Chris Conway

Year 4 Team

Terrie Litherland
Susanne White
Hannah Kirkman
Daniel Ballard
Isobel Gabanski
Laura Stubbs

Year 5 Team

Lynne Armstrong
Laura Heath
Clare Bolton
Helen Eddie
Chris Dunn
Rebecca Gascoigne

Year 6 Team

Lindsay Coates
Kayleigh Parkes
Shahir Khan
Sarah Howlett



How to use the small steps

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

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

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

Teaching notes

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

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

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

Count Objects to 100

Notes and Guidance

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

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

Mathematical Talk

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

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

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

Varied Fluency

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

There are _____ cars in the car park.

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

Match the numerals to the words.

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

Assessments

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

Part 1: Fluency based arithmetic practice

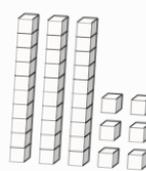
Part 2: Reasoning and problem solving based questions

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

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

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

16 Here are some cubes.



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

Show your method

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



How much does she earn in a week?

Show your method

2 marks

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

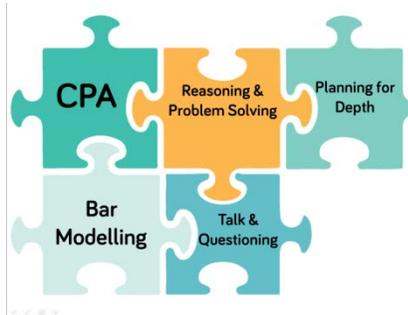
Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Training

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

Our popular JIGSAW package consists of five key elements:

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



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



Additional Materials

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

KS1 and KS2 Problem Solving Questions

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

Shopping and Baking

1 These items are sold in a shop.



£9



£6



£7



£10

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

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



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



End of Block Assessments

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

Year 1

Place Value Assessment

Name _____

1 How many teddy bears are there?



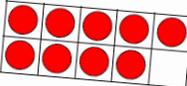
1 mark

2 Circle 7 apples.



1 mark

3 How many counters are there?



1 mark

4 Circle the number four: _____

1 3 4 6

Circle the smallest number: _____

7 2 10 9

1 mark

5 Complete the missing numbers.

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

1 mark

FAQs

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

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

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

Should I teach one small step per lesson?

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

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

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

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

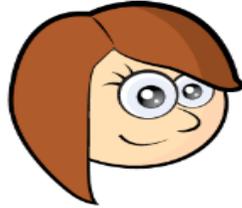
The scheme has been designed to give sufficient time for teachers to explore concepts in depth, however we also interleave prior content in new concepts. E.g. when children look at measurement we recommend that there are lots of questions that practice the four operations and fractions. This helps children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

Meet the Characters

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



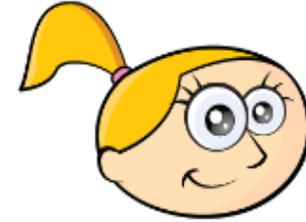
Teddy



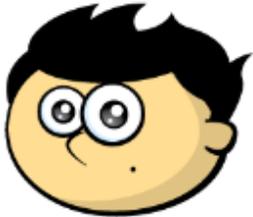
Rosie



Mo



Eva



Jack



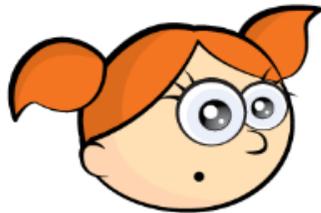
Whitney



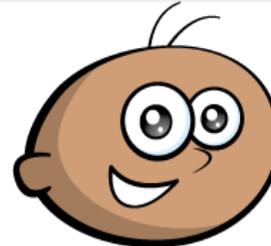
Amir



Dora



Alex



Tommy

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

White

**Rose
Maths**

Autumn - Block 1

Place Value

Overview

Small Steps

NC Objectives

- Numbers to 10,000
- Roman Numerals to 1,000
- Round to nearest 10, 100 and 1,000
- Number to 100,000
- Compare and order numbers to 100,000
- Round numbers within 100,000
- Numbers to a million
- Counting in 10s, 100s, 1,000s, 10,000s, and 100,000s
- Compare and order numbers to one million
- Round numbers to one million
- Negative numbers

Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit.

Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000

Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero.

Round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000

Solve number problems and practical problems that involve all of the above.

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

Numbers to 10,000

Notes and Guidance

Children use concrete manipulatives and pictorial diagrams to recap representing numbers up to 10,000

Within this step, ensure children revise adding and subtracting 10, 100 and 1,000, and discuss what is happening to the place value columns.

Mathematical Talk

Show me 8,045 in three different ways.

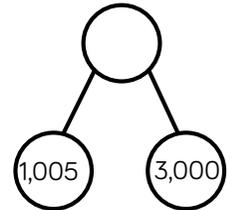
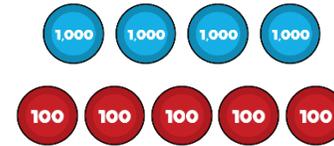
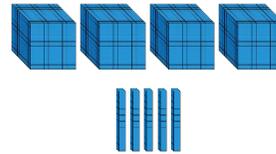
Do you prefer to use concrete objects or draw an image pictorially? Why?

Make 1,500 and explain why you choose to make it in this way (use this to see what concrete objects children choose to use).

Varied Fluency



Match the diagram to the number.



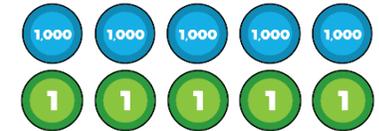
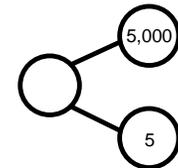
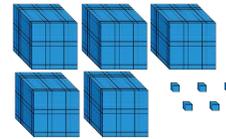
4,005

4,500

4,050



Which diagram is the odd one out?



Complete the table.

	Add 10	Add 100	Add 1,000
2,506			
7,999			
		6,070	

Numbers to 10,000

Reasoning and Problem Solving

Harriet has made five numbers, using the digits 1, 2, 3 and 4

She has changed each number into a letter.

Her numbers are

- aabcd
- acdbc
- dcaba
- cdadc
- bdaab

Here are three clues to work out her numbers:

- The first number in her list is the greatest number.
- The digits in the fourth number total 12
- The third number in the list is the smallest number.

- 44,213
- 43,123
- 13,424
- 31,413
- 21,442

Simon says he can order the following numbers by only looking at the first three digits.

12,516	12,832
12,679	
12,538	12,794

Is he correct?

Explain your answer.

He is incorrect because two of the numbers start with twelve thousand, five hundred therefore you need to look at the tens to compare and order.

Roman Numerals

Notes and Guidance

Building on their Year 4 knowledge of Roman Numerals to 100, children explore Roman Numerals to 1,000. They explore what is the same and what is different between the number systems, for example there is no zero.

Teachers could introduce writing the date in Roman Numerals to revise the concept on a daily basis.

Mathematical Talk

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

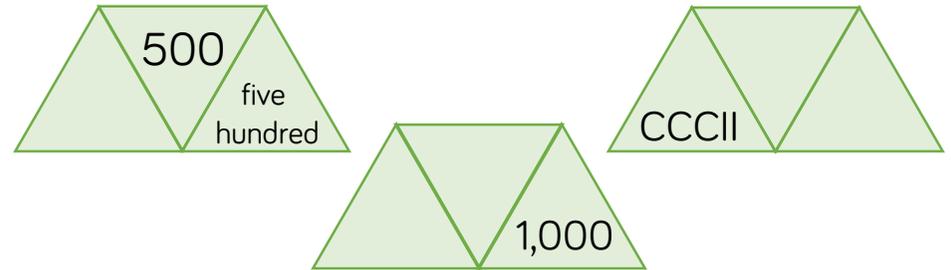
Do you notice any patterns? Look at 30 and 300

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

Varied Fluency

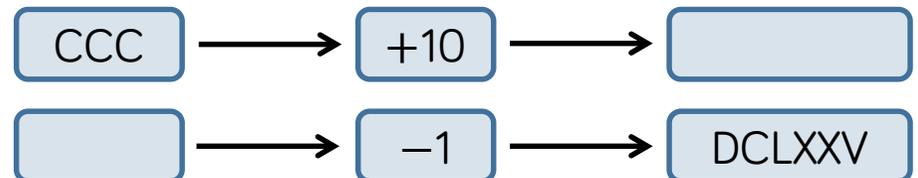
- Lollipop stick activity.
The teacher shouts out a number and the children make it with lollipop sticks.
Children could also do this in pairs or groups, or for a bit of fun they could test the teacher!

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



Complete the diagrams.

- Complete the function machines.



Roman Numerals

Reasoning and Problem Solving

Solve

$$CCCL + CL =$$

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

Possible answers:

$$CD + C$$

$$M \div II$$

$$C + CC + CC$$

$$C \times V$$

Here is part of a Roman Numerals hundred square.

Complete the missing values.

XLIV	XLV		XLVII
		LVI	LVII
LXIV		LXVI	LXVII

What patterns do you notice?

Missing Roman Numerals from the top row and left to right:

- XLVI
- LIV
- LV
- LXV

Round to 10, 100 and 1,000

Notes and Guidance

Children build on their Year 4 knowledge of rounding to 10, 100 and 1,000. They need to experience rounding up to and within 10,000

They need to understand that the column form the question and the column to the right of it are used e.g. round 1,450 to the nearest hundred – look at the hundreds and tens columns.

Mathematical Talk

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

When is it best to round to 10? 100? 1,000?

Can you give an example of this?

Can you justify your reasoning?

Is there more than one solution?

Will the answers to the nearest 100 and 1,000 be the same or different for the different start numbers?

Varied Fluency

Complete the table.

Start Number	Rounded to the nearest 10	Rounded to the nearest 100	Rounded to the nearest 1,000
DCCLXIX			

For each number, find five numbers that round to it when rounding to the nearest 100

300

10,000

8,900

Complete the table.

Start Number	Nearest 10	Nearest 100	Nearest 1,000
365			
1,242			
	4,770		

Rounding to 10, 100 and 1,000

Reasoning and Problem Solving

My number rounded to the nearest 10 is 1,150
 Rounded to the nearest 100 it is 1,200
 Rounded to the nearest 1,000 it is 1,000


 Jack

1,150
 1,151
 1,152
 1,153
 1,154

What could Jack's number be?

Can you find all of the possibilities?

2,567 to the nearest 100 is 2,500


 Whitney

I do not agree with Whitney because 2,567 rounded to the nearest 100 is 2,600. I know this because if the tens digit is 5, 6, 7, 8 or 9 we round up to the next hundred.

Do you agree with Whitney?
 Explain why.

Teddy



4,725 to the nearest 1,000 is 5,025

Teddy has correctly changed four thousand to five thousand but has added the tens and the ones back on. When rounded to the nearest thousand the hundreds tens and ones will be zeros.

Explain the mistake Teddy has made.

Numbers to 100,000

Notes and Guidance

Children focus on numbers up to 100,000. They represent numbers on a place value grid, read and write numbers and place them on a number line to 100,000

Using a number line, they find numbers between two points, place a number and estimate where larger numbers will be.

Mathematical Talk

How can we estimate a number on a number line if there are no divisions?

How many digits change when you add 10, 100 or 1,000?

Do you need to count forwards and backwards to find out if a number is in a number sequence? Explain.

Varied Fluency



A number is shown in the place value grid.

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

Write the number in figures and in words.

- Ashy adds 10 to this number
- Zack adds 100 to this number
- Isobel adds 1,000 to this number

Write each of their new numbers in figures and in words.



Complete the grid to show the same number in different ways.

Counters	65,048	Part-whole model
Bar model		Number line



Complete the missing numbers.

$$59,000 = 50,000 + \underline{\hspace{2cm}}$$

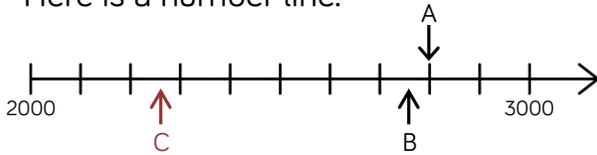
$$\underline{\hspace{2cm}} = 30,000 + 1,700 + 230$$

$$75,480 = \underline{\hspace{2cm}} + 300 + \underline{\hspace{2cm}}$$

Numbers to 100,000

Reasoning and Problem Solving

Here is a number line.



What is the value of A?

B is 40 less than A.

What is the value of B?

C is 500 less than B.

Add C to the number line.

$$A = 2,800$$

$$B = 2,760$$

(C in red on diagram)

Here are three ways of partitioning 27,650

27 thousands and 650 ones

27 thousands, 5 hundreds and 150 ones

27 thousands and 65 tens

Write three more ways

Possible answers:
2 ten thousands, 6 hundreds and 5 tens

20 thousands, 7 thousands and 650 ones

Jennie counts forwards and backwards in 10s from 317

Circle the numbers Jennie will count.

427

997

507

1,666

3,210

5,627

-23

7

-3

Explain why Jennie will not say the other numbers.

427
997
5,627
507
7
-3
-23

Any positive number will have to end in a 7

Any negative number will have to end in a 3

Compare and Order

Notes and Guidance

Building on their learning from Year 4, children will compare and order numbers up to 100,000

Children should be able to do this with numbers presented in a variety of ways.

Mathematical Talk

In order to compare numbers, what do we need to know?

What is the value of each digit?

What is the value of _____ in this number?

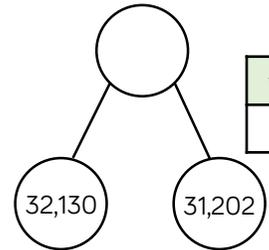
What is the value of the whole? Can you suggest other parts that make the whole?

Can you write a story to support your part-whole model?

Varied Fluency



Order the following.



10,000s	1,000s	100s	10s	1s
6	3	3	2	0

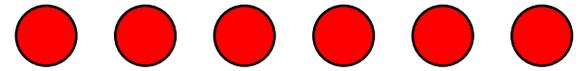


Add the symbol $<$, $>$ or $=$ to make the statement correct.

MMXVII



Use six counters to make five different 5 digit numbers.



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

Order your numbers from greatest to smallest.

Compare and Order

Reasoning and Problem Solving

Place the digit cards 0 to 9 face down and select five of them.

Make the greatest number possible and the smallest number possible.

How do you know this is the greatest or smallest?

Dependent on numbers chosen.
e.g. 4, 9, 1, 3, 2

Smallest: 12,349
Greatest: 94,321

I know this is the greatest number because the digit cards with the larger numbers are in the place value columns with the greater values.

Using the digit cards 0 to 9, create three different five digit numbers that fit the following clues:

- The digit in the hundreds column and the ones column have a difference of 2
- The digit in the hundreds column and the ten thousands column has a difference of 2
- The sum of all the digits totals 19

Possible answers:

47,260
56,341
18,325
20,476

Round within 100,000

Notes and Guidance

Children continue with work on rounding, now using numbers up to 100,000. They round to the nearest 10, 100, 1,000 and 10,000

Children use their knowledge of multiples to work out which two numbers the number they are rounding sits between.

Mathematical Talk

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

When is it best to round to 10? 100? 1,000?

Can you give an example of this?

Can you justify your reasoning?

Varied Fluency



Round 85,617

- To the nearest 10
- To the nearest 100
- To the nearest 1,000
- To the nearest 10,000



Round the distances to the nearest 1,000 miles.

Destination	Miles from Manchester airport	Miles to the nearest 1,000
New York	3,334	
Sydney	10,562	
Hong Kong	5,979	
New Zealand	11,550	



Complete the table.

Rounded to the nearest 100	Start Number	Rounded to the nearest 1,000
	15,999	
	28,632	
	55,555	

Round within 100,000

Reasoning and Problem Solving

Round 59,996 to the nearest 1,000
Round 59,996 to the nearest 10,000

What do you notice about the answers?

Can you think of three more numbers where the same thing could happen

Both numbers round to 60,000

Other examples:

19,721 to the nearest 1,000 and 10,000

697 to the nearest 10 and 100

22,982 to the nearest 100 and 1,000

Two five digit numbers have a difference of 5

When they are both rounded to the nearest thousand, the difference is 1,000

What could the numbers be?

Two numbers with a difference of five where the last three digits are between 495 and 504

e.g. 52,498 and 52,503

Numbers to One Million

Notes and Guidance

Children read, write and represent numbers to 1,000,000

Children need to see numbers represented with counters on a place value grid, as well as drawing the counters.

Mathematical Talk

If one million is the whole, what could the parts be?

Show me 800,500 in three different ways.

Where do the commas go in the numbers?
How does the place value grid help?

How else can the numbers be represented?

Varied Fluency



Thousands			Ones		
H	T	O	H	T	O

Use counters to make these numbers on the place value chart.

32,651

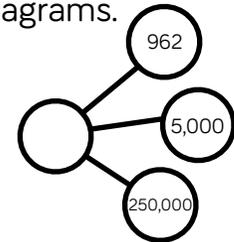
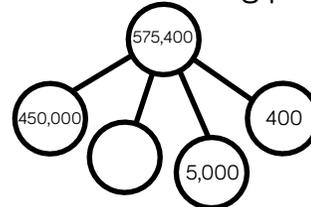
456,301

50,030

Can you say the numbers out loud?



Complete the following part-whole diagrams.



Katya has the following number.

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

She adds 4 counters to the hundreds column.

What is her new number?

Numbers to One Million

Reasoning and Problem Solving

Show the value of the digit 7 in each of the following numbers.

407,338

700,491

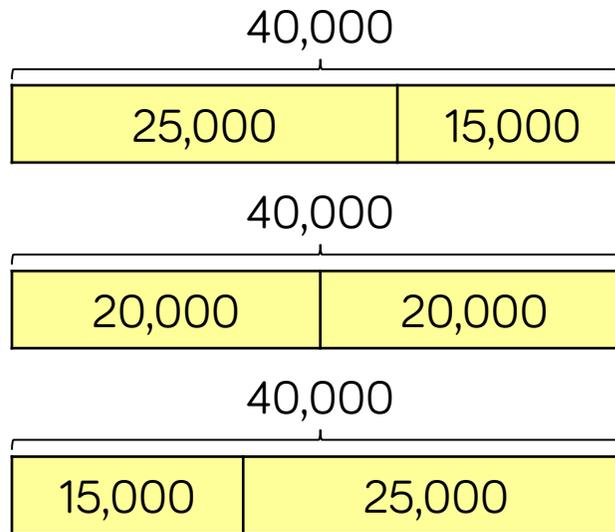
25,571

407,338: the value is 7 thousand. It is to the left of the hundreds column.

700,491: the value is 7 hundred thousand. It is a 6-digit number and there are 5 other numbers in place value columns to the right of this number.

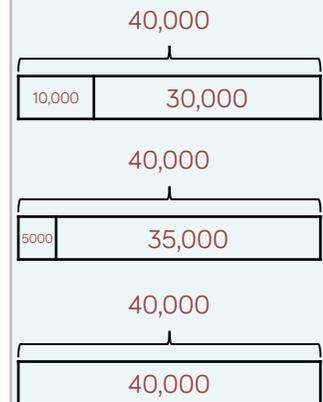
25,571: the value is 7 tens. It is one column to the left of the ones column.

The bar models are showing a pattern.



Draw the next three.

Create your own pattern of bar models for a partner to continue.



Counting in Powers of 10

Notes and Guidance

Children complete number sequences and can describe the term to term rule e.g. add ten each time.

They count forwards and backwards in powers of ten up to 1,000,000

Mathematical Talk

What happens to the pattern when you move into negatives?

What patterns do you notice when you compare sequences increasing or decreasing in 10s, 100s, 1,000s etc.?

Can you create a rule for the sequence?

Varied Fluency

Complete the sequence.

____, ____, 2, ____, 22, ____, 42, ____, ____, 72

The rule for the sequence is:

Circle and correct the mistake in each sequence.

7,875, 8,875, 9,875, 11,875, 12,875, 13,875, ...
864,664, 764,664, 664,664, 554,664, 444,664, ...

Here is a Gattegno chart showing 32,450

1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000
10000	20000	30000	40000	50000	60000	70000	80000	90000

Cards

+10	-10
+100	-100
+1,000	-1,000
+10,000	-10,000

Give children a target number to make then let them choose a card. Children then need to adjust their number on the chart.

Counting in Powers of 10

Reasoning and Problem Solving

Amir writes the first five numbers of a sequence.

They are
3,666, 4,666, 5,666, 6,666, 7,666

The 10th term will be 15,322 because I will double the 5th term.



Amir

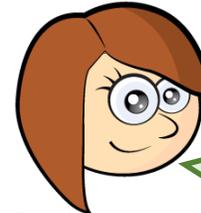
Is he correct?
Explain why.

The 10th term is 12,666 because Amir is adding 1,000 each time. He should have added 5,000 not doubled the 5th term.

I am counting up in 10s from 184
I will include 224

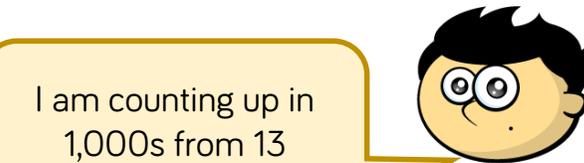


Mo



Rosie

I am counting up in 100s from 604
I will include 1,040



Jack

I am counting up in 1,000s from 13
I will include 130,000

Who has made a mistake?
Identify anyone who has made a mistake and explain how you know.

Rosie has made a mistake. She is counting in 100s; therefore the ones column should never change

Henry has also made a mistake as he is counting in 1,000s, so the tens and ones columns won't change.

Compare and Order

Notes and Guidance

Children compare and order numbers up to 1,000,000 using comparison vocabulary and symbols.

They use a number line to compare numbers, and look at the importance of focusing on the column with the highest place value when comparing numbers.

Mathematical Talk

In order to compare, what do we need to know?

What is the value of each digit?

What is the value of ___ in this number?

What is the value of the whole? Can you suggest other parts that make the whole?

Can you write a story to support your part-whole model?

Varied Fluency

Put the number cards in order of size.

13,010

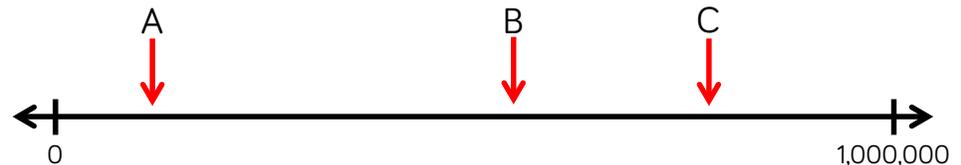
13,100

13,011

13,110

13,111

Estimate the values of A, B and C.



Here is a table showing the population in areas of Yorkshire.

Halifax	88,134
Brighouse	32,360
Leeds	720,492
Huddersfield	146,234
Wakefield	76,886
Bradford	531,200

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

The population of Halifax ___ the population of Wakefield.

Double the population of Brighouse ___ the population of Halifax.

Compare and Order

Reasoning and Problem Solving

The missing number is an odd number.

When rounded to the nearest 10,000 it is 440,000

The sum of the digits is 23



What could the number be?

Can you find three possibilities?

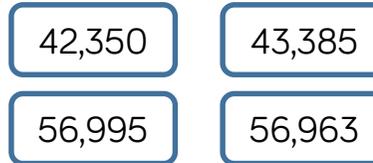
Possible answers:

444,812

435,812

439,502

Here are four number cards.



Four children take one each and say a clue.

- Mo** (boy icon): My number is 57,000 when rounded to the nearest 100
- Rosie** (girl icon): My number has exactly three hundreds in it
- Jack** (boy icon): My number is 43,000 when rounded to the nearest thousand
- Dora** (girl icon): My number is exactly 100 less than 57,063

Which card did each child have?

Mo: 56,995
 Rosie: 42,350
 Jack: 43,385
 Kyra: 56,963

Round within a Million

Notes and Guidance

Children use up to 6-digit numbers to recap previous rounding, and learn the new skill of rounding to the nearest 100,000

They look at cases when rounding a number for a purpose, and in certain contexts, goes against the general rules of rounding.

Mathematical Talk

How many digits does one million have?

Partition these numbers. Show me.

Which digits do you need to look at when rounding to the nearest 10? 100? 1,000? 10,000? 100,000?

How do you know which is the greatest value? Show me.

Varied Fluency

Round these populations to the nearest 100,000

City	Population	Rounded to the nearest 100,000
Leeds	720,492	
Durham	87,559	
Sheffield	512,827	
Birmingham	992,000	

Round 450,985 to the nearest

- 10
- 100
- 1,000
- 10,000
- 100,000

At a festival, 218,712 people attend across the weekend. Tickets come in batches of 100,000

How many batches should the organisers buy? Explain why this goes against the rounding rule.

Round within a Million

Reasoning and Problem Solving

<p>The difference between two 3-digit numbers is two.</p> <p>When each number is rounded to the nearest 1,000 the difference between them is 1,000</p> <p>What could the two numbers be?</p>	<p>499 and 501 498 and 500</p>	<p>When the difference between A and B is rounded to the nearest 100, the answer is 700</p> <p>When the difference between B and C is rounded to the nearest 100, the answer is 400</p> <p>A, B and C are not multiples of 10</p> <p>What could A, B and C be?</p>	<p>$A - B =$ in the range of and including 650 to 749</p> <p>B has to be greater than 400 to complete $B - C = 400$</p> <p>Possible answer:</p> <p>$A = 1,240$ $B = 506$ $C = 59$</p>
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Negative Numbers

Notes and Guidance

Children continue to explore negative numbers and their position on a number line.

They need to see and use negative numbers in context, and be able to count back through zero.

Mathematical Talk

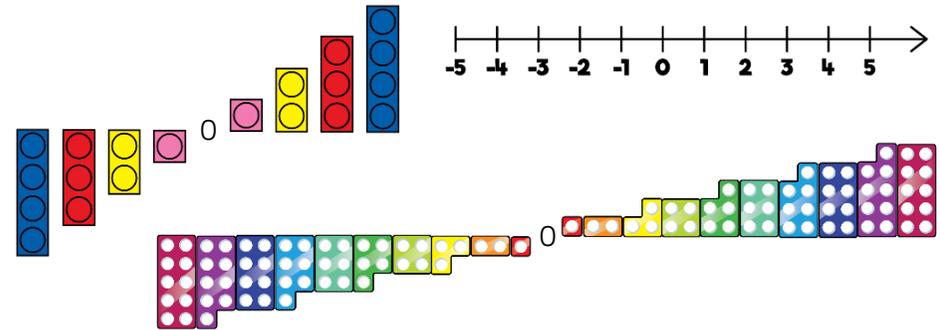
Do we include zero when counting backwards?

Which is the coldest? Warmest?

What was the temperature increase? Decrease?.

Varied Fluency

Here are three representations for negative numbers.



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

Estimate and label where 0, -12 and -20 will be on the number line.



Jane visits a zoo.
 The rainforest room has a temperature of 32°C
 The Arctic room has a temperature of -24°C
 Show the difference in room temperatures on a number line.

Negative Numbers

Reasoning and Problem Solving

True or False?

- The temperature outside is -5 degrees, the temperature inside is 25 degrees.
The difference is 20 degrees.
- Four less than negative six is minus two.
- 15 more than -2 is 13

Explain how you know each statement is true or false.

False: the difference is 30 degrees because it is 5 degrees from -5 to 0. Added to 25 totals 30.

False: it is negative 10 because the steps are going further away from zero.

True

Children may use concrete or pictorial resources to explain.

Put these statements in order so that the answers are from smallest to greatest.

The difference between -24 and -76 52

The even number that is less than -18 but greater than -22 -20

The number that is half way between 40 and -50 -5

The difference between -6 and 7 13

Ordered:
 $-20, -5, 13, 52$

White

**Rose
Maths**

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

- ▶ Add whole numbers with more than 4 digits (column method)
- ▶ Subtract whole numbers with more than 4 digits (column method)
- ▶ Round to estimate and approximate
- ▶ Inverse operations (addition and subtraction)
- ▶ Multi-step addition and subtraction problems

NC Objectives

Add and subtract numbers mentally with increasingly large numbers.

Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.

Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Add More than 4-digits

Notes and Guidance

Children will build upon previous learning of column addition. They will now look at numbers with more than four digits and use their place value knowledge to line the numbers up accurately.

Children will learn that when there are more than ten thousands in the thousands column these can be exchanged for ten thousands.

Mathematical Talk

Will you have to exchange? How do you know which columns will be affected?

Does it matter that the two numbers don't have the same amount of digits?

Which number goes on top in the calculation? Does it affect the answer?

Varied Fluency



Use a place value grid and counters to calculate $4,434 + 3,325$

Show the column method alongside.

Th	H	T	O

How does the column method represent the concrete?



Calculate.

	3	2	4	6	1
+		4	3	5	2

	4	8	2	7	6
+		5	6	1	3

Can you think of a sensible story to represent each calculation?



Use the column method to calculate:

$$54,311 + 425 + 3,501$$

$$35,622 + 24,316 + 743$$

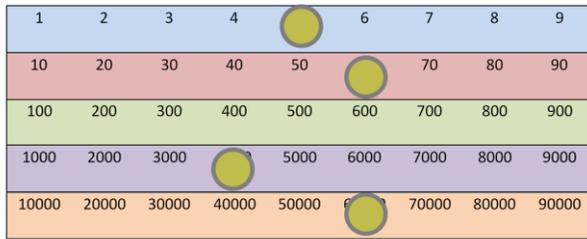
$$3,942 + 14,356 + 88$$

Add More than 4-digits

Reasoning and Problem Solving

Sam is discovering numbers on a Gattegno chart.

He makes this number.



Sam moves one counter three spaces on a horizontal line to create a new number.

When he adds this to his original number he gets 131,130

Which counter did he move?

He moved the counter on the thousands row, he moved it from 4,000 to 7,000

Work out the missing numbers.

	?	4	?	3	?
+	2	?	5	?	2
	7	8	5	2	9

$$54,937 + 23,592 = 78,529$$

Subtract More than 4-digits

Notes and Guidance

Building on Year 4, children use their knowledge of subtracting using the formal column method to subtract more than four digit numbers. Children will be focusing on exchange and will be concentrating on the correct place value. It is important that children know when an exchange is and isn't needed. Children need to experience '0' as a place holder.

Mathematical Talk

Why is it important that we start subtracting the ones first? What could happen if we didn't? Does it matter which number goes on top? Why? Will you have to exchange? How do you know which columns will be affected? Does it matter that the two numbers don't have the same amount of digits?

Varied Fluency

- A plane is flying at 29,456 feet. During the flight the plane descends 8,896 feet. It then descends another 989 feet. What height is the plane now flying at?
- Using column subtraction answer: Adam earns £37,506 pounds a year. Sarah earns £22,819 a year. How much more money does Adam earn than Sarah?
- Calculate:

$$4,648 - 2,347$$

Th	H	T	O
4 1,000	6 100	4 10	8 1
2 1,000	3 100	3 10	7 1
6 1,000	4 100	4 10	1 1
4 1,000	6 100	4 10	8 1

$$45,536 - 8,426$$

TTh	Th	H	T	O
45 10,000	5 1,000	3 100	6 10	6 1
8 10,000	4 1,000	2 100	4 10	2 1
5 10,000	5 1,000	3 100	5 10	3 1
5 10,000	3 1,000	4 100	6 10	6 1

Subtract More than 4-digits

Reasoning and Problem Solving

Gina makes a 5-digit number.

Mike makes a 4-digit number.

The difference between their numbers is 3,465

What could their numbers be?

Possible answers:

9,658 and 14,023

12,654 and 8,289

5,635 and 10,000

Etc.

Holly completes this subtraction incorrectly.

$$\begin{array}{r} 28701 \\ - 7621 \\ \hline 21180 \end{array}$$

Explain the mistake to Holly and correct it for her.

Holly did not write down the exchange she made when she exchanged 1 hundred for 10 tens. This means she still had 7 hundreds subtract 6 hundreds when she should have 6 hundreds subtract 6 hundreds. The correct answer is 21,080

Estimate and Approximate

Notes and Guidance

Children build on their understanding of estimating and rounding to estimate answers for calculations and problems. The term approximate is used throughout.

Mathematical Talk

Which numbers shall I round to?

Why should I round to this number?

Why should an estimate be quick?

When, in real life, would we use an estimate?

Varied Fluency

Which is the best question to estimate the total of 22,223 and 5,687?

$$22220 + 5690$$

$$22230 + 5690$$

$$22220 + 5680$$

The children from West Pool Junior School all go on a whole school trip to a museum. There are 30 children in each year group and all 4 year groups go. The cost for each child is as follows:

Cost of ticket	£9.95
Cost of coach	£7.63
Cost of lunch	£3.32

What is the approximate cost for each individual child?

Here are the total costs for the whole school trip:

Total cost of tickets	£1,194
Total cost of coach	£915.60
Total cost of lunches	£398.49

What is the approximate total cost of the trip?

Estimate and Approximate

Reasoning and Problem Solving

True or False?

$$49,999 - 19,999 = 50,000 - 20,000$$



Dora

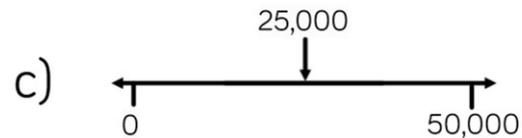
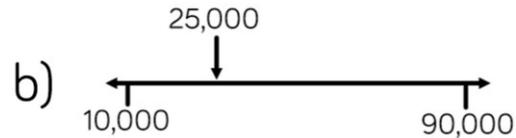
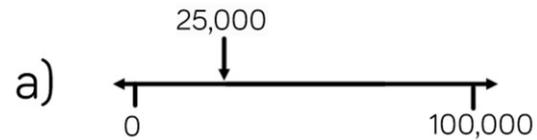
I did not need to use a written method to work this out.

How could Dora have worked this out?

True

Dora has used her related number facts. Both numbers on the right have decreased by 1 therefore whatever the difference is, it will remain the same as the left hand side.

Which estimate is inaccurate?



Explain how you know.

B is inaccurate. The arrow is about a quarter of the way along the number line so it should be 30,000

Inverse Operations

Notes and Guidance

In this small step, children will use their knowledge of addition and subtraction to check their workings to ensure accuracy.

They use the commutative law to see that addition can be done in any order but subtraction cannot.

Mathematical Talk

How can you tell if your answer is sensible?

What is the inverse of addition?

What is the inverse of subtraction?

Varied Fluency

- When calculating $17,468 - 8,947$, which answer gives the corresponding addition question?

$$8,947 + 8,631 = 17,468$$

$$8,947 + 8,521 = 17,468$$

$$8,251 + 8,947 = 17,468$$

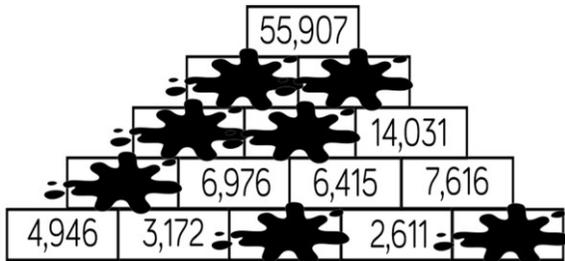
- I'm thinking of a number.
After I add 5,241 and subtract 352, my number is 9,485
What was my original number?
- Amy and Matthew are playing their favourite computer game.
Amy's current high score is 8,524
Matthew's high score is bigger than Amy's.
The total of both of their scores is 19,384

What is Matthew's high score?

Inverse Operations

Reasoning and Problem Solving

Complete the pyramid using addition and subtraction.



From left to right:

Bottom row:
3,804, 5,005

Second row:
8,118

Third row:
15,094, 13,391

Fourth row:
28,485, 27,422

Mo, Whitney, Teddy and Eva collect marbles.



Mo

I have 1,648 marbles.

I have double the amount of marbles Mo has.



Whitney



Teddy

I have half the amount of marbles Mo has.

In total they have 8,524 marbles between them.

How many does Eva have?

Eva has 2,756 marbles.

Multi-step Problems

Notes and Guidance

In this small step children will be using their knowledge of addition and subtraction to solve multi-step problems. The problems will appear in different contexts and in different forms, i.e. bar models and word problems.

Mathematical Talk

What is the key vocabulary in the question?

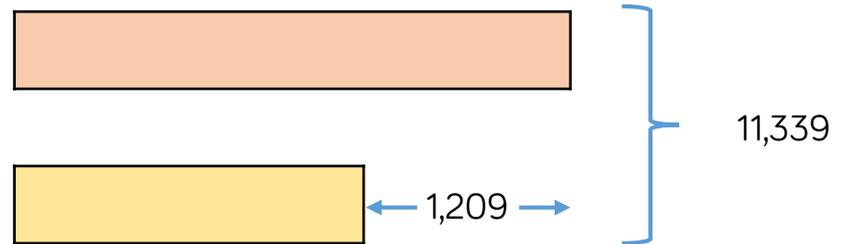
What are the key bits of information?

Can we put this information into a model?

Which operations do we need to use?

Varied Fluency

- 
 When Claire opened her book, she saw two numbered pages. The sum of these two pages was 317. What would the next page number be?
- 
 Adam is twice as old as Barry. Charlie is 3 years younger than Barry. The sum of all their ages is 53. How old is Barry?
- 
 The sum of two numbers is 11,339. The difference between the same two numbers is 1,209. Use the bar model to help you find the numbers.



Multi-step Problems

Reasoning and Problem Solving

A milkman has 250 bottles of milk.

He collects another 160 from the dairy, and delivers 375 during the day.

How many does he have left?



Tommy

My method:

$$375 - 250 = 125$$

$$125 + 160 = 285$$

Do you agree with Tommy?
Explain why.

Tommy is wrong. He should have added 250 and 160, then subtracted 375 from the answer.

There are 35 bottles of milk remaining.

On Monday, Dupree was paid £114

On Tuesday, he was paid £27 more than on Monday.

On Wednesday, he was paid £27 less than on Monday.

How much was Dupree paid in total?

How many calculations did you do?

Is there a more efficient method?

£342

Children might add 114 and 27, subtract 27 from 114 and then add their numbers.

A more efficient method is to recognise that the '£27 more' and '£27 less' cancel out so they can just multiply £114 by three.

White

**Rose
Maths**

Autumn - Block 3

Statistics

Overview

Small Steps

NC Objectives

- Read and interpret line graphs
- Draw line graphs
- Use line graphs to solve problems
- Read and interpret tables
- Two-way tables
- Timetables

Solve comparison, sum and difference problems using information presented in a line graph.

Complete, read and interpret information in tables including timetables.

Read & Interpret Line Graphs

Notes and Guidance

Children are introduced to line graphs. They use their knowledge of scales to read information accurately. They look at effective ways to read a line graph and answer questions relating to the graphs.
Children use data in different real life contexts.

Mathematical Talk

What do you notice about the scale on the vertical axis?

What would happen if you used a different scale?

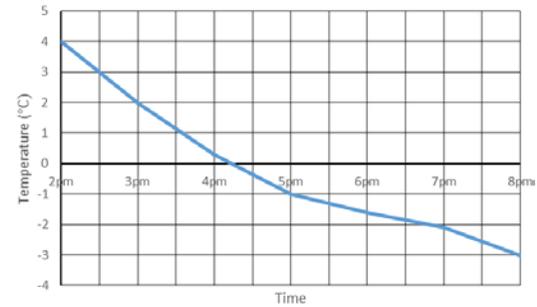
Can you think of two questions to ask each other about your graph?

Where have you seen information presented in line graphs? Is it clear?

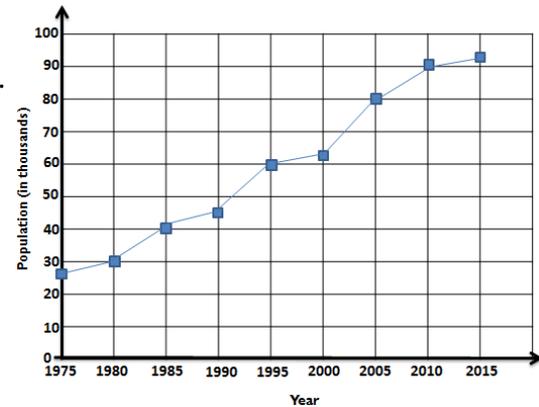
Varied Fluency



- What was the lowest temperature record on the graph?
- What was the time when freezing point was reached?
- Can you estimate what the temperature was at 6pm?
- The temperature was below 0°C for ____ hours.



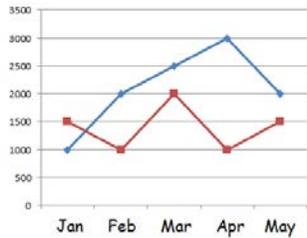
- This line graph shows the population growth of a town. What was the population of the town in 1985?
- In what year did the population reach double the population of 1985?
 - By how much had the population grown between 1990 and 2010?



Read & Interpret Line Graphs

Reasoning and Problem Solving

The graph shows how many cars were sold by two different companies in the first 5 months of 2017. Blue represents Ace Motors and red represents Briggs.

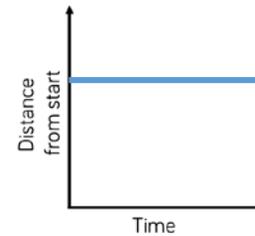


- How many more cars did Ace Motors sell than Briggs in April?
- For the first 3 months of the year compare the total sales for each company. Who sold more and by how many?
- Crooks Motors sold 250 more cars than Briggs each month. Plot their sales on the graph.

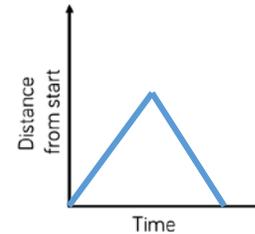
2,000
 Ace 5,500
 Briggs 4,500
 Difference of 1,000
 Ace sold more.

Points on graph are all half an interval up from Briggs.

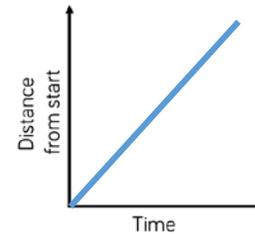
Match the graph to the activity.



A car travels at constant speed on the motorway.



A car is parked outside a house.



A car drives to the end of the road and back.

The first graph matches with the second statement.

Second graph with the third statement.

Third graph with the first statement.

Draw Line Graphs

Notes and Guidance

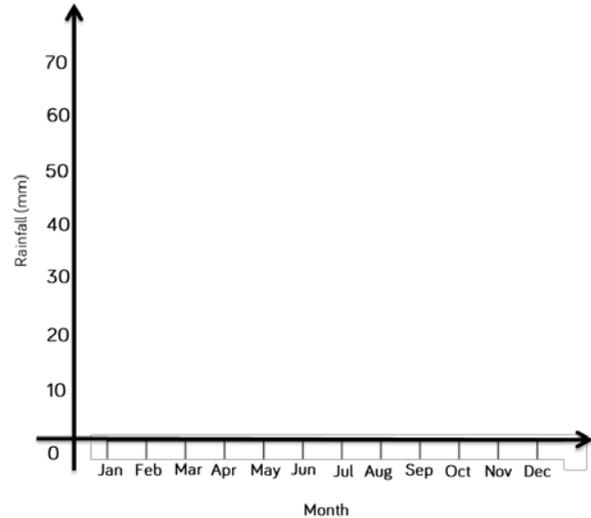
Children use their knowledge of scales and coordinates to represent data as a line graph. Drawing line graphs is a Year 5 Science objective and has been included here to support this learning and link to reading and interpreting graphs. Children draw axis with different scales depending on the data they are representing.

Mathematical Talk

- What intervals will you use?
- What will each square represent?
- What does the x -axis represent?
- What does the y -axis represent?
- Why are line graphs useful?
- What makes them different to other types of graphs?
- What data could we collect?

Varied Fluency

The table shows average rainfall in Leicester over a year. Complete the graph below using the information from the table.



Month	Rainfall (mm)
January	54
February	40
March	38
April	38
May	48
June	46
July	58
August	60
September	50
October	57
November	65
December	50

Here is a table showing the conversion between pounds and rupees. Put the information into a line graph.

Pounds	1	2	3	4	5	6	7	8	9	10
Rupees	80	160	240	320	400	480	560	640	720	800

Draw Line Graphs

Reasoning and Problem Solving

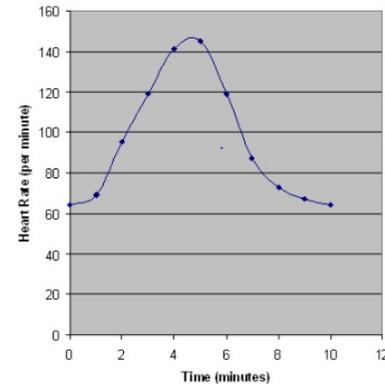
Activity

This would be a good opportunity to collect your own data and draw a line graph to display the results.

As this objective is taken from the science curriculum, it would be a good idea to link it to this or PE.

- Measuring shadows over time
- Melting and dissolving substances
- Plant growth

Here is a line graph showing the effect that exercise had on Jimmy’s heart during Monday’s PE lesson.



70 bpm

Approximately 3 mins 30 secs and 5 mins 45 secs

What was Jimmy’s heart rate at 1 min 15 secs?

At what time was Jimmy’s heart rate 130 beats per minute?

Problems with Line Graphs

Notes and Guidance

Children will use line graphs to solve problems. They may use prepared graphs and also graphs which they have drawn themselves, and will make links to other subjects, particularly science.

They need to consider comparison, sum and difference problems.

Mathematical Talk

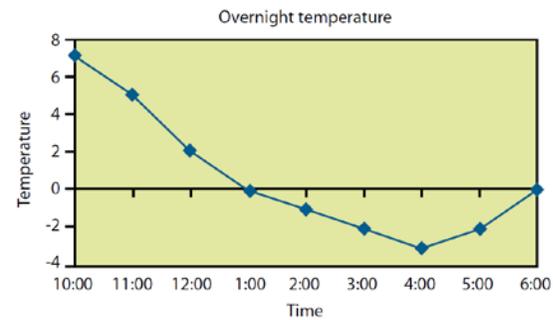
How is the information organised?

Is it clear?

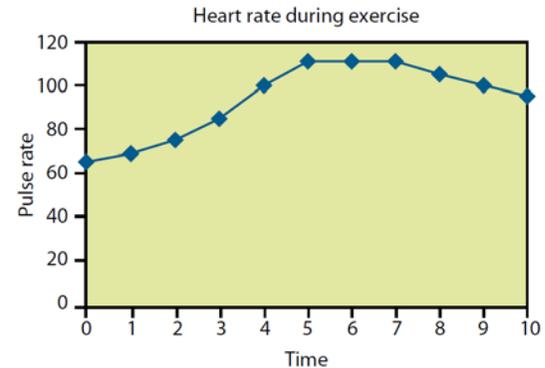
What else does this graph tell you?

What does it not tell you?

Varied Fluency



What was the highest/lowest temperature?
 What time did they occur?
 What is the difference between the highest and lowest temperature?
 How long did the temperature stay at freezing point or less?



How long did it take for the pulse rate to reach the highest level? Explain using the graph to help.

What could have happened at 5 minutes?

What could have happened at 7 minutes?

Estimate what the pulse rate was after 2 and a half minutes. How did you get an accurate estimate?

Problems with Line Graphs

Reasoning and Problem Solving

Carry out your own exercise experiment and record your heart rate on a graph like the one shown in the section above. How does it compare?



Can you make a set of questions for a friend to answer about your graph?

Can you put the information into a table?

Open ended answers.

Children can be supported by being given part-drawn line graphs.

Here is a line graph showing a bath time. Can you write a story to explain what is happening in the graph?



How long did it take to fill the bath?

How long did it take to empty?

The bath doesn't fill at a constant rate. Why might that be?

Discussions around what happens to the water level when someone gets in the bath would be useful.

9 and a half mins to fill the bath

5 mins to empty

One or two taps could be used to fill.

Read & Interpret Tables

Notes and Guidance

Children will extract information from tables and apply previously learned skills to manipulate information.

There are many opportunities to link this to the local area or topics being studied by the class.

This step provides good opportunities to add and subtract larger numbers in meaningful contexts.

Mathematical Talk

Can you find the information on the table?

Can you make up your own question to ask about the table?

Varied Fluency



Use the table to answer the questions.

Planet	Time for Revolution	Diameter (km)	Time for Rotation
Mercury	88 days	4,878	59 days
Venus	225 days	12,104	243 days
Earth	365 days	12,756	24 hours
Mars	687 days	6,794	25 hours
Jupiter	12 years	142,984	10 hours
Saturn	29 years	120,536	11 hours
Uranus	84 years	51,118	17 hours
Neptune	165 years	49,500	17 hours

- How many planets take more than one day to rotate?
- Which planets take more than one year to make one revolution?
- Write the diameter of Jupiter in words.
- Make up some questions for a friend to answer



Answer the questions using information from the table.

City	Leeds	Wakefield	Bradford	Liverpool	Coventry
Population	720,000	316,000	467,000	440,000	305,000

- What is the difference between the highest and lowest population?
- Which two cities have a combined population of 621,000?

Read & Interpret Tables

Reasoning and Problem Solving

	100 m sprint (s)	Shot put (m)	50 m Sack Race (s)	Javelin (m)
Stephen	15.5	6.5	18.9	11.2
Julie	16.2	7.5	20.1	13.3
Fred	15.8	6.9	19.3	13.9
Chris	15.6	7.2	18.7	14.1
Dora	17.9	6.3	18.7	13.3

Dora's number is the biggest but this means she was the slowest therefore she did not win the 100 m sprint.

Dora thinks that she won the 100 m sprint because she has the biggest number.

Do you agree?
Explain your answer.

This table shows the 10 largest stadiums in Europe.

Stadium	City	Country	Capacity
Camp Nou	Barcelona	Spain	99,365
Wembley Stadium	London	England	90,000
Signal Iduna Park	Dortmund	Germany	81,359
Estadio Santiago Bernabeu	Madrid	Spain	81,044
San Siro	Milan	Italy	80,018
Stade de France	Paris	France	80,000
Luzhniki Stadium	Moscow	Russia	78,300
Ataturk Olimpiyat Stadium	Istanbul	Turkey	76,092
Old Trafford	Manchester	England	75,811
Allianz Arena	Munich	Germany	75,000

True or false?

- The fourth largest stadium is The San Siro.
- There are 6 stadiums with a capacity of more than 80,000
- Three of the largest stadiums are in England.

False
False
False

Two-way Tables

Notes and Guidance

Children read a range of two-way tables where the data is represented in various ways.

These tables show two different sets of data which are displayed horizontally and vertically.

Children show they can interpret a two-way table by creating questions themselves.

Mathematical Talk

What does the table show?

What information is missing?

How can we calculate the missing information?

How else could this data be represented?

Varied Fluency



This two way table shows the staff at Liverpool police station.

	Male	Female	Total
Constable	55	24	79
Sergeant	8	5	13
Inspector	2	4	6
Chief Inspector	1	1	2
Total	66	34	100

- How many female inspectors work there?
- How many male sergeants work there?
- How many constables are there altogether?
- How many people work at Liverpool police station?
- How many male inspectors and female constables are there altogether?
- How many people in total are ranked below inspector?



This table shows how many football games teams have won and lost. Fill in the totals and write your own questions to interpret the information.

	Man United	Liverpool	Chelsea	TOTAL
Lost	36	42	29	
Won	174	76	126	
TOTAL				

Two-way Tables

Reasoning and Problem Solving

This table shows how many children own dogs and cats.

Fill in the missing gaps and answer the questions below.

	Boys	Girls	Total
Dogs		44	
Cats	38		
Total	125		245

- How many more boys have dogs than girls?
- How many more girls have cats than dogs?
- How many more children have dogs than cats?

Completed table:

	Boys	Girls	Total
Dogs	87	44	131
Cats	38	76	114
Total	125	120	245

43

32

17

120 people were asked where they went on holiday during the summer months of last year.



Use this information to create a two way table.

In June, 6 people went to France and 18 went to Spain.

In July, 10 people went to France and 19 went to Italy.

In August, 15 people went to Spain.

35 people went to France altogether.

39 people went to Italy altogether.

35 people went away in June.

43 people went on holiday in August.

You can choose to give children a blank template.

Children may not know where to put the 120, or realise its importance.

Children will need to work

systematically in order to get all of the information.

As a teacher, you could choose not to give the children the complete total and let them find other possible answers.

Timetables

Notes and Guidance

Children need to extract information from timetables. Where possible it is useful to look at real timetables of public transport in the local area.

Allow children plenty of time to examine the timetables and ask each other questions about the information.

Mathematical Talk

- How often does a bus leave ____ station?
- How many buses leave each hour?
- Where do you see timetables and why are they useful?
- What information is displayed in a row when you read across the timetable?
- What information is displayed in a column when you read down the timetable?

Varied Fluency



Use the timetable to answer the questions.

	Bus Timetable				
Halifax	06:05	06:35	07:10	07:43	08:15
Shelf	06:15	06:45		07:59	08:31
Shelf Village	06:16	06:46	07:23	08:00	08:32
Woodside	06:21	06:50	07:28		
Odsal	06:26	06:55	07:33	08:15	08:45
Bradford	06:40	07:10	07:48	08:30	09:00

- On the 06:35 bus, how long does it take to get from Shelf Roundabout to Bradford Interchange?
- Can you travel to Woodside on the 07:43 bus?
- Which journey takes the longest time between Shelf Village and Bradford Interchange, the bus that leaves Shelf Village at 06:46 or the bus that leaves Shelf Village at 07:23?
- If you needed to travel from Halifax Bus Station to Odsal and had to arrive by 08:20, which would be the best bus to catch? Explain your answer.
- Which journey takes the longest time from Halifax Bus Station to Bradford Interchange?

Timetables

Reasoning and Problem Solving

NatureWatch		NatureWatch +1		QuizTime		Cookery Channel	
5pm	News	5pm	Puppy playtime	5pm	Talk the Talk	5pm	Cheese Please
5:30pm	Weather	6pm	News	5:30pm	Quizdom	6pm	Cook with Lydia
6:45pm	Deep Blue	6:30pm	Weather	6pm	What's the Q?	6:30pm	Pizza Pasta Pietro
6pm	Pampered Pets	6:45pm	Deep Blue	6:30pm	aMAZement	6:45pm	5 Minute Menu
7pm	Safari	7pm	Pampered Pets	7:30pm	Buzzed Out	7pm	Budget Baker
8:15pm	Animal Antics	8pm	Safari	8pm	Guess the Noise	8pm	Lots of Lollies
9:15pm	Worldly Wonders	9:15pm	Animal Antics	9pm	Dance & Decide	9:15pm	Biscuit Bites

Simon scans the TV guide and plans his viewing for the evening. He chooses this sequence of TV shows:

Cheese Please, What's the Q, aMAZement, Budget Baker, Safari, Dance & Decide.

Will Simon be able to watch all the shows he has chosen?

True or False – Safari, Guess the Noise and Lots of Lollies are all on for 1 hour.

No, Budget Baker clashes with aMAZement.

False – Safari and Lab of Lollies are on for over an hour.

Here is Becky's weekly timetable from secondary school.

Y7CM	1 8.15 to 9.55	2 9.55 to 10.45	3 11.05 to 11.55	4 11.55 to 12.45	5 1.45 to 2.35	6 2.35 to 3.25
Monday	Literacy	English	Maths	ICT	PSCHE	Geography
Tuesday	English	Art	French	Science	Lunch time (12.45 - 1.40)	
Wednesday	Literacy	DT	Art	Drama	ICT	Science
Thursday	PE	Maths	RE	English	History	PSCHE
Friday	Literacy	Maths	Art	Science	PE	

True or false?

- If Becky was 10 minutes late for her English lesson on Monday there would be 45 mins of the lesson left.
- Becky has 2 hours and 20 minutes of PE in a week.
- Becky has 130 minutes of literacy in a week.

False, 40 mins

True

False, 120mins (2 hours)

White

**Rose
Maths**

Autumn - Block 4

Multiplication & Division

Overview

Small Steps

- ▶ Multiples
- ▶ Factors
- ▶ Common factors
- ▶ Prime numbers
- ▶ Square numbers
- ▶ Cube numbers
- ▶ Multiply by 10, 100 and 1,000
- ▶ Divide by 10, 100 and 1,000
- ▶ Multiples of 10, 100 and 1,000

NC Objectives

Multiply and divide numbers mentally drawing upon known facts.

Multiply and divide whole numbers by 10, 100 and 1000.

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.

Recognise and use square numbers and cube numbers and the notation for squared (2) and cubed (3)

Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes.

Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.

Establish whether a number up to 100 is prime and recall prime numbers up to 19

Multiples

Notes and Guidance

Building on their times tables knowledge, children will find multiples of whole numbers. Children build multiples of a number using concrete and pictorial representations e.g. in an array.

Mathematical Talk

What do you notice about the multiples of 2? What is the same about them, what is different?

Look at multiples of other numbers; is there a rule that links them?

Varied Fluency

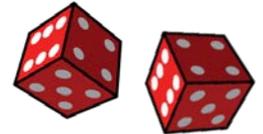
- Circle the multiples of 5

25 32 54 40 175 3000

What do you notice about the multiples of 5?

- Write down all the multiples of 4 between 20 and 80

- Roll 2 dice (1-6), multiply the numbers.
What is the number a multiple of?
Is it a multiple of more than one number?



How many different numbers can you make multiples of?
Can you make multiples of all numbers up to 10?
Can you make multiples of all numbers up to 20?

Use a table to show your results.
Multiply the numbers you roll to complete the table.

Multiples

Reasoning and Problem Solving

Use the digits 0 – 9. Choose 2 digits.
Multiply them together.

What is your number a multiple of?

Is it a multiple of more than one number?

Can you find all the numbers you could make?

Use the table below to help.

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Always, sometimes, never.

- The product of two even numbers is a multiple of an odd number.
- The product of two odd numbers is a multiple of an even number.

Always - all multiples of 1

Never - Two odd numbers multiplied together are always a multiple of an odd number.

Clare's age is a multiple of 7 and is 3 less than a multiple of 8

She is younger than 40

How old is Clare?

Claire is 21 years old.

Factors

Notes and Guidance

Children understand the relationship between multiplication and division and can use arrays to show the relationship between them. They know that division can involve either sharing or finding equal groups of amounts. Children learn that a factor of a number is the number you get when you divide a whole number by another whole number and that factors come in pairs. (factor \times factor = product).

Mathematical Talk

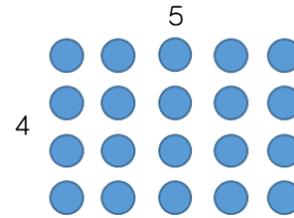
How can you work in a systematic way to prove you have found all the factors?

Do factors always come in pairs?

How can we use our multiplication and division facts to find factors?

Varied Fluency

❖ If you have twenty counters, how many different ways of arranging them can you find?



How many factors of twenty have you found?
E.g. A pair of factors of 20 are 4 and 5

❖ Circle the factors of 60

9, 6, 8, 4, 12, 5, 60, 15, 45

Which factors of 60 are not shown?

❖ Fill in the missing factors of 24

$1 \times \underline{\quad}$ $\underline{\quad} \times 12$

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

What do you notice about the order of the factors?

Use this method to find the factors of 42

Factors

Reasoning and Problem Solving

Here is Kayla’s method for finding factor pairs:

1	36
2	18
3	12
4	9
5	X
6	6

When do you put a cross next to a number?

How many factors does 36 have?

Use Kayla’s method to find all the factors of 64

If it is not a factor, put a cross.

36 has 9 factors.

Factors of 64:

1	64
2	32
3	X
4	16
5	X
6	X
7	X
8	8

Always, sometimes, never.

- An even number has an even amount of factors.
- An odd number has an odd amount of factors.

Sometimes, e.g. 6 has four factors but 36 has nine.

Sometimes, e.g. 21 has four factors but 25 has three.

True or False?

The bigger the number, the more factors it has.

False. For example, 12 has 6 factors but 97 only has 2

Common Factors

Notes and Guidance

Using their knowledge of factors, children find the common factors of two numbers.

They use arrays to compare the factors of a number and use a Venn diagram to show their results.

Mathematical Talk

How can we find the common factors systematically?

Which number is a common factor of any pair of numbers?

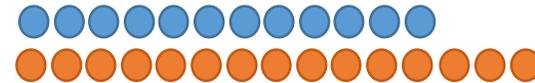
How does a Venn diagram help to show common factors?

Where are the common factors?

Varied Fluency



Use arrays to find the common factors of 12 and 15
Can we arrange the counters in one row?



Yes- so they have a common factor of one.

Can we arrange the counters in two equal rows?

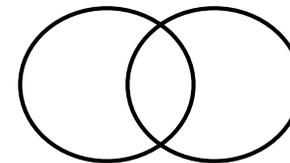


2 is a factor of 12 but not of 15 so 2 is not a common factor.

Continue to work through the factors systematically until you find all the common factors.



Fill in the Venn diagram to show the factors of 20 and 24



Where are the common factors of 20 and 24?

Can you use a Venn diagram to show the common factors of 9 and 15?

Common Factors

Reasoning and Problem Solving

True or False?

- 1 is a factor of every number. True
- 1 is a multiple of every number. False
- 0 is a factor of every number. False
- 0 is a multiple of every number. True

I am thinking of two 2-digit numbers.

24 and 60

Both of the numbers have a digit total of six.

Their common factors are:

1, 2, 3, 4, 6, & 12

What are the numbers?

Prime Numbers

Notes and Guidance

Using their knowledge of factors, children see that some numbers only have 2 factors and these are special numbers called Prime Numbers. They also learn that non-primes are called composite numbers. Children can recall primes up to 19 and are able to establish whether a number is prime up to 100. Using primes, they break a number down into its prime factors.

Mathematical Talk

- How many factors does each number have?
- How many other numbers can you find that have this number of factors?
- What is a prime number?
- What is a composite number?
- How many factors does a prime number have?

Varied Fluency

Use counters to find the factors of the following numbers.

5, 13, 17, 23

What do you notice about the arrays?

A prime number has 2 factors, one and itself. A composite number can be divided by numbers other than 1 and itself. Sort the numbers into the table.

- 5
- 15
- 9
- 12
- 3
- 27
- 24
- 30

	Prime	Composite
2 factors (1 & itself)		
More than 2 factors		

Put two of your own numbers into the table.
 Why are two of the boxes empty?
 Where would 1 go in the table? Would it fit in at all?

Prime Numbers

Reasoning and Problem Solving

Find all the prime numbers between 10 and 100, sort them in the table below.

End in a 1	End in a 3	End in a 7	End in a 9

End in a 1	End in a 3
11, 31, 41, 61, 71,	13, 23, 43, 53, 73
End in a 7	End in a 9
17, 37, 47, 67, 97	19, 29, 59, 79, 89

Why do no two-digit prime numbers end in an even number?

Why do no two-digit prime numbers end in a 5?

No 2-digit primes end in an even number because 2-digit even numbers are divisible by 2.
No 2-digit prime numbers end in a 5 because they are divisible by 5 as well as 1 and itself.

Dora says all prime numbers have to be odd.



Her friend Abdul says that means 9, 27 and 45 are prime numbers.

Explain Abdul and Dora's mistakes and correct them.

2 is a prime number so Dora is wrong.

Abdul thinks all odd numbers are prime but he is wrong as some have more than 2 factors. E.g.

Factors of 9:

1, 3 & 9

Factors of 27:

1, 3, 9 & 27

Etc.

Square Numbers

Notes and Guidance

Children will need to be able to find factors of whole numbers. Square numbers have an odd number of factors and are the result of multiplying a number by itself.

They learn the notation for squared is '²'

Mathematical Talk

Why are square numbers called 'square' numbers?

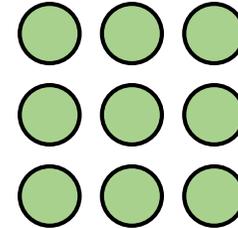
Is there a pattern between the numbers?

True or False: The square of an even number is even and the square of an odd number is odd.

Varied Fluency



What does this array show you?
Why is it square?



How many ways are there of arranging 36 counters in an array?
What is the same about each array?
What is different?



Find the first 12 square numbers.
Prove that they are square numbers.
How many different squares can you make using counters?
What do you notice?
Are there any patterns?

Square Numbers

Reasoning and Problem Solving

Teddy says,



Factors come in pairs so all whole numbers must have an even number of factors.

Do you agree?
Explain your reasoning.

How many square numbers can you make by adding prime numbers together?

Here's one to get you started:

$$2 + 2 = 4$$

Children will find that some numbers don't have an even number of factors e.g. 25
Square numbers have an odd number of factors.

Solutions include:
 $2 + 2 = 4$
 $2 + 7 = 9$
 $11 + 5 = 16$
 $23 + 2 = 25$
 $29 + 7 = 36$

Julian thinks that 4^2 is equal to 16

Do you agree?
Convince me.

He also thinks that 6^2 is equal to 12

Do you agree?
Explain what you have noticed.

Children may use concrete materials or draw pictures to prove it.

Children should spot that 6 has been multiplied by 2

They may create the array to prove that $6^2 = 36$ and $6 \times 2 = 12$

Always, sometimes, never.

A square number has an even number of factors.

Never. Square numbers have an odd number of factors.

Cube Numbers

Notes and Guidance

Children learn that a cubed number is the product of three numbers which are the same.

If you multiply a number by itself, then itself again the result is a cubed number.

They learn the notation for cubed is ‘ 3 ’

Mathematical Talk

Why are cube numbers called ‘cube’ numbers?

How are squared and cubed numbers similar?

How are they different?

True or False: Cubes of even numbers are even and cubes of odd numbers are odd.

Varied Fluency



Use multilink cubes and investigate how many are needed to make different sized cubes.



How many multilink cubes are required to make the first cube number? The second? Third?

Can you predict what the tenth cube number is going to be?



Complete the table.

3^3	$3 \times 3 \times 3$	27
5^3	$5 \times 5 \times 5$	
	$6 \times 6 \times 6$	
4^3		
		8



Calculate:

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

$$5^3 = \underline{\quad}$$

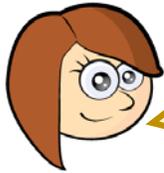
$$4 \text{ cubed} = \underline{\quad}$$

$$6 \text{ cubed} = \underline{\quad}$$

Cube Numbers

Reasoning and Problem Solving

Rosie says,



5^3 is equal to 15

Do you agree?
Explain your answer.

Here are 3 number cards



Each number card is a cubed number.
Use the information to find each number.

$$A \times A = B$$

$$B + B - 3 = C$$

$$\text{Digit total of } C = A$$

Rosie is wrong, she has multiplied 5 by 3 rather than by itself 3 times.

A = 8
B = 64
C = 125

Jenny is thinking of a two-digit number that is both a square and a cube number. What number is she thinking of?

64

Caroline's daughter has an age that is a cube number.

8 years old

Next year her age will be a square number.

How old is she now?

The sum of a cube number and a square number is 150

125 & 25

What are the two numbers?

Multiply by 10, 100 & 1,000

Notes and Guidance

Children recap multiplying by 10 and 100 before moving on to multiplying by 1,000.

They look at numbers in a place value grid and discuss how many places to the left digits move when you multiply by different multiples of 10.

Mathematical Talk

Which direction do the digits move when you multiply by 10, 100 or 1,000?

How many places do you move to the left?

When we have an empty place value column to the right of our digits what number do we use as a place holder?

Can you use multiplying by 100 to help you multiply by 1,000? Explain why.

Varied Fluency



Make the number 234 on a place value grid using counters.

HTh	TTh	Th	H	T	O
			2 1	3 1	4 1

When I multiply my number by 10, where will I move my counters?

Is this always the case?



Complete the following questions using counters and a place value grid.

$234 \times 100 = \underline{\quad}$

$324 \times 100 = \underline{\quad}$

$100 \times 36 = \underline{\quad}$

$1,000 \times 207 = \underline{\quad}$

$45,020 \times 10 = \underline{\quad}$

$\underline{\quad} = 3,456 \times 1,000$



Use $<$, $>$ or $=$ to complete the statements.

$62 \times 1,000$



62×100

100×32



32×100

48×100



$48 \times 10 \times 10 \times 10$

Multiply by 10, 100 & 1,000

Reasoning and Problem Solving

<p>Rosie has £300 in her bank account.</p> <p>Louis has 100 times more than Rosie in his bank account.</p> <p>How much more money does Louis have than Rosie?</p>	<p>Rosie has £300</p> <p>Louis has £30,000</p> <p>Louis has £29,700 more than Rosie.</p>	<p>Jack is thinking of a 3-digit number.</p> <p>When he multiplies his number by 100, the ten thousands and hundreds digit are the same.</p> <p>The sum of the digits is 10</p> <p>What number could Jack be thinking of?</p>	<p>181</p> <p>262</p> <p>343</p> <p>424</p> <p>505</p>
<p>Emily has £1,020 in her bank account.</p> <p>Philip has £120 in his bank account.</p> <p>Emily says, 'I have ten times more money than you.'</p> <p>Is Emily correct? Explain your reasoning.</p>	<p>Emily is incorrect, she would have £1,200 if this was the case.</p>		

Divide by 10, 100 & 1,000

Notes and Guidance

Children look at dividing by 10, 100 and 1,000 using a place value chart.

They use counters and digits to learn that the digits move to the right when dividing by powers of ten.

Mathematical Talk

What happens to the digits?

How are dividing by 10, 100 and 1,000 related to each other?

How are dividing by 10, 100 and 1,000 linked to multiplying by 10, 100 and 1,000?

What does 'inverse' mean?

Varied Fluency

HTh	TTh	Th	H	T	O
	●	● ●	● ● ●		

What number is represented in the place value grid?

Divide the number by 100

Which direction do the counters move?

How many columns do they move?

What number do we have now?

Complete the following using a place value grid.

- Divide 460 by 10
- Divide 5,300 by 100
- Divide 62,000 by 1,000

Divide these numbers by 10, 100 and 1,000

80,000

300,000

547,000

Calculate $45,000 \div 10 \div 10$

How else could you write this?

Divide by 10, 100 & 1,000

Reasoning and Problem Solving

David has £357,000 in his bank.

He divides the amount by 1,000 and takes that much money out of the bank.

Using the money he has taken out, he buys some furniture costing two hundred and sixty-nine pounds.

How much money does David have left from the money he took out?

Show your working out.

$$357,00 \div 1,000 = 357$$

If you subtract £269, he is left with £88

Here are the answers to some problems:

5,700

405

397

6,203

Can you write at least two questions for each answer involving dividing by 10, 100 or 1,000?

Possible solutions could be:

$$3,970 \div 10 = 397$$

$$57,000 \div 10 = 5,700$$

$$397,000 \div 1,000 = 397$$

$$40,500 \div 100 = 405$$

$$620,300 \div 100 = 6,203$$

Multiples of 10, 100 & 1,000

Notes and Guidance

Children have been taught how to multiply and divide by 10, 100 and 1,000

They now use knowledge of other multiples to calculate related questions.

Mathematical Talk

If we are multiplying by 20, can we break it down into two steps and use our knowledge of multiplying by 10?

How does using multiplication and division as inverses help us use known facts?

Varied Fluency



$$36 \times 5 = 180$$

Use this fact to solve the following questions:

$$36 \times 50 = \underline{\quad} \qquad 500 \times 36 = \underline{\quad}$$

$$5 \times 360 = \underline{\quad} \qquad 360 \times 500 = \underline{\quad}$$



Here are two methods to solve 24×20

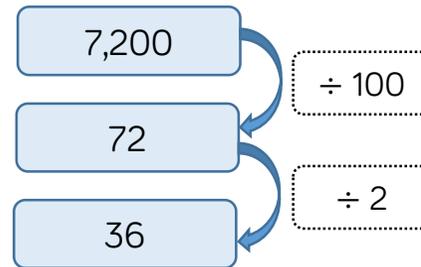
Method 1	Method 2
$24 \times 10 \times 2$ $= 240 \times 2$ $= 480$	$24 \times 2 \times 10$ $= 48 \times 10$ $= 480$

What is the same about the methods, what is different?



Use the division diagram to help solve the calculations.

$$7,200 \div 200 = 36$$



$$3,600 \div 200 = \square$$

$$18,000 \div 200 = \square$$

$$5,400 \div \square = 27$$

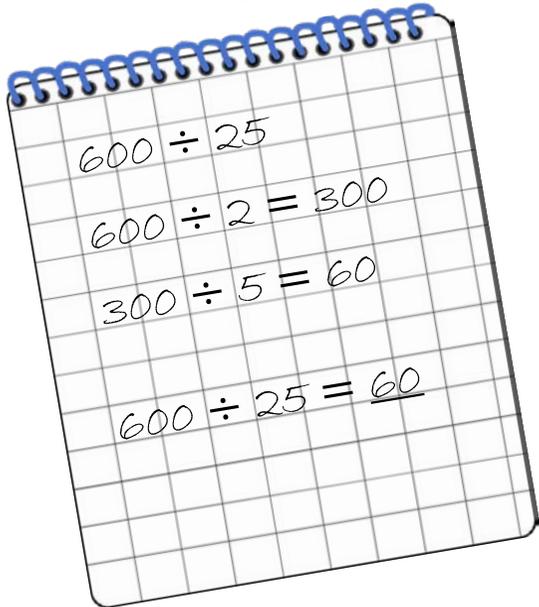
$$\square = 6,600 \div 200$$

Multiples of 10, 100 & 1,000

Reasoning and Problem Solving

Tim has answered a question.

Here is his working out.



Is he correct?

Explain your answer.

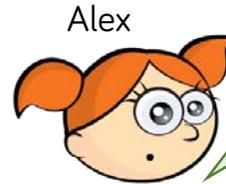
Tim is not correct as he has partitioned 25 incorrectly.

He could have divided by 5 twice.

The correct answer should be 24

$$6 \times 7 = 42$$

$$420 \div 70 = \underline{\quad}$$



Alex

The answer is 60 because all of the numbers are 10 times bigger.

Do you agree with Alex?

Explain your answer.

Alex is wrong because

$$60 \times 70 = 4200$$

and

$$6 \times 70 = 420$$

So the answer should be 6

White

**Rose
Maths**

Autumn - Block 5

Perimeter & Area

Overview

Small Steps

NC Objectives

- ▶ Measure perimeter
- ▶ Calculate perimeter
- ▶ Area of rectangles
- ▶ Area of compound shapes
- ▶ Area of irregular shapes

Measure and calculate the perimeter of composite rectilinear shapes in cm and m.

Calculate and compare the area of rectangles (including squares), and including using standard units, cm^2 , m^2 estimate the area of irregular shapes.

Measure Perimeter

Notes and Guidance

Children measure the perimeter of rectilinear shapes from diagrams without grids. They will recap measurement skills and recognise that they need to use their ruler accurately in order to get the correct answer.

Mathematical Talk

What is perimeter?

Do we need to measure every side?

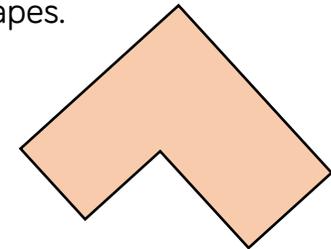
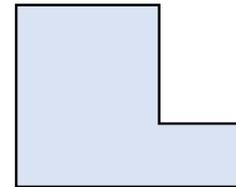
Once we have measured each side, how do we find the perimeter?

Varied Fluency

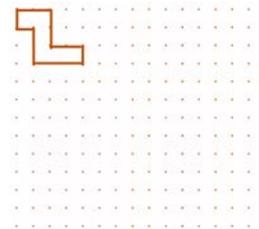
Measure the perimeter of the shapes.



Measure the perimeter of the shapes.



Make this shape double the size using dot paper.



Measure the perimeter of both shapes.

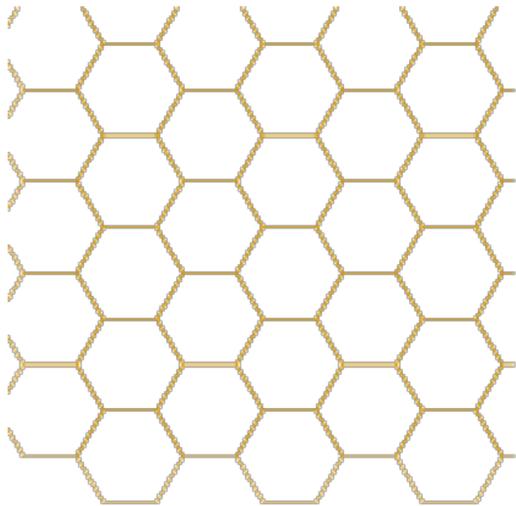
What do you notice about the perimeter of the larger one? Why?

Measure Perimeter

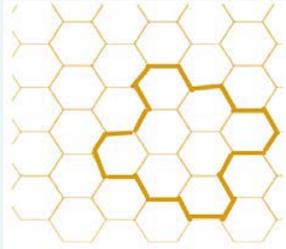
Reasoning and Problem Solving

Each regular hexagon has a side length of 2 cm

Can you construct a shape with a perimeter of 44 cm?



Possible answer:



Activity

Investigate different ways you can make composite rectilinear shapes with a perimeter of 54 cm.

Calculate Perimeter

Notes and Guidance

Children apply their knowledge of measuring and finding perimeter to find unknown lengths.

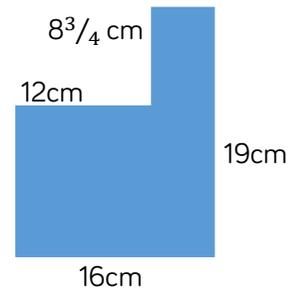
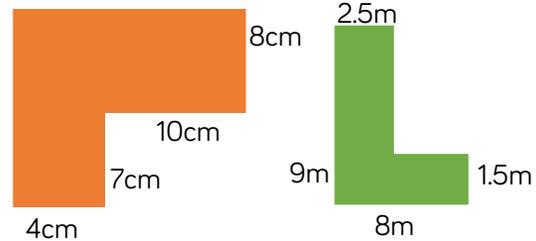
They find the perimeter of shapes with and without grids. When calculating perimeter of shapes, encourage children to mark off the sides as they add them up to prevent repetition of counting/omission of sides.

Mathematical Talk

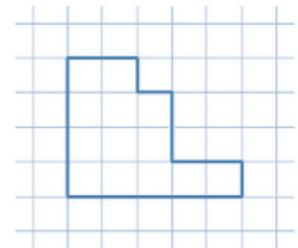
What can you tell me about the sides of a square/rectangle?
How does this help you work out this question?

Varied Fluency

Find the perimeter of the following shapes.



Each square has an area of 4 square cm. What is the perimeter of the whole shape?



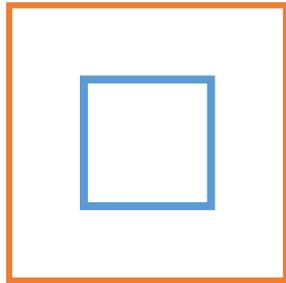
How many _____ can you draw with a perimeter of x cm?
e.g. irregular shapes
e.g. rectangles

How many regular shapes can you make with a perimeter of _____ cm?

Calculate Perimeter

Reasoning and Problem Solving

Here is a square inside another square.



The perimeter of the inner square is 16cm

The outer square's perimeter is four times the size of the inner square.

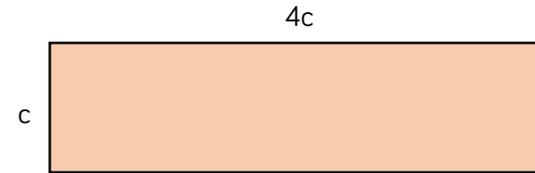
What is the length of one side of the outer square?

How do you know? What do you notice?

Small square = 16cm

Large square = 64cm

Length of one of the outer sides is 8cm, because 64 is a squared number.

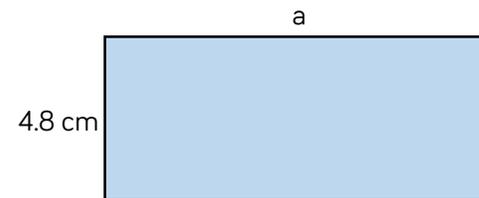


The value of c is 14 m.

What is the total perimeter of the shape?

$$4c + 4c + c + c = 10c$$

$$10 \times 14 = 140 \text{ m}$$



The blue rectangle has a perimeter of 38cm.

What is the value of a ?

$$\text{Total perimeter} = 38\text{cm}$$

$$38 - (4.8 + 4.8) = 28.4$$

$$\text{So } 28.4 \text{ divided by } 2 = 14.2\text{cm}$$

Area of Rectangles

Notes and Guidance

Children build on previous knowledge in Year 4 by counting squares to find the area. They then move on to using a formula to find the area.

Mathematical Talk

What properties of these shapes do you need to know to help you work this out?

What can you tell me about the sides of a square/rectangle?

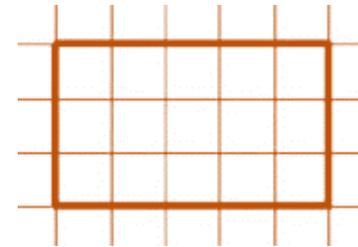
How does this help you work out this question?

Show formula for area alongside examples:

Area = length \times width

Varied Fluency

- How many rectangles can you draw with an area of ____ cm²?
- What is the area of this shape if:
 - each square is 2 cm in length?
 - each square is 3.5 cm in length?

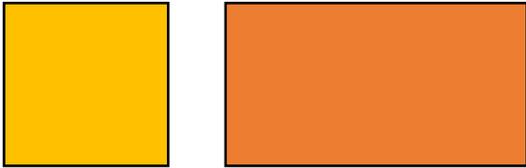


- Simon buys a house with a small back garden, which has an area of 12 m². His house lies in a row of terraces, all identical. If there are 15 terraced houses altogether, what is the total area of the garden space?

Area of Rectangles

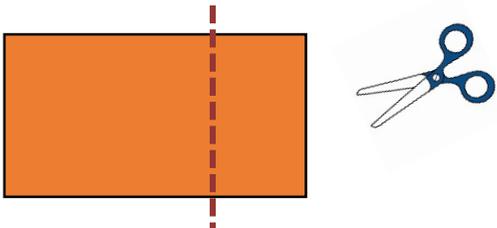
Reasoning and Problem Solving

Investigate how many ways you can make different squares and rectangles with the same area of 84 cm^2
 What strategy did you use?

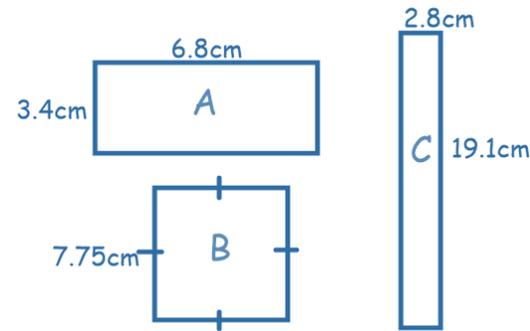


True or False?

If you cut off a piece from a shape, you reduce its area and perimeter.
 Draw 2 examples to prove your thinking.



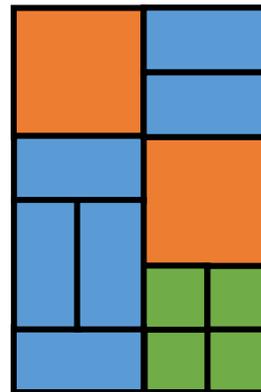
True



Approximate the area of each shape and then order from largest to smallest.

Answer: $A = 3\text{cm} \times 7\text{cm} = 21\text{cm}^2$
 $B = 8\text{cm} \times 8\text{cm} = 64\text{cm}^2$
 $C = 3\text{cm} \times 19\text{cm} = 57\text{cm}^2$

Order: B, C, A



Each orange square has an area of 24 cm^2 .
 Calculate the total orange area.
 Calculate the blue area.
 Calculate the green area.
 What is the total area of the whole shape?

Answer: Orange = 48cm^2
 Blue = 72cm^2
 Green = 24cm^2
 Total = 144cm^2

Area of Compound Shapes

Notes and Guidance

Children learn to calculate area of compound shapes. They need to apply their previous knowledge of area and the formula used.

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

Mathematical Talk

What formula do we use to find the area?

How can we split the compound shape?

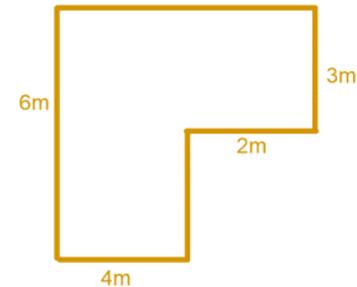
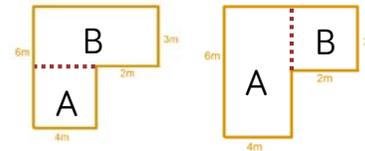
Is there more than one way?

Do we get a different answer if we split the shape differently?

Varied Fluency



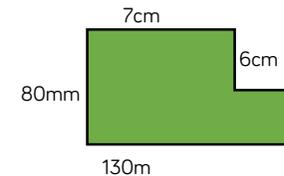
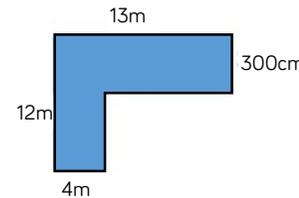
Find the area of the compound shape:
How many ways can we split the compound shape?
Is there more than one way?



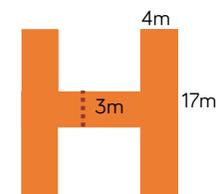
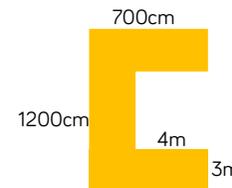
Could we multiply $6\text{ m} \times 6\text{ m}$ and then subtract $2\text{ m} \times 3\text{ m}$?



Calculate the area.



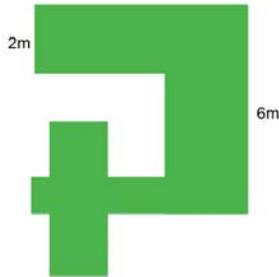
Calculate the area of these symmetrical shapes.



Area of Compound Shapes

Reasoning and Problem Solving

How many different ways can you split this shape to find the area?



Add more values and work out the area.

Possible solution:

$$A = 2m \times 5m = 10m^2$$

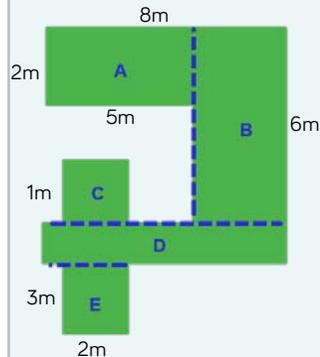
$$B = 6m \times 3m = 18m^2$$

$$C = 1m \times 2m = 2m^2$$

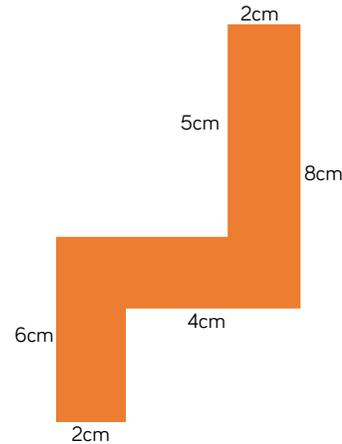
$$D = 1m \times 8m = 8m^2$$

$$E = 3m \times 2m = 6m^2$$

Total area = $36m^2$

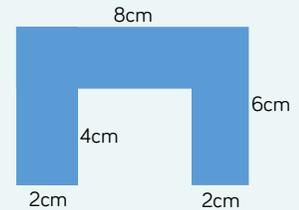


Jack has a shape with an area of 34 cm^2 .



Find 3 possible compound shapes that have an area of 34 cm^2 .

Possible solution:



Area of Irregular Shapes

Notes and Guidance

Children use their knowledge of counting squares to estimate the areas of irregular shapes. They use their knowledge of fractions to estimate how much of a square is covered and combine different part covered squares to give an overall approximate area.

Children need to physically annotate to avoid repetition when counting the squares.

Mathematical Talk

How many whole squares can you see?

How many part squares can you see?

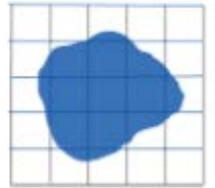
What will we do with the parts?

What does approximate mean?

Varied Fluency



Estimate the area of the pond.
Each square = 1 m²

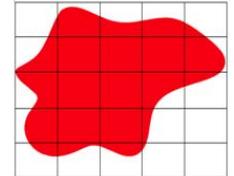
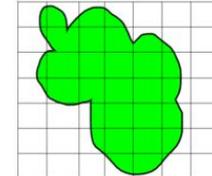
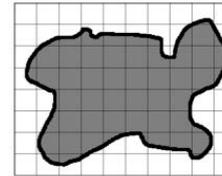


The answer is 4 whole and 11 parts.
Is this an acceptable answer?

What can we do with the parts to find an approximate answer?



If all of the squares are 1cm in length, which shape has the greatest area?

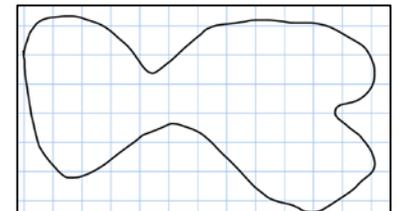


Is the red shape the greatest because it fills more squares? Why? Why not?

What is the same about each image? What is different about each image?



Each square is ___ m²
What is the approximate area?

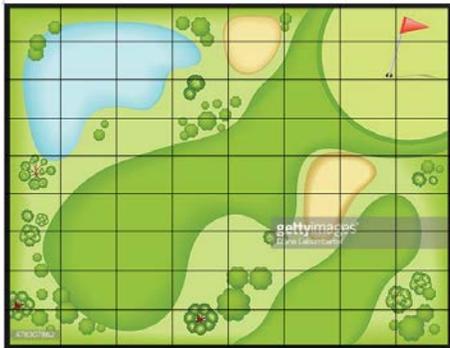


Area of Irregular Shapes

Reasoning and Problem Solving

Draw a circle on 1 cm² paper. What is the estimated area?

Can you draw a circle that is approximately 20 cm²?



If each square represents 3 m², what is the approximate area of:

- The lake
- The bunkers
- The fairway
- The rough
- Tree/forest area

Can you construct a 'Pirate Island' to be used as part of a treasure map for a new game? Each square represents 4 m².

The island must include the following features and be of the given approximate measure:

- Circular Island 180 m²
- Oval Lake 58 m²
- Forests with a total area of 63 m² (can be split over more than one space)
- Beaches with a total area of 92 m² (can be split over more than one space)
- Mountains with a total area of 57 m²
- Rocky coastline with total area of 25 m²