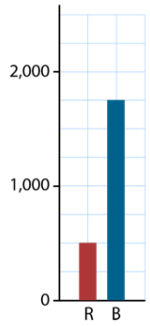
	Number and place value	Number facts	Addition and subtraction	Multiplication and division	Fractions, decimals and percentages	Geometry
6	♦ Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000). ♦ Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning. ♦ Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts. ♦ Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.	♦	♦ Understand that 2 numbers can be related additively or multiplicatively, and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number). ♦ Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding. ♦ Solve problems involving ratio relationships. ♦ Solve problems with 2 unknowns.	♦	♦ Recognise when fractions can be simplified, and use common factors to simplify fractions. ♦ Express fractions in a common denomination and use this to compare fractions that are similar in value. ♦ Compare fractions with different denominators, including fractions greater than 1, using reasoning, and choose between reasoning and common denomination as a comparison strategy.	♦ Draw, compose, and decompose shapes according to given properties, including dimensions, angles and area, and solve related problems.

Number and place value



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- How do the squares help you? Could each square be worth 200? Why not?
- What is the correct value of each square? How do you know?
- What are the mid-points between each labelled value? Click to repeat.
- What is the value of the red bar? What is the value of the blue bar?
- What is the difference in value between the bars? Can you do this without having to subtract? Explain how.

	1,000s	100s	10s	1s	0.1s	0.01s	0.001s
				0	3	7	
÷ 1000 ↑	0	3	7	0			↓ × 1,000

0.37	×	1,000	=	**370**
370	÷	1,000	=	**0.37**

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

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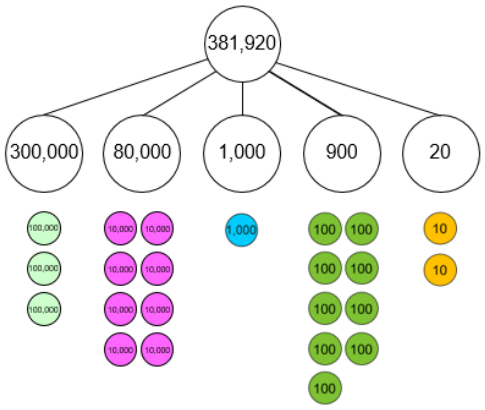
- What do you notice about the digits three and seven in both numbers?
- What is the relationship between 370 and 0.37?

370 is one thousand times the size of 0.37.
0.37 is one-thousandth of the size of 370.

- Repeat, including with other larger numbers.



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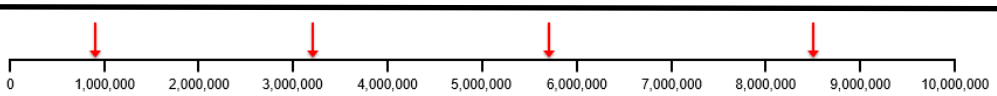
- Represent this number using place value counters and a part-part-whole model.
- What digit is in the thousands place? What is the value of the hundred thousands digit?
- What does the 8 represent?

The 8 represents eight ten thousands.

- Repeat for different 5-digit numbers.
- Show children representations of numbers either using part-part-whole or place value counters and ask them to write the value of each number represented.



- What does each interval on the number line increase by?
- What number do you estimate the arrow is pointing to? What information helped your estimate?
- Which multiples of one million is the arrow in between? Which multiple is it closest to? Is it before or after the unlabelled half-way point between the two known values? What about the quarter and three-quarter points? Repeat for all the arrows.
- Where would 4,250,000 be located? 1,750,000? 7,999,000? Repeat for other values.

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Addition and Subtraction, Multiplication and Division

200 + ☐ = 1,200

200 x ☐ = 1,200

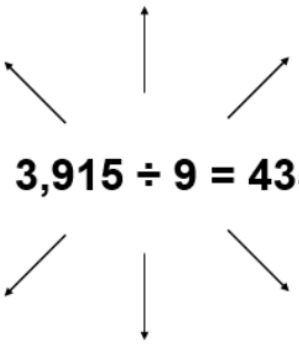
30 = 3 + ☐

30 = 3 x ☐

☐ + 0.1 = 1

☐ x 0.1 = 1

Complete these calculations and consider the difference between additive and multiplicative relationships.



- What other calculations can you derive from this calculation?
- You could:
  - rearrange the terms;
  - rewrite using inverse operations;
  - apply place value;
  - use the properties of division that correspond to the commutative, associative or distributive property of multiplication;
  - use the compensation property.

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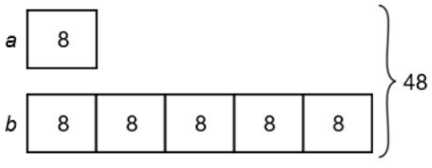
number of smoothies:	2
number of strawberries:	20
number of bananas:	1
amount of yoghurt (ml):	200

- The recipe shown creates two smoothies. What do you need to make four smoothies?
- How many times greater is 4 smoothies than 2 smoothies? How can this be used to calculate the unknown values in the recipe?
- What do you need to make 20 smoothies? How is this calculated?



one part = 48 ÷ 6 = 8

a = 8

b = 5 × 8 = 40

The two numbers are 8 and 40.

Check: 8 + 40 = 48

- The sum of two numbers is 48. One number is one-fifth times the size of the other number. What are the two numbers?
- What should our starting point be?
- Why is the second number five times the size of the first number, but we are dividing by six?

One number is one-fifth the size of the other. This can be represented by one part to five parts. There are six equal parts that sum to forty-eight, so we must divide by six.

- How can we check that our solutions are correct?

End points for knowledge Year 6

Fractions, decimals and percentages

$\frac{3}{15}$ $\frac{1}{6}$ $\frac{23}{30}$ $\frac{18}{30}$

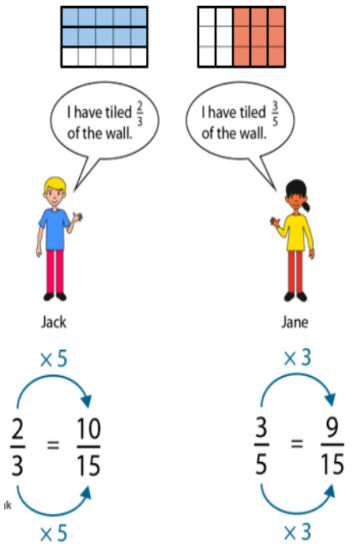
Fraction in its simplest form	Fraction not in its simplest form

$\frac{2}{6}$ $\frac{4}{5}$ $\frac{3}{24}$ $\frac{9}{16}$

- Sort these fractions according to whether they are expressed in their simplest form or not. Convert fractions that are not, into their simplest form.
- How do we know that $\frac{3}{15}$ is not written in its simplest form? How can we convert it to its simplest form?

The highest common factor of 3 and 15 is 3. If we divide both the numerator and denominator by their highest common factor the fraction will be converted to its simplest form.

3 ÷ 3 = 1 15 ÷ 3 = 5 $\frac{3}{15} = \frac{1}{5}$



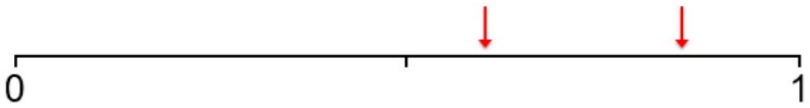
- Jack and Jane want to compare the fraction of the wall that they have each tiled. How can they do this?
- How can both fractions be expressed with a common denominator?

5 is not a multiple of 3.
15 is a multiple of both 3 and 5.
We can use 15 as the common denominator.
We need to express both fractions in fifteenths.

- What do you notice about the shaded sections of the wall and the fractions before and after they have been changed to have a common denominator?

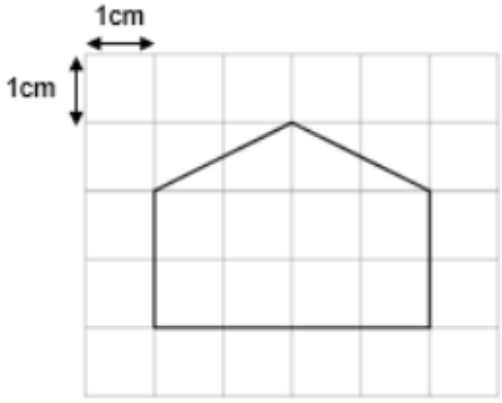
$\frac{7}{11}$ $\frac{5}{6}$

$\frac{7}{11} \bigcirc \frac{5}{6}$



- Where would each fraction be positioned on the number line? What did you consider for each fraction? How does this help to compare the two fractions?
- Which fractions does drawing $\frac{1}{2}$ help to position on the number line? Why?
- How does comparing the relative size of the numerator to the denominator of each fraction help to consider its size?

Geometry



- What is the area of one square on the grid shown? How is it calculated?
- What is the area of the pentagon shown? How many different ways can this area be calculated?
- Draw a different shape with the same area.
- Repeat, asking children to calculate the area of different shapes and draw different shapes with different areas. This could include using squared and isometric paper.