

Number and place value; addition and subtraction; multiplication and division; fractions (including decimals and percentages); measurements

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

In context.....

10 000 more than 34 678 is 44 678.

300 000 less than 756 440 is 456 440.

The population of Littletown in 2011 was 178 543. Two years later it had decreased by 30 000. What was the population in 2013?

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

In context.....

Which two numbers round to 16 000?

16 542, 16 347, 15 453, 16 916

A swimming pool holds 216 000 litres of water. How much water does the pool hold to the nearest 100 000 litres?

How do you know?

Describe linear sequences, including those involving fractions and decimals, and find the term-to-term rule.

Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers

If the temperature is 10 degrees and drops to -10, how many degrees has it dropped?

It is -15 degrees. It gets warmer by 5 degrees each hour. How long will it take to reach 5 degrees?

Read Roman numerals to 1000(M) and recognises years written in Roman numerals

$3^2/5, 3^1/5, 3, \dots$

What is the next fraction? What is the rule?

12.3, 12.6, 12.9, 13.2.....

How does the pattern increase?

What is the rule for finding the next term (next pattern)?

Next term = +3

Term	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Circle	3	6	9							
Square	1	2	3							

Pupils may begin to see a relationship between the term and the number in the sequence. Pupils may be able to use a simple rule to find the nth term in the sequence.

$c = 3t$

Count forward and back in steps of powers of 10 up to 1 000 000

Write the next number in this counting sequence: 110 000, 120 000, 130 000

Year 5 Pitch and Expectations

24×16 becomes

2	4	
2	4	
×	1	6
2	4	0
1	4	4
3	8	4

124×26 becomes

1	2	4	
1	2	4	
×	2	6	
7	4	4	
2	4	8	0
3	2	2	4

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

Explain why there will never be a prime in the fourth or tenth column of a 100 square.

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

What are the factors of 36? Which factors are prime factors? How do you know?

Which factors are composite numbers? Why aren't they prime?

How many pairs of factors does this number have?

Why does it have an uneven number of factors?

Identify factors, multiples, factor pairs of a number, and common factors of 2 numbers.

Circle the two numbers that share 2 common factors. What are they?

25 49 12 18 27

3 and 2 are factors of 12 and are also factors of 18.

Multiply numbers with up to 4 digits by a one and two-digit number, including long multiplication.

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

"The sum of two square numbers is another square number."

$3^2 + 4^2 = 5^2$
 $9 + 16 = 25$

But.....
 $2^2 + 4^2 = 20$

So the statement is true only sometimes.

3^3 is the same as $3 \times 3 \times 3$

Pupils use arrays to show they understand square and cube numbers.

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context by rounding and as fractions and decimals.

97 chocolate eggs are packed into boxes of 4. How many boxes are filled?

$432 \div 5$ becomes

8	6	r2	
5	4	3	2

Answer: 86 remainder 2

Write remainders as a fraction.

Estimate the answer to be about 25 because $100 \div 4 = 25$

So there is 1 egg left over out of space for 4. So 24 boxes are filled.

$24 \text{ r}1 = 24 \frac{1}{4} = 24.25$

Solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors.

$72 \times 7 =$
 $8 \times 9 \times 7 =$
 $8 \times 7 \times 9 =$
 $56 \times 10 = 560$
 $560 - 56 = 504$

A pair of factors of 72 is 8 and 9. I can rearrange the factors to make the calculation easier..... I can do 56×10 and adjust.

Seven lorries are used to transport 72 crates of bananas. How many crates are on the lorries?

$630 \div 14 =$
 $630 \div 7 \div 2 =$
 $90 \div 2 = 45$

A pair of factors of 14 is 7 and 2 so I can divide 630 by 7 then halve.

630 bunches of bananas are packed into boxes of 14. How many boxes are needed?

$1000 + 700 + 20 + 14p$
 $- 1000 + 200 + 10 + 6p$
 $500 + 10 + 8p$

$1734p$
 $- 1216p$
 $518p$

$\pounds 2$
 17.34
 $- 12.16$
 5.18

346.7 km
 $- 29.67 \text{ km}$

Pupils will be able to add and subtract numbers with:

- A different number of digits
- A mix of whole numbers and decimals
- Decimals with a different number of decimal places
- Decimals in the context of money and measures

Add and subtract whole numbers with more than 4 digits including using formal written methods.

$\pounds 563.14$
 $+ \pounds 207.88$
 $\pounds 771.02$
111

Solve problems involving multiplication and division, including scaling by simple fractions and simple rates.

The Lego model of the tower of Big Ben is a tenth of the size of the real thing. In reality, it measures approximately 96.4m tall. How tall is the model?

Sally builds her own model. It is $\frac{1}{4}$ of the size of the Lego tower. How tall is Sally's model?

Multiply and divide numbers mentally drawing upon known facts.

$3 \times 75 = 225$
Use this fact to work out
 $450 \div 6 =$
 $225 \div 0.6 =$

Use factorising:
 $210 \div 15$
 $210 \div 3 \div 5$
 $70 \div 5 = 14$

Use factorising:
 $24 \times 15 = 24 \times 5 \times 3$
 $24 \times 5 = 120$
(half of 24×10)
 $120 \times 3 = 360$

If $63 \div 7 = 9$, then $6.3 \div 7 = 0.9$

$340 \div 16 = 21 \text{ r}4$
Or $21 \frac{1}{4}$
Or 21.25

Multiply and divide whole numbers and decimals by 10, 100 and 1000. Multiply and divide by powers of 10 in scale drawings.

Patio: 3.21cm, 1.09cm

Grass: 2.6cm, 1.67cm

The design of the garden is to the scale 1cm:10m. What are the dimensions of the grass area in the full-size garden?

The patio? What if the scale was 1cm:20m?

Add and subtract mentally with increasingly large numbers to aid fluency.

Work out mentally by counting up from a smaller to a larger number.
e.g. $8000 - 2785$ is $5 + 10 + 200 + 5000 = 5215$

Mentally add and subtract tenths, and one-digit numbers and tenths.

$12462 + 2300 = 14762$
 $27000 - 3800 = 23200$

Use rounding to check answers to calculations and determine levels of accuracy

Which of these has the answer that is between 0.5 and 0.6?
 $11.74 - 11.18$
 $33.3 - 32.71$
 $659 + 259 = 918$

Derive quickly number pairs that total 100 or pairs of multiples of 50 that total 1000,
e.g. $32 + 68 = 100$ or $150 + 850 = 1000$

Identify and use near doubles,
e.g. work out $28 + 26 = 54$ by doubling 30 and subtracting first 2, then 4, or by doubling 26 and adding 2

$6.7 + 0.8 = 7.5$
 $8.3 - 0.7 = 7.6$

My answer will be roughly 920 because I know that $60 + 60$ is 120. So $600 + 200 + 120$ is 920.

How much more to make $\pounds 1$ if you have 0.73 pence?
 $0.43 + \square = 1$

Add and subtract mentally, compliments of 1, including 1 and 2 place decimals.

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

13 502 people were at the match last week and there are 2483 more this week, how many more people need to attend to bring the total to the club's target of 20 000 people?

The table shows the cost of coach tickets to different cities.

		Hull	York	Leeds
Adult	single	£12.50	£15.00	£10.25
	return	£23.75	£28.50	£19.30
Child	single	£8.50	£10.80	£8.25
	return	£14.90	£17.90	£14.75

How much more does it cost for two adults to make a single journey to Hull than to Leeds?

Pupils begin to express the distributive law using an equation in preparation for using algebra.

Pupils use arrays to begin to see that 9×7 can be split into $(7 \times 7) + (2 \times 7) = 9 \times 7$

They develop this thinking so that it can also be expressed as $7 \times (7 + 2)$

$a(b+c) = ab + ac$

$(7 \times 6) + (7 \times 2) = 56m^2$
I can also say.....
 $7 \times (6 + 2) = 56m^2$

Pupils link arrays to finding the area of rectangles and compound shapes and begin to express this algebraically, using the distributive law.

Compare and order fractions whose denominators are multiples of the same number.

Write the fractions in order of size starting with the smallest:

$$\frac{1}{4} \quad \frac{4}{12} \quad \frac{2}{3}$$



Pupils may use diagrams and concrete materials to change the fractions to a common denominator and compare the size of the fractions.

Which is larger? $\frac{1}{3}$ or $\frac{4}{9}$?

Pupils know that 9 is a multiple of 3 so change to the same denominator to compare the size.

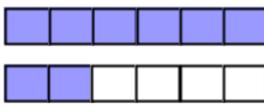


Pupils may draw a diagram showing one-third, then split into ninths to show an equivalent fraction.

$\frac{6}{10}, \frac{3}{5}, \frac{18}{20}, \frac{9}{15}$
The odd one out is $\frac{18}{20}$ because.....

Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number.

What is $\frac{8}{6}$ as a mixed number?



I can see that $\frac{8}{6}$ makes 1 whole and $\frac{2}{6}$ of another shape. So the answer is $1\frac{2}{6}$. I know that $\frac{2}{6}$ is equivalent to $\frac{1}{3}$, so I can also say $1\frac{1}{3}$.

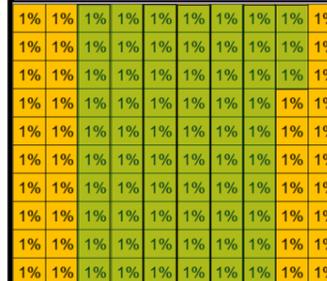
How many halves in: $1\frac{1}{2} \ 3\frac{1}{2} \ 9\frac{1}{2} \dots$?

How many quarters in: $1\frac{1}{4} \ 2\frac{1}{4} \ 5\frac{1}{4} \dots$?

$$2\frac{3}{4} = \frac{(4 \times 2) + 3}{4} = \frac{11}{4}$$

Pupils will be able to carry out the procedure, once they have used visual representations to model the conversion from one to the other. Pupils will be able to explain the process.

Recognise the % symbol and understand that per cent relates to 'number of parts per hundred'. Write percentages as a fraction and as a decimal.



$$\frac{63}{100} = 63\% = 0.63$$

Hide Reveal buttons and a CHANGE button.

What is 45% as a decimal?
Give two different ways to show 0.30.
How many hundredths of a pound is 63p?
What is 1% as a fraction? As a decimal?
If this represented a metre, how many cm would 50% of a metre be?

Which is bigger: 65% or $\frac{3}{4}$? How do you know?
What percentage is the same as $\frac{7}{10}$? Explain how you know?
What is $\frac{31}{100}$ as a percentage?
Which is a better mark in a test: 61% , or 30 out of 50? How do you know?

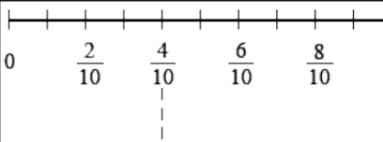
30%	0.5
0.5	
0.5	

Solve problems that require knowing percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those with a denominator of a multiple of 10 or 25.
Complete the grid so that each column and row totals one whole. Each row and column must have 1 fraction, 1 decimal and 1 percentage.

Pupils make connections between percentages, fractions and decimals and relate this to finding 'fractions of'. Recognise the percentages are proportions of quantities as well as operators of quantities

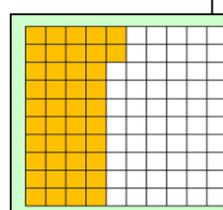
Write in the missing numbers:
30% of 60 is \square
30% of \square is 60
Sam ate $\frac{1}{5}$ of his chocolate bar. What percentage of the bar was left?

Identify, name and write equivalent fractions of given fractions, represented visually, including tenths and hundredths.



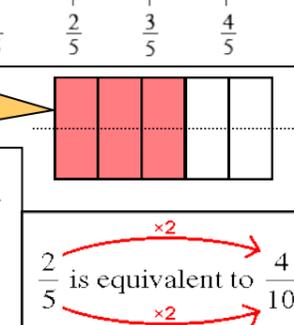
How many ways can you show the proportion of this shape that is shaded?

$\frac{4}{10}$ and $\frac{2}{5}$
 $\frac{42}{100}$
0.42
 $0.4 + 0.02$



I know that $\frac{1}{5}$ is equivalent to $\frac{2}{10}$ and I can show it on a number line and by drawing a diagram...

Pupils will be able to use the procedure for finding equivalent fractions once they have used visual representations to model the equivalence. They will be able to explain the process.



Add and subtract fractions with the same denominator and multiples of the same number, where the calculation exceeds 1 as a mixed number.

$\frac{8}{10}$ of a kg of potatoes were added to a shopping bag containing $\frac{2}{5}$ of a kg of carrots. What does the shopping bag weigh?

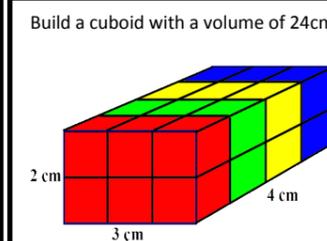
$$\frac{8}{10} + \frac{2}{5} = \frac{8}{10} + \frac{4}{10} = \frac{12}{10}$$

$$\frac{12}{10} = 1\frac{2}{10} \text{ of a kg.}$$

1kg and 200g
1.2kg

Pupils can find equivalent fractions to add and convert improper fractions to mixed numbers and relate fractions to measures.
Pupils practice adding and subtracting fractions to become fluent through a variety of increasingly complex problems.

Estimate volume (using 1cm^3 blocks to build cubes and cuboids) and capacity (using water).



Build a cuboid with a volume of 24cm^3
How many cuboids can you build with a volume of 36cm^3 ?
I know the factors of 36 are: 3,12,18,2,4,9,6. So I can do $2 \times 2 \times 9$, $6 \times 3 \times 2$ and so on....

Solve problems involving converting between units of time.

A large bucket holds 6 litres and a small bucket holds 4 litres. A jug holds 250ml and a bottle holds 500ml. Suggest some ways to fill the buckets.
In a skipping competition, John skipped continuously for 1 hour and 35 minutes. For how many seconds did John skip?

Solve problems involving numbers up to 3 decimal places. Read, write, order and compare numbers with up to 3 decimal places.

$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ \hline 1 \end{array}$ 8 tenths add 6 tenths makes 14 tenths, or 1 whole and 4 tenths. The 1 whole is 'carried' into the units column and the 4 tenths is written in the tenths column.

Arrange the 3 digits to make two numbers that:

4 5 6

Read and write decimal numbers as fractions. Write the total as a decimal.
 $4 + \frac{8}{10} + \frac{2}{100} =$

- Round to 1
- Are $> \frac{54}{100}$
- Round to 0.5

U	.	t	h	th

Round decimals to 2 decimal places to the nearest whole number and one decimal place.
Extend knowledge of fractions to thousandths and relate them to tenths and hundredths and show decimal equivalents and relationships to measures.

Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.

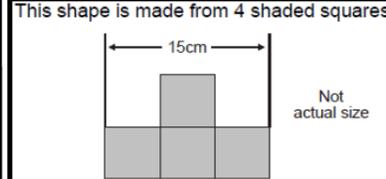
$\frac{1}{4} \times 5 = 1\frac{1}{4}$
What is the area of this rectangle?



$1\frac{2}{3} \times 3 = 5$
'One and two thirds, three times'

I know this means.... '5 lots of a quarter' OR 'One quarter of 5'
How many halves in: $1\frac{1}{2} \ 3\frac{1}{2} \ 9\frac{1}{2} \dots$?
How many quarters in: $1\frac{1}{4} \ 2\frac{1}{4} \ 5\frac{1}{4} \dots$?

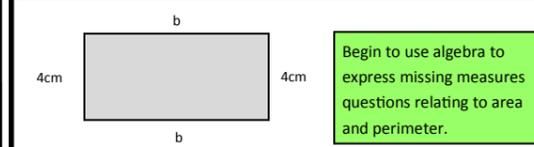
Measure and calculate the perimeter of composite rectilinear shapes in cm and m.



Calculate the perimeter of the shape.
Use all four operations to solve problems involving measures, using decimal notation including scaling.

This is a plan for a paved area in a garden. Each paving slab is 10 times as big as those in the plan. What will the perimeter of the paved area in the garden be?

Find unknown lengths using the relation between area and perimeter.



If the perimeter is 20cm, can you write an equation that helps you to find the missing lengths (b)?

$$4 + 4 + b + b = 20$$

$$8 + 2b = 20$$

$$20 - 8 = 12$$

$$\text{So } \dots 2b = 12$$

$$b = 6 \text{ cm}$$

Connect multiplication by a fraction to using fractions as operators to find fractions of quantities and measures and scaling problems.

$\frac{1}{6} \times 12 =$ What is a sixth of 12 metres?
A seedling is $\frac{1}{6}$ of the size of a larger plant, which is 12m tall. How tall is the seedling?
 $\frac{1}{4} \times 7 =$ What is a quarter of 7?
John is a quarter of the way through reading a series of 7 books. How much has he read so far?

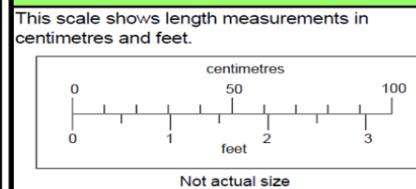
Convert between different units of metric measure (km to m, cm to m, g to kg, l to ml). Use place value knowledge and multiplication and division to convert between standard units.

This table shows the weight of some fruits and vegetables. Complete the table.

	grams	kilograms
potatoes	3500	3.5
apples		1.2
grapes	250	

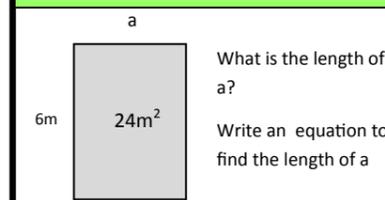
There are 1000 grams in a kg, so I need to divide by 1000 to convert to kg and multiply by 1000 to convert to grams.

Understand and use equivalences between metric and common imperial units of measure (inches, pound, pints).

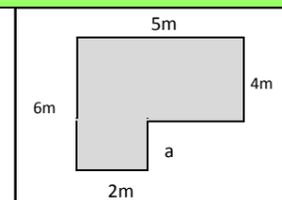


Look at the scale. Estimate the number of centimetres that are equal to $2\frac{1}{2}$ feet.
Estimate the difference in centimetres between 50 cm and 1 feet.

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



What do you notice about the area of these two shapes? Can you prove they have the same area?



What is the area of this shape? What is the length of a?