St Walburga's Catholic Primary School
Year 5 – Fluency and Reasoning

Number, Place Value and Rounding

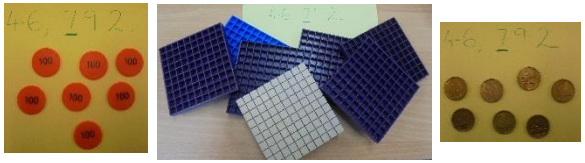
Key vocab: ten thousands, hundred thousands, millions, context, steps of powers, decimal equivalents, two decimal places, thousandths, numbers up to 1 000 000

NC Objectives:

- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000.
- Read, write, order and compare numbers to at least 1 000 000, and determine the value of each digit.
- Solve number problems and practical problems that involve place value.
- Interpret negative numbers in context, and count forwards and backwards with positive and negative whole numbers, including through zero.
- Read Roman Numerals to 1000 (M) and recognise years written in Roman Numerals.

Concrete

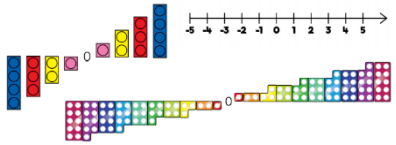
- Use place value counters to make numbers up to 1,000,000.
- Use place value counters to create number sentences which compare and order numbers up to 1,000,000.
- Use place value counters/Base 10/money to show the value of different digits in a number up to 1,000,000.



Lollipop stick activity. Roman Numerals
The teacher shouts out a number and the children make it with lollipop sticks.

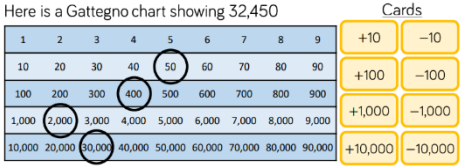
Pictorial

Here are three representations for negative numbers.



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

Here is a Gattegno chart showing 32,450



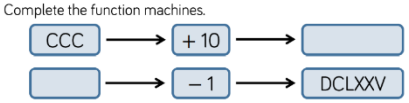
Cards: +10 −10 | +100 −100 | +1,000 −1,000 | +10,000 −10,000

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

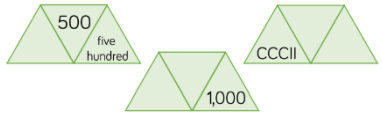
Abstract

- Count out loud forwards and backwards in steps of powers of 10 from different numbers up to 1,000,000.

Complete the function machines.



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



Complete the diagrams.

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.

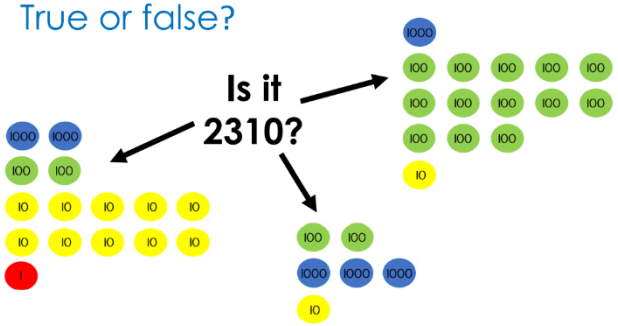
The population of Halifax ◯ the population of Wakefield.

Double the population of Brighouse ◯ the population of Halifax.

Whitney 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.

Reasoning

True or false?



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

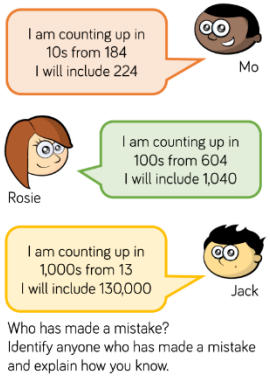
12,516 12,832 12,679 12,538 12,794

Is he correct?

Explain your answer.

Using the digit cards 0 to 9, create three different 5-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



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

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

- The difference between −24 and −76
- The even number that is less than −18 but greater than −22
- The number that is half way between 40 and −50
- The difference between −6 and 7

Number, Place Value and Rounding

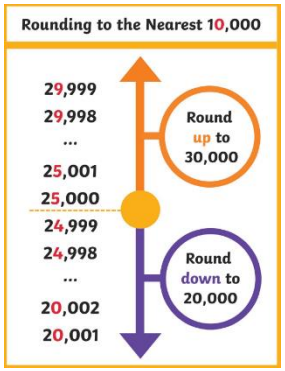
Key vocab: ten thousands, hundred thousands, millions, context, steps of powers, decimal equivalents, two decimal places, thousandths, numbers up to 1 000 000

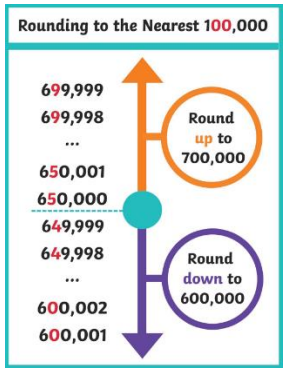
NC Objectives:

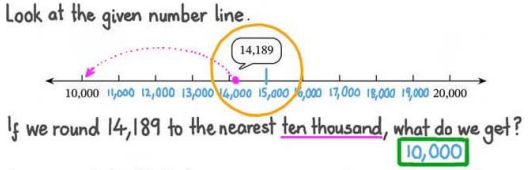
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.

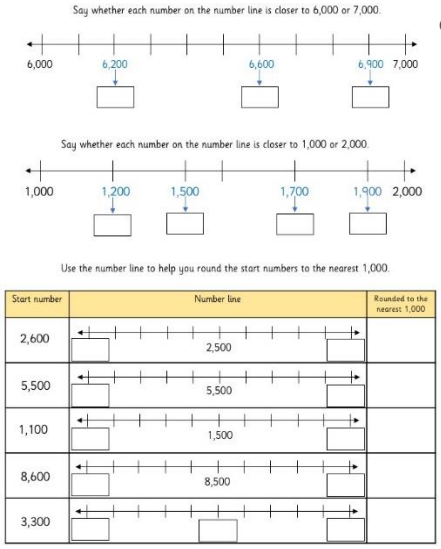
Concrete

Pictorial









Complete the table.

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

Abstract

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	

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

How many batches should the organisers buy?

Round 450,985 to the nearest

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

Number	Round the number to the ...				
	nearest 10	nearest 100	nearest 1,000	nearest 10,000	nearest 100,000
78,341					
375,296					
824,582					
5,682,150					
1,525,500					
7,955,000					

Reasoning

Explore

A and B are whole numbers.

Rounded to the nearest 100, A is 500

Rounded to the nearest 10, B is 350

What is the smallest possible difference between A and B?

I know... so...

745 rounded to the nearest 10 is **750**

745 rounded to the nearest 100 is _____

396 rounded to the nearest 10 is _____

396 rounded to the nearest 100 is _____

Explain the mistakes

What is 6 352 to the nearest 100?

Mistake 1: 400

Mistake 2: 6350

Mistake 3: 6300

Two 5-digit numbers have a difference of five.

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

What could the numbers be?

The difference between two 3-digit numbers is two.

When each number is rounded to the nearest 1,000 the difference between them is 1,000

What could the two numbers be?

When the difference between A and B is rounded to the nearest 100, the answer is 700

When the difference between B and C is rounded to the nearest 100, the answer is 400

A, B and C are not multiples of 10

What could A, B and C be?

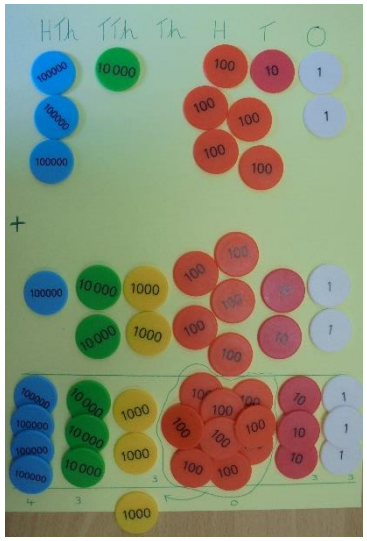
Addition and Subtraction

Key vocab: increasingly large numbers more than 4 digits, rounding, determine, context, multi-step problems

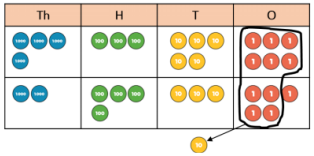
NC Objectives:

- **Add** numbers mentally with increasingly large numbers.
- **Add** numbers with more than 4 digits, using formal written methods of columnar addition and subtraction where appropriate.
- 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.

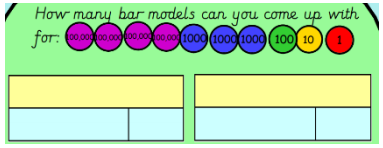
Concrete

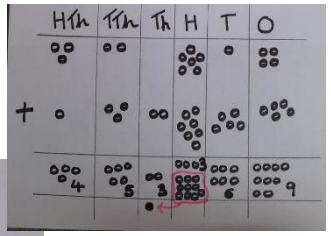


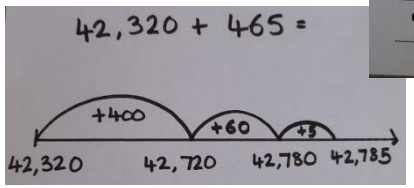
Pictorial



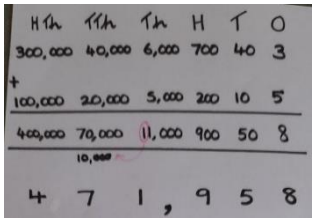
	Th	H	T	O
	4	3	5	6
+	2	4	3	5
	6	7	9	1
			1	

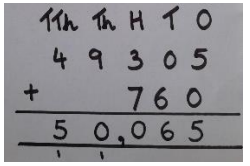


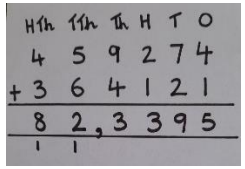




Abstract







	33 000	42 200
	21 050	21 150

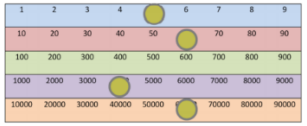
Jack, Rosie and Eva are playing a computer game. Jack has 3,452 points, Rosie has 4,039 points and Eva has 10,989 points.

How many points do Jack and Rosie have altogether?
How many points do Rosie and Eva have altogether?
How many points do Jack and Eva have altogether?
How many points do Jack, Rosie and Eva have altogether?

Reasoning

Amir is discovering numbers on a Gattegno chart.

He makes this number.



Amir 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?

Work out the missing numbers.

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

Investigate

□□ + □□ = □□□

Stage 1: complete using digits 0-9
Stage 2: complete using digits 1, 2, 3, 5, 6, 7, 9

Jack says,

When I add two numbers together I will only ever make up to one exchange in each column.

Do you agree?
Explain your reasoning.

What is the missing 4-digit number?

	Th	H	T	O
	___	___	___	___
+	6	3	9	5
	8	9	4	9

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

Annie's Strategy

6,000 + 2,000 = 8,000
300 + 800 = 110
70 + 20 = 90
4 + 3 = 7
8,000 + 110 + 90 + 7 = 8,207

Mo's Strategy

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

Alex's Strategy

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

Who is correct?

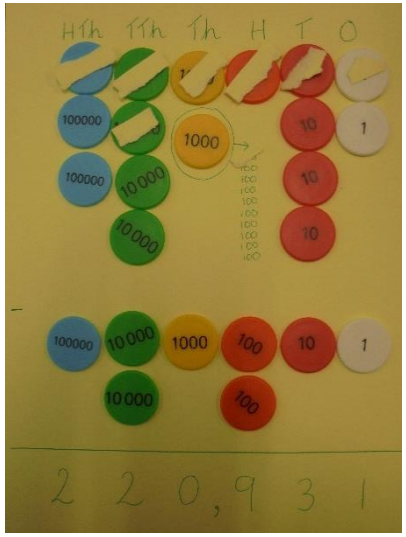
Addition and Subtraction

Key vocab: increasingly large numbers more than 4 digits, rounding, determine, context, multi-step problems

NC Objectives:

- **Subtract** numbers mentally with increasingly large numbers.
- **Subtract** numbers with more than 4 digits, using formal written methods of columnar addition and subtraction where appropriate.
- 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.

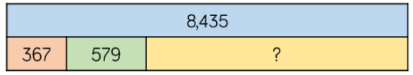
Concrete



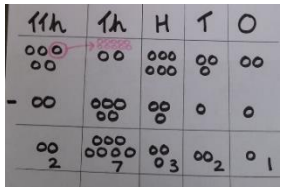
Pictorial

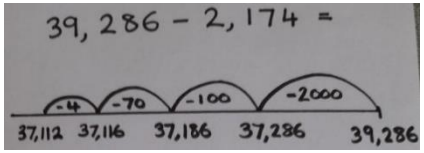
A shop has 8,435 magazines.
367 are sold in the morning and 579 are sold in the afternoon.

How many magazines are left?



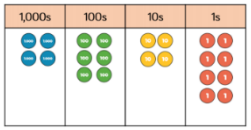
There are ___ magazines left.



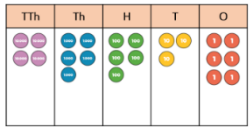


Calculate:

4,648 – 2,347



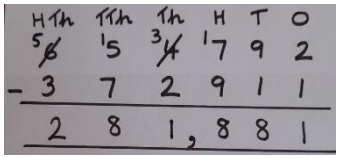
45,536 – 8,426



Abstract

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



8,252 – 6,560
2,037 – 1,589
6,737 – 759
2,037 – 889

A plane is flying at 29,456 feet.
During the flight the plane descends 8,896 feet.
What height is the plane now flyingat?

Reasoning

Eva makes a 5-digit number.

Mo makes a 4-digit number.

The difference between their numbers is 3,465

What could their numbers be?

I know… so…

200 – 15 = 185

2000 – 15 = _____

20000 – 15 = _____

I know… so…

5001 – 2998 = _____

5000 – 3000 = 2000

5003 – _____ = 1994

Investigate

□□ - □□ = □□

Stage 1: complete using digits 0-9

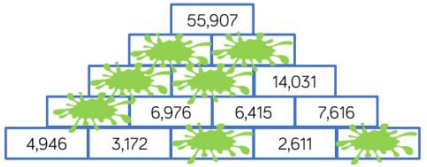
Stage 2: complete with the units digit of the first number smaller than the units digit of the second number

Rosie completes this subtraction incorrectly.

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

Explain the mistake to Rosie and correct it for her.

Complete the pyramid using addition and subtraction.



Multiplication and Division

Key vocab: decimals, four-digit, long multiplication, short division, remainders, context, common factors, common multiples, prime numbers, prime factors, composite numbers, square number, cube number, notation, squares, cubes, equivalent to

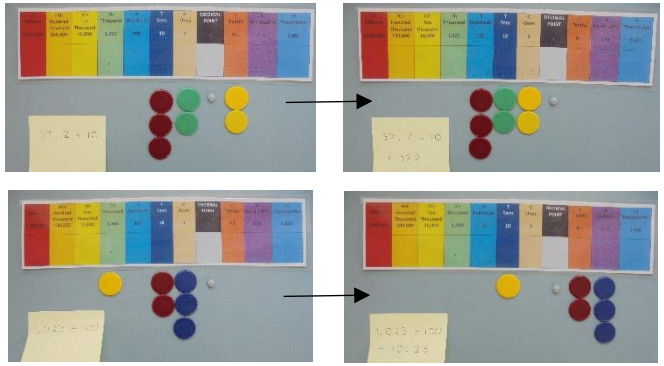
NC Objectives:

- Multiply and divide numbers mentally drawing upon known facts, including multiplying and dividing whole numbers and those involving decimals by 10, 100 and 1000.

Concrete

Complete the following using a place value grid.

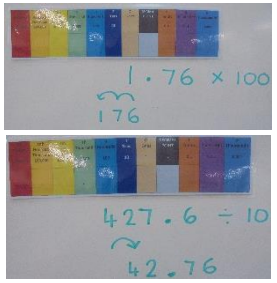
- Divide 460 by 10
- Divide 5,300 by 100
- Divide 62,000 by 1,000

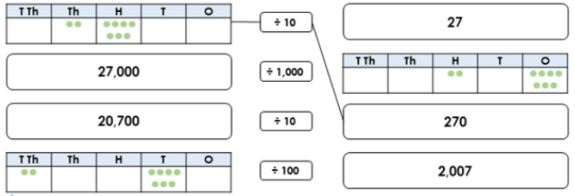


Pictorial

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? How do you know how many columns to move?
What number do we have now?





Abstract

Multiply the following numbers by 10, 100 and 1000 to complete the table.

	x 10	x 100	x 1000
5.7			
23.02			
0.92			

Divide the following numbers by 10, 100 and 1000 to complete the table.

	÷ 10	÷ 100	÷ 1000
43			
219			
703			

Use <, > or = to complete the statements.

71 × 1,000 ◯ 71 × 100
100 × 32 ◯ 16 × 1,000
48 × 100 ◯ 48 × 10 × 10 × 10

274 ÷ 100 = _____ 84.39 x 10 = _____

Reasoning

Rosie has £300 in her bank account.

Tommy has 100 times more than Rosie in his bank account.

How much more money does Tommy have than Rosie?

Jack is thinking of a 3-digit number.

When he multiplies his number by 100, the ten thousands and hundreds digit are the same.

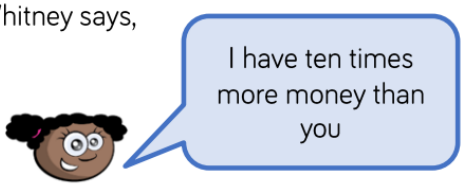
The sum of the digits is 10

What number could Jack be thinking of?

Whitney has £1,020 in her bank account.

Tommy has £120 in his bank account.

Whitney says,



Is Whitney correct? Explain your reasoning.

Mo 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 Mo have left from the money he took out?

Show your working out.

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?

Multiplication and Division

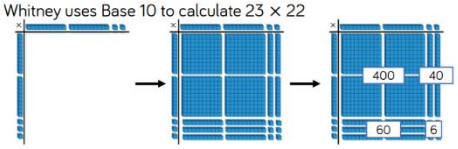
Key vocab: decimals, four-digit, long multiplication, short division, remainders, context, common factors, common multiples, prime numbers, prime factors, composite numbers, square number, cube number, notation, squares, cubes, equivalent to

NC Objectives:

- Multiply numbers up to 4-digits by a 1-digit or 2-digit number using formal written methods, including long multiplication for 2-digit numbers.

Concrete

Whitney uses Base 10 to calculate 23 × 22



How could you adapt your Base 10 model to calculate these:

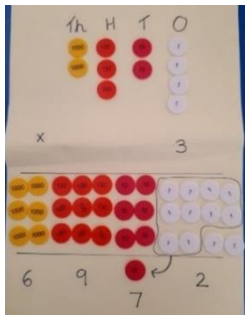
32 × 24 25 × 32 35 × 32

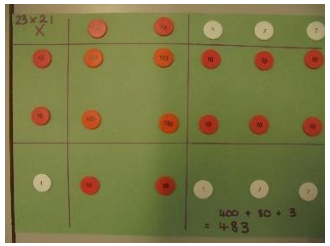
Rosie adapts the Base 10 method to calculate 44 × 32

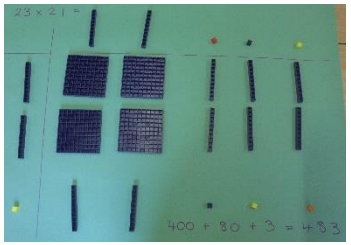
×	40	4
30	1,200	120
2	80	8

Compare using place value counters and a grid to calculate:

45 × 42 52 × 24 34 × 43

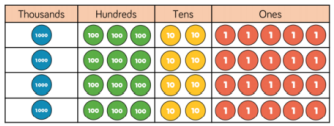




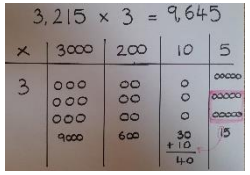


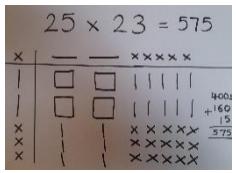
Pictorial

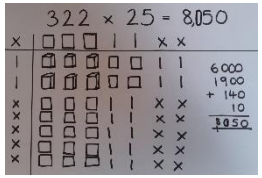
Annie earns £1,325 per week.
How much would he earn in 4 weeks?



	Th	H	T	O
	1	3	2	5
×				4







Abstract

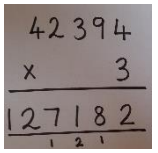
Complete the calculation to work out 23 × 14

		2	3
×		1	4
		9	2
	2	3	0

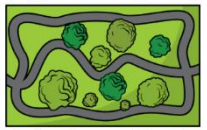
(23 × 4)
(23 × 10)

Use this method to calculate:

34 × 26 58 × 15 72 × 35

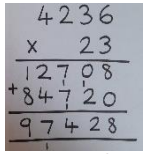


A playground is 128 yards by 73 yards.



Calculate the area of the playground.

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



4,458 × 56 ◯ 4,523 × 54

4,458 × 55 ◯ 4,523 × 54

4,458 × 55 ◯ 4,522 × 54

Reasoning

I know... so...

24 × 18 = 432

25 × 18 = ____

25 × 17 = ____

Missing digits

□8□
× 9
7047

Explain the mistakes

163 × 27

Mistake 1

163
× 27
1141
326
1467

Mistake 2

163
× 27
721
2260
2981

Rank by difficulty

49 × 8

17 × 8

25 × 8

Is it the same?

Is **13 × 9** the same as...

- 11 × 11
- 99 + 18
- 130 − 9
- 39 × 3

How many ways?

Complete using digits 0-9. The digit in the box with a border must be odd.

Level 1: I can find a way
Level 2: I can find different ways
Level 3: I know how many ways there are

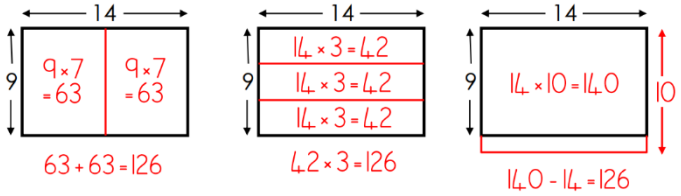
Eva says,

To multiply 23 by 57 I just need to calculate 20 × 50 and 3 × 7 and then add the totals.

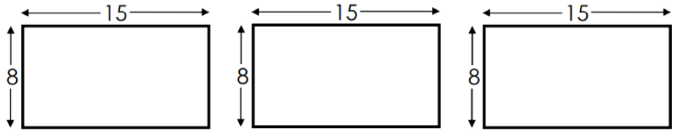
What mistake has Eva made?
Explain your answer.

3 ways

14 × 9



Find 3 ways to calculate **15 × 8:**



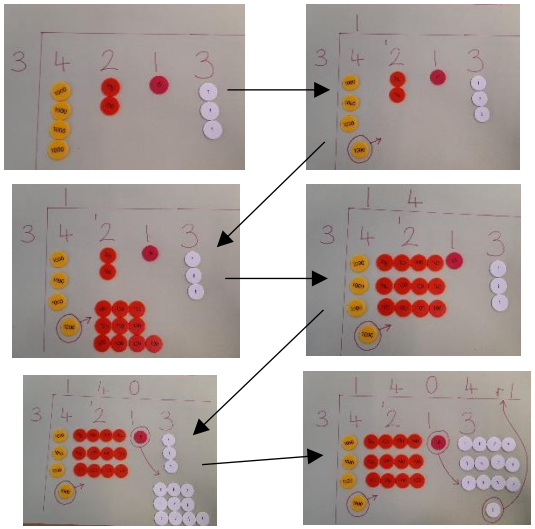
Multiplication and Division

Key vocab: decimals, four-digit, long multiplication, short division, remainders, context, common factors, common multiples, prime numbers, prime factors, composite numbers, square number, cube number, notation, squares, cubes, equivalent to

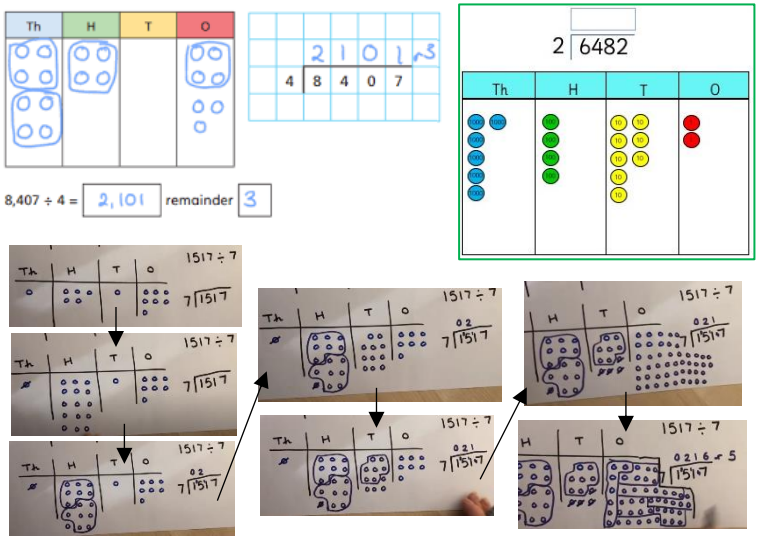
NC Objectives:

- Divide numbers up to 4-digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Solve problems involving addition, subtraction, multiplication and division and a combination of these.

Concrete



Pictorial



Abstract

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

7 | 2, 5 6 2	3,495 ÷ 5 ◯	3,495 ÷ 3
	8,064 ÷ 7 ◯	9,198 ÷ 7
9 | 3, 8 0 7	7,428 ÷ 4 ◯	5,685 ÷ 5

2 | 8, 2 5 4

Muffins are packed in trays of 6 in a factory.
In one day, the factory makes 5,623 muffins.
How many trays do they need?
How many trays will be full?
Why are your answers different?

Mr Porter has saved £8,934
He shares it equally between his three grandchildren.
How much do they each receive?

Reasoning

Broken calculator

'The 7 and 5 keys on my calculator are broken!'

How can I use it to work out:

160 ÷ 5

72 ÷ 4

Explain the mistakes

564 ÷ 3

Mistake 1

$$3\overline{)564} \quad 121$$

Mistake 2

$$3\overline{)564} \quad 194 \text{ r } 2$$

Mistake 3

$$3\overline{)564} \quad 187$$

How many ways?

60 ÷ ____ = 12 ÷ ____

Complete using positive whole numbers.

Level 1: I can find a way

Level 2: I can find different ways

Level 3: I know how many ways there are

I know... so...

78 ÷ 6 = ___

74 ÷ 6 = 12 remainder 2

___ ÷ 6 = 11 remainder 5

Jack is calculating 2,240 ÷ 7

He says you can't do it because 7 is larger than all of the digits in the number.

Do you agree with Jack?
Explain your answer.

How many ways?

Level 1: complete using digits 0-9.

□□ ÷ □ = □ remainder □

Level 2: complete, using the 7 as 2 as shown.

□□ ÷ 7 = □ remainder 2

Level 3: how many ways can level 2 be done?

I am thinking of a 3-digit number.

When it is divided by 9, the remainder is 3

When it is divided by 2, the remainder is 1

When it is divided by 5, the remainder is 4

What is my number?

Multiplication and Division

Key vocab: decimals, four-digit, long multiplication, short division, remainders, context, common factors, common multiples, prime numbers, prime factors, composite numbers, square number, cube number, notation, squares, cubes, equivalent to

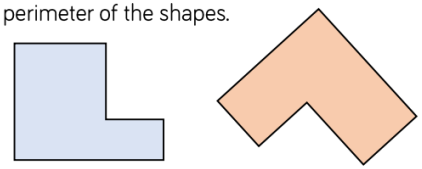
NC Objectives:

- Measure and calculate the perimeter of composite rectilinear shapes in cm and m.
- Calculate and compare the area of rectangles (including squares and using cm^2 and m^2) and estimate the area of irregular shapes.

Concrete

Measure the perimeter of the rectangles.

Measure the perimeter of the shapes.



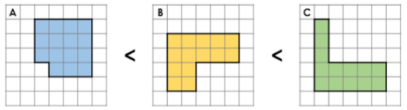
Use cubes to measure the area of rectangles.

Pictorial

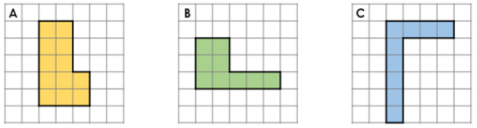
Estimate the area of the pond.
Each square = 1 m^2

Ron's answer is 4 whole squares and 11 parts.
Is this an acceptable answer?
What can we do with the parts to find an approximate answer?

Which two shapes below must swap places for the inequality symbols to be correct

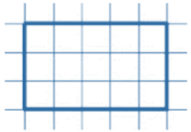


Find the two shapes below with the same area.



What is the area of this shape if:

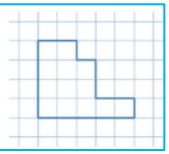
- each square is 2 cm in length?
- each square is 3.5 cm in length?



Each square has an area of 4 square cm.

What is the length of each square?

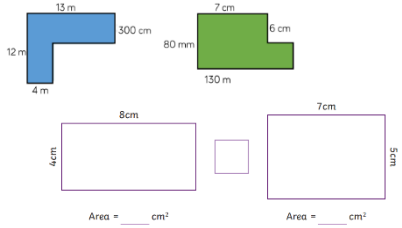
What is the perimeter of the whole shape?



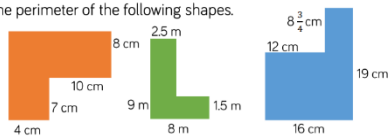
Abstract

Mo buys a house with a small back garden, which has an area of 12 m^2.
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?

Calculate the area.



Find the perimeter of the following shapes.



Reasoning

Activity

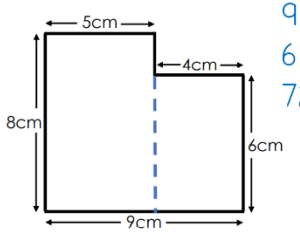
Investigate different ways you can make composite rectilinear shapes with a perimeter of 54 cm.

Explain

The area of the large square is 100cm^2.
The perimeter of the small square is half the perimeter of the large square.
What is the area of the small square?

Spot the mistake

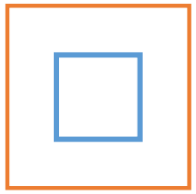
What is the area of the shape?



$9 \times 8 = 72$
$6 \times 4 = 24$
$72 + 24 = 96cm^2$

Draw a circle on 1 cm^2 paper. What is the estimated area?
Can you draw a circle that has area approximately 20 cm^2?

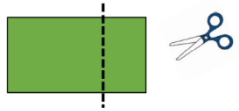
Here is a square inside another square.



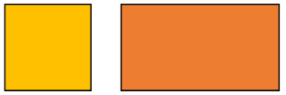
The perimeter of the inner square is 16 cm
The outer square's perimeter is four times the size of the inner square.
What is the length of one side of the outer square?
How do you know? What do you notice?

True or False?

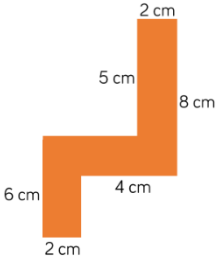
If you cut off a piece from a shape, you reduce its area and perimeter.
Draw 2 examples to prove your thinking.



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



Jack says this shape has an area of 34 cm^2.



Show that Jack is correct.

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

Multiplication and Division

Key vocab: decimals, four-digit, long multiplication, short division, remainders, context, common factors, common multiples, prime numbers, prime factors, composite numbers, square number, cube number, notation, squares, cubes, equivalent to

NC Objectives:

- Identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers.
- Know and use the vocabulary of prime numbers, prime factors, and composite (non-prime) numbers.
- Establish whether a number up to 100 is a prime and recall prime numbers up to 19.
- Recognise and use square numbers (^{2}) and cube numbers (^{3}) and notation.
- Solve problems involving multiplication and division, including using knowledge of factors and multiples, squares, and cubes.
- Solve problems involving multiplication and division, including scaling by simple fractions, and problems involving simple rates.

Concrete

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

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

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

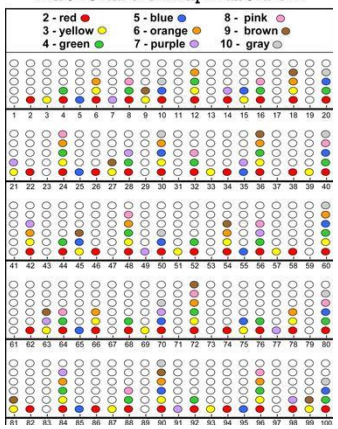
If you have twenty counters, how many different ways of arranging them can you find?

How many factors of twenty have you found by arranging your counters in different arrays?

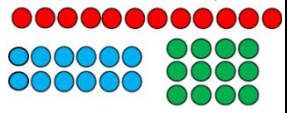
Find the first 12 square numbers.
Show why they are square numbers.
How many different squares can you make using counters?
What do you notice?
Are there any patterns?

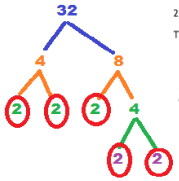
Pictorial

- Draw arrays to show square numbers.

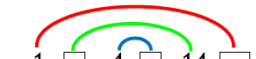


What factor pairs for 12 do these arrays show?





2. Complete these factor rainbows.
This rainbow is for 28.



When you multiply a number by itself, and then multiply it by itself again, you get a cube number.

Abstract

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

2	3	5	9	15	24	29	30

	Prime	Composite
Exactly 2 factors (1 and itself)		
More than 2 factors		

Put two of your own numbers into the table.
Why are two of the boxes empty?
Would 1 be able to go in the tablet? Why or why not?

Circle the multiples of 5

25 32 54 175 554 3000

What do you notice about the multiples of 5?

7,135 is a multiple of 5. Explain how you know.

Roll 2 dice (1-6), and multiply the numbers the you roll.
List all the numbers that this number is a multiple of.
Repeat the dice roll.
Use a table to show your results.
Multiply the numbers you roll to complete the table.

Circle the factors of 60

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

Which factors of 60 are not shown?

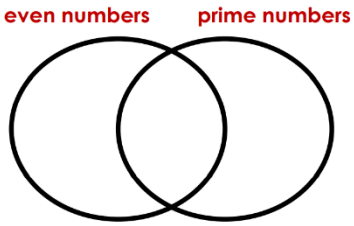
Complete the table.

		8
3^3	3 × 3 × 3	27
4^3		
5^3	5 × 5 × 5	
	6 × 6 × 6	

Reasoning

Explore

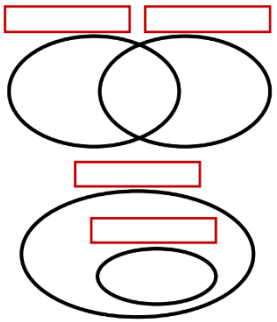
Put a number in each section of the Venn diagram.



How many numbers can go in the middle section?

Explore

Position the headings. Put a number in each section.



Headings:

- Multiples of 7
- Multiples of 3
- Multiples of 12
- Even numbers

True or false?

'Odd square numbers greater than 1 have three factors.'

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

She is younger than 40

How old is Eva?

Here is Annie's method for finding factor pairs of 36

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 Annie's method to find all the factors of 64

Dora says all prime numbers have to be odd.

Her friend Amir says that means all odd numbers are prime, so 9, 27 and 45 are prime numbers.

Explain Amir's and Dora's mistakes and correct them.

Fractions, Decimals and Percentages

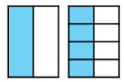
Key vocab: thousandths, multiples, three decimal places, per cent, number of parts per hundred, percentages, decimal fraction, mixed numbers, improper fraction, proper fractions, convert, mathematical statements multiply, percentage and decimal equivalents

NC Objectives:

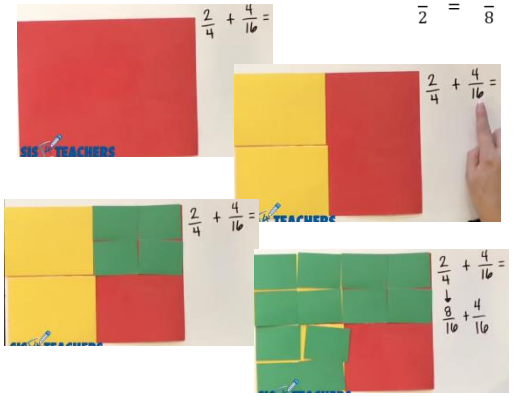
- Practise counting forwards and backwards in simple fractions.
- Compare and order fractions whose denominators are all multiples of the same number.
- Add and subtract fractions with the same denominator and multiples of the same number.
- Identify, name, and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.
- Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.

Concrete

Take two pieces of paper the same size.
Fold one piece into two equal pieces.
Fold the other into eight equal pieces.
What equivalent fractions can you find?

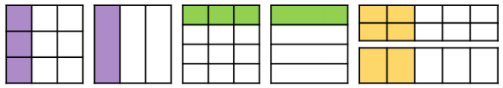


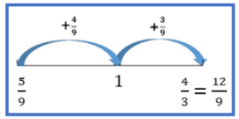
$\frac{1}{2} = \frac{4}{8}$



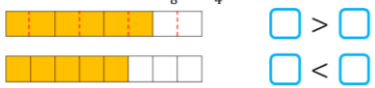
Pictorial

Use the models to write equivalent fractions.





Use bar models to compare $\frac{5}{8}$ and $\frac{3}{4}$



$\square > \square$
$\square < \square$

Use this method to help you compare:
$\frac{5}{6}$ and $\frac{2}{3}$ $\frac{2}{3}$ and $\frac{5}{9}$ $\frac{7}{16}$ and $\frac{3}{8}$

Use common numerators to help you compare $\frac{2}{5}$ and $\frac{2}{3}$

$\square > \square$
$\square < \square$

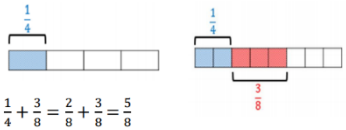
Use this method to help you compare:
$\frac{6}{7}$ and $\frac{6}{8}$ $\frac{4}{9}$ and $\frac{4}{5}$ $\frac{4}{11}$ and $\frac{2}{5}$

Mo is calculating $\frac{1}{2} + \frac{1}{8}$
He uses a diagram to represent the sum.

$\frac{1}{2} + \frac{1}{8} = \frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

Use Mo's method to solve :
$\frac{1}{2} + \frac{3}{8}$ $\frac{1}{4} + \frac{3}{8}$ $\frac{7}{10} + \frac{1}{5}$

Rosie is using a bar model to solve $\frac{1}{4} + \frac{3}{8}$



$\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

Abstract

$\frac{4}{12} = \frac{\square}{3}$
$\frac{6}{12} = \frac{\square}{4}$
$\frac{6}{12} = \frac{\square}{2}$

Complete the sequences.

$\frac{3}{4}, \frac{\square}{\square}, 1\frac{3}{4}, 2\frac{1}{4}$

$\frac{\square}{\square}, 3\frac{1}{3}, \frac{\square}{\square}, 2\frac{2}{3}$

$\frac{\square}{\square}, 5\frac{1}{2}, 5\frac{7}{10}, 5\frac{9}{10}$

$\frac{3}{5}, \frac{\square}{\square}, \frac{\square}{\square}, 3$

$0.837 = \frac{837}{1000}$

$0.732 =$

- Start at 0 and count up in steps of $\frac{1}{4}$
- Start at 4 and count down in steps of $\frac{1}{3}$
- Start at 1 and count up in steps of $\frac{2}{3}$

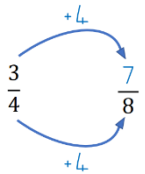
¼ + ½ =

$^{9}/_{15} - {}^{1}/_{5} =$

Complete the missing values on the number line.

Reasoning

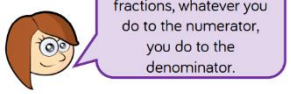
Explain the mistake



Explain the mistake

$\frac{3}{6} + \frac{1}{3} = \frac{4}{9}$

Rosie says,



Using her method, here are the equivalent fractions Rosie has found for $\frac{4}{8}$

$\frac{4}{8} = \frac{8}{16}$ $\frac{4}{8} = \frac{6}{10}$

$\frac{4}{8} = \frac{2}{4}$ $\frac{4}{8} = \frac{1}{5}$

Are all Rosie's fractions equivalent?
Does Rosie's method work?
Explain your reasons.

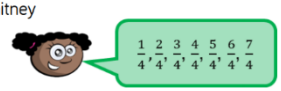
Here are some fraction cards.
All of the fractions are equivalent.

$\frac{4}{A}$ $\frac{B}{C}$ $\frac{20}{50}$

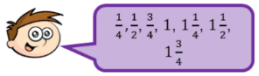
A + B = 16
Calculate the value of C.

Three children are counting in quarters.

Whitney



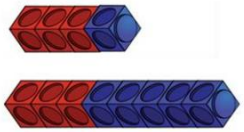
Teddy



Eva

Who is counting correctly?
Explain your reasons.

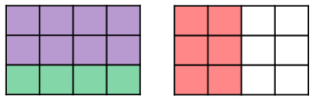
Ron makes $\frac{3}{4}$ and $\frac{3}{8}$ out of cubes.



He thinks that $\frac{3}{8}$ is equal to $\frac{3}{4}$

Do you agree?
Explain your answer.

Annie is adding three fractions.
She uses the model to help her.



What could her three fractions be?

How many different combinations can you find?

Can you write a number story to represent your calculation?

Fractions, Decimals and Percentages

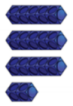
Key vocab: thousandths, multiples, three decimal places, per cent, number of parts per hundred, percentages, decimal fraction, mixed numbers, improper fraction, proper fractions, convert, mathematical statements multiply, percentage and decimal equivalents

NC Objectives:

- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number.
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
- Find fractions of numbers and quantities.

Concrete

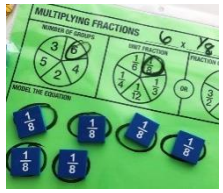
Whitney converts $3\frac{2}{5}$ into an improper fraction using cubes.



1 whole is equal to ☐ fifths.

3 wholes are equal to ☐ fifths.

☐ fifths + two fifths = ☐ fifths



Use Whitney's method to convert $2\frac{2}{3}$, $2\frac{2}{4}$, $2\frac{2}{5}$ and $2\frac{2}{6}$

Whitney converts the improper fraction $\frac{14}{5}$ into a mixed number using cubes.

She groups the cubes into 5s, then has 4 left over.

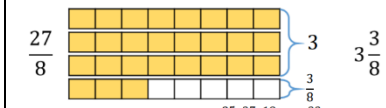
$\frac{5}{5}$ is the same as ☐ $\frac{10}{5}$ is the same as ☐

$\frac{14}{5}$ as a mixed number is ☐☐

Use Whitney's method to convert $\frac{11}{3}$, $\frac{11}{4}$, $\frac{11}{5}$ and $\frac{11}{6}$

Pictorial

Tommy converts the improper fraction $\frac{27}{8}$ into a mixed number using bar models.



Use Tommy's method to convert $\frac{25}{8}$, $\frac{27}{6}$, $\frac{18}{7}$ and $\frac{32}{4}$

Jack uses bar models to convert a mixed number into an improper fraction.

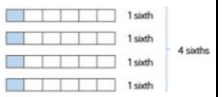
$2\frac{3}{5}$ = ☐ wholes + ☐ fifths

2 wholes = ☐ fifths

☐ fifths + ☐ fifths = ☐ fifths

Use Jack's method to convert $2\frac{1}{6}$, $4\frac{1}{6}$, $4\frac{1}{3}$ and $8\frac{2}{3}$

Work out $\frac{1}{6} \times 4$ by counting in sixths.

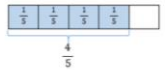


$\frac{1}{6} \times 4 = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$

Use this method to work out:

$2 \times \frac{1}{3}$ $\frac{1}{5} \times 3$ $6 \times \frac{1}{10}$

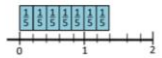
Mo uses a single bar model to work out: $\frac{1}{5} \times 4 = \frac{4}{5}$



Use this method to work out:

$\frac{1}{4} \times 3$ $6 \times \frac{1}{8}$ $\frac{1}{10} \times 8$

Eva uses a number line and repeated addition to work out $\frac{1}{5} \times 7 = \frac{7}{5} = 1\frac{2}{5}$



Use this method to work out:

$5 \times \frac{1}{8}$ $\frac{1}{3} \times 3$ $\frac{1}{4} \times 7$

Abstract

Use repeated addition to work out $2\frac{2}{3} \times 4$

$2\frac{2}{3} \times 4 = 2\frac{2}{3} + 2\frac{2}{3} + 2\frac{2}{3} + 2\frac{2}{3} = 8\frac{8}{3} = 10\frac{2}{3}$

Convert to an improper fraction to calculate:

$3\frac{2}{7} \times 4$ $2\frac{4}{9} \times 2$ $4 \times 3\frac{3}{5}$

$\frac{5}{12}$ of 1.44 litres $\frac{3}{7}$ of 21 kg

Complete:

2 lots of $\frac{1}{10}$ = ☐ $\frac{1}{10}$ of 2 = ☐

6 lots of ☐ = 3 ☐ of 6 = 3

8 lots of $\frac{1}{4}$ = ☐ $\frac{1}{4}$ of 8 = ☐

Reasoning

Different ways

Fill in the gaps. Find different ways.

$\frac{5}{4} = \frac{1}{4} \rightarrow \oplus$

$\frac{\square}{4} = \square\frac{\square}{4}$

$\frac{\square}{4} = \square\frac{\square}{4}$

How many ways?

$\frac{\square}{4} \times \square = 3\frac{3}{4}$

Level 1: I can find a way

Level 2: I can find different ways

Level 3: I know how many ways there are

Explain the mistake

$\frac{3}{4} \times 5 = \frac{15}{20}$

Rank by difficulty

$\frac{1}{4} \times 5$ $\frac{3}{10} \times 3$ $\frac{3}{4} \times 3$

Different ways

Fill in the gaps. Find different ways.

$\frac{2}{5}$ of 60 = 24 $\frac{2}{\square}$ of ☐ = 24

$\frac{2}{\square}$ of ☐ = 24 $\frac{2}{\square}$ of ☐ = 24

I know... so...

$\frac{3}{5} \times 4 = \square\frac{\square}{\square}$

$\frac{3}{5} \times 6 = 3\frac{3}{5}$

$\frac{3}{5} \times 7 = \square\frac{\square}{\square}$

Spot the mistake

- $\frac{27}{5} = 5\frac{1}{5}$
- $\frac{27}{3} = 8$
- $\frac{27}{4} = 5\frac{7}{4}$
- $\frac{27}{10} = 20\frac{7}{10}$

What mistakes have been made?

Can you find the correct answers?

Fractions, Decimals and Percentages

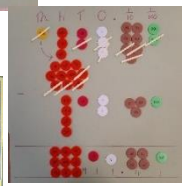
Key vocab: thousandths, multiples, three decimal places, per cent, number of parts per hundred, percentages, decimal fraction, mixed numbers, improper fraction, proper fractions, convert, mathematical statements multiply, percentage and decimal equivalents

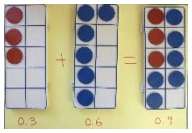
NC Objectives:

- Read, write, order, and compare numbers with up to three decimal places.
- Round decimals with two decimal places to the nearest whole number and to one decimal place.
- Practise adding and subtracting decimals, including a mix of whole numbers and decimals.
- Solve problems involving numbers up to three decimal places.

Concrete

- Place counters on a place value chart to make different decimal numbers. Say each number out loud.





Pictorial

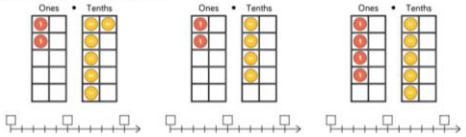
- Write numbers onto a place value chart to make decimal numbers. Say each number out loud.

Use this place value chart to help answer the questions.

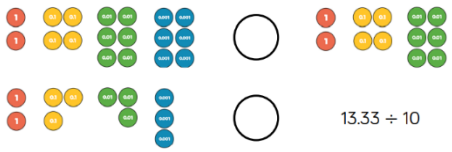
Ones	Tenths	Hundredths	Thousandths
	0.1 0.1 0.1	0.01	0.001 0.001

- What number is one hundredth more?
- Add 0.3, what number do you have now?
- How many more thousandths can I add before the hundredths digit changes?

Complete the number lines and round the representations to the nearest whole number:

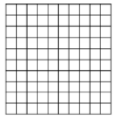


Use <, > or = to make the statements correct.



Use the number lines to round 3.24 to the nearest tenth and the nearest whole number.

Each box in this hundred square represents one hundredth of the whole. Use this to answer:



0.07 + 0.78 | 0.87 + 0.07

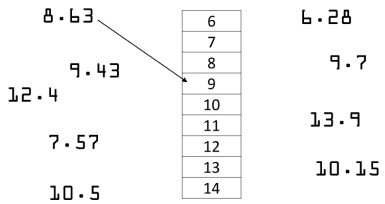
Abstract

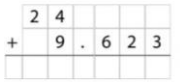
- Practise reading and saying decimal numbers out loud.
- Write down decimals numbers that are read aloud.

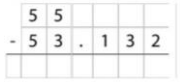
Compare these numbers using < > or =.

4.66 ☐ 4.67 ☐ 3.32 ☐ 3.36

Draw an arrow to match each number to its nearest whole.







Place in descending order.

- 0.123 0.321 0.231 0.103
- 3.2 km 3.21 km 3.212 km 3202 m
- 65.394 65.309 63.999 65.493

Reasoning

How many ways?

You have a pile of 1 coins and a pile of 0.1 coins.

Make 2.4

1 | 0.1

Level 1: I can find a way
Level 2: I can find different ways
Level 3: I know how many ways there are

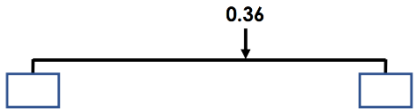
Alex says,

3.105 is greater than 3.2 because 105 is greater than 2

Do you agree?
Explain your answer.

Different ways

What could the start and end numbers be?



Whitney is thinking of a number.

Rounded to the nearest whole her number is 4
Rounded to the nearest tenth her number is 3.8
Write down at least 4 different numbers that she could be thinking of.

Match each description to the correct number.

My number has the same amount of tens and tenths. — Teddy

My number has one decimal place. — Amir

My number has two hundredths. — Rosie

My number has six tenths. — Eva

46.2 | 2.64 | 46.02 | 40.46

Dexter is measuring a box of chocolates with a ruler that measures in centimetres and millimetres.

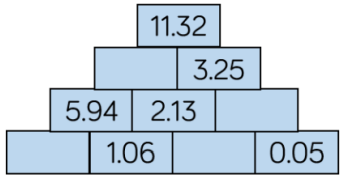
He measures it to the nearest cm and writes the answer 28 cm.
What is the smallest length the box of chocolates could be?

Compare the numbers sentences using <, > or =

0.7 + 0.03 + 0.001 ◯ 0.07 + 0.3 + 0.1

0.4 + 0.1 + 0.05 ◯ 0.3 + 0.2 + 0.05

In this number pyramid, each number is calculated by adding the two numbers underneath.



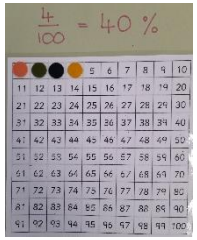
Fractions, Decimals and Percentages

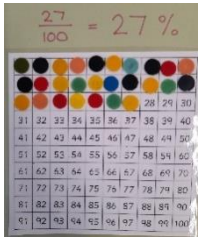
Key vocab: thousandths, multiples, three decimal places, per cent, number of parts per hundred, percentages, decimal fraction, mixed numbers, improper fraction, proper fractions, convert, mathematical statements multiply, percentage and decimal equivalents

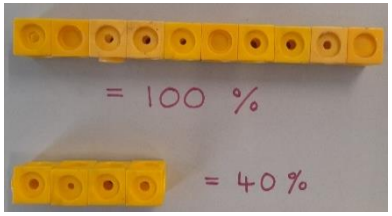
NC Objectives:

- Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100'.
- Write percentages as a fraction with denominator 100 as a decimal fraction.

Concrete

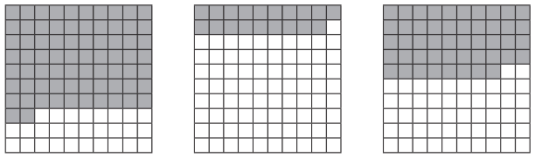




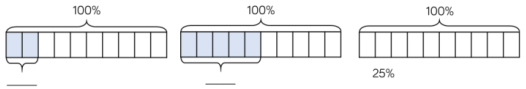


Pictorial

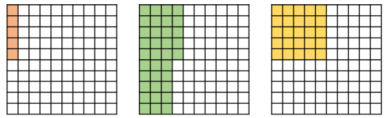
Write the percentage represented by the following:



Complete the bar models.

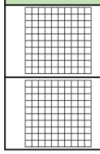


Complete the sentence stem for each diagram.



There are ___ parts per hundred shaded. This is ___%

Complete the table.

Pictorial	Parts per hundred	Percentage
	There are 51 parts per hundred.	
		75%

Complete the table.

Pictorial	Percentage	Fraction	Decimal
	41 parts per hundred 41%	41 out of 100 $\frac{41}{100}$	41 hundredths 0.41
			
	7 parts per hundred 7%		

Abstract

Record the fractions as decimals and percentages.

$\frac{120}{300}$ $\frac{320}{400}$ $\frac{20}{200}$ $\frac{12}{50}$

Alex has read 93 pages of her book. Her book has 300 pages.
What proportion of her book has she read? Give your answer as a percentage and a decimal.

$\frac{93}{300} = \frac{?}{100} =$ ____ % = ____

Write fraction as percent.

$\frac{23}{100}$		$\frac{34}{100}$	
$\frac{35}{100}$		$\frac{29}{100}$	

Write these percentages as fractions and decimal fractions:

43% ☐ and ☐ 29% ☐ and ☐

Reasoning

At a cinema, $\frac{4}{10}$ of the audience are adults.
The rest of the audience is made up of boys and girls.
There are twice as many girls as boys.

What percentage of the audience are girls?

Teddy says,

To convert a fraction to a percentage, you just need to put a percent sign next to the numerator.

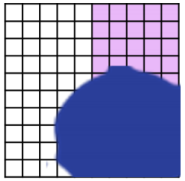
Is Teddy correct? Explain your answer.

Mo, Annie and Tommy all did a test with 100 questions. Tommy got 6 fewer questions correct than Mo.

Name	Score	Percentage
Mo	56 out of 100	
Annie		65%
Tommy		

Complete the table.
How many more marks did each child need to score 100%?

Oh no! Dexter has spilt ink on his hundred square.



Complete the sentence stems to describe what percentage is shaded.

It could be...

It must be...

It can't be...

Three children have each read 360 pages of their own book.

Ron's book has 500 pages.
Dora's book has 400 pages.
Eva's book has 600 pages.

What fraction of their books have they each read?

What percentage of their books have they read?

How much of their books have they each read as a decimal?

Who has read the most of their book?

Dora and Amir each have 100 sweets.
Dora eats 65% of hers. Amir has 35 sweets left.
Who has more sweets left?

Jack has £55
He spends $\frac{3}{5}$ of his money on a coat and 30% on shoes.
How much does he have left?

Fractions, Decimals and Percentages

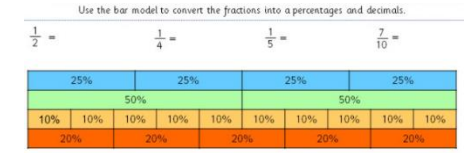
Key vocab: thousandths, multiples, three decimal places, per cent, number of parts per hundred, percentages, decimal fraction, mixed numbers, improper fraction, proper fractions, convert, mathematical statements multiply, percentage and decimal equivalents

NC Objectives:

- Read and write decimal numbers as fractions.
- Solve problems which require knowing percentage and decimal equivalents of ½, ¼, $^1/_5$, $^2/_5$, $^4/_5$ and those with a denominator of a multiple of 10 or 25.

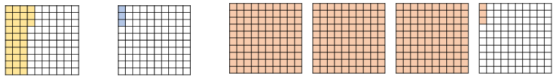
Concrete

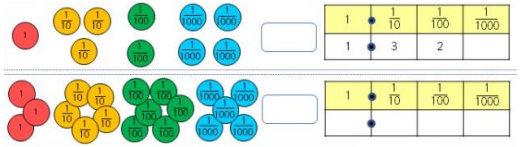
Pictorial



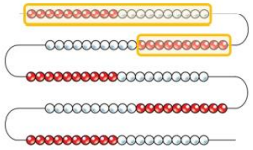
Use the models to record equivalent decimals and fractions.

$0.3 = \frac{3}{10} = \frac{30}{100}$

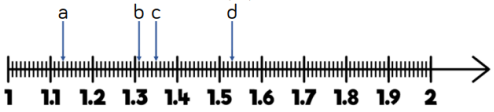




If the whole bead string represents one whole, what decimal is represented by the highlighted part? Can you represent this on a 100 square?



Write down the value of a, b, c and d as a decimal and a fraction.

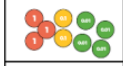


Abstract

Write the following decimal numbers as fractions.

0.77 = —— 0.64 = —— 0.24 = ——

Complete the table.

Concrete	Decimal	Decimal – expanded form	Fraction	Fraction – expanded form	In words
	3.24	3 + 0.2 + 0.04	$3\frac{24}{100}$	$3+\frac{2}{10}+\frac{4}{100}$	Three ones, two tenths and four hundredths.
	3.01		$3\frac{1}{100}$		
				$3+\frac{4}{10}+\frac{2}{100}$	

Write these numbers in order, starting with the smallest.

0.6 $\frac{3}{10}$ 0.2 $\frac{9}{10}$

Reasoning

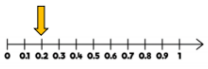
Odd one out

Which of the images below is the odd one out?

A

B

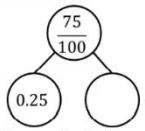
C



D

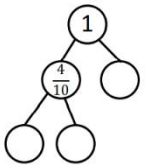
Explain why.

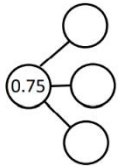
How many different ways can you complete the part-whole model using fractions and decimals?



Create another part-whole model like the one above for your partner to complete.

Now complete the following part-whole models using fractions and decimals.





2.25 = 2 ones, 2 tenths and 5 hundredths.

Can you write the following numbers in at least three different ways?

23.7	2.37	9.08	0.98

Use the digits 3, 4 and 5 to complete the decimal number.

List all the possible numbers you can make.

Write these decimals as mixed numbers.

Choose three of the numbers and write them in words.

Amir says,

To convert a fraction to a decimal, take the numerator and put it after the decimal point. E.g. $\frac{21}{100} = 0.21$

Write two examples of converting fractions to decimals to prove this does not always work.

Measurement

Key vocab: square centimetres (cm2), square metres (m2), irregular shapes, volume (cm3), cubes, cuboids, square numbers, cube numbers, metric measure, metric units, imperial units Inches, pounds, pints

NC Objectives:

- Convert between different units of metric measure (e.g., km/m; cm/m; cm/mm; g/kg; l/ml).
- Solve problems involving converting between units of time.
- Understand and use approximate equivalences between metric units and common imperial units, such as inches, pounds, and pints.

Concrete

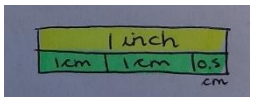
Pictorial

Converting Between Metric Units

Length: cm ↔ mm (×10 / ÷10); m ↔ cm (×100 / ÷100); km ↔ m (×1000 / ÷1000)

Mass: g ↔ mg (×1000 / ÷1000); kg ↔ g (×1000 / ÷1000); t ↔ kg (×1000 / ÷1000)

Volume: l ↔ ml (×1000 / ÷1000); cl ↔ ml (×10 / ÷10); l ↔ cl (×100 / ÷100)

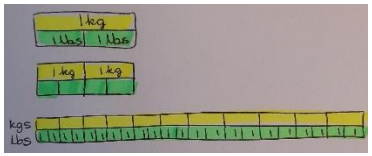


1 kilogram is approximately 2 pounds
1 kg ≈ 2 lbs

Use this information to complete the conversions.

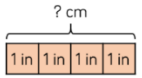
2 kg ≈ ☐ lbs 5 kg ≈ ☐ lbs

☐ kg ≈ 22 lbs 55 kg ≈ ☐ lbs



One inch is approximately 2.5 centimetres
1 inch ≈ 2.5 cm

Use the bar models to help with the conversions.



16in ≈ ☐ cm

15in ≈ ☐ cm

33in ≈ ☐ m

10cm ≈ ☐ in

1cm ≈ ☐ in

5.5m ≈ ☐ in

Abstract

Complete the conversions.

1,000 mm = 1 m

5,000 mm = ☐ m

50,000 mm = ☐ m

500 mm = ☐ m

5,500 mm = ☐ m

1,000 ml = 1 l

☐ ml = 3 l

☐ ml = 30 l

300 ml = ☐ l

☐ ml = 0.3 l

Complete the missing information

$\frac{1}{1{,}000}$ m = ☐ mm $\frac{1}{100}$ m = ☐ mm $\frac{1}{10}$ m = ☐ mm

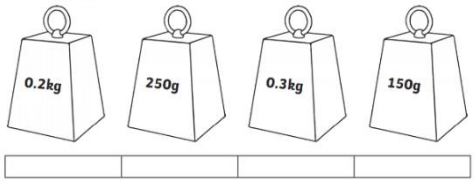
3 l + $\frac{1}{4}$ l = ☐ ml 2 l + ☐ ml = 2,500 ml

Compare the measurements using <, > or =

2 l ◯ 1,500 ml 60 l ◯ 6,000 ml

2.8 m ◯ 280 mm 3,700 m ◯ 3.7 mm

Order these weights:



Match these capacities:

60ml	60cl
0.6l	6000cl
0.6cl	6cl
60l	6ml
6l	600cl

Complete the table.

Days	Weeks / Weeks and Days
42 days	
	5 weeks and 5 days
	10 weeks and 5 days
100 days	

Use this information to complete the conversions.

$\frac{1}{3}$ hour = ☐ minutes

3 ☐ and 24 ☐ = 204 ☐

1.5 minutes = ☐ seconds

1.05 minutes = ☐ seconds

Reasoning

Order

Order the following from shortest to longest:

400 minutes $\frac{1}{3}$ of a day

6 hours 18000 seconds

Amir buys 2,500 grams of potatoes and 2,000 grams of carrots.

He pays with a £5 note.
How much change does he get?

A plank of wood is 5.8 metres long.

5.8 m

Two lengths are cut from the wood.

175 cm $3\frac{4}{5}$ m

How much of the wood is left?

Rank by difficulty

200 minutes = ___ hours ___ minutes

200 hours = ___ days ___ hours

200 days = ___ months ___ days

Cola is sold in bottles and cans.

330 ml
48 p

1.25 litres
£1.59

Alex buys 5 cans and 3 bottles.
She sells the cola in 100 ml glasses.
She sells all the cola.
How many glasses does she sell?

Alex charges 50 p per glass.
How much profit does she make?

Eva is converting measurements.
She says,

I have divided by 1,000 to convert the measurements.

Which conversions could Eva have completed?

- 3 km → 3,000 m
- 3,000 m → 3 km
- 5,500 g → 5.5 kg
- 2.8 kg → 2,800 g

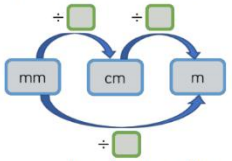
Ribbon is sold in 225 mm pieces.
Teddy needs 5 metres of ribbon.
How many pieces does he need to buy?

Teddy would like to make either a bookmark or a rosette with his left over ribbon. Which can he make?

To make 5 bookmarks you will need:
1.2 metres of ribbon
1 pair of scissors

To make 1 mini rosette you will need:
4 pieces of ribbon cut to 35 mm
A stapler

Complete the conversion diagram.



Can you make a diagram to show conversions from m and cm to mm?

Measurement

Key vocab: square centimetres (cm2), square metres (m2), irregular shapes, volume (cm3), cubes, cuboids, square numbers, cube numbers, metric measure, metric units, imperial units Inches, pounds, pints

NC Objectives:

- Estimate volume (e.g., using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g., using water).
- Use all four operations to solve problems involving measure using decimal notation, including scaling.

Concrete

Use five identical tumblers and some rice.

- Fill a tumbler half full.
- Fill a tumbler one quarter full.
- Fill a tumbler three quarters full.
- Fill a tumbler, leaving one third empty.
- Fill a tumbler that has more than the first but less than the third, what fraction could be filled?

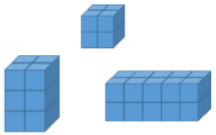
Show children 5 different containers.
Which containers has the largest/smallest capacity?
Can we order the containers?
If I had ___ ml/l, which container would I need and why?
Fill each container with rice/water and estimate then measure how much each holds.

Give children a container.
Using rice, water and cotton wool balls, can children estimate how much of each they will need to fill it?

Discuss what is the same and what is different.
Will everyone have the same amount of cotton wool?
Will everyone have the same amount of rice?
Will everyone have the same amount of water?

Give children a container.
Using rice/water and a different container e.g. cups, discuss how many cups of rice/water we will need to fill the containers.
Link this to the capacity of the containers.

Make these shapes.

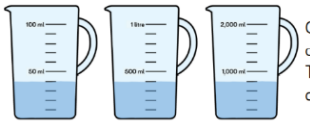


Complete the table to describe your shapes.

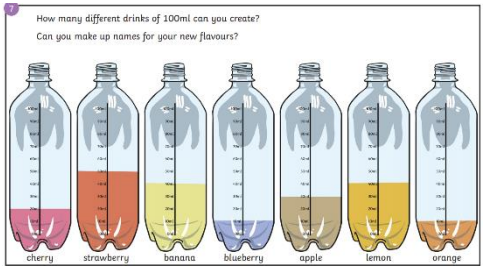
Shape	Width (cm)	Height (cm)	Length (cm)	Volume (cm^3)
A				
B				
C				

Pictorial

Compare the capacity and the volume. Use the sentence stems to help you.



Container ___ has a capacity of ____ ml
The volume of water in container ___ is ___ cm^3



Abstract

Here are 3 famous tall buildings.

Draw the respective heights of the three buildings using the same scale. For example 1cm:100m (1:10 000)

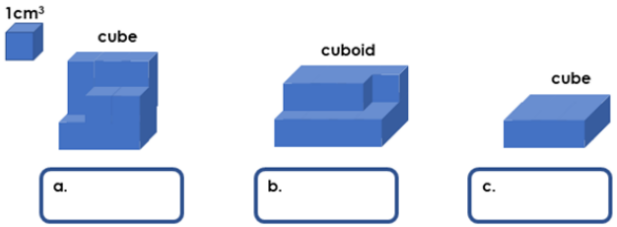
Here are the main ingredients for making chocolate chip cookies:

350g flour
225g butter
175g caster sugar
175g soft brown sugar
300g chocolate
2 eggs

Sam has 5 eggs to make some cookies. How much of the other ingredients is required? Write your answer in kilograms.

Reasoning

Nadia is trying to create cubes and cuboids. Estimate the number of cubes to complete each model.

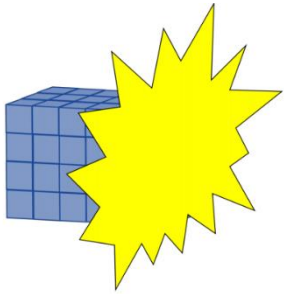


How many possible ways can you make a cuboid that has a volume of 12 cm^3?

My shape is made up of 10 centimetre cubes.

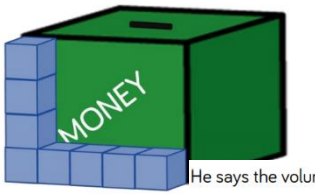
The height and length are the same size.

What could my shape look like?



Each of the cubes have a volume of 1 m^3
The volume of the whole shape is between 64 m^3 and 96 m^3
What could the shape look like?

Jack is using cubes to estimate the volume of his money box.



He says the volume will be 20 cm^3

Do you agree with Jack?
Explain your answer.

What would the approximate volume of the money box be?

Geometry

Key vocab: angles, measure, degrees, missing lengths, missing angles, regular polygons, irregular polygons, degrees, estimate, compare, reflex angle, point, straight line, multiples, refection

NC Objectives:

- Identify 3D shapes, including cubes and cuboids, from 2D representations.
- Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
- Use the properties of rectangles to deduce related facts and find missing lengths and angles.

Concrete

Use equipment, such as Polydron or 2-D shapes, to build the 3-D solids being described.

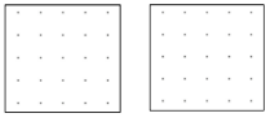
- My faces are made up of a square and four triangles.
- My faces are made up of rectangles and triangles.

Can the descriptions make more than one shape?

Use a protractor to measure angles in 2D shapes to see whether they are regular or irregular.

Pictorial and Abstract

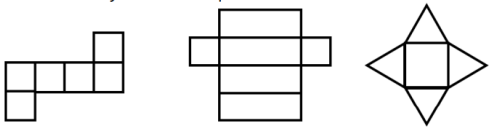
Draw a regular polygon and an irregular polygon on the grids.

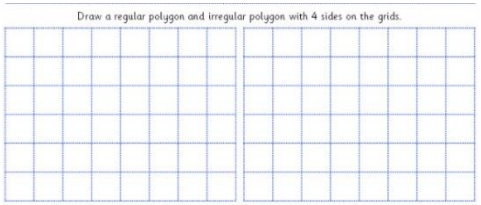


Sort the shapes in to irregular and regular polygons.

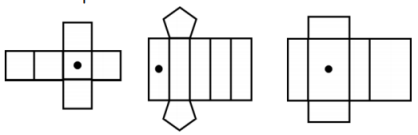
What's the same? What's different?

Look at the different nets. Describe the 2-D shapes used to make them and identify the 3-D shape.

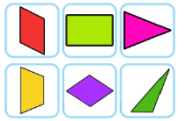


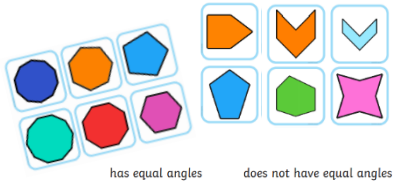


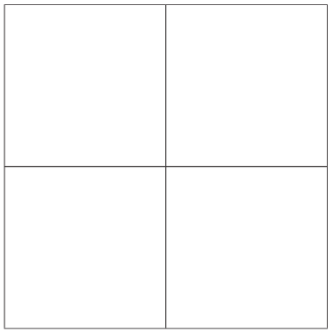
Draw another dot on the nets so the dots are on opposite faces when the 3D shape is constructed.



Put the shapes in the correct places in the Carroll diagram.



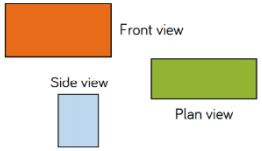




Reasoning

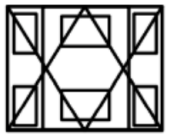
Using different 3-D solids, how can you represent them from different views? Work out which representation goes with which solid.

For example,

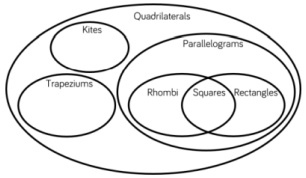


Create cubes and cuboids by using multilink cubes.
Draw these on isometric paper.
Would it be harder if you had to draw something other than squares or rectangles?

How many regular and irregular polygons can you find in this picture?



Cut out lots of different regular and irregular shapes. Ask children to work in pairs and sort them into groups. Once they have sorted them, can they find a different way to sort them again? Children could use Venn diagrams and Carroll diagrams to deepen their understanding, for example:



	Regular polygon	Irregular polygon
Has at least one right angle		
Has no right angles		

Amir says,

If two 3-D shapes have the same number of edges, then they also have the same number of vertices.

Do you agree?
Explain why.

Always, sometimes or never true?

- A regular polygon has equal sides but not equal angles.
- A triangle is a regular polygon.
- A rhombus is a regular polygon.
- The number of angles is the same as the number of sides in any polygon.

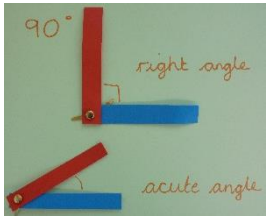
Geometry

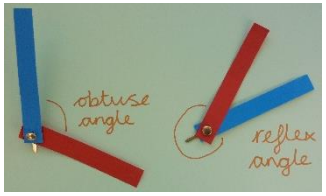
Key vocab: angles, measure, degrees, missing lengths, missing angles, regular polygons, irregular polygons, degrees, estimate, compare, reflex angle, point, straight line, multiples, refection

NC Objectives:

- Know angles are measured in degrees; estimate and compare acute, obtuse, and reflex angles.
- Identify:
  - Angles at a point on a straight line and half a turn (total 180°)
  - Angles at a point and one whole turn (total 360°)
  - Other multiples of 90°
- Draw given angles and measure them in degrees.

Concrete

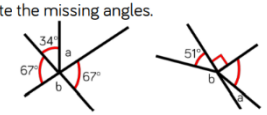




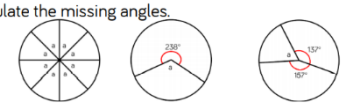
Use angle finders to compare angles.

Pictorial and Abstract

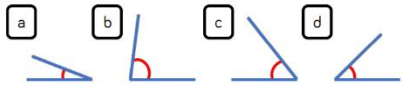
Calculate the missing angles.



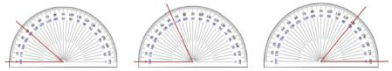
Calculate the missing angles.



Put these angles in order of size. Explain how you know.

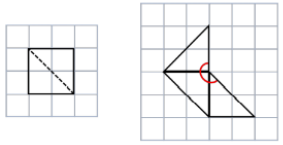


Read the angles shown on the protractor.



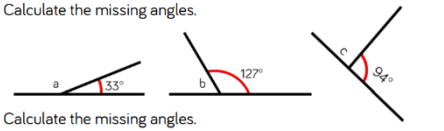
What's the same? What's different?

Here is a square cut into two triangles.

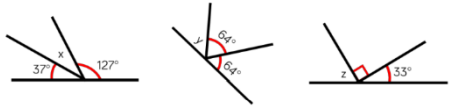


Use the square to calculate the size of the angle.

Calculate the missing angles.

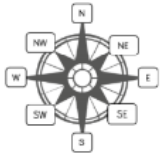


Calculate the missing angles.



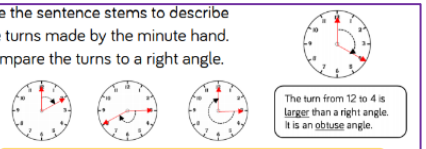
Is there more than one way to calculate the missing angles?

Use the compass to complete the table.



Turn	Degrees	Type of angle	Fraction of a turn
North-East to South-East Clockwise	90°	Right angle	$\frac{1}{4}$ of a turn
North-West to North-West Clockwise			
South-West to South-East Anti-clockwise			
South-West to northeast Clockwise	180°		
North-East to East Clockwise			$\frac{1}{8}$ of a turn

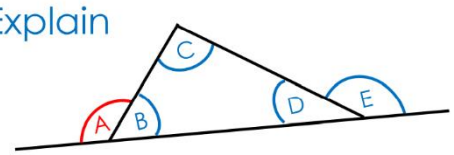
Use the sentence stems to describe the turns made by the minute hand. Compare the turns to a right angle.



The turn from ___ to ___ is _____ than a right angle.
It is an _____ angle.

Reasoning

Explain



I can work out angle A if I know...

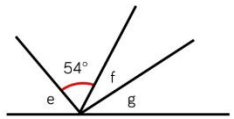
Angles C and D ☐
Angles D and E ☐
Angles C and E ☐

Tick correct option(s).
Explain how you know.

Which angle is the odd one out?

180° | 45° | 79° | 270°

Could another angle be the odd one out for a different reason?



- The total of angle f and g are the same as angle e
- Angle e is 9° more than the size of the given angle.
- Angle f is 11° more than angle g

Calculate the size of the angles.

Create your own straight line problem like this one for your partner.

Use Kandinsky's artwork to practice measuring lines and angles.

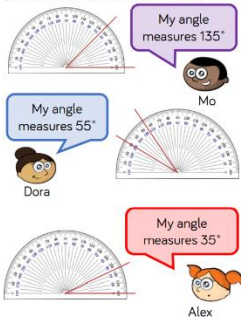
Create clues for your partner to work out which line or angle you have measured.

Use a cut out of a circle and place a spinner in the centre.

- Point the arrow in the starting position above.
- Move the spinner to try to make the angles shown on the cards below.
- Check how close you are with a protractor.

40° | 72° | 154°

Three children are measuring angles. Can you spot and explain their mistake?



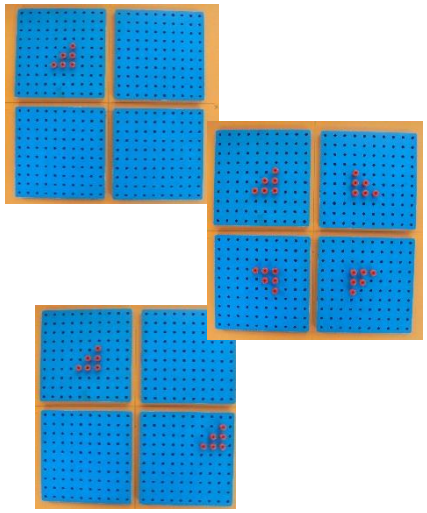
Geometry

Key vocab: angles, measure, degrees, missing lengths, missing angles, regular polygons, irregular polygons, degrees, estimate, compare, reflex angle, point, straight line, multiples, refection

NC Objectives:

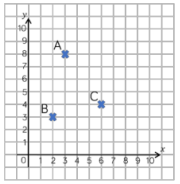
- Identify, describe, and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

Concrete



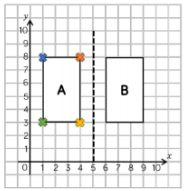
Pictorial

Translate each coordinate 2 down, 1 right. Record the coordinates of its new position.



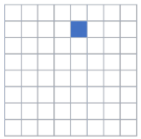
	Before translation	After translation
A	(3, 8)	
B		
C		

Object A is reflected in the mirror line to give image B. Write the coordinates of the vertices for each shape.

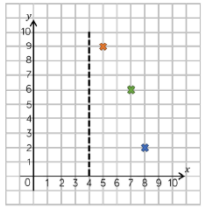


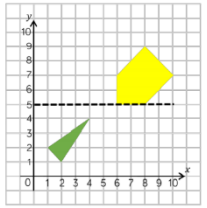
	Original Coordinate	Reflected Coordinate

A square is translated two squares to the right and three down. Draw the new position of this square.



Reflect the coordinates and the shapes in the mirror line.





Match the translations.

to

to

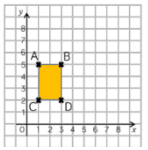
to

4 right, 2 down

2 left, 3 up

5 left, 5 down

Rectangle ABCD is translated so vertex C is translated to (3, 5). Describe the translation. What are the coordinates of the other vertices of the translated rectangle?



Abstract

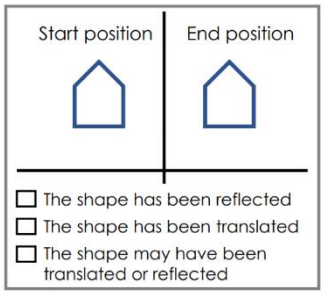
Translate the coordinates below.

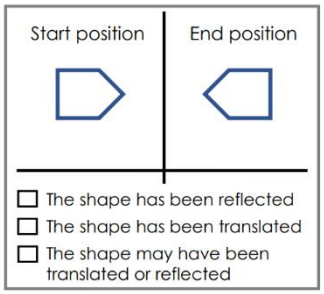
(3, 6)	3 left	(,)	1 up	(,)
(5, 7)	2 right	(,)	4 down	(,)

Reasoning

Explain

Tick the correct box for each example. Explain.

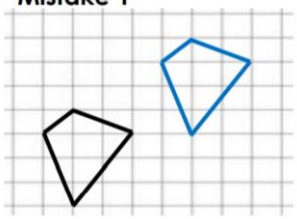




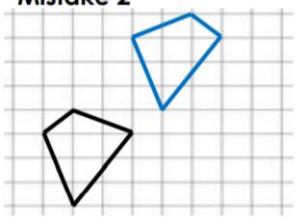
Explain the mistakes

Translate 3 squares to the right and 4 squares up.

Mistake 1



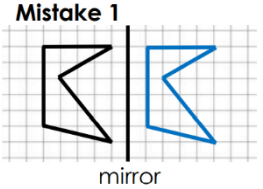
Mistake 2



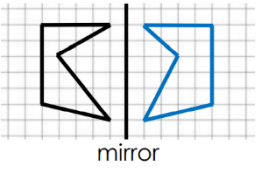
Explain the mistakes

Reflect the shape in the mirror line.

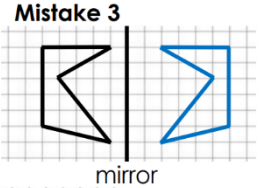
Mistake 1



Mistake 2



Mistake 3



Statistics

Key vocab: timetables, line graph

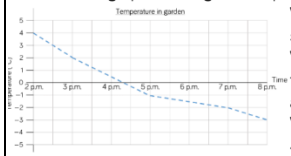
NC Objectives:

- Complete, read, and interpret information in:
  - tables, including timetables
- Solve comparison, sum and difference problems using information presented in a line graph.

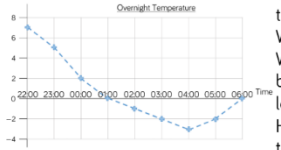
Concrete

Pictorial

Here is a line graph showing the temperature in a garden.

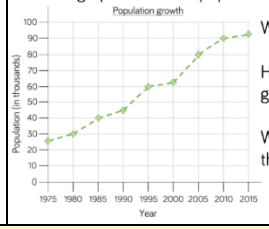


What was the temperature at 5 p.m.?
What was the difference in temperature between 3 p.m. and 7 p.m.?
When was the temperature 4°C?
Estimate the time when the temperature was 0°C.
Estimate the temperature at 6 p.m.

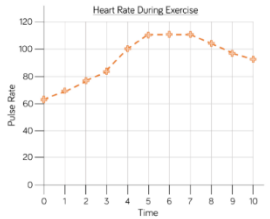


What was the highest/lowest temperature?
What time did they occur?
What is the difference between the highest and lowest temperature?
How long did the temperature stay at freezing point or less?

This line graph shows the population growth of a town.



What was the population in 1985?
How much did the population grow between 1990 and 2010?
When was the population double the population of 1985?



How long did it take for the pulse rate to reach the highest level? Explain your answer, 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?

Abstract

Here is a table with information about planets. 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.
What is the difference between the diameter of Mars and Earth?
What is the difference between the time for rotation between Mercury and Venus?

Use the table to answer the questions.

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?
How much larger is the population of Liverpool than Coventry?

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 are there?
- How many male sergeants are 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?

Complete the table.

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

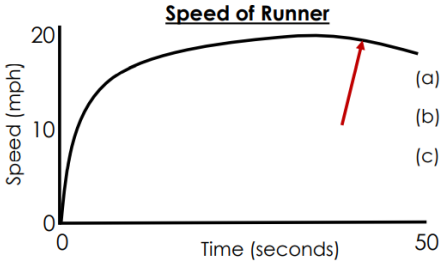
Write questions about the information for a friend to solve.

Reasoning

Which answer?

This graph shows the speed of a 400m runner.

What is happening at the point showed by the arrow?



(a) The runner's fastest speed
(b) The runner finishes
(c) The runner slows down

Explain

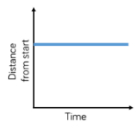
Sam lives in Lancaster. He has a job interview at an office which is a 20-minute walk from Manchester Piccadilly train station. His interview starts at 10:15am.

Here is the train timetable:

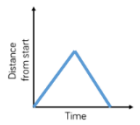
Penrith	7:19	7:45	8:11	8:32
Lancaster	7:58	8:24	8:50	9:11
Preston	8:18	8:44	9:10	9:31
Wigan	8:30	8:56	9:22	9:43
Manchester Piccadilly	9:01	9:27	9:53	10:14
Manchester Airport	9:07	9:43	10:09	10:30

At what time does Sam need to arrive at Lancaster train station?

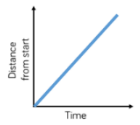
Match the graph to the activity.



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.

	100 m sprint (s)	Shot put (m)	50 m Sack race (s)	Javelin (m)
Amir	15.5	6.5	18.9	11.2
Dora	16.2	7.5	20.1	13.3
Teddy	15.8	6.9	19.3	13.9
Rosie	15.6	7.2	18.7	14.1
Ron	17.9	6.3	18.7	13.3

Ron thinks that he won the 100 m sprint because he has the biggest number.

Do you agree?
Explain your answer.