Maths – Place Value

YEAR 6

Small Steps:

1. Numbers to 1,000,000.
2. Numbers to 10,000,000.
3. Read and write numbers to 10,000,000.
4. Powers of 10.
5. Number line to 10,000,000.
6. Compare and order any integers.
7. Round any integer.
8. Negative numbers.

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

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

Complete the number sentences.

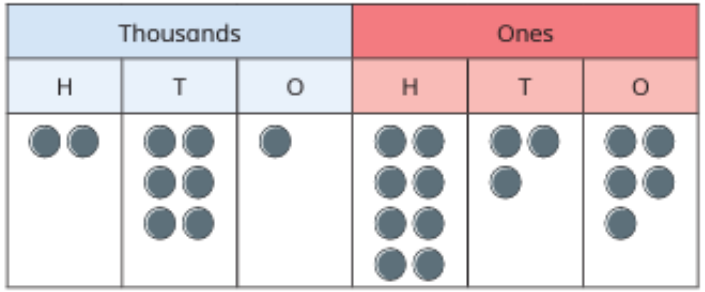
- 604,821 = 600,000 + _____ + _____ + 20 + 1
- _____ = 300,000 + 4,000 + 700 + 4
- 2,000 + 8 + 60,000 + 500 + 700,000 = _____

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

Key Questions:

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

What number is shown in the place value chart?



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

- tens column
- ten-thousands column
- hundreds column?

Stem Sentences:

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

Key Vocabulary:

million
place value
columns
patterns
ones
tens
hundreds
thousands
ten thousands
hundred thousands
Gattegno chart
partitioning
composing
commas
figures
whole
parts
value
add
subtract
placeholders

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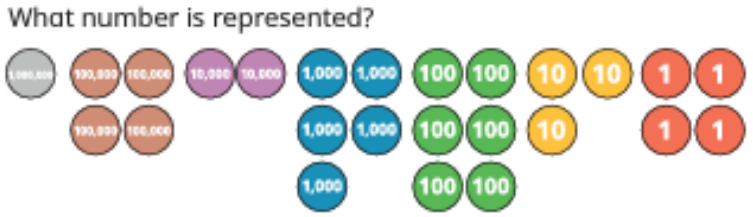
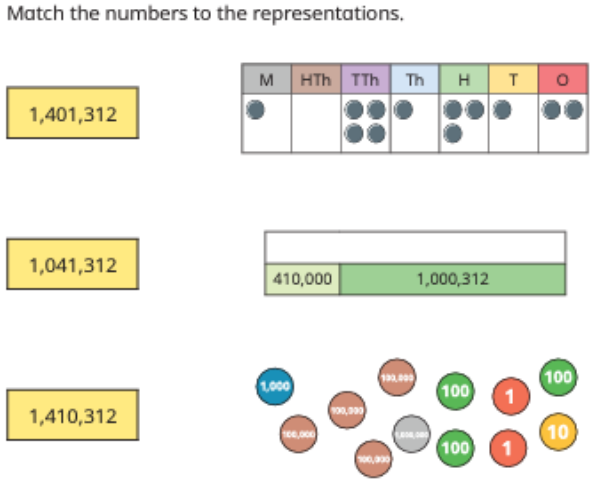




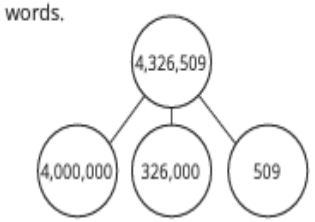
Key Questions:

- Where do the commas go when writing 7-digit numbers? How does this connect to place value charts?
- How does the place value chart help you to represent large numbers?
- What is the value of each digit in the number?
- Are 7-digit numbers always greater than 1,000,000?
- When do you use placeholders in numbers?
- What is the same and what is different about counting in 1,000s and counting in 1,000,000s?
- When a number is written with two commas, what does that tell you about the size of the number?
- What do the numbers before this comma represent?
- How do you write "one million" in words and numerals?
- How do you write "half a million" in words and numerals?
- When do we use "and" when reading or writing a number?

Key Vocabulary:

ten million
7-digit
commas
separators
place value
Gattegno chart
part-whole
partition
value
greater
placeholders
same
different
column
numerals

Alex is using a part-whole model to help write the number 4,326,509 in words.



forty million and three hundred and twenty-six thousand and five hundred and nine

What mistakes has Alex made?

Write 4,326,509 correctly in words.

Here is a number shown on a Gattegno chart.

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

Write in words the number that is:

- 80 greater than this number
- 80 less than this number
- 80,000 greater than this number
- 80,000 less than this number.

Stem Sentences:

- The value of the _____ in _____ is _____.
- The column before/after the _____ column is the _____ column.
- The digit before the first/second commas is _____. This part of the number is said/written as _____.
- The digit after the first/second commas is _____. This part of the number is said/written as _____.
- The whole of the number is said/written as _____.

Maths – Place Value

YEAR 6

Small Steps:

1. Numbers to 1,000,000.
2. Numbers to 10,000,000.
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4. Powers of 10.
5. Number line to 10,000,000.
6. Compare and order any integers.
7. Round any integer.
8. Negative numbers.

What number is shown on the Gattegno chart?

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

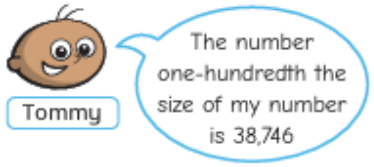
Use the chart to make the number one hundred times the size of the number shown.

Use the chart to make the number one-hundredth the size of the number shown.

Annie is thinking of a number.

What number is 1,000 times the size of Annie's number?

Tommy is thinking of a number.



What number is 100 less than Tommy's number?

Key Questions:

- How can you tell if a number is a power of 10?
- Is this number a multiple of a power of 10? How can you tell?
- If you move a digit one/two places to the left in a place value chart, how many times greater is the value of the digit?
- How can you use a Gattegno chart to find a number 10 times/one-tenth the size of a given number?

Which calculations have the same answers?

460 × 10	46,000 ÷ 1,000	46 × 10 × 10
46 × 100 × 100	460 × 10 ÷ 100	4,600 ÷ 10 × 1,000

Stem Sentences:

- _____ is 10 times the size of _____, so _____ is one-tenth the size of _____.
- _____ is 100 times the size of _____, so _____ is one-hundredth the size of _____.
- Multiplying/dividing by 10 twice/three times is the same as multiplying/dividing by _____.

Key Vocabulary:

multiplying
dividing
ten
hundred
thousand
place value
integers
10/100/1000 times the size
one-tenth
one-hundredth
one-thousandth
increase
decrease
power of 10
columns
adjacent
multiple
digit
greater
value
Gattegno chart

Maths – Place Value

YEAR 6

Small Steps:

1. Numbers to 1,000,000.
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4. Powers of 10.
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6. Compare and order any integers.
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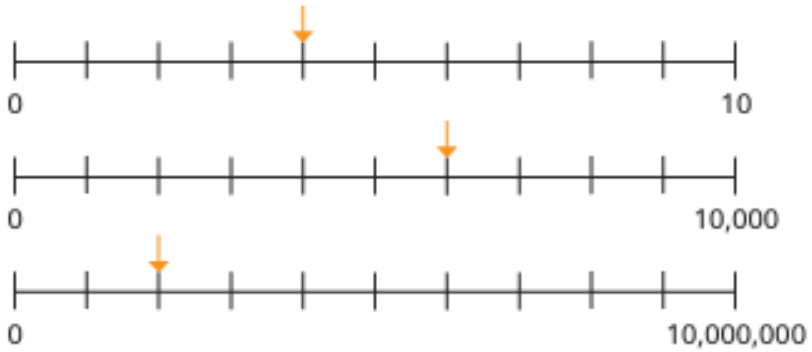
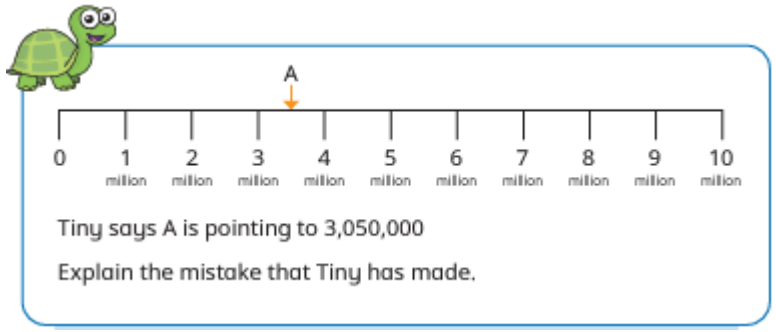
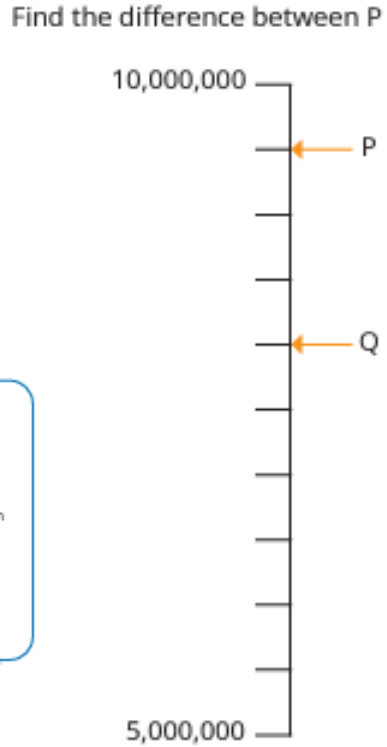
8. Negative numbers.

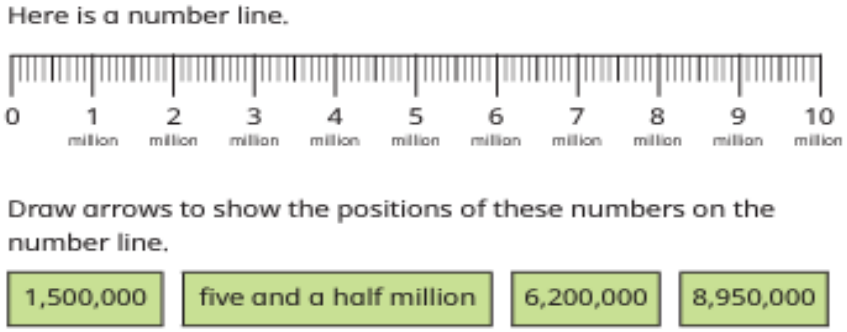






Key Questions:

- What are the values of the start and the end of the number line?
- What is each interval worth?
- How many small divisions are there between each of the large divisions on the number line? What is each small interval worth?
- What is the same and what is different about a number line that goes from 0 to 10,000 and a number line that goes from 0 to 10,000,000?
- What is the midpoint between ____ and ____?
- What is each interval worth if one million is split into two/four/five/ten equal parts?



Stem Sentences:

- The previous multiple of ____ is _____.
- The next multiple of ____ is _____.

Key Vocabulary:

ten thousand
million
number lines
equal
midpoints
divisions
value
interval
worth
same
different
multiple

Maths – Place Value

YEAR 6

Small Steps:

1. Numbers to 1,000,000.
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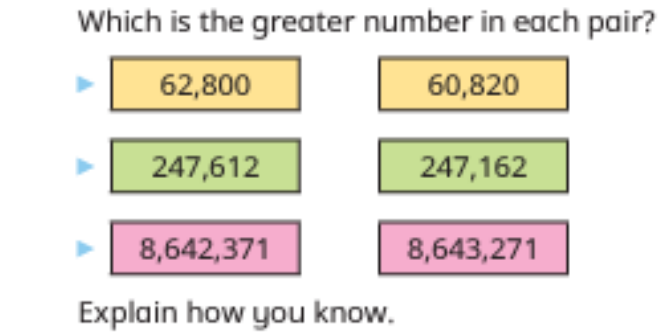
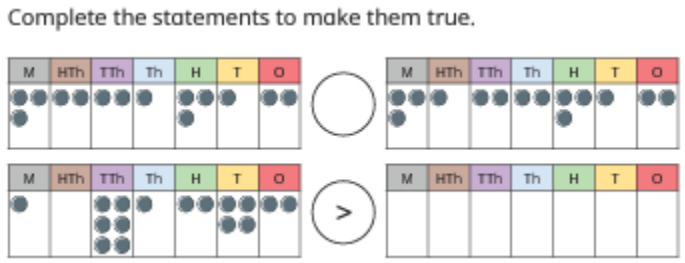
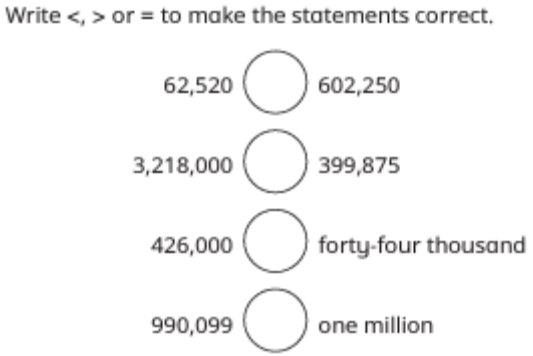
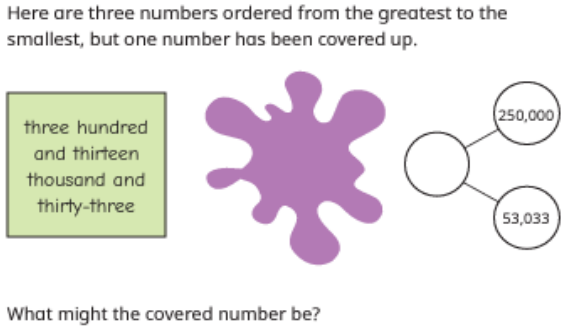


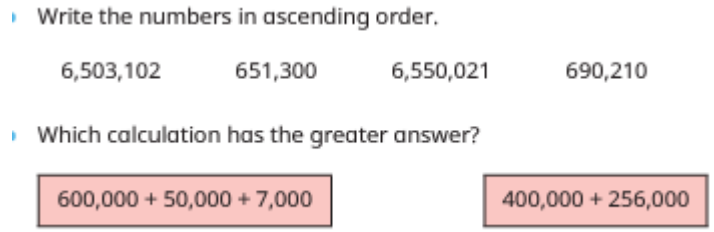






Key Questions:

- What is the value of each digit in the number?
- Which digit in each number has the greatest value? What is the value of these digits?
- When comparing two numbers with the same number of digits, what do you look at first?
- What is the difference between ascending and descending order?
- What is different about comparing numbers with the same number of digits and comparing numbers with different number of digits.



Stem Sentences:

- The value of the first digit in the number _____ is _____.
- _____ is less than/greater than _____.

Key Vocabulary:

compare
order
integers
million
ten million
digits
place value
symbols
greater than
less than
value
difference
ascending
descending

Maths – Place Value

YEAR 6

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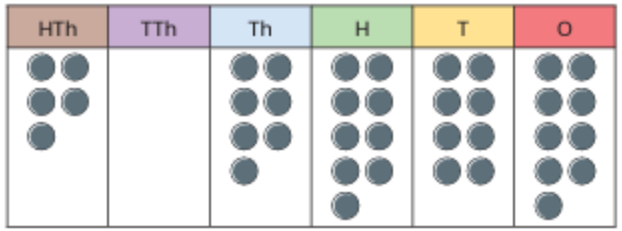
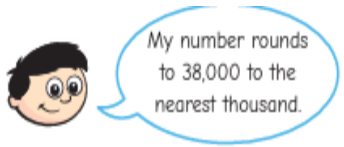
Draw an arrow to show the approximate position of 8,640,000 on the number line.

Round 8,640,000 to the nearest million.



Round the number in the place value chart to:

- the nearest ten thousand
- the nearest hundred thousand
- the nearest million.



What is the greatest possible value of Dexter's number?

What is the smallest possible value of Dexter's number?

In April 2021, the average price of a house in England was £273,486

Round this price to the nearest £100,000

Round this price to the nearest £10,000

Round this price to the nearest £1,000

Which do you think is the most appropriate number to round the price to?

Key Questions:

- Which multiples of 1,000,000 does the number lie between?
- How can you represent the rounding of this number on a number line?
- Which division on the number line is the number closer to?
- What is the number rounded to the nearest million?
- What is the most appropriate way of rounding this number?
- Which place value column should you look at to round the number to the nearest ten/hundred/thousand/ten thousand/hundred thousand/million?

The population of London is 8,982,604

Between which two multiples of 1,000,000 does this number lie?

Round the population of London to the nearest million.

Stem Sentences:

- The previous multiple of _____ is _____.
- The next multiple of _____ is _____.
- _____ rounded to the nearest _____ is _____.

Key Vocabulary:

rounding
million
power of 10
hundred thousand
previous
next
multiples
midpoints
number lines
closer to
halfway
greater
division
place value
column
nearest

Maths – Place Value

YEAR 6

Small Steps:

1. Numbers to 1,000,000.
2. Numbers to 10,000,000.
3. Read and write numbers to 10,000,000.
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5. Number line to 10,000,000.
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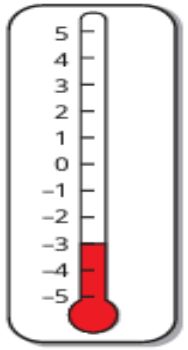
What temperature does the thermometer show?

If the temperature drops by 1 °C, what temperature will the thermometer show?

What temperature is 5 °C warmer than the temperature shown on the thermometer?



The table shows the temperatures in four places on a day in January.

Bradford	2 °C
Harlow	−3 °C
Aberdeen	−7 °C
Southampton	4 °C

Which place has the lowest temperature?

Work out the difference between the temperature in Harlow and the temperature in Southampton.

The next day the temperature in Bradford dropped by 6 °C. Work out the new temperature in Bradford.

Complete the number sequences.

▸	8	5	2		
▸	−11		−3	1	

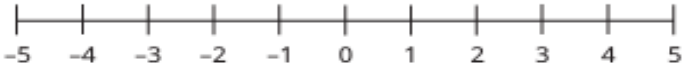
Find different ways of completing the calculation.

_____ + _____ = −2

Key Questions:

- What is the same and what is different about the numbers 2 and -2 (negative two)?
- How far is -5 from zero? How far is -5 from 1?
- Which is the greater temperature, -1 degrees or -2 degrees?
- How do you find the difference between two negative numbers?
- How do you find the difference between a positive number and a negative number?
- What is the same and what is different about counting forwards/backwards along a number line beyond zer?

Use the number line to answer the questions.



What is 6 less than 4?

What is 5 more than −2?

What is the difference between 3 and −3?

Key Vocabulary:

negative numbers
number line
zero
horizontal/vertical
temperatures
thermometer
adding
subtracting
positive
negative
difference
calculating
intervals
same
different
degrees
forwards
backwards
greater than
less than

Stem Sentences:

- To find the number _____ greater/less than _____, I count _____ on the number line.
- _____ is _____ away from zero.

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

1. Add and subtract integers.
2. Common factors.
3. Common multiples.
4. Rules of divisibility.
5. Primes to 100.
6. Square and cube numbers.
7. Multiply up to a 4-digit number by a 2-digit number.
8. Solve problems with multiplication.
9. Short division.
10. Division using factors.
11. Introduction to long division.
12. Long division with remainders.
13. Solve problems with division.
14. Solve multi-step problems.
15. Order of operations.
16. Mental calculations and estimation.
17. Reason from known facts.

Find the answers to the calculations.

		3	4	6	2	1
+	2	5	7	3	4	

		4	7	6	1	3	2	5
−		9	3	8	0	5	2	

Which calculations would you work out mentally, and which would you work out using the column method?

67,832 + 5,258	834,501 − 299,999	450,000 + 201,000
8 million subtract $3\frac{1}{2}$ million	604,000 − 25,000	

Work out the answers to the calculations.

Find the missing digits.

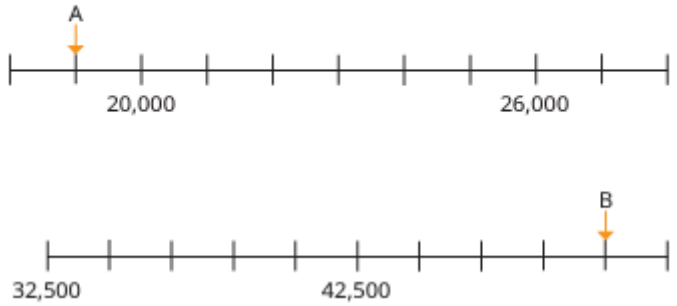
		5	2	2	4	7	□
	+	3	□	5	9	0	4
		9	0	□	3	□	2

The perimeter of the triangle is equal to the perimeter of the rectangle. Work out the unknown length of the triangle.

Key Questions:

- What is the greatest digit you can have in a place value column?
- How do you exchange when adding?
- How do you exchange when subtracting?
- Which columns are affected by the exchange?
- How do you know whether to add or subtract the numbers?
- How can you check your answer to the calculation?

Find the difference between A and B.



Stem Sentences:

- In column addition/subtraction, we start with the ____ place value column.
- The ____ is in the ____ column. It represents ____.

Key Vocabulary:

add
subtract
integers
formal column method
mental strategy
place value
multi-step
operations
methods
exchanges
greatest
column

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

1. Add and subtract integers.
2. Common factors.
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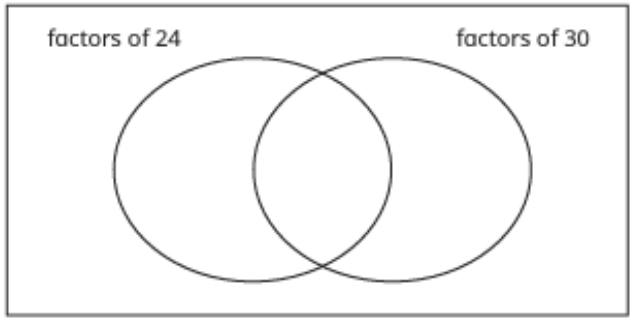
8. Solve problems with multiplication.
9. Short division.
10. Division using factors.
11. Introduction to long division.
12. Long division with remainders.
13. Solve problems with division.
14. Solve multi-step problems.
15. Order of operations.
16. Mental calculations and estimation.
17. Reason from known facts.

Find the common factors of each pair of numbers.

20 and 30	28 and 45	24 and 40

Write the numbers in the sorting diagram.

1 2 3 4 5 6 8 10 12 15 24 30



List the common factors of 24 and 30

Decide if each statement is true or false.

5 is a factor of both 95 and 75
3 is a common factor of 45 and 54
4 is not a common factor of 56 and 80

Key Questions:

- What are the factors of ____?
- What factors do ____ and ____ have in common?
- How can you easily tell if 2/5/10 is a factor of number?
- If you know one factor of a number, how can you use it to find another factor of the number?
- Is 1 a factor of all numbers?
- How can you work systematically to find all the factors of a number?

Key Vocabulary:

factors
common factors
arrays
times-tables
rules of divisibility
pairs
largest
HCF
highest common factor
systematically

Here is a table for sorting numbers.

Write one number in each box.

	Factor of 6	Not a factor of 6
Factor of 9		
Not a factor of 9		

Stem Sentences:

- ____ is a factor of all number.
- The largest factor of a number is always ____.
- ____ is a factor of ____ because ____ is in the _____ times-table.

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

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3. Common multiples.
4. Rules of divisibility.
5. Primes to 100.
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12. Long division with remainders.
13. Solve problems with division.
14. Solve multi-step problems.
15. Order of operations.
16. Mental calculations and estimation.
17. Reason from known facts.

Here is a hundred square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Shade the multiples of 6

Circle the multiples of 5

What common multiples of 5 and 6 do you find?

Use these numbers to find other common multiples of 5 and 6

Find the first three common multiples of each pair of numbers.

4 and 5	5 and 6	4 and 8	6 and 8

Here is a table for sorting numbers.

Write one number in each box.

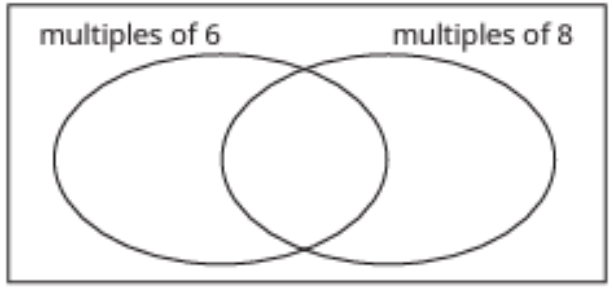
	Multiple of 8	Not a multiple of 8
Multiple of 5		
Not a multiple of 5		

Key Questions:

- How do you find the multiples of a number?
- What multiples do ____ and ____ have in common?
- What is the difference between a multiple and a factor?
- Can a number be both a factor and a multiple of another number?
- How can you tell is a number is a multiple of another number?
- When do numbers have common multiples that are less than their product?

Write the numbers in the sorting diagram.

12 18 40 6 48 24 16 42 56 54 30



Stem Sentences:

- The first multiple of a number is always ____.
- ____ is a multiple of ____ because ____ x ____ = ____
- ____ is a common multiple of ____ and ____.

Key Vocabulary:

multiples
times-tables
common multiples
factors
arrays
rules of divisibility
systematically
product
LCM
lowest common multiple
difference

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

1. Add and subtract integers.
2. Common factors.
3. Common multiples.
4. Rules of divisibility.
5. Primes to 100.
6. Square and cube numbers.
7. Multiply up to a 4-digit number by a 2-digit number.
8. Solve problems with multiplication.
9. Short division.
10. Division using factors.
11. Introduction to long division.
12. Long division with remainders.
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14. Solve multi-step problems.
15. Order of operations.
16. Mental calculations and estimation.
17. Reason from known facts.

Which of the numbers are divisible by 2?

62	901	5,462
10,308	111,111	224,528

Which of the numbers are also divisible by 4? How can you tell?

Use the digit sums to decide which numbers are divisible by 3 and which are also divisible by 9

78	801	5,460
12,307	555,222	48,117

Find a number that matches each description.

- a 3-digit number that is divisible by 5
- a 6-digit number that is divisible by 10
- a 4-digit number that is divisible by 5 and 3
- a 5-digit number that is divisible by 3 but not divisible by 5

Scott is packing cakes into boxes.

He puts an equal number of cakes into each box with no cakes left over.

He has 1,032 cakes to pack.

How many cakes can go in each box?

Key Questions:

- How does the ones digit help you to decide if a number is divisible by 2, 5 or 10?
- How can you use the rule for divisibility by 2 to find out if a number is divisible by 4/8?
- What two other numbers must a number be divisible by if the number is divisible by 6/12?
- How can you tell if a 2-digit number is divisible by 11?
- Which divisibility rules are based on the sum of the digits of a number?

Use ticks and crosses to complete the table.

	Is the number divisible by ...?				
	3	4	6	9	11
87					
96					
99					
216					
702					

Stem Sentences:

- If a number is divisible by ____ and ____, then the number must also be divisible by ____.
- If the sum of the digits is divisible by ____, then the number is divisible by ____.
- A number is divisible by ____ if its ones digit is ____.

Key Vocabulary:

rules of divisibility
patterns
times-tables
ones
digits
halving
even
divisible
sum
factors
2-digit
same

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

1. Add and subtract integers.
2. Common factors.
3. Common multiples.
4. Rules of divisibility.
5. Primes to 100.
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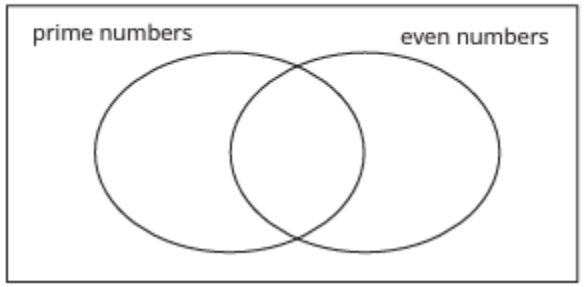
Which of these numbers are prime and which are composite?

30	31	32	33	34
35	36	37	38	39

Write the numbers in the sorting diagram.

10 13 2 12 11 6 7



Find the prime factors of the numbers.

30	33	39	42	43	49	50

Write the three prime numbers that multiply to make 105

_____ × _____ × _____ = 105

Key Questions:

- What is a prime number?
- What is a composite number?
- How many factors does a prime number have?
- Why is 1 not a prime number?
- How can you find the prime factors of a number?
- Are the multiples of prime numbers also prime?

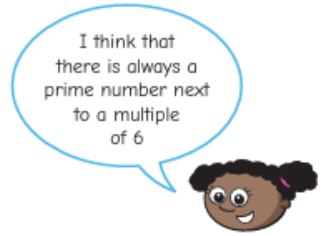
Ron is thinking of a number.

Use the clues to work out Ron's number.

- It is a composite number.
- It has two prime factors.
- It is an odd number.
- It is a factor of 60

Shade the multiples of 6 on a hundred square.

What do you notice about all the numbers either side of the multiples of 6?



Is Whitney correct?

Explain your reasoning.

Stem Sentences:

- The factors of ____ and ____. The prime factors of ____ are ____.
- ____ is prime because it has exactly ____ factors.
- ____ is a composite number because ____ = ____ x ____

Key Vocabulary:

prime numbers
composite numbers
factors
prime factors
square numbers
cube numbers

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

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The table shows some square numbers and cube numbers.

Complete the table and describe any patterns and connections you notice. The first row has been done for you.

1^2	1×1	1	1^3	$1 \times 1 \times 1$	1
					8
	3×3		3^3		27
	4×4			$4 \times 4 \times 4$	
		25	5^3		
				$6 \times 6 \times 6$	
8^2					

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

3^3 ◯ 4^2

8^2 ◯ 4^3

11^2 ◯ 5^3

Here are some number cards.

1	4	8	9	16

27	37	49	64

Which numbers are square?

Which numbers are cube?

Which numbers are both square and cube?

Which numbers are prime?

Key Questions:

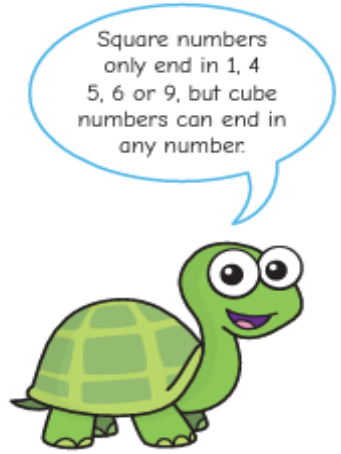
- How do you square a number?
- How do you cube a number?
- Are the squares of even/odd numbers even or odd?
- Are the cubes of even/odd numbers even or odd?
- Can a number be both a square number and a cube number?
- How can you use a square number to help find a cube number?

● + ▲ = 38

● is a cube number.

▲ is a prime number.

Find pairs of values for ● and ▲.



Do you agree with Tiny?

Stem Sentences:

- To square a number, you multiply the number by ____.
- To cube a number, you multiply the number by ____ and then by ___ again.
- I know ____ is a square /cube number because...

Key Vocabulary:

square numbers
cube numbers
notation
area
volume
formula
factors
odd
even
multiple
prime
multiply

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

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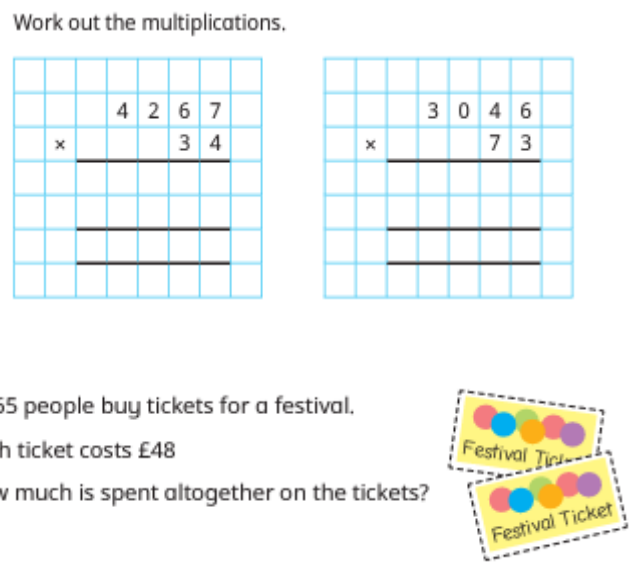

Key Questions:

- How do you set out a long multiplication?
- Which number do you multiply first?
- What is important to remember when you begin to multiply by the tens digit?
- When do you need to make an exchange? How do you do this?
- What happens if there is an exchange needed in the last step of the calculation?
- What is the quickest way of multiplying whole numbers by 10/100/1000?
- What number is 99 close to? How does this help you to multiply by 99?
- If you double a number and then double it again, what is the overall effect on the original number?
- What factor pairs have a product of ____? How does this help you to multiply by ____? Which factor pair is easiest to use?

Stem Sentences:

- To multiply by a 2-digit number, first multiply by the ____, then multiply by the ____ and then find the ____.
- Multiplying by ____ is the same as multiplying by ____ and then multiplying the answer by ____.
- To multiply by ____, I can multiply by ____ and add/subtract ____ to/from the product.
- ____ = ____ x ____, so to multiply by ____ I can multiply by ____ and then multiply the product by ____.

Key Vocabulary:

long multiplication
multiply
4-digits
2-digits
commutative
multi-step
tens
exchange
zero
placeholder
calculation
column method
powers of 10
adjust
subtract
product
factors
alternative
times-table
whole number
double
factor pair

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

1. Add and subtract integers.
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4. Rules of divisibility.
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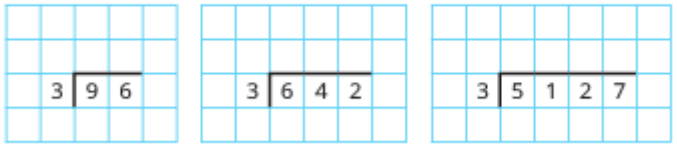
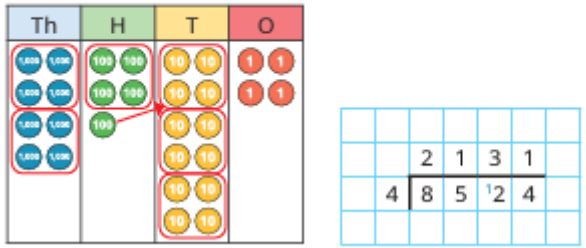
Complete the short divisions.



Here is 8,524 ÷ 4 shown using place value counters and short division.

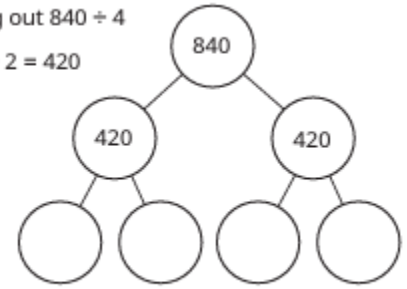


1,480 pencils are grouped into packets of 5

How many groups of 5 pencils are there?

Esther is working out 840 ÷ 4

She knows 840 ÷ 2 = 420



How can Esther use this fact to help find 840 ÷ 4?

Key Questions:

- How many groups of 4 ___ are there in 40/400/4000?
- How many groups of 4 ___ are there in 80/800/8000?
- What do you do with any remaining ones at the end of a division?
- If you cannot make a group in a column, what do you do?
- What does the remainder mean in this questions?
- What does the word factor mean?
- What are the factors of the number you are dividing by?
- What numbers did you find it easy to divide by?
- How can you check your answer?
- Which factor are you going to divide by first/second? Why?

Stem Sentences:

- _____ thousands divided by _____ is equal to _____ thousands with a remainder of _____. The remainder is exchanged into _____ hundreds.
- _____ hundreds divided by _____ is equal to _____ hundreds with a remainder of _____. The remainder is exchanged into _____ tens.
- Dividing by 4 is the same as dividing by _____ and _____ again.
- The factor pairs of _____ are _____.
- To divide by _____, I can first divide by _____ and then divide the answer by _____.
- _____ = _____ x _____, so to divide by _____ I can divide by _____ and then divide the answer by _____.

Key Vocabulary:

short division
divide
4-digit
single-digit
long division
integer
remainder
multiples
times-table
groups of
column
thousands
equal to
exchanged
hundreds
tens
factors
multiplication
repeated division
halve

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

1. Add and subtract integers.
2. Common factors.
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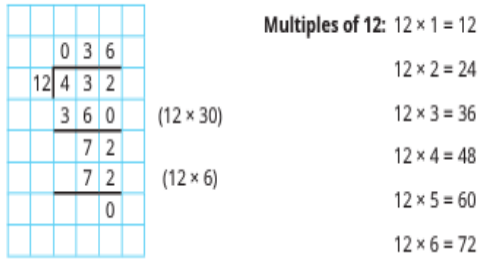
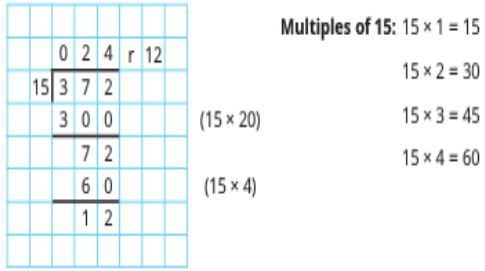
Here is 360 ÷ 12 using the long division method.



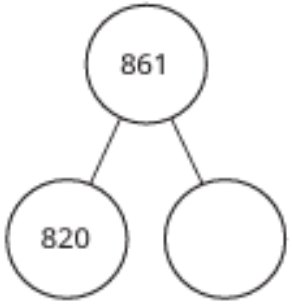
Multiples of 12: 12 × 1 = 12
12 × 2 = 24
12 × 3 = 36
12 × 4 = 48
12 × 5 = 60
12 × 6 = 72

Filip uses multiples to help divide 372 by 15



Multiples of 15: 15 × 1 = 15
15 × 2 = 30
15 × 3 = 45
15 × 4 = 60

861 ÷ 41



Key Questions:

- How can you use multiples to divide by a 2-digit number?
- Why do we subtract as we go along?
- What does the arrow represent in the long division?
- Can this division be done using factors instead? Why or why not?
- What is the first step when performing a long division?
- Why do we subtract as we go along?
- In a long division, what happens are the subtraction if you cannot divide exactly?
- What is the first step when performing a long division?
- What is the most useful way of portioning the number?
- Would you use short division or long division? Why?
- If you double a number and then double it again, what is the overall effect on the original number?
- What factor pairs have a product of ____? How does this help you to divide by ____? Which factor pair is easiest to use?

Stem Sentences:

- ____ hundreds divided by ____ is equal to ____ hundreds with a remainder of ____. The remainder is exchanged into ___ tens.
- ____ tens divided by ____ is equal to ____ with a remainder of ____. The remainder is exchanged into ____ ones.
- ____ cannot be divided by ____, so there is a ____ of ____.
- I will partition the number into ____ and ____ because both ____ and ____ are divisible by ____.
- ____ = ____ x ____, so to divide by ____ I can divide by ____ and then divide the quotient by ____.

Key Vocabulary:

long division
dividing
2-digit
single-digit
3-digit
remainders
expanded method
multiples
formal long division
4-digit
composite numbers
factors
subtract
exchanged
integer
full
total
less than
estimation
subtract
strategy
solution
partitioning
double
quotient

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

Small Steps:

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The total mass of apples in a box is 25 kg.

The total mass of oranges in a box is 24 kg.

- There are 32 boxes of apples and 25 boxes of oranges in a supermarket.

  What is the total mass of apples and oranges?

- A customer orders 300 kg of apples and 600 kg of oranges.

  How many boxes of fruit will the customer receive?

At a parade, there are 25 rows of people with 8 people in each row.

Each person holds 2 flags.

How many flags are needed for the parade?

The area of a rectangular tile is 40 cm²

The width of the tile is 5 cm.

A strip of tiles is made by laying tiles end-to-end.

How long is a strip with 15 tiles?

How many tiles are needed to make a strip 280 cm long?

How many tiles are needed to make a strip 4 m long?

Key Questions:

- What can you work out first?
- Is this step an addition, a subtraction, a multiplication or a division? How can you tell?
- Could you draw a diagram to represent the problem?
- Can you work out the answer to this part of the problem mentally or do you need another method?
- What can you do next?

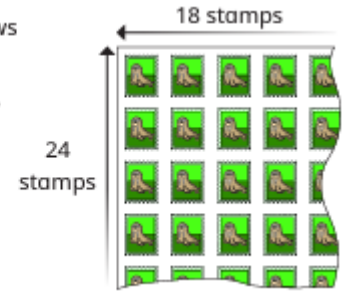
Five boxes of toy trains cost £120

Each box contains 6 trains.

How much does each train cost?

A sheet of stamps has 24 rows and 18 columns of stamps.

How many stamps are there altogether on 35 sheets?



Stem Sentences:

- First, I need to work out _____.
- The calculation I need to do it _____.
- Next, I need to work out _____.
- The calculation I need to do it _____.

Key Vocabulary:

problems
real-life context
calculation
operations
order
informal/formal
number line
add
subtract
multiply
divide

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

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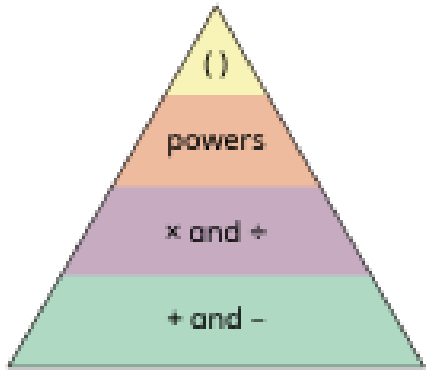
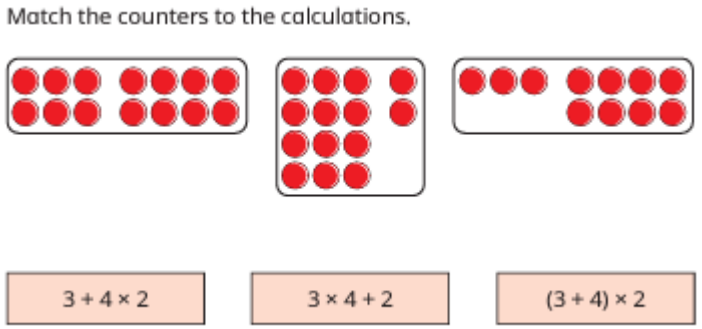




Dani has 7 bags with 5 sweets in each bag.

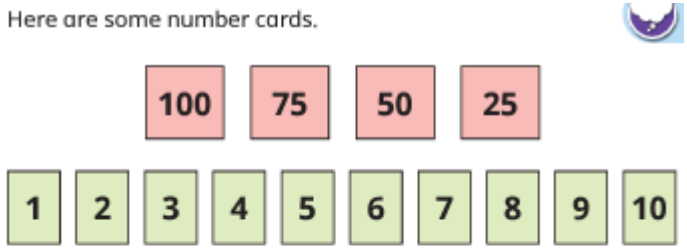
She adds one more sweet to each bag.

Which calculation shows how many sweets there are in total?

7 × (5 + 1) | 7 × 5 + 1

Key Questions:

- Does it make a difference if you perform the operations in a different order?
- What do brackets in a calculation mean? What would happen if you did not use the brackets?
- Which operation has greater priority, addition or multiplication?
- How many pairs of operations do you know that have equal priority?
- How do you find the square of a number?



Pick **one** large number from the top row.

Pick **five** smaller numbers from the bottom row.

Use a calculator or computer to generate a 3-digit target number.

Use your numbers, the four operations and brackets to find a number as close as possible to the target number.

Stem Sentences:

- _____ has greater priority than _____, so the first part of the calculation I need to do it _____.

Key Vocabulary:

order
priority
operations
calculation
brackets
multiplication
division
equal
additions
subtractions
difference
square number
greater

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

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Use rounding to estimate the answer to each calculation.

6,941 + 4,099	6,941 – 4,099	6,941 × 18	6,941 ÷ 11

Compare answers with a partner.

What strategies would you use to find the exact answers to the calculations?

480 + 20	480 – 20	480 × 20	480 ÷ 20

Compare answers with a partner.

How could you change the order of the numbers in each of the calculations to make them easier to do mentally?

97 + 58 + 43	68 + 57 – 28	12 × 9 × 5
50 × 16 × 2	4 × 17 × 25	

Work out the answers to the calculations.

Mo wants to buy a T-shirt for £9.99,
a pair of socks for £2.49
and a cap for £8.99

He has £22 in his wallet.

How can he quickly check whether he has enough money?

Key Questions:

- Should you round the number to the nearest 10/100/1,000? Why?
- Are any of the number multiples of powers of 10? How does this help you to add/subtract/multiply/divide the numbers?
- What number is (for example) 99 close to? How does this help you with the calculation? What adjustment do you need to make?
- How would portioning/reordering the number(s) help?
- Why are estimates of the answers of calculations useful?

It is 816 km from Mr Trent's house to Glasgow.

He drives 583 km of the way.

Approximately how much further does he have to drive?

A textbook costs £19.99

Approximately how many textbooks can be bought for £300?

Stem Sentences:

- The previous multiple of _____ is _____.
- The next multiple of _____ is _____.
- _____ rounded to the nearest _____ is _____.

Key Vocabulary:

mental strategies
estimation
calculation
rounding
simplifying
nearest
multiples
powers of 10
add
subtract
multiply
divide
close to
adjustment
partitioning
reordering
previous
next

Maths – Addition, Subtraction, Multiplication and Division

YEAR 6

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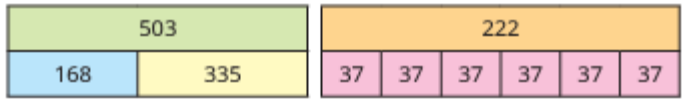
13. Solve problems with division.
14. Solve multi-step problems.
15. Order of operations.
16. Mental calculations and estimation.
17. Reason from known facts.

- Write four facts shown by each bar model.



- Use the fact that 327 + 482 = 809 to work out the answers to the calculations.

3,270 + 4,820	327 + 492	325 + 482	482 + 327
809 – 327	809 – 328	48,200 + 33,700	

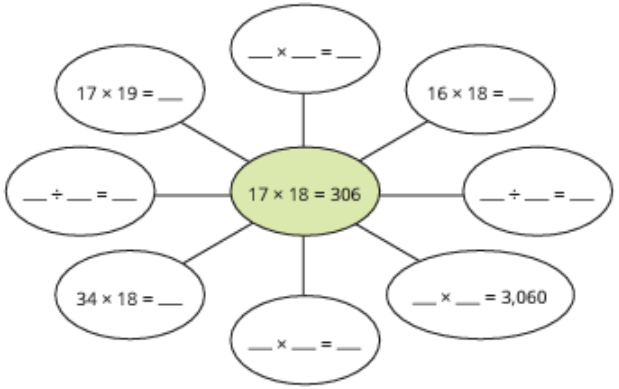
- Use the fact that 11,832 ÷ 29 = 408 to work out the answers to the calculations.

11,832 ÷ 408	408 × 290	4,080 × 290	
118,320 ÷ 408	11,832 ÷ 290		

Key Questions:

- What is an inverse operation?
- How can you use an inverse operation to find related facts?
- What is the same and what is different about the numbers in the given calculation and the numbers in the calculation you want to work out?
- How will the answer change if you increase/decrease/multiply/divide one/both of the numbers by ___?

Complete the spider diagram.



Stem Sentences:

- If I add/subtract ____ to/from one of the numbers in the calculation, then the answer will change by ____.
- If I multiply/divide ____ one of the numbers in the calculation by ____, then the answer will change by ____.

Key Vocabulary:

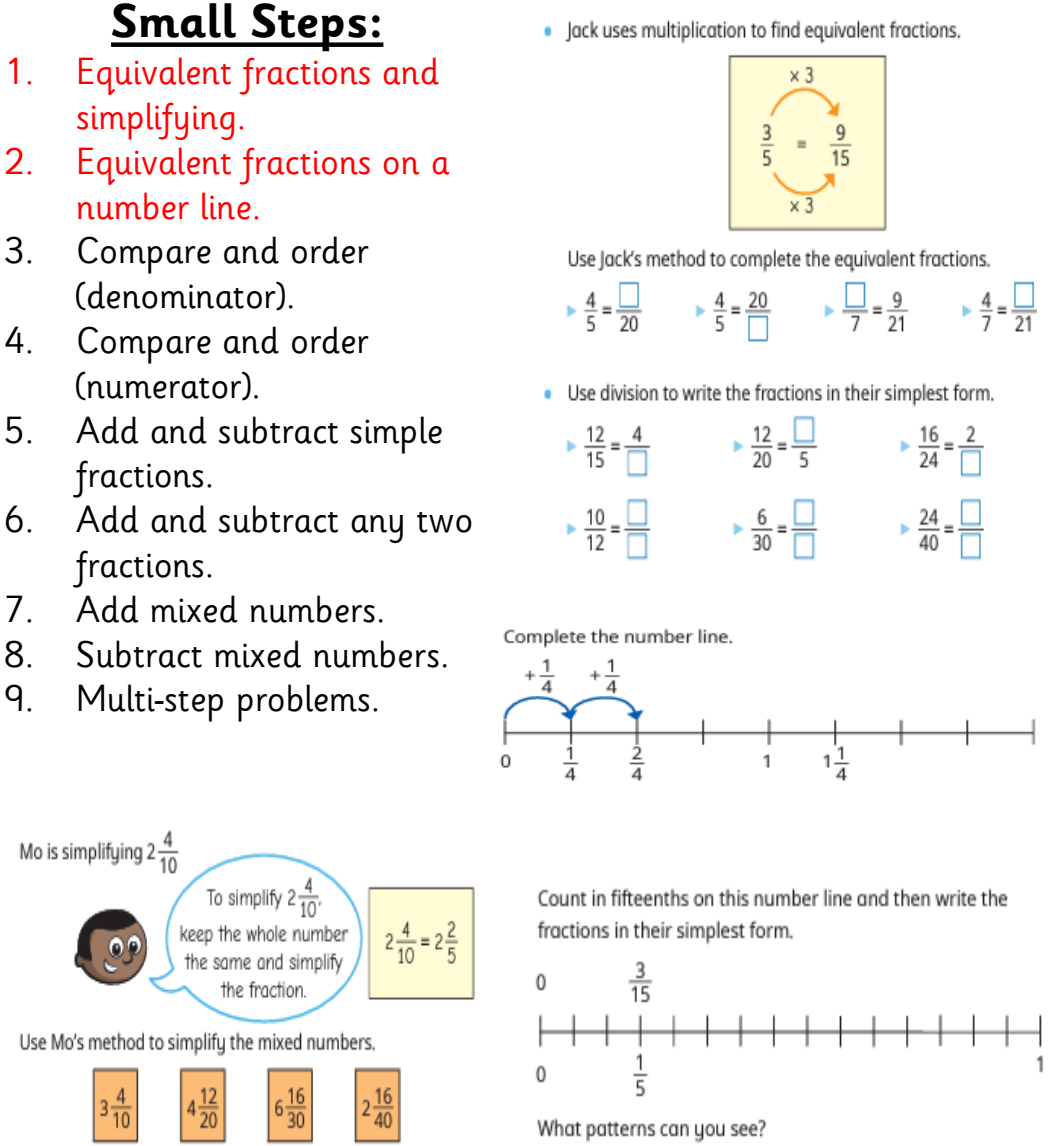
facts
place value
inverse operations
commutativity
mental strategies
area model
number line
links
calculations
multiplying
dividing
powers of 10
doubling
halving
connections
integers
decimal
same
different
increase
decrease

Maths – Fractions A

YEAR 6

Small Steps:

1. Equivalent fractions and simplifying.
2. Equivalent fractions on a number line.
3. Compare and order (denominator).
4. Compare and order (numerator).
5. Add and subtract simple fractions.
6. Add and subtract any two fractions.
7. Add mixed numbers.
8. Subtract mixed numbers.
9. Multi-step problems.



Key Questions:

- What are the common factors of ____ and ____?
- Why is it better to identify the greatest possible number that both the numerator and denominator can be divided by?
- Does the simplified fraction have the same value?
- Do the numerator and denominator have any more common factors?
- How can you tell if a fraction is in its simplest form?
- When simplifying a mixed number, why does the integer not change?
- How many intervals are there on a number line? What is each interval worth?
- What equivalent fractions have you found?
- Is this fraction in its simplest form? How do you know?
- Can you divide the number line into more intervals to place the fractions more accurately?
- How will you place one sixteenth on a number like that is counting in eighths?
- Which fraction was the easiest/hardest to label? Why?

Stem Sentences:

- Both the numerator and the denominator can be divided by ____.
- To simplify the fraction, I will divide the numerator and denominator by ____.
- ____ in its simplest from is ____.
- From my number line, I can see that ____ is equivalent to ____.
- When I count in eighths, I can change____ into ____ because they are equivalent.

Key Vocabulary:

equivalent
simplest form
common factors
simplify
numerator
denominator
greater
divide
fraction wall
value
mixed number
integer
number line
forwards
backwards
intervals
difference

Maths – Fractions A

YEAR 6

Small Steps:

1. Equivalent fractions and simplifying.
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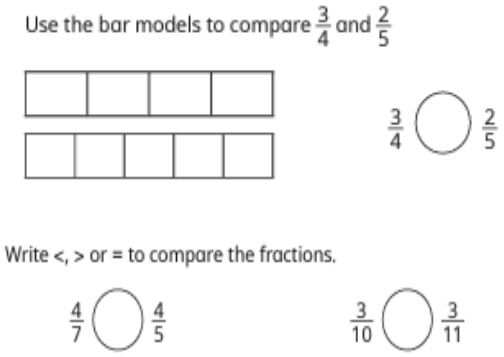

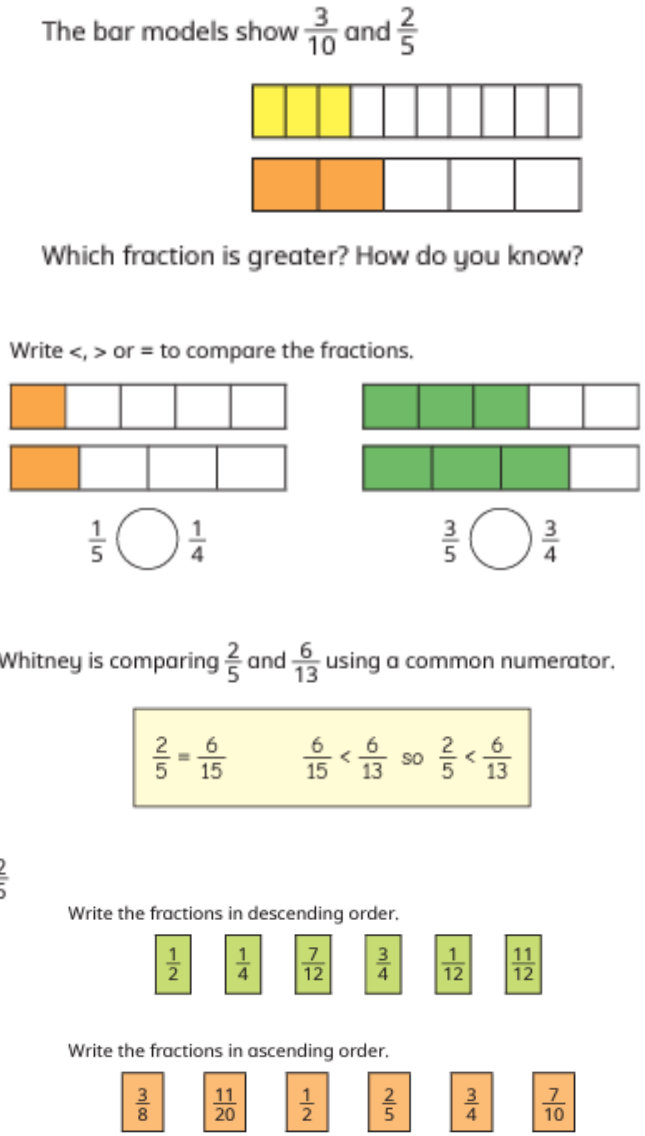

Key Questions:

- How could you use a number line or bar model to help you compare the fractions?
- If the denominators are the same? How do you compare the fractions?
- Is one denominator a multiple of the other?
- If one denominator is not a multiple of the other, what do you need to do to be able to compare the fractions?
- How is comparing mixed numbers different from comparing proper fractions? How is it similar?
- How can you compare the fractions shown in the bar model?
- Do you need to change one or both numerators? Why?
- If this fraction closer to 0 or 1?
- Is this fraction greater or less than ½?
- Is it more efficient to find a common numerator or a common denominator?

Stem Sentences:

- I am comparing ____ and ____. I can use ___ as the common denominator.
- If one denominator is not a multiple of the other, I need to find a ____.
- When the numerators are the same, the ____ the denominator, the ____ the fraction.
- I know ____ is greater than ½ because…
- I know ___ is closer to 1 than ____ because ….

Key Vocabulary:

compare
order
denominator
equivalent
common denominator
bar model
multiple
common multiple
number line
same
different
mixed numbers
proper fractions
similar
numerator
unit fractions
non-unit fractions
greater
smaller
greater than
less than

Maths – Fractions A

YEAR 6

Small Steps:

1. Equivalent fractions and simplifying.
2. Equivalent fractions on a number line.
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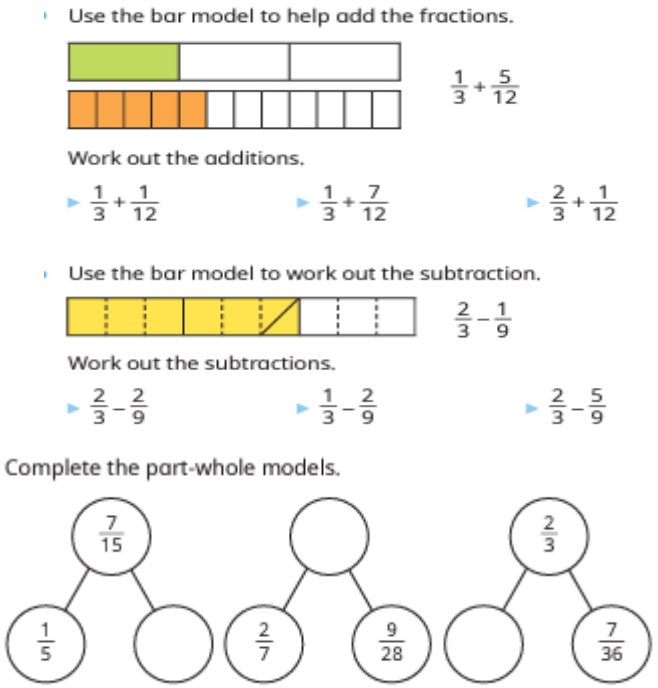
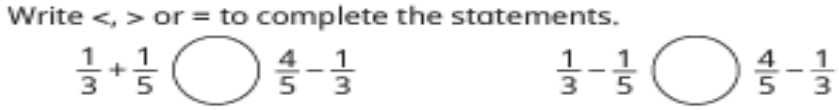
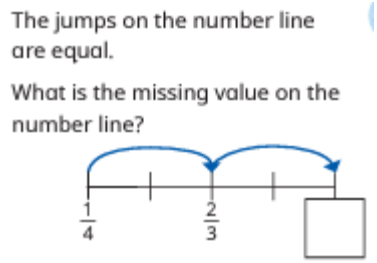
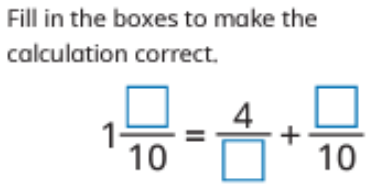








Key Questions:

- Do the fractions have the same denominator?
- When are two fractions equivalent?
- How can you find a common denominator?
- How many of the fractions do you need to convert?
- Now the denominators are the same, how do you add/subtract the fractions?
- Do the fractions have the same denominator?
- What is the first common multiple of ___ and ___?
- How many of the fractions do you need to convert?
- How do you know if your answer is in its simplest form?
- Do you need to convert your answer to a mixed number? Why or why not?

Key Vocabulary:

adding
subtracting
denominator
numerators
equivalent
multiple
bar model
common multiple
improper
mixed number
common denominator
convert
multiply
calculation
greater
simplify
LCM
lowest common multiple

Stem Sentences:

- Fractions must have the same ____ before they can be added or subtracted.
- The denominator has been multiplied by ____, so to make the equivalent fraction, multiply the numerator by ____.
- When fractions have the same ____, to add or subtract them I just ____ the ____.
- The lowest common multiple of ___ and ___ is ____.
- To add/subtract the fractions, I could convert them both to ____.
- When fractions have the same ____, to add or subtract them you just ___ the ____.

Maths – Fractions A

YEAR 6

Small Steps:

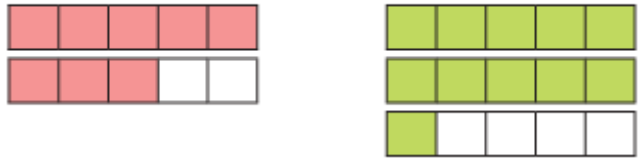
1. Equivalent fractions and simplifying.
2. Equivalent fractions on a number line.
3. Compare and order (denominator).
4. Compare and order (numerator).
5. Add and subtract simple fractions.
6. Add and subtract any two fractions.
7. Add mixed numbers.
8. Subtract mixed numbers.
9. Multi-step problems.

The numbers in the row and column add up to make the totals shown.

$2\frac{1}{4}$	$\square\frac{\square}{8}$	$\frac{1}{2}$	$=3\frac{7}{8}$
$\frac{1}{\square}$			
$3\frac{1}{12}$			
$=5\frac{1}{2}$			

Find the missing values.

Aisha uses a bar model to help work out $1\frac{3}{5}+2\frac{1}{5}=3\frac{4}{5}$



Rosie and Amir are working out $1\frac{1}{2}+2\frac{1}{6}$

Rosie

$1+2=3$

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

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

Amir

$1\frac{1}{2}+2\frac{1}{6}=\frac{3}{2}+\frac{13}{6}$

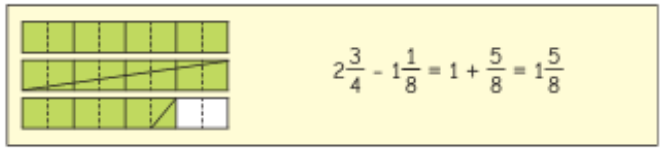
$=\frac{9}{6}+\frac{13}{6}$

$=\frac{22}{6}=3\frac{4}{6}=3\frac{2}{3}$

Whose method do you prefer?

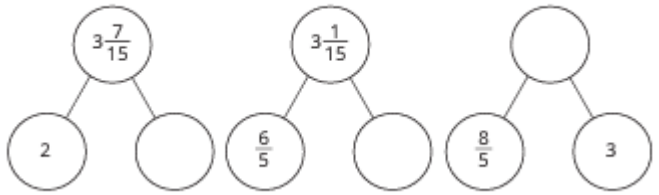
Explain your answer.

Tom uses bar models to help work out $2\frac{3}{4}-1\frac{3}{8}$



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

Complete the part-whole models.



Key Questions:

- How can you partition the mixed numbers?
- How can the addition/subtraction be rewritten to make it easier?
- In this question, it is easier to deal with wholes and fractions or to use improper fractions? Why?
- How do you convert a mixed number into an improper fraction?
- Are there any improper fractions in the answer?
- What can you do about this?

What method would you use to work out the subtractions?

$3\frac{7}{8}-1$ $\quad$ $3\frac{7}{8}-\frac{3}{8}$ $\quad$ $3\frac{7}{8}-1\frac{3}{8}$

Compare methods with a partner.

How is this similar to addition? How is it different?

Stem Sentences:

- Mixed numbers can be partitioned into a ___ part and a ____ part.
- A fraction is improper when the ___ is greater than the ____.
- ____ is made up of ___ wholes and ____.
- This calculation will/will not cross the whole because...
- A fraction is equal to one whole when the ___ is equal to the ___.
- The mixed number can be partitioned into ___ and ____.
- ____ can be written as ____ wholes and ____.

Key Vocabulary:

mixed numbers
additions
wholes
fractional parts
efficient
converting
improper
denominator
numerators
partition
greater than
subtract
same
different
exchange
number line
bar model
equal

Maths – Fractions A

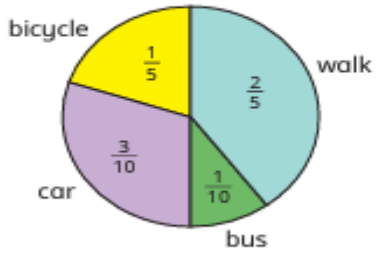
YEAR 6

Small Steps:

1. Equivalent fractions and simplifying.
2. Equivalent fractions on a number line.
3. Compare and order (denominator).
4. Compare and order (numerator).
5. Add and subtract simple fractions.
6. Add and subtract any two fractions.
7. Add mixed numbers.
8. Subtract mixed numbers.
9. Multi-step problems.

Children in Class 6 were asked how they travel to school.

The results of the survey are shown in the pie chart.



What fraction of children do not get the bus to school?

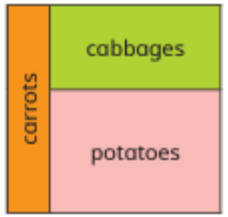
Here is a vegetable patch.

$\frac{1}{5}$ of the patch is for carrots and $\frac{3}{8}$ of the patch is for cabbages.

What fraction of the patch is for potatoes?

How much more of the patch is for the potatoes than for the cabbages?

Give all your answers in their simplest form.

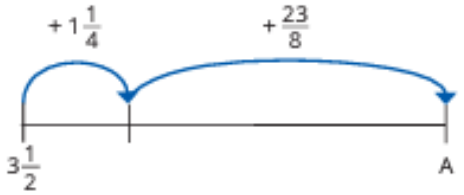


Find the value of ☀

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

$8\frac{1}{10} - \heartsuit = ☀$

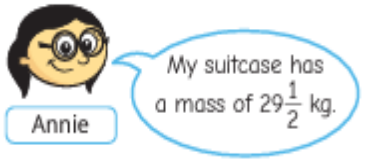
What is the value of A?

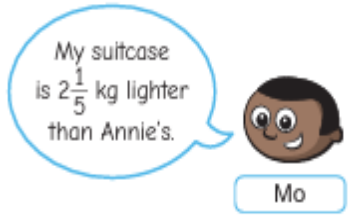


Key Questions:

- What can you work out first?
- What do you need to know to work out the answer?
- Can you draw a diagram to represent the problem?
- Can you work out the answer to this part of the problem mentally or do you need another method?
- What can you do next?

Annie and Mo are going on a trip.





What is the total mass of the suitcases?

There is a weight allowance of 32 kg per suitcase.

How much below the weight allowance are Annie and Mo's suitcases?

Complete the calculation.

$2\frac{9}{12} + 3\frac{15}{20} - 2\frac{3}{4} - 2\frac{75}{100} = \square$

How can you make this calculation simpler?

Key Vocabulary:

solving problems
real-life context
calculation
operations
order
perform
method
simplest form
convert
improper
mixed numbers
mentally
add
subtract

Stem Sentences:

- First, I need to work out...
- The calculation I need to do is...
- Next, I need to work out...

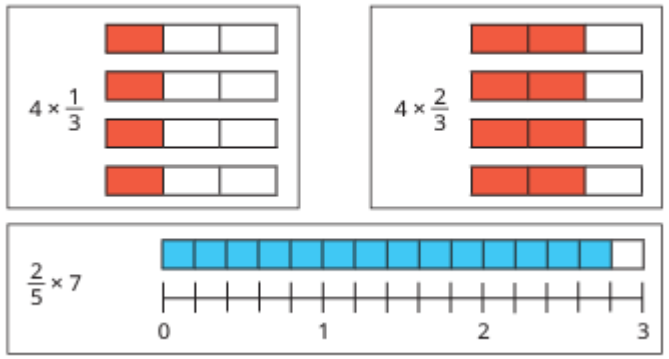
Maths – Fractions B

YEAR 6

Small Steps:

1. Multiply fractions by integers.
2. Multiply fractions by fractions.
3. Divide a fraction by an integer.
4. Divide any fraction by an integer.
5. Mixed questions with fractions.
6. Fraction of an amount.
7. Fraction of an amount – find the whole.

Use the diagrams to work out the multiplications.



Eva partitions $2\frac{3}{5}$ to help her work out $2\frac{3}{5} \times 3$

$2 \times 3 = 6$

$\frac{3}{5} \times 3 = \frac{9}{5} = 1\frac{4}{5}$

$6 + 1\frac{4}{5} = 7\frac{4}{5}$

There are 12 children in a class.

The teacher has 4 litres of orange juice.

Each child gets $\frac{1}{5}$ litre of orange juice.

How much orange juice will be left over?

Huan works out $4 \times \frac{7}{8}$

$4 \times \frac{7}{8} = \frac{28}{8} = 3\frac{4}{8}$

How can you improve Huan's answer?

Key Questions:

- How is multiplying fractions by integers similar to addition of fractions? How is it different?
- What happens to the denominator when you multiply a fraction by an integer?
- Do you find it easier to partition the mixed number first or to convert it to an improper fraction?
- Is 2/3 x 7 equal to 7 x 2/3? Why?

Tiny is working out $4 \times 3\frac{2}{5}$

Is Tiny correct?

Explain your reasoning.

Key Vocabulary:

multiplying
integers
repeated addition
adding
subtracting
denominator
numerator
mixed numbers
partition
convert
improper
similar
different
equal to

Stem Sentences:

- To multiply a fraction by an integer, I need to multiply the numerator by ____.
- To multiply a mixed number by an integer, I can partition it into ____ and ____ and then multiply them both by the integer.
- To multiply a mixed number by an integer, I can convert the mixed number to an ___ and then...

Maths – Fractions B

YEAR 6

Small Steps:

1. Multiply fractions by integers.
2. Multiply fractions by fractions.
3. Divide a fraction by an integer.
4. Divide any fraction by an integer.
5. Mixed questions with fractions.
6. Fraction of an amount.
7. Fraction of an amount – find the whole.

Work out the missing numbers.

$\frac{1}{2} \times \frac{1}{\square} = \frac{1}{16}$

$\frac{\square}{6} \times \frac{3}{5} = \frac{21}{30}$

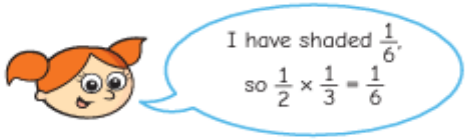
$\frac{3}{\square} \times \frac{4}{5} = \frac{3}{5}$

Alex is using a piece of paper to work out $\frac{1}{2} \times \frac{1}{3}$

First, she folds the piece of paper in half.

Then she folds the half into thirds.

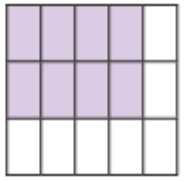
Alex shades the fraction that she has created.



Use Alex's method to work out the multiplications.

$\frac{1}{4} \times \frac{1}{2}$ $\frac{1}{4} \times \frac{1}{3}$ $\frac{1}{4} \times \frac{1}{4}$

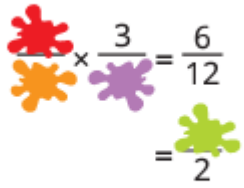
Dani is using a diagram to work out $\frac{2}{3} \times \frac{4}{5}$



Explain why the diagram shows $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$

Use similar diagrams to work out $\frac{2}{3} \times \frac{2}{5}$ and $\frac{2}{3} \times \frac{3}{5}$

Find the missing numbers.

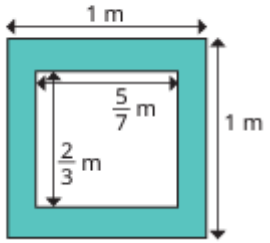


Is there more than one answer?

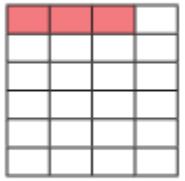
Key Questions:

- How can you show the calculation as a diagram?
- What is the same and what is different about "half of" a number "1/2 x" a number?
- When you multiply two fractions, is the product greater than or smaller than each of the fractions? Why?
- Why are all of your answers less than 1?

What is the area of the shaded region?



Aisha uses this diagram to work out the product of two fractions.



What fractions has Aisha multiplied?

What is the answer?

Stem Sentences:

- To show ____, I have split my diagram into ____ equal sections.
- To find the product, I need to…
- When multiplying a pair of fractions, I need to multiply the ____ and multiply the ____.

Key Vocabulary:

multiply
numerators
denominators
simplest form
calculations
same
different
half
product
greater
less than
equal

Maths – Fractions B

YEAR 6

Small Steps:

1. Multiply fractions by integers.
2. Multiply fractions by fractions.
3. Divide a fraction by an integer.
4. Divide any fraction by an integer.
5. Mixed questions with fractions.
6. Fraction of an amount.
7. Fraction of an amount – find the whole.

Is the statement true or false?

$\frac{3}{5} \div 4 = \frac{3}{4} \div 5$

Explain your answer.

Find the missing fractions and integers.

$\_\_\_\_ \div 4 = \frac{7}{36}$

$\frac{3}{20} \div \_\_\_\_ = \frac{3}{80}$

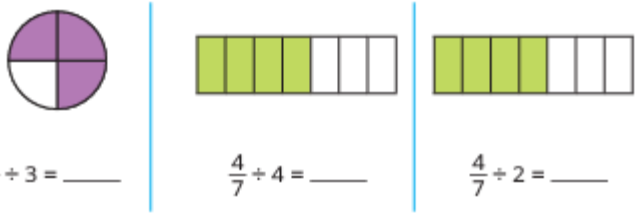
$\_\_\_\_ \div \_\_\_\_ = \frac{2}{5}$

Filip has $\frac{2}{5}$ of a chocolate bar.

He shares it with his friend.

What fraction of the chocolate bar do they each get?

Use the diagrams to help you work out the divisions.

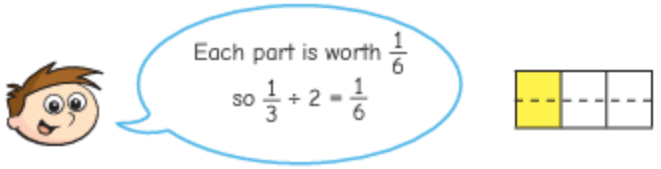


$\frac{3}{4} \div 3 = \_\_\_\_$

$\frac{4}{7} \div 4 = \_\_\_\_$

$\frac{4}{7} \div 2 = \_\_\_\_$

Teddy divides one third into 2 equal parts.



Draw diagrams to work out the divisions.

$\frac{1}{3} \div 3$ $\frac{2}{3} \div 3$ $\frac{1}{5} \div 3$ $\frac{2}{5} \div 3$

Work out the missing numbers.

$\frac{1}{3} \div 2 = \frac{3}{4} \times \frac{\square}{\square} = \frac{\square}{\square}$

$\frac{3}{5} \div 2 = \frac{3}{5} \times \frac{\square}{\square} = \frac{\square}{\square}$

Key Questions:

- How could you represent the fraction?
- How could you split the fraction into ___ equal parts?
- What do you notice about the numerators in the question and the answer?
- What do you notice about the denominators in the question and the answer?
- What changes and what stays the same?
- How can you show the division as a bar model?
- What is each part of the fraction worth?
- How is 1/3 ÷ 2 similar to 1/3 x 1/2?
- What fractions are equivalent to____?
- Why does finding an equivalent fraction help you to divide a fraction by an integer?
- What multiplication can you use to work out _____ ÷ _____ ?

Stem Sentences:

- If you divide _____ into equal groups, then each group is _____ because _____ ÷ _____ = _____.
- _____ ones divided by _____ is equal to _____ ones, so _____eighths divided by _____ is equal to _____ eighths.
- The bar is split into _____ equal parts.
- I am dividing each _____ by _____, so I must split each part into ___ equal parts.
- _____ is equivalent to _____, so _____ ÷ _____ is equal to _____ ÷ _____.

Key Vocabulary:

dividing
Integers
numerator
multiple
bar model
number sentence
representation
denominator
same
shared
equal
split
changes
division
groups
equivalent
multiplying
unit fraction
pattern

Maths – Fractions B

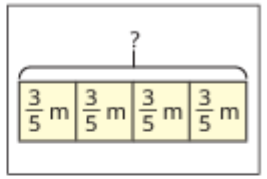
YEAR 6

Small Steps:

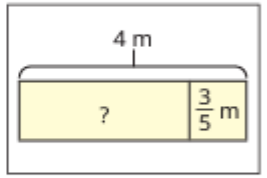
1. Multiply fractions by integers.
2. Multiply fractions by fractions.
3. Divide a fraction by an integer.
4. Divide any fraction by an integer.
5. Mixed questions with fractions.
6. Fraction of an amount.
7. Fraction of an amount – find the whole.

Match the bar models to the correct problems.

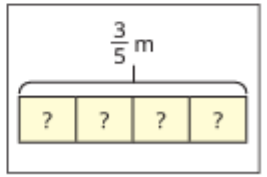
A piece of ribbon is 4 m long. Tom cuts $\frac{3}{5}$ off. How much ribbon is left?



Nijah has 4 pieces of ribbon. Each piece is $\frac{3}{5}$ m long. How much ribbon does Nijah have altogether?



A piece of ribbon is $\frac{3}{5}$ m long. Brett cuts it into 4 equal parts. How long is each part?

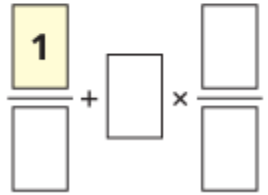


Work out the answer to each problem.

Key Questions:

- Do you need to find the whole or a part? Where can you show this on the bar model?
- What type of calculation do you need to do? How can you tell?
- Does it matter in which order you perform the calculations? Why/why not?
- Which operation should you perform first/second?
- What happens when you insert brackets into the calculation?

Using each digit once only, find as many solutions to the calculation that are between 1 and 2 as you can.

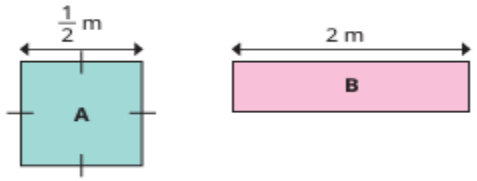


Key Vocabulary:

four operations
bar model
word problems
multi-step
add
subtract
multiply
divide
whole
part
calculation
order
perform
brackets

Square A and rectangle B have the same area.

Find the difference between their perimeters.



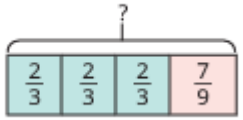
Find the difference between $\frac{3}{4} \times 3$ and $\frac{3}{4} + 3$

Add two sets of brackets to make the calculation correct.

$$\frac{1}{2} + \frac{1}{4} \times 8 + \frac{1}{6} \div 2 + 1 = 6\frac{1}{18}$$

Find the total length of the bar.

Is there more than one way to find the answer?



Stem Sentences:

- In this calculation, first I need to do ____ and then...
- To solve the problem, I need to find the ____ of the two fractions.

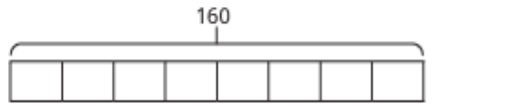
Maths – Fractions B

YEAR 6

Small Steps:

1. Multiply fractions by integers.
2. Multiply fractions by fractions.
3. Divide a fraction by an integer.
4. Divide any fraction by an integer.
5. Mixed questions with fractions.
6. Fraction of an amount.
7. Fraction of an amount – find the whole.

Use the bar model to find the missing numbers.



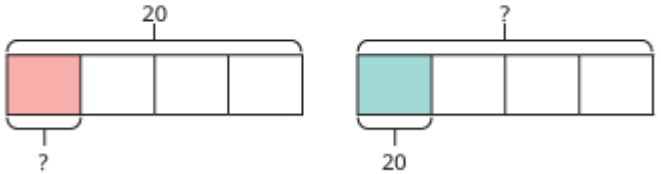
▸ $\frac{1}{8}$ of 160 = _____ ▸ $\frac{5}{8}$ of 160 = _____ ▸ _____ of 160 = 60

Work out the fractions of the amounts.

$\frac{1}{5}$ of 20	$\frac{1}{4}$ of 40	$\frac{1}{5}$ of 30
$\frac{1}{10}$ of £20	$\frac{1}{8}$ of 40 m	$\frac{1}{10}$ of 90 g

Complete the calculations.

$\frac{1}{4}$ of 20 = _____ $\frac{1}{4}$ of _____ = 20

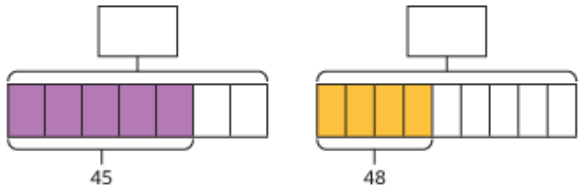


Fill in the missing numbers.

$\frac{\square}{6}$ of £300 = £250

420 g = $\frac{\square}{12}$ of 720 g

Work out the missing wholes.



Key Questions:

- How do multiplication and division help us when finding fractions of an amount?
- What does dividing the whole amount by the denominator work out?
- How are the parts and wholes represented in a fraction?
- What bar model could you draw to represent the calculation?
- What is the difference between a unit fraction and a non-unit fraction?
- How many equal parts are there altogether?
- How many equal parts do you know the value of?
- What is the value of each equal part?
- How can you find the whole?
- Should the whole be greater than or less than the value you are given? Why?

Stem Sentences:

- The whole is divided into _____ equal parts. Each part is worth _____.
- The numerator is _____, so the fraction is worth _____.
- If one fifth is equal to _____, then _____ fifths are equal to _____.
- If one-sixth is equal to _____, then the whole is equal to _____.
- If five-sixths is equal to _____, then one-sixth is equal to_____ and the whole is equal to _____.
- The whole is split into _____ equal parts.
- To find one part, I need to divide by _____. To find the whole, I need to multiply by _____.

Key Vocabulary:

bar model
unit/non-unit fraction
amount
denominator
parts
whole
divided
numerator
multiply
difference
equal to
greater than
less than
times-tables facts
altogether
value

Maths – Measurements Converting Units

YEAR 6

Small Steps:

1. Metric measures
2. Convert metric measures
3. Calculate with metric measures.
4. Miles and kilometres.
5. Imperial measures.

Choose the most appropriate unit for each measurement.

- the length of a table

km | kg | cm | mm

- the mass of a car

g | kg | l | tonnes

- the capacity of a water bottle

cm^3 | g | mm | ml

Sort the units of measurement into the table.

km | l | kg | mm | tonnes | g | cm | ml | m

Length	Mass	Capacity

Write <, > or = to compare the measurements.

100 ml ◯ 0.1 l

15 cm ◯ 1.5 m

25 l ◯ 2,500 ml

1,500 mm ◯ $1\frac{1}{2}$ m

4,020 ml ◯ 4.2 l

1.5 km ◯ 150 m

Brett has a piece of ribbon measuring 1.75 m.

He is given a second piece of ribbon.

Now he has 296 cm of ribbon in total.

How long is the second piece of ribbon in centimetres?

There are 1,000 g in 1 kg and 1,000 kg in 1 tonne.

Use this fact to complete the tables.

g	kg
3,000	
	4
2,500	

kg	tonnes
7,000	
	8
9,500	

Key Questions:

- Which units could you use to measure length, mass, capacity?
- Which is the most appropriate unit to measure the ____ of a ____? Why?
- Why do you think ____ is not an appropriate estimate?
- Why would you not use kilometres to measure the length of the classroom? What would you use?
- What is the difference between capacity and volume?
- What is the same and what is different about kilometres?
- What is the same and what is different about 1.5km and 1.500 km?
- What do you notice about the conversions from metres to kilometres and grams to kilograms?
- Do you need to multiply of divide by 10/100/1000? How do you know?
- Which operation are you going to use? Why?
- How could you use a bar model to help you understand the question?
- How many grams are there in one kilogram?
- Does it matter if the items in the question are measured in different units? Why?
- How can you convert between metres and centimetres?

Stem Sentences:

- The best unit to measure the ___ of a ____ would be ____ because...
- There are ____ grams in one kilogram, so there are ____ grams in ____ kilograms.
- There are ____ in a ____.
- To convert from ____ to ____, multiply/divide by ____.

Key Vocabulary:

metric measures
length
mass
capacity
tonnes
difference between
volume
estimation
units
measurement
imperial units
weight
gravity
kilometres/metres
Multiply/divide
convert/conversions
centimetres
decimal place value
comparing
inverse
placeholder
kilograms/grams
operations
numerical
fraction of an amount
adding/subtracting

Maths – Measurements Converting Units

YEAR 6

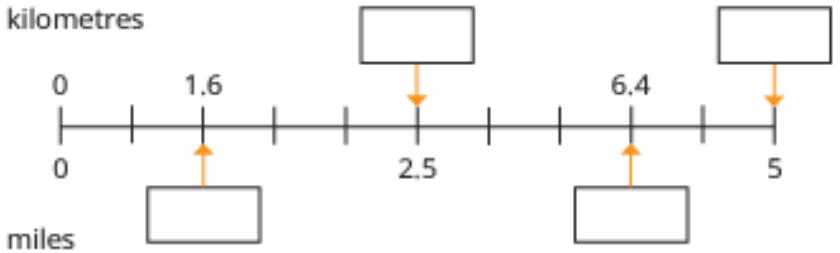
Small Steps:

1. Metric measures
2. Convert metric measures
3. Calculate with metric measures.
4. Miles and kilometres.
5. Imperial measures.

Use the fact 5 miles ≈ 8 km to complete the conversions.

- 10 miles ≈ _____ km
- 15 miles ≈ _____ km
- 25 miles ≈ _____ km
- 32 km ≈ _____ miles
- 40 km ≈ _____ miles
- 64 km ≈ _____ miles

Fill in the missing numbers on the number line.



Write <, > or = to compare the distances.

100 km ◯ 100 miles

48 km ◯ 28 miles

1.6 km ◯ 1 mile

0.5 miles ◯ 1 km

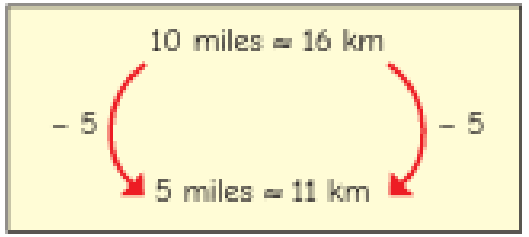
Key Questions:

- Which is further, one mile or one kilometre?
- What does the word "approximately" mean?
- What does the symbol "=" mean?
- How can you use the key fact of 5 miles = 8km to calculate how many kilometres are approximately equal to 20 miles?
- When might you need to convert between miles and kilometres?

Stem Sentences:

- _____ miles are approximately equal to 8km.
- 10 miles are approximately equal to _____ km.

Here are Tiny's workings to convert 5 miles to kilometres.



Explain Tiny's mistake.

Key Vocabulary:

imperial
metric
measures
miles
kilometres
greater
distance
approximately
equal
conversions
further

Maths – Measurements Converting Units

YEAR 6

Small Steps:

1. Metric measures
2. Convert metric measures
3. Calculate with metric measures.
4. Miles and kilometres.
5. Imperial measures.

1 inch ≈ 2.5 cm

1 foot = 12 inches

1 pound = 16 ounces

- 1 stone = 14 pounds
- 1 gallon = 8 pints

1 inch ≈ 2.5 cm **1 foot = 12 inches**

Use these key facts to complete the conversions.

- 2 inches ≈ _____ cm
- _____ inches ≈ 7.5 cm
- _____ inches ≈ 25 cm
- 12 inches ≈ _____ cm
- 2 feet = _____ inches
- 5 feet = _____ inches
- 20 feet = _____ inches
- 100 feet = _____ inches

1 gallon = 8 pints

Use this key fact to complete the conversions.

- 2 gallons = _____ pints
- 10 gallons = _____ pints
- _____ gallons = 40 pints
- _____ gallons = 104 pints

1 pound (lb) = 16 ounces **1 stone = 14 pounds (lb)**

Use these key facts to complete the conversions.

- 2 pounds = _____ ounces
- 5 pounds = _____ ounces
- _____ pounds = 240 ounces
- 2 stones = _____ lb
- 5 stones = _____ lb
- _____ stones = 154 lb

Amir wants to make a cake.

Here are some of the ingredients he needs:

- 8 ounces caster sugar
- 6 ounces flour
- 6 ounces butter

This is what he has in his cupboards:

- 0.5 lb caster sugar
- 0.25 lb flour
- $\frac{3}{8}$ lb butter

Does Amir have enough ingredients to bake the cake?

If not, how much more does he need to buy?

Key Questions:

- When do you use imperial measures instead of metric measures?
- Why is it easier to convert between metric measures than between imperial measures?
- Which is greater, one foot or one metre?
- Which is shorted, one centimetre or one inch?
- Which is heavier, one pound or one stone?

Key Vocabulary:

imperial
measures
metric
conversions
approximate
exact
greater
shorter
heavier
equal

Stem Sentences:

- As 1 inch is approximately equal to _____ cm, _____ inches are approximately equal to _____ cm.
- There are _____ inches in 1 foot, so there are ___ inches in ___ feet.

Sort the units of measurement into the table.

millilitre	centimetre	mile	gram	litre
stone	inch	metre	millimetre	tonne
gallon	ounce	pound	foot	kilometre

	Length	Mass	Capacity
Metric			
Imperial			

Maths – Decimals

YEAR 6

Small Steps:

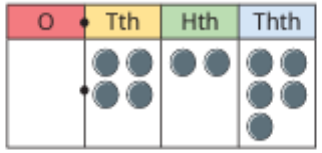
1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

Use the diagrams to complete the sentences in as many ways as possible.

_____ is one-tenth the size of _____

_____ is 10 times the size of _____

Scott has made a number on a place value chart.



Complete the sentences to describe Scott's number.

There are _____ ones, _____ tenths, _____ hundredths and _____ thousandths.

The number is _____

Use a place value chart and plain counters to represent the numbers.

0.613 | 0.84 | 0.402 | 0.051

Ron has partitioned 0.536

0.536 = 0.4 + 0.13 + 0.006

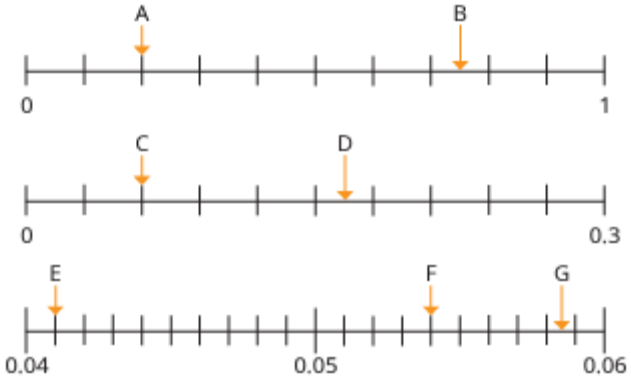
Use a place value chart to partition 0.536 a different way.

Compare answers with a partner.

Key Questions:

- What does each digit in a decimal number represent? How do you know?
- How many tenths/hundredths/thousandths are there in 1 whole?
- How many thousandths are there in 1 hundredth?
- What is the value of the digit ____ in the number ____?
- Which is greater, 0.3 or 0.14? How do you know?

What decimal numbers are the arrows pointing to?



Stem Sentences:

- There are ____ tenths, ____ hundredths and ____ thousandths.
- The number is ____.
- There are ____ in ____.
- ____ is 10 times/one-tenth the size of ____.

Key Vocabulary:

3 decimal places
represent
place value
values
digits
partition
columns
tenths
hundredths
thousandths
...times the size
within 1
greater
whole
one-tenth the size

Maths – Decimals

YEAR 6

Small Steps:

1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

Use the cards to complete the sentences in as many ways as possible.

tens	ones	tenths	hundredths	thousandths

_____ are 10 times the size of _____

_____ are one-tenth the size of _____

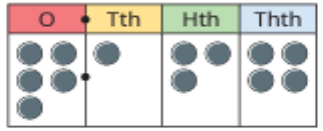
_____ are 100 times the size of _____

_____ are one-hundredth the size of _____

_____ are 1,000 times the size of _____

_____ are one-thousandth the size of _____

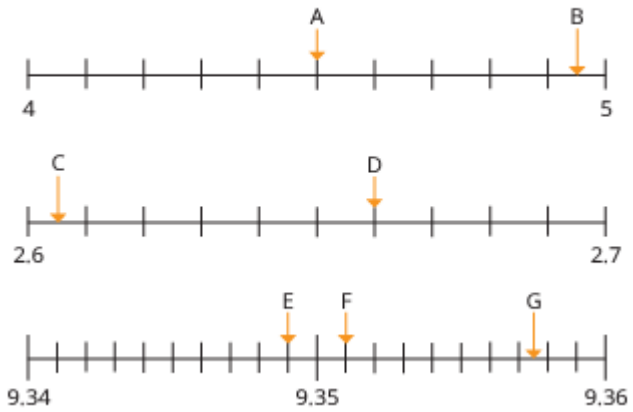
Complete the sentences to describe the number.



There are _____ ones, _____ tenth, _____ hundredths and _____ thousandths.

The number is _____

What decimal numbers are the arrows pointing to?



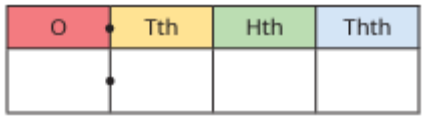
Key Questions:

- What does a decimal number represent?
- How many tenths/hundredths/thousandths are there in 1 whole?
- How many thousandths are there in 1 hundredth?
- What digit is in the ____ column?
- What is the value of the digit ____ in the number ____?
- Which is greater, 1,897 or 3.1? How do you know?

Is the statement always true, sometimes true or never true?

A number with 3 decimal places is greater than a number with only 1 decimal place.

Explain your answer.



Use five plain counters to make a number greater than 1

What is the value of each digit in your number?

How many ways can you partition it?

Stem Sentences:

- There are ____ ones, ____ tenths, ____ hundredths and ____ thousandths.
- The number is ____.
- There are ____ in ____.
- ____ is 10/100/1,000 times the size of ____.
- ____ is one-tenth/hundredth/thousandths the size of ____.

Key Vocabulary:

3 decimal places
greater than 1
place value
digits
decimal
partition
integer
ones
tens
tenths
hundredths
thousandths
columns
...times the size
one-tenth the size
number lines
represent
whole
value
greater

Maths – Decimals

YEAR 6

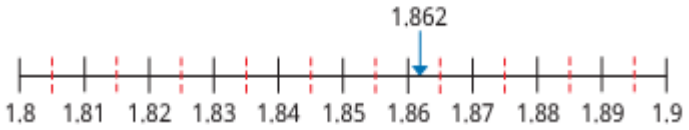
Small Steps:

1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

Complete the table.

Number	3.472	2.196	0.804
Previous integer	3		
Next integer	4		
Previous tenth	3.4		
Next tenth	3.5		
Previous hundredth	3.47		
Next hundredth	3.48		

Use the number line to complete the sentences.



1.862 is closer to _____ than _____

1.862 rounded to the nearest hundredth is _____

Use the digit cards to make the statements correct.

You may use each card once only.

☐.803 rounded to the nearest integer is 6

5.9☐ rounded to the nearest tenth is 6

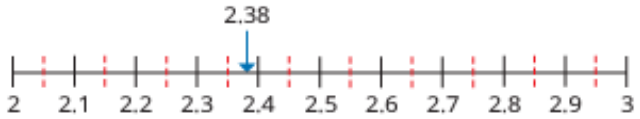
6.☐ rounded to the nearest integer is 6

☐.002 rounded to the nearest hundredth is 6

Key Questions:

- What is next/previous integer/tenth/hundredth?
- Using the number line, which multiple of ___ is ____ closer to?
- If you are rounding to the nearest ____, which column do you need to look at to decide where to round to?
- If the digit in this column is between 0 and 4, which multiple should you round to?
- Which multiple should you round to if the digit is a 5?

Use the number line to complete the sentences.



2.38 is closer to 2 than 3

2.38 rounded to the nearest integer is _____

2.38 is closer to 2.4 than 2.3

2.38 rounded to the nearest tenth is _____

Stem Sentences:

- The previous/next multiple of ____ is ____.
- ____ is closer to ____ than ____.
- So ____ rounded to the nearest ____ is ____.

Key Vocabulary:

round
decimal places
integer
tenth
hundredth
multiples
before/after
number lines
column
place value
right
previous/next
closer to
nearest

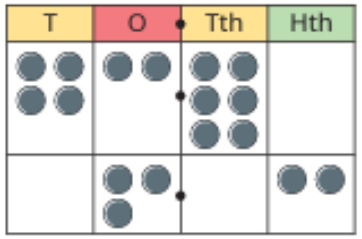
Maths – Decimals

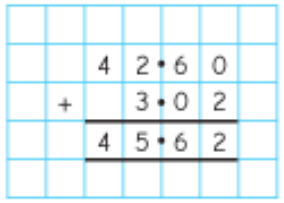
YEAR 6

Small Steps:

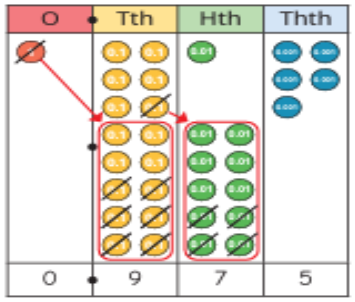
1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

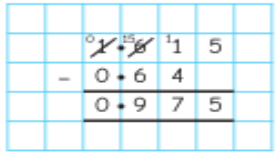
Whitney is working out 42.6 + 3.02 using a place value chart.

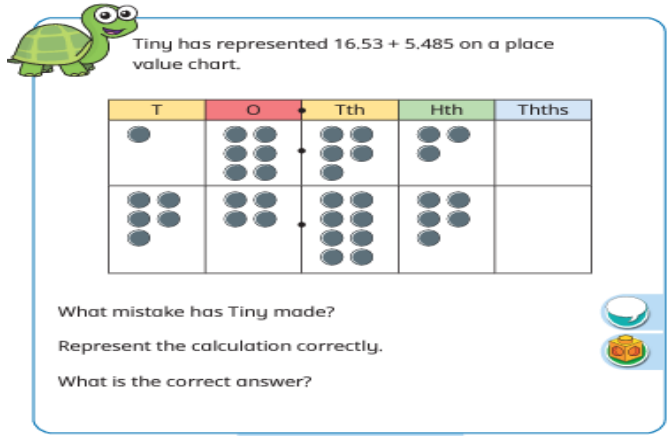




Esther uses place value counters to work out 1.615 – 0.64



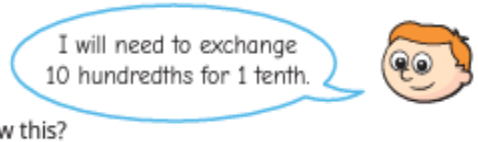




Key Questions:

- How can you represent this question using place value counters?
- Do you have enough ____ to make an exchange?
- Do you need to exchange any ____?
- What are 10 tenths/10 hundredths/10 thousandths equal to?
- If there are not enough tenths/hundredths/thousandths for the subtraction, what do you need to do?

Ron is finding the total of 0.64 and 0.27



How does Ron know this?

Use a place value chart and counters to find the total of 0.64 and 0.27

Stem Sentences:

- ____ added to ____ is equal to ____.
- ____ subtract ____ is equal to ____.
- ____ tenths added to ____ tenths is equal to ____ tenths.
- I do/do not need to make an exchange because...

Key Vocabulary:

add
subtract
3 decimal places
exchanging
columns
place value
formal written method
zero placeholders
bar models
part-whole models
calculation
tenths
hundredths
thousandths
equal to

Maths – Decimals

YEAR 6

Small Steps:

1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

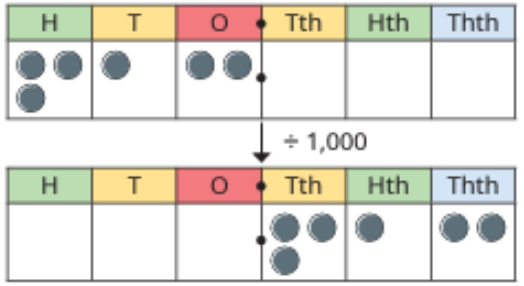
Nijah multiplies 0.213 by 1,000 using a place value chart.

0.213 × 1,000 = 213
213 is 1,000 times the size of 0.2130.123 is one-thousandth the size of 213

Jack uses a Gattegno chart to work out that 0.46 × 100 = 46

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

Amir uses a place value chart to divide 312 by 1,000

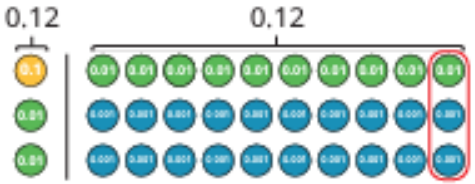


312 ÷ 1,000 = 0.312
312 is 1,000 times the size of 0.312
0.312 is one-thousandth the size of 312

Key Questions:

- How can you represent multiplying/dividing a decimal number with place value counters?
- What number is 10 times the size of ____?
- What number is 100 times the size of ____?
- What number is 1,000 times the size of ____?
- How can you multiply/divide decimal numbers using a Gattegno chart?
- How can you use counters on a place value chart to multiply/divide numbers by 10/100/1,000?
- What is one-tenth the size of ____?
- What is one-hundredth the size of ____?
- What is one-thousandths the size of ____?

Alex divides 0.12 by 10 using place value counters.



1 tenth = 10 hundredths
1 hundredth = 10 thousandths
0.12 ÷ 10 = 0.012

Stem Sentences:

- ____ is 10/100/1,000 times the size of ____.
- ____ is one-tenth/hundredth/thousandth the size of ____.
- To multiply by ____, I move the digits ____ places to the ____.
- To divide by ____, I move the digits ____ places to the ____.

Key Vocabulary:

multiplied
2 decimal numbers
ten
hundred
thousand
place value
decimal number
exchange
column
left/right
Gattegno chart
...times the size
one-tenth the size
divide
whole
powers of 10

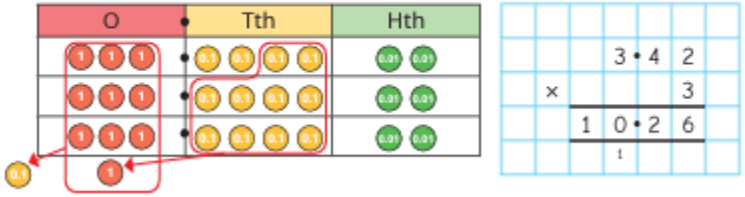
Maths – Decimals

YEAR 6

Small Steps:

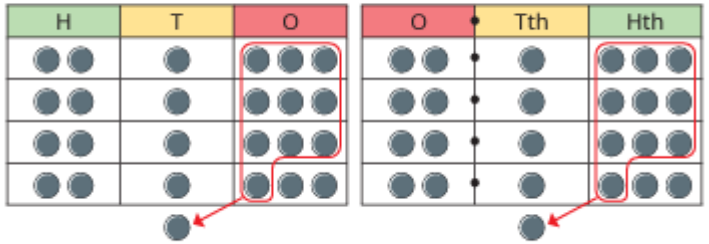
1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

- Dexter uses place value counters to work out 3.42 × 3



Aisha and Filip are using counters to work out multiplications.

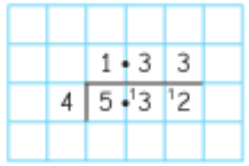
Aisha: 213 × 4 = 852 **Filip:** 2.13 × 4 = 852



What is the same and what is different about their calculations?

Scott uses place value counters in a place value chart to work out 5.32 ÷ 4

He writes his calculation using the formal written method.



Key Questions:

- What is an integer?
- If you know 3 x 2 = 6, what else do you know?
- How can you show multiplying decimals by integers using counters?
- How is multiplying decimal numbers similar to/different from multiplying whole numbers?
- Do you have enough hundredths/tenths/ones to make an exchange?
- If you know that ____ ÷ ____ = ____, what else do you know?
- If you make the number being divided one-tenth the size, what must you do to the answer?
- How can you show this division using place value counters?
- How many groups of ____ can you make with ____?
- What happens to tenths or hundredths that you cannot group?

Stem Sentences:

- I need to exchange 10 ____ for 1 ____.
- I know that ____ x ____ = ____, so I also know that ____ x ____ = ____.
- ____ multiplied by ____ is equal to ____.
- I know that ____ ÷ ____ is ____, so I also know that ____ ÷ ____ is ____.
- If ____ ones divided by ____ is equal to ____, then ____ tenths/hundredths divided by ____ is equal to ____.

Key Vocabulary:

multiply
decimal places
integers
ten
hundred
thousand
multiplication facts
place value
exchanging
calculations
1-digit number
2-digit number
partitioning
similar to/different from
whole numbers
hundredths
tenths
ones
equal to
divide
division facts
pattern
smaller/greatest
groups
formal written method
one-tenth

Maths – Decimals

YEAR 6

Small Steps:

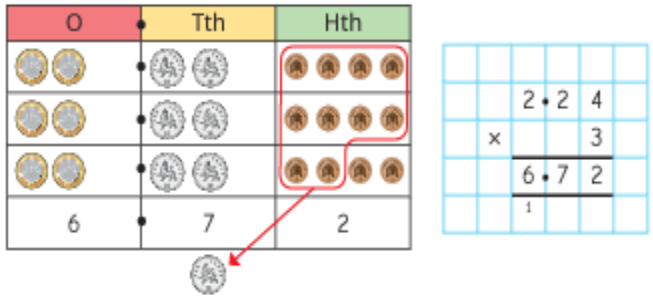
1. Place value within 1.
2. Place value – integers and decimals.
3. Round decimals.
4. Add and subtract decimals.
5. Multiply by 10, 100 and 1,000.
6. Divide by 10, 100 and 1,000.
7. Multiply decimals by integers.
8. Divide decimals by integers.
9. Multiply and divide decimals in context.

The table shows the prices of items in a shop.

Item	Cost
Magazine	£2.24
Book	£5.25
CD	£3.49
DVD	£4.75

Esther wants to buy three magazines.

She uses coins in a place value chart alongside the formal written method to work out the total cost.



A box of chocolates costs 4 times as much as a chocolate bar.

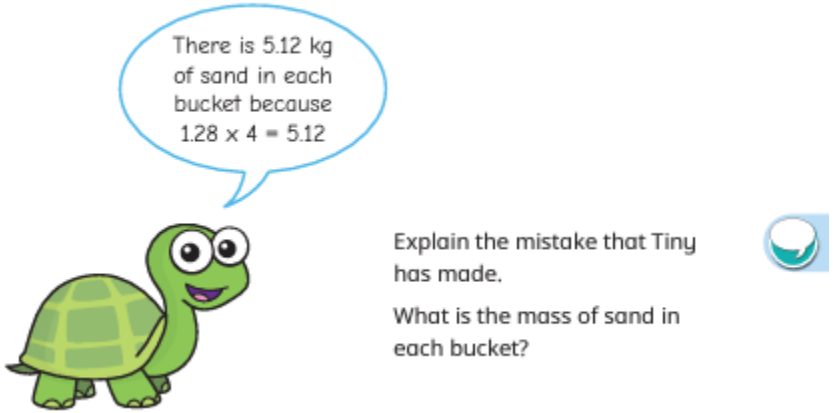
Together they cost £7.55

How much more does the box of chocolates cost than the chocolate bar?

Key Questions:

- How can you tell what operation you need to perform to answer this question?
- How can you represent this question using place value counters?
- What do you need to work out?
- How can you draw a bar model to represent this problem?
- Do you need to convert any units of measure to answer this question?

1.28 kg of sand is shared equally between 4 buckets.



Explain the mistake that Tiny has made.

What is the mass of sand in each bucket?

Stem Sentences:

- _____ multiplied by _____ is _____.
- _____ divided by _____ is _____.

Key Vocabulary:

formal written methods
multiplication
division
place value
tenths
hundredths
contexts
solve problems
bar models
operation
order
conversions
units
measure
convert
multiplied
divided

Maths – Algebra

YEAR 6

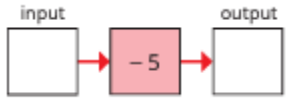
Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

Mo has made a function machine.

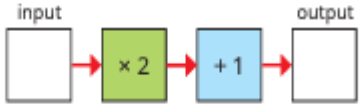
- If the input is 7, what is the output?
- If the input is 4,023, what is the output?

Complete the table for the function machine.



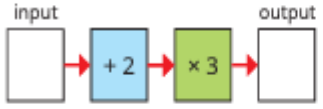
Input	5	23	5.1	23.2	0	−3	−5
Output							

- Here is a 2-step function machine.

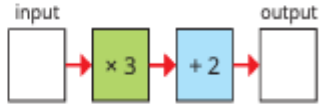


- If the input is 5, what is the output?
- If the input is 10, what is the output?

- Complete the tables for the function machines.



Input	3	4	5	10
Output				



Input	3	4	5	10
Output				

Key Questions:

- How does the function machine work?
- What is the difference between an input and an output?
- If you know the input and function, how can you work out the output?
- If you know the output and function, how can you work out the input?
- What is the inverse of ____?
- Does your rule work for all the sets of numbers?
- Which function should you apply first?
- What happens if you do not following the functions in the correct order?
- When given the output, which function should you do first?
- What Is the input if the output is ____?
- What is the missing function if the input is ____, the output is ____ and one of the functions is ____?
- Does it always matter what order you apply the functions?

Stem Sentences:

- If the input is ____, the output is ____.
- If I know the output, I need to …
- If the input is ____ and the output is ____, then the function is ____.
- First, I am going to ____, then I am going to ____.
- If the input is ____, then the output is ____.
- The inverse of ____ then ____ is ____ then ____.

Key Vocabulary:

algebra
function machines
operations
inverse
missing numbers
input/output
function
rule
calculate
difference
1-step/2-step
order
forwards/backwards

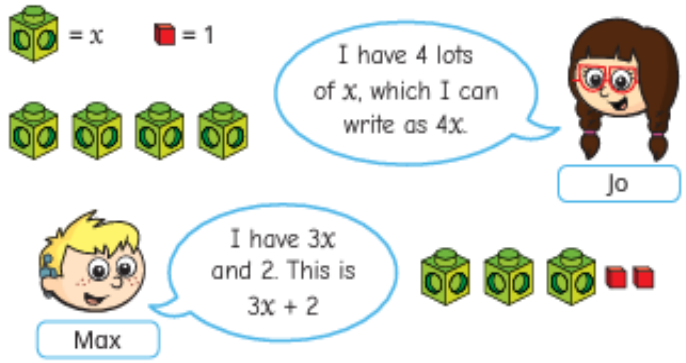
Maths – Algebra

YEAR 6

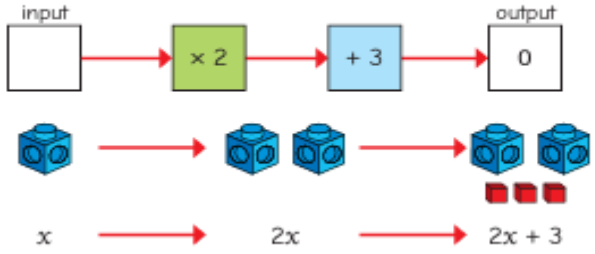
Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

Jo and Max are using cubes to represent unknown numbers and base 10 ones to represent 1



Dan writes an expression for the 2-step function machine.



Tom draws three shapes and gives each one a value.

Work out the values of the expressions.

Key Questions:

- What could x represent?
- How can you represent this expression using a bar model?
- How else can you write a+a?
- What is the same and what is different about the expressions x+5 and 5x?
- If the input is p, what is the output?
- If m is the input, what is the output after the first operation? What is the output after the second operation?
- If 1 cube is worth ____, what are 3 cubes worth?
- What does 4x mean? If you know the value of x, how can you work out the value of 4x?
- What does substitute mean?
- How can you represent the expression as a bar model? Which parts of the bar model can you replace with a number? What is the total value of the bar model?
- Which part of the expression can you work out first? What is the total value of the expression?

Stem Sentences:

- ____ more than x can written as ____.
- ____ + ____ + ____ = 3 x _____ = ____
- If I have ____ x and I add/subtract ____ x, then I have ____x altogether.
- If ____ is worth ____, then ____ is worth ____.
- To work out the value of ____, I need to replace the letter ____ with the number ____ and then calculate _____.

Key Vocabulary:

algebraic expressions
letters
numbers
convention
multiplied
repeated addition
base 10
unknown number
function machines
input/output
bar models
same/different
Operation
add/subtract
altogether
values
substituting
total

Maths – Algebra

YEAR 6

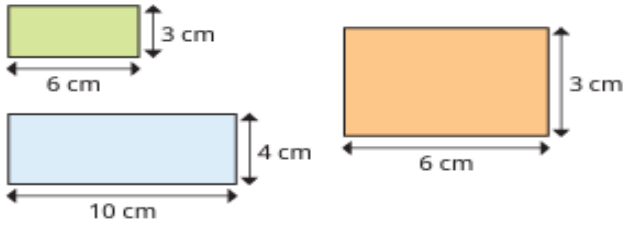
Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

Ron uses a formula to work out the areas of rectangles.

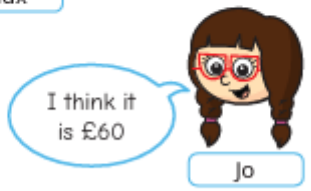
$A = lw$
When $l = 7$ and $w = 4$, $A = 7 \times 4 = 28$

- What do the letters A, l and w represent?
- Use the formula to find the areas of the rectangles.



Max and Jo use this formula to work out the cost in pounds (C) of four hours (h) of cleaning.

$C = 20 + 10h$



Who do you agree with?

Explain your answer.

Key Questions:

- What is a formula?
- What formulae do you know?
- How is a formula similar to/different from an expression?
- What is the formula for ____?
- If the formula is t = 3s + 1 and you know that s = ____, how can you work out t?
- Which letter(s) do you know the value of? Which letters(s) can you work out?

Fay makes a sequence of patterns with stars and circles.

Complete the table to show the number of circles and stars in the patterns.

Number of stars	1	2	3	5		
Number of circles	2				18	30

If s = number of stars and c = number of circles, which formula describes Fay's pattern?

$s = 2 + c$	$c = s + 2$	$c = 2s$	$s = 2c$	$2s = c + 2$

The table shows the total number of legs on a given number of ants.

Number of ants (a)	1	2	3		
Number of legs (L)	6			30	72

Complete the table and write a formula that describes the pattern.

Key Vocabulary:

formulae
symbols
area
substitute
values
input
output
relationships
variables
difference
expression
similar/different
letters

Stem Sentences:

- In the formula ____, the letter ____ represents ____ and the letter ____ represents ____.
- To work out ____ when I know ____, I substitute ____ into the formula.

Maths – Algebra

YEAR 6

Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

Tom thinks of a number and calls it x.

Which expression represents 5 more than Tom's number?

$5x$	$x + 5$	$x - 5$	$x \div 5$

Double Tom's number is 64

Which equation shows this information?

$x + 2 = 64$	$x \div 2 = 64$	$2x = 64$	$x - 2 = 64$

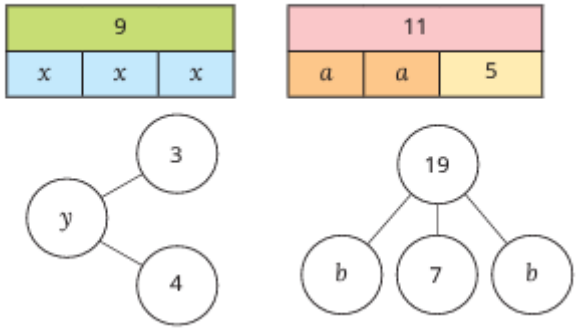
Max has represented some equations.

Each linking cube represents y and each base 10 cube represents 1

$2y + 3 = 7$

What equations are represented?

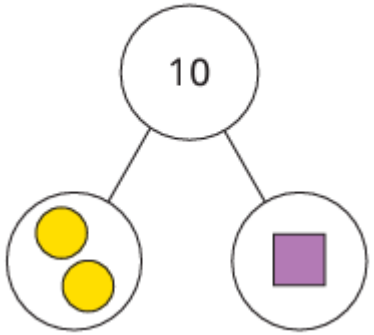
Write equations to match the models.



Key Questions:

- If a is a number, how do you write "3 times the value of a"?
- How do you write "4 more than the number x"?
- If 4 more than the number x is equal to 26, how can you write this as an equation?
- Is an equation the same as or different from a formula?
- What is the difference between an equation and an expression?
- Can you write the equation a different way?
- Is ____ an equation or an expression? How do you know?

Here is a part-whole model.



Write an equation representing the part-whole model.

Each shape has a different integer value.

What values might the shapes have?

Stem Sentences:

- ____ + ____ + ____ = 3 x ____ = ____
- The equation ____ means that the expression ____ is equal to ____.
- ____ more/less than ____ is equal to ____ can be written as the equation ____ = ____.

Key Vocabulary:

form equations
diagrams
word descriptions
difference
algebraic
expression
equation
value
conventions
bar model
part-whole models
numerical
more than
formula
more/less
equal to
times

Maths – Algebra

YEAR 6

Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

Ben has 9 counters altogether.

He has 3 counters in his left hand and c counters in his closed right hand.

Which equation represents this problem?

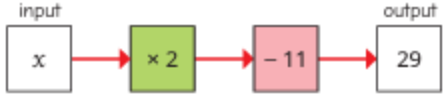
$c - 3 = 9$	$3c = 9$	$c + 3 = 9$	$c = 9 + 3$

How many counters does he have in his closed hand?

Write an equation to represent each bar model.

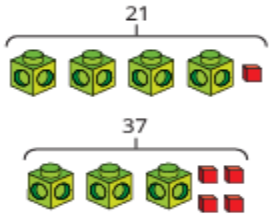
Then find the value of x for each one.

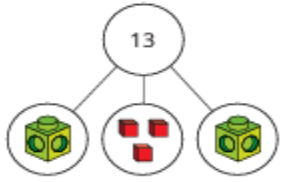
Explain how this 2-step function machine shows the equation $2x - 11 = 29$



Work out the value of x.

Write and solve equations for the models.





Key Questions:

- What does the expression 3x mean?
- If you know 3 times the value of a number, how can you use this to work out the number?
- How can you represent the problem as a bar model?
- How can you represent the problem as an equation?
- What is the inverse of ____?
- What does the bar model show?
- What can you use to work it out?
- How can you draw a function machine to represent the equation? How does the function machine help you to solve the equation?
- If you know 3 more than 2x, how can you work out 2x?
- If you know 5 less than 2x, how can you work out 2x?
- How can you represent the problem with a bar model? Which part(s) of the bar model do you already know? Which part(s) can you work out?
- What is the first step you need to take to solve the equation?

Stem Sentences:

- The inverse of ____ is ____.
- If ____ has been added to a number to give ____, then to work out the number, I need to ____ from ____.
- If ____x + ____ = ____, then ____x = ____, so x = ____.
- The first step in solving the equation is to ____.
- The second step in solving the equation is to ____.

Key Vocabulary:

solving equations
notation
missing number
same as
function machines
input/output
inverse
operations
expression
value
times
bar model
add
one-step/two-step
forwads/backwards

Maths – Algebra

YEAR 6

Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

x and y are both whole numbers.

$x + y = 5$

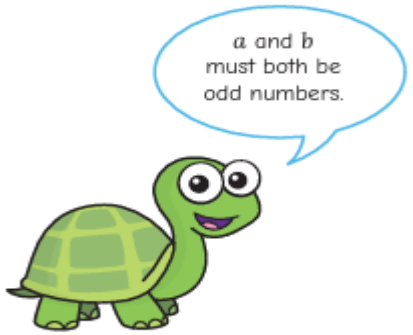
Ann creates a table to work out the possible sets of values of x and y.

x	y	$x + y$
0	5	5
		5
		5
		5
		5
		5

Work systematically to complete Ann's table.

a and b are both whole numbers.

$ab + b = 18$



Is Tiny correct?

Explain your answer.

Key Questions:

- What two numbers could add together to make ____?
- What could the values of x and y be in the equation ____?
- What are there several possible answers for this question?
- Have you found all the possible pairs of values? How do you know?
- In the equation ____, if x = ____, what must the value of y be? If x is a different value, does the y also change?
- How can you draw a bar model to represent the equation ____?

a, b and c are integers between 0 and 5

$a + b = 6$

$b + c = 4$

Find the values of a, b and c.

How many possibilities can you find?

a and b are both whole numbers.

$a \times b = 24$

Create a table to show all the possible sets of values for a and b.

Stem Sentences:

- In the equation x + y = ____, if x = _____ then y = _____.
- If the product of p and q is ____, then p could be _____ and q could be ____.

Key Vocabulary:

equations
unknown values
solutions
substitution
pairs
integer
greater than
equal to
negative
decimal
multiples
add
bar model
product

Maths – Algebra

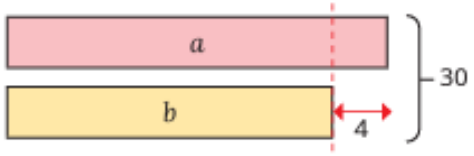
YEAR 6

Small Steps:

1. 1-step function machines.
2. 2-step function machines.
3. Form expressions.
4. Substitution.
5. Formulae.
6. Form equations.
7. Solve 1-step equations.
8. Solve 2-step equations.
9. Find pairs of values.
10. Solve problems with two unknowns.

The sum of a and b is 30

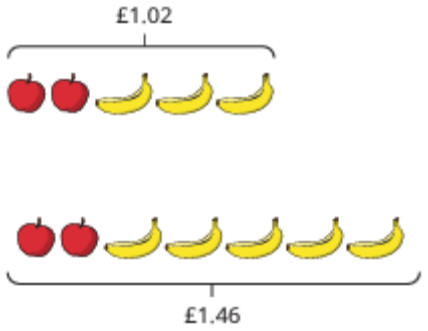
The difference between a and b is 4



Use the bar model to work out the values of a and b.

Two apples and three bananas cost £1.02

Two apples and five bananas cost £1.46



What is the total cost of one apple and one banana?

Key Questions:

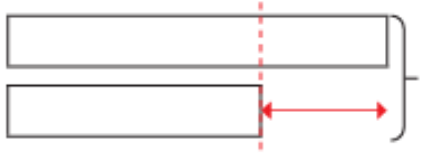
- How can you represent this information as a pair of equations?
- How can you represent this information with a bar model?
- What information does the bar model show?
- What else can you work out?
- How can you draw a bar model to represent the problem?
- Which parts can you label straight away?
- What else can you work out?
- Is there more than one possible solution?

Here is some information about two numbers, x and y.

$x + y = 10$

$x - y = 2$

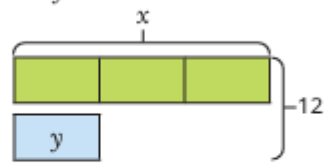
- Label the information on the bar model.



- Use the bar model to work out the values of x and y.

The sum of x and y is 12

x is 3 times the size of y.



- Explain how you can use the bar model to work out the value of y.
- What is the value of x?

  Are there any other possible solutions?

Key Vocabulary:

solve problems
unknowns
solution
sum
difference
bar models
multiple
values
total
equations
equal to
pair
label
lots of
worth
substituting

Stem Sentences:

- If ____ lots of x is worth ____, then x = ____ ÷ ____ = ____.
- If I know the value of ____, I can find the value of ____ by substituting into the equation ____.

Maths – Ratio

YEAR 6

Small Steps:

1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

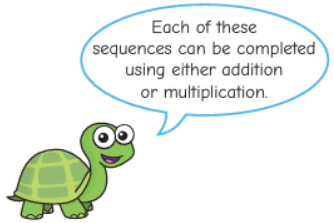
The relationship between 2 and 8 can be described as additive or multiplicative.

8 is 6 more than 2
2 is 6 less than 8

8 is four times the size of 2
2 is a quarter the size of 8

Complete the models to show the additive and multiplicative relationships.

6	12		
2	4	8	
4	12	20	

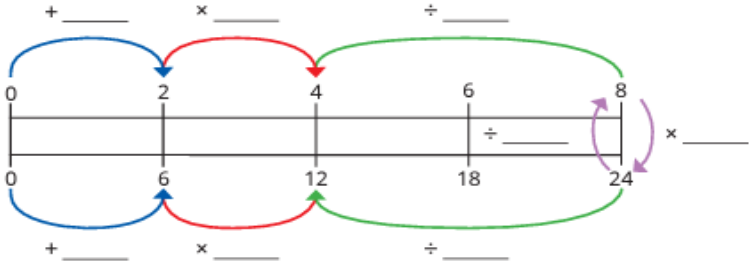


Do you agree with Tiny?

Explain your answer.

The double number line shows the relationship between two sets of numbers.

Fill in the missing values to describe the relationships.



Key Questions:

- How can you describe the relationship between these two numbers using addition/multiplication?
- What is the inverse of addition/multiplication?
- What addition/subtraction/multiplication/division calculations can be written from this information?
- Is the relationship in the sequence additive or multiplicative?
- How do the relationships on the upper number line relate to those on the lower number line?

Complete the sequences.

- 4, 8, _____, 32, _____, _____
- _____, 14, 21, 28, _____, _____
- 1, _____, _____, 27, 81, _____

Are the relationships additive or multiplicative? Could they be both?

Stem Sentences:

- _____ x _____ = _____ and _____ + _____ = _____.
- _____ is _____ times the size of _____
- _____ is $\frac{\square}{\square}$ the size of _____.

Key Vocabulary:

additively
multiplicatively
expressed
addition
multiplication
sequences
relationship
inverse
...times the size
a third of the size
double number lines
calculations
upper/lower

Maths – Ratio

YEAR 6

Small Steps:

1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

Complete the sentences to describe the counters.

There are _____ red counters and _____ yellow counters.

For every _____ red counters, there are _____ yellow counters.

For every _____ yellow counters, there are _____ red counters.

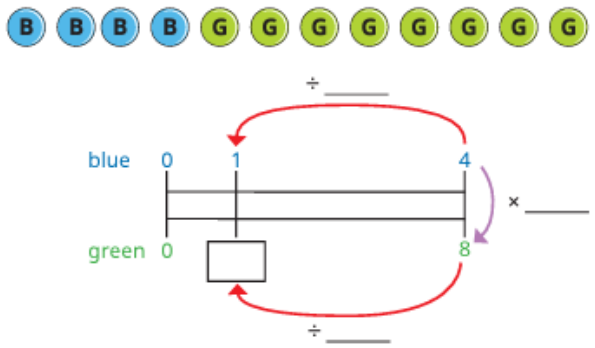
Complete the sentences to describe the cubes.

For every 16 yellow cubes, there are _____ blue cubes.

For every 8 yellow cubes, there are _____ blue cubes.

For every 1 blue cube, there are _____ yellow cubes.

Amir is using a double number line to find equivalent ratios.



Key Questions:

- How can you give the relationship between the number of _____ and the number of _____?
- For every _____, how many _____ are there?
- How can you rearrange the counters to make the ratio simpler?
- What number is a common factor of _____ and _____?
- How can you use this to make the ratio simpler?
- How many _____ would there be if there were _____?
- If there are 3 blue counters and 5 red counters, how can you describe the relationship between these numbers?
- What does the : symbol mean in the context of ratio?
- What does 2:3 mean?
- How can you compare the relationship between three quantities?
- Are the ratios 2:3 and 3:2 the same?
- How else can you write the ratio 2:4?

Stem Sentences:

- For every _____, there are _____.
- If there were _____, there would be _____.
- A common factor of _____ and _____ is _____.
- For every _____, there are _____, which can be written as _____:_____.
- The ratio of _____ to _____ is _____:_____.
- In the ratio _____:_____, the first number represents _____ and the second number represents _____.

Key Vocabulary:

ratio
multiplicative
relationship
amounts
value
related
comparisons
double number line
equivalent
expressed
ratio symbol
dividing
common factor
simplifying fractions
rearrange
simpler
for every...
colon
order
notation
measure
masses
ingredients
recipes

Maths – Ratio

YEAR 6

Small Steps:

1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

The ratio of red counters to blue counters in a box is 1 : 2

- What fraction of the counters are blue?
- What fraction of the counters are red?
- What is the same about the ratio and the fractions? What is different?

This bar model represents $\frac{2}{5}$

This bar model represents 2 : 5

What is the same and what is different about the bar models?

Use the diagram to complete the sentences.

The ratio of blue counters to green counters is 2 : _____

The fraction of counters that are blue is $\frac{2}{\square}$

The bar model shows the ratio 2 : 3 : 4

- What fraction of the bar is pink?
- What fraction of the bar is yellow?
- What fraction of the bar is blue?

Key Questions:

- What is the ratio of one part to another?
- How many parts are there altogether?
- What fraction of the whole is the first/second/third part?
- How are fractions and ratios similar? How are they different?
- What fraction does the ratio 1:2 mean? Is this the same as ½ or is it different?
- How can you represent the ratio/fraction as a bar model?

There are some red and green cubes in a bag.

$\frac{2}{7}$ of the cubes are red.

Are the statements true or false?

For every 2 red cubes, there are 7 green cubes.	For every 5 green cubes, there are 2 red cubes.
For every 2 red cubes, there are 5 green cubes.	For every 5 green cubes, there are 7 red cubes.

Stem Sentences:

- The ratio of _____ to _____ is _____:_____.
- There are _____ parts altogether.
- The fraction that is _____ is _____.

Key Vocabulary:

differences
similarities
ratios
fractions
simplifying
dividing
common factors
bar models
counters
whole
altogether
bar model

Maths – Ratio

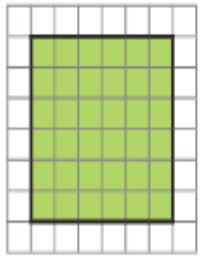
YEAR 6

Small Steps:

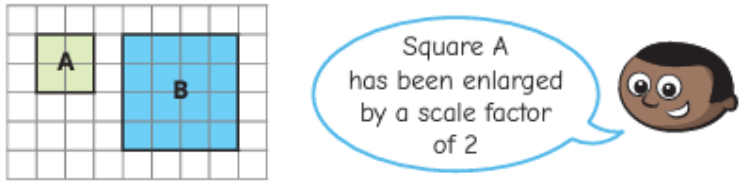
1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

A square has side lengths of 12 cm.

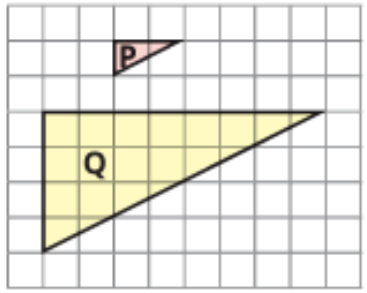
Scott has drawn a scale diagram of the shape in which the side length of each square in the grid represents 2 cm.



Mo draws a square twice as big as square A and labels it B.



What is the scale factor of enlargement from P to Q?



Key Questions:

- How do you know if a diagram is drawn to scale?
- Why might you need to draw a scale diagram?
- If 1 square represent 5cm, what do ____ squares represent? How do you know?
- If 1 square represents 5cm, how many squares represent ____cm? How do you know?
- Is there more than one way of finding the missing value?
- How is a scale like a ratio?
- What does "scale factor" mean?
- How do you draw an enlargement of a shape?
- How can you work out the scale factor of enlargement between two shapes?
- If a shape has been enlarged by a scale factor of ____, how can you find the dimensions of the original shape?
- Do you need to multiply of divide to find the missing length? How do you know?

Stem Sentences:

- ____squares represents ____, so each square represents ____.
- Each square represents ____, so ____ squares represent ____ x ____ = ____.
- Each square represents ____, so ____ is represented by ____ ÷ ____ = _____squares.
- The shape is ____ times as big, so the scale factor of the enlargement is ____.
- If a shape has been enlarged by a scale factor of ____, I need to ____ by ____ to find the original dimensions.

Key Vocabulary:

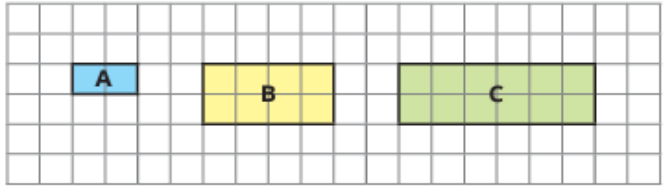
ratio
multiplicative relationships
scale
accurately
scaled
proportion
dimensions
calculating
scaled lengths
squares
rectangles
rectilinear shapes
value
represents
enlarge
enlargements
...times as big
scale factors
inverse operations
multiply
divide

Maths – Ratio

YEAR 6

Small Steps:

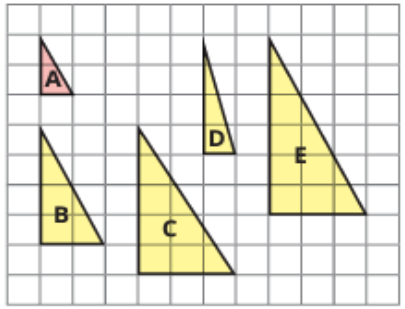
1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

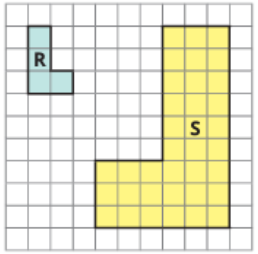


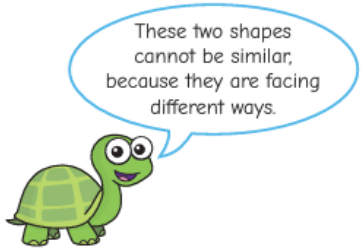
- Explain why shapes A and B are similar.
- Explain why shapes A and C are **not** similar.
- Draw another shape that is similar to A.

Compare answers with a partner.

Which of the shapes are similar to shape A?







Do you agree with Tiny?

Explain your answer.

The Eiffel Tower is 320 m tall and 120 m wide.

Tommy makes a scale model of the Eiffel Tower.

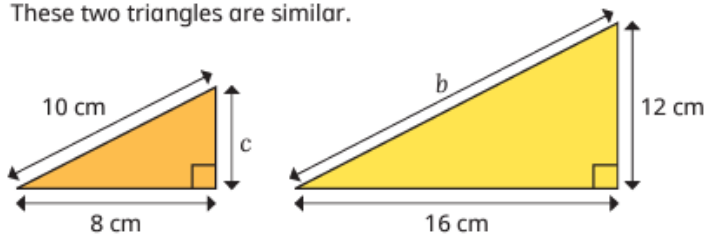
His model is 16 cm tall.

How wide is his model?

Key Questions:

- What do you think "similar" means?
- What is the scale factor of the enlargement?
- Have all the sides been enlarged by the same amount?
- What are corresponding sides? Can you identify the corresponding sides in these two shapes?
- What do you notice about corresponding angles in similar shapes?
- Does it matter that the shapes are in a different orientation?

These two triangles are similar.



- Find the lengths of b and c.
- Measure the sizes of all the angles.

  What do you notice?

Stem Sentences:

- Each side of the shape is ___ times the size, so the shape has been enlarged by a scale factor of ____. Therefore, the shapes are ____.
- I know that the shapes are similar, because the corresponding sides have been enlarged by the same ____, and the corresponding angles are ____.

Key Vocabulary:

similar shapes
corresponding sides
proportion
corresponding angles
equal
enlargement
similarity
scale factor
relationship
protractor
orientations
amount

Maths – Ratio

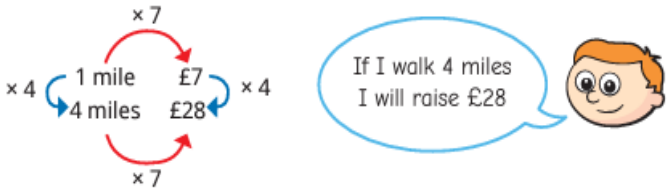
YEAR 6

Small Steps:

1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

- Ron is doing a sponsored walk for charity.

  For every mile he walks, he will raise £7



- How much will Ron raise if he walks 3 miles?
- How much will Ron raise if he walks 22 miles?
- How many miles will Ron need to walk to raise £42?

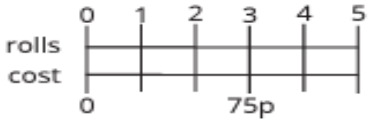
The double number line shows the relationship between miles and kilometres.

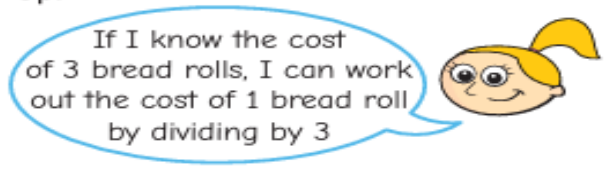
- Complete the double number line.

- Complete the statements.

55 miles = _____ km _____ miles = 96 km

Eva buys 3 bread rolls for 75p.





Tell a partner how this will help Eva to find the cost of 5 bread rolls.

What is the cost of 5 bread rolls?

Key Questions:

- What is the ratio of _____ to _____?
- If there are _____, how many _____ must there be?
- If the total number of _____ is _____, how many _____ must there be?
- If there are _____ more _____ than _____, how many are there in total?
- How can you draw a bar model to solve the problem? Which parts of the model do you know? How can you work out the remaining parts?
- What is the multiplicative relationship between _____ and _____.
- If 3 _____ cost £_____, how much do 12 _____ cost?
- If 5 _____ cost £ _____, how can you work out what 1 _____ costs?
- Once you know what 1 _____ costs, how can you work out what 9 _____ cost?
- How can a double number line help you solve this proportion problem,?

Stem Sentences:

- The ratio of _____ to _____ is _____ : _____.
- I know that _____ multiplied/divided by _____ is equal to _____, so to find out how many _____ there are, I need to multiply/divide by _____.
- If _____ costs _____, then _____ costs _____.
- To get from _____ to _____, I multiply/divide by _____.
- To find the cost of 1 _____, I will …

Key Vocabulary:

problems
ratio
multiplicative
relationships
multiply
divide
amount
value
equivalent
fractions
double number lines
vertical
horizontal
bar models
interpretation
How many?
total
bar model
parts
equal to
proportion
one-step
two-step

Maths – Ratio

YEAR 6

Small Steps:

1. Add or multiply?
2. Use ratio language.
3. Introduction to the ratio symbol.
4. Ratio and fractions.
5. Scale drawing.
6. Use scale factors.
7. Similar shapes.
8. Ratio problems.
9. Proportion problems.
10. Recipes.

Here are some ingredients for cupcakes.

Tom wants to make 10 cupcakes.

Explain to a partner how to work out what ingredients Tom will need.

How much of each ingredient will Tom need to make the different numbers of cupcakes?

Cupcakes (makes 5)
100 g flour
2 eggs
40 g sugar

15 cupcakes | 20 cupcakes | 25 cupcakes

Here are some ingredients for soup.

How much of each ingredient is needed to make soup for the different numbers of people?

Soup (for 6 people)
1 onion
60 g butter
180 g lentils
1.2 litres stock
480 ml tomato juice

2 people | 1 person | 9 people

Here are the ingredients for an apple crumble.

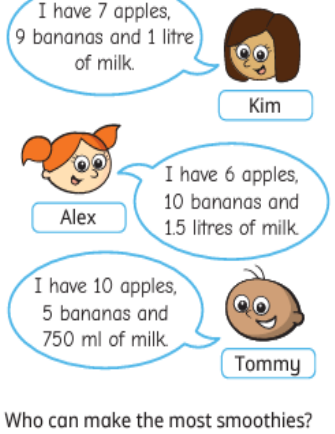
How much of each ingredient is needed to make apple crumble for the different numbers of people?

Apple crumble (5 people)
300 g plain flour
225 g brown sugar
200 g butter
450 g apples

10 people | 12 people

Here are the ingredients for making one smoothie.

Smoothie
2 apples
3 bananas
500 ml milk



Who can make the most smoothies?

Key Questions:

- How can a double number line help you to decide how much of each ingredient you need?
- How many times more people are there? How will this affect the amount of each ingredient needed?
- Do you need to find the amounts needed for one person first? Why or why not?
- What is the greatest number of ____ you can make with ____?
- How does changing the quantities in a recipe link to using scale factors?

Sam is making pancakes.

She follows a recipe with this list of ingredients.

She has 1.2 litres of milk and wants to make as many pancakes as she can.

How many eggs will she need?

Pancakes
120 g plain flour
2 eggs
300 ml milk

Stem Sentences:

- There are ____ times as many people, so I need ____ times as much of each ingredient.
- First, I will find the quantities for 1 person by dividing by ____ and then I will multiply this by ____.

Key Vocabulary:

ratio
proportion
solving problems
ingredients
recipes
adapted
scaling-up/scaling-down
amount
multi-step
multiplying
dividing
quantities
adjusting
double number line
greatest
scale factors
...times as many

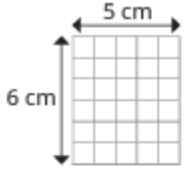
Maths – Area, Perimeter and Volume

YEAR 6

Small Steps:

1. Shapes – same area.
2. Area and perimeter.
3. Area of a triangle – counting squares.
4. Area of a right-angled triangle.
5. Area of any triangle.
6. Area of a parallelogram.
7. Volume – counting cubes.
8. Volume of a cuboid.

Complete the sentences to describe the rectangle.



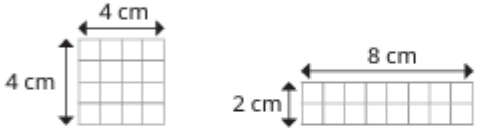
The length of the rectangle is _____ cm.

The width of the rectangle is _____ cm.

The total number of squares in the rectangle is _____

The area of the rectangle is _____ cm²

Use the same method to find the areas of these rectangles.

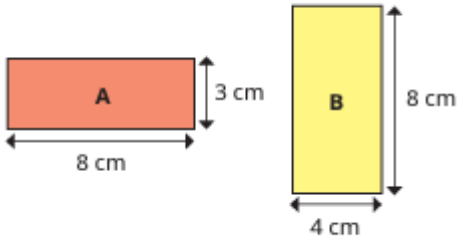


What do you notice?

Each square represents 1 cm²

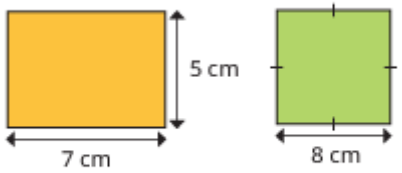
- Which shapes have an area of 12 cm²?
- Which shapes have an area of 16 cm²?
- Why is there more than one representation for each?

Which two rectangles have the same area?



How do you know?

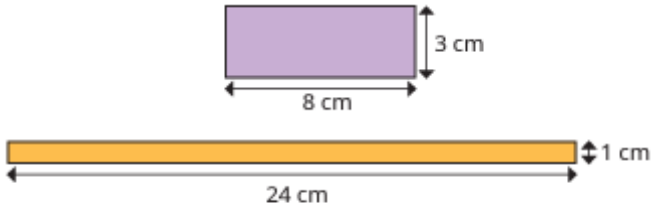
Find the areas of the rectangles.



Explain your method to a partner.

Key Questions:

- How can you find the area of this shape? Is there more than one way?
- Do shapes that have the same area have to look the same?
- How can you use factor pairs to find shapes that would have the same area?
- How would you draw more than one rectangle that has an area of ___cm2?



Do you agree with Alex?

Explain your answer.

Stem Sentences:

- The total number of squares in the rectangle is ____.
- The area of the rectangle is ____cm2.
- The length of the rectangle is ____cm.
- The width of the rectangle is ____cm.
- The area of the rectangle is ____cm2.

Key Vocabulary:

areas
shapes
difference
perimeter
counting
squares
identify
same
rectilinear
multiplication
rectangles
factor pairs
total
length
width

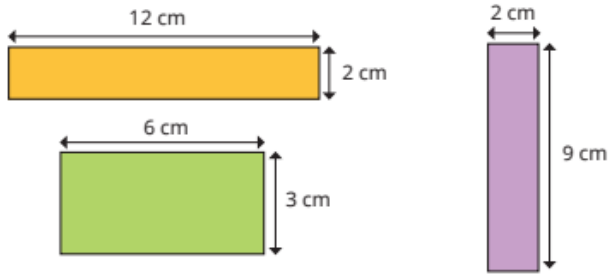
Maths – Area, Perimeter and Volume

YEAR 6

Small Steps:

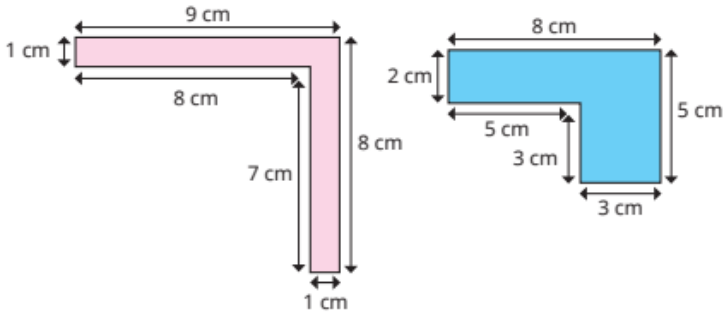
1. Shapes – same area.
2. Area and perimeter.
3. Area of a triangle – counting squares.
4. Area of a right-angled triangle.
5. Area of any triangle.
6. Area of a parallelogram.
7. Volume – counting cubes.
8. Volume of a cuboid.

- Find the area and perimeter of each rectangle.

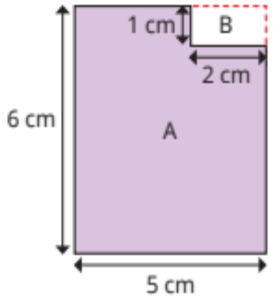


Compare methods with a partner.

- Work out the perimeters of the rectilinear shapes.



Tiny is finding the area of this shape.



Area of A = 6 cm × 5 cm
= 30 cm²

Area of B = 1 cm × 2 cm
= 2 cm²

Total area = 32 cm²

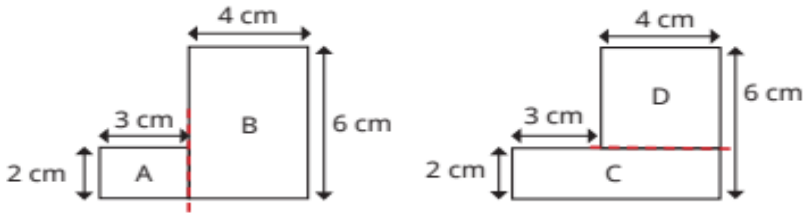
Do you agree with Tiny?

Explain your answer.

Key Questions:

- What is perimeter? What is area?
- How can you find the area of the rectangle?
- How can you find the perimeter of the rectangle?
- What is the formula to find the area of a rectangle?
- How can you split the rectilinear shape into rectangles? Is there more than one way?
- How is finding the area/perimeter of a rectilinear shape different to finding the area/perimeter of a rectangle? How is it similar?
- How can you work out the other side lengths?

Both of these rectilinear shapes are made from two rectangles.



Work out the areas of the rectangles to work out the areas of the rectilinear shapes.

Stem Sentences:

- The formula to find the area of a rectangle is …
- To find the perimeter of a rectangle, I …

Key Vocabulary:

areas
perimeters
rectangles
rectilinear
shapes
compare
efficiency
split
calculating
length
add
subtract
part
missing
whole
formula
similar
different

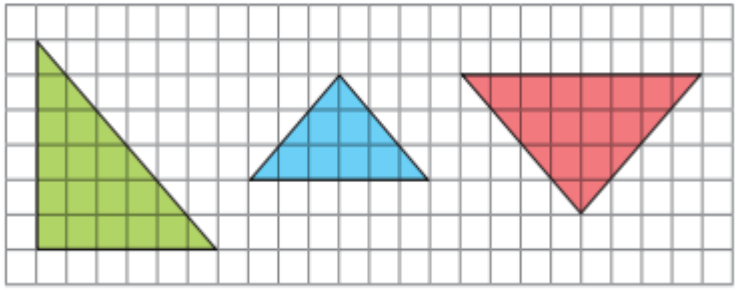
Maths – Area, Perimeter and Volume

YEAR 6

Small Steps:

1. Shapes – same area.
2. Area and perimeter.
3. Area of a triangle – counting squares.
4. Area of a right-angled triangle.
5. Area of any triangle.
6. Area of a parallelogram.
7. Volume – counting cubes.
8. Volume of a cuboid.

Complete the sentences to find the area of the triangles.



The triangle has _____ full squares.

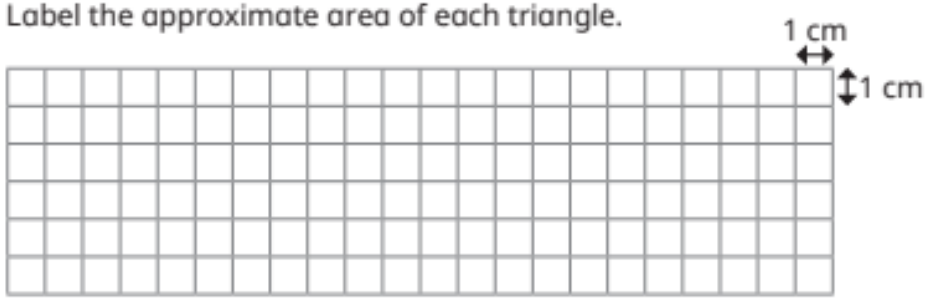
The triangle has _____ half squares.

_____ + _____ = _____

The total area of the triangle is _____ cm²

Draw three different triangles that have an area between 5 cm² and 15 cm²

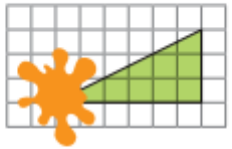
Label the approximate area of each triangle.



Key Questions:

- How is finding the area of a triangle similar to finding the area of a rectangle when counting squares? How is it different?
- How will you count the squares accurately?
- Is more or less than half the square shaded?
- Can you see any parts of squares that combine to make approximately one full square?
- How does the area of the rectangle link to the area of a triangle? Why do you think this happens?

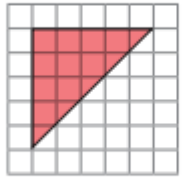
Part of the triangle has been covered.



Estimate the area of the whole triangle.

Would your estimate change if the splat was in a different place?

Tiny says that the area of the triangle is 15 cm²



Tiny is incorrect.

Explain what Tiny has done wrong.

Stem Sentences:

- The triangle has _____ full squares.
- The triangle has ____ half squares.
- The area of the triangle is _____cm2.
- The approximate area of the triangle is ____ cm2.

Key Vocabulary:

area
triangle
counting
squares
estimated
efficient
strategies
calculating
shapes
full
whole
half
separately
combine
sections
greater
less than
similar
different
accurately
approximately

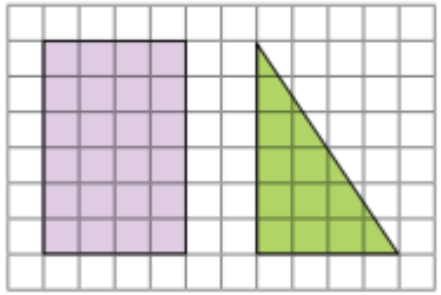
Maths – Area, Perimeter and Volume

YEAR 6

Small Steps:

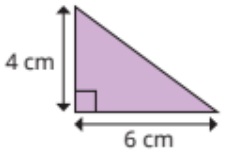
1. Shapes – same area.
2. Area and perimeter.
3. Area of a triangle – counting squares.
4. Area of a right-angled triangle.
5. Area of any triangle.
6. Area of a parallelogram.
7. Volume – counting cubes.
8. Volume of a cuboid.

Here is a rectangle and a right-angled triangle.



- What is the area of the rectangle?
- What is the area of the right-angled triangle?
- What do you notice?

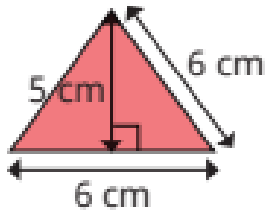
Scott uses the formula to work out the area of this right-angled triangle.

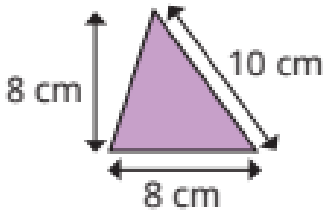


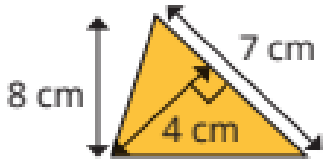
area = $\frac{1}{2}$ × base × perpendicular height

area = $\frac{1}{2}$ × 6 × 4 = $\frac{1}{2}$ × 24 = 12 cm²

Find the area of each triangle.







Key Questions:

- How can you split the rectangle into two right-angles-triangles?
- What do you notice about the two triangles?
- What do you notice about finding the area of a rectangle and finding the area of a right-angled triangle?
- What is the formula to find the area of a triangle/right-angled triangle?
- What does "perpendicular" mean?
- How do you know which measurement is the base/perpendicular height?
- How do you know which side is the base?
- How do you know what the perpendicular height is?
- How do you know that you are using the correct lengths?
- Is there more than one way to find the area of this triangle?
- Is the base always at the bottom of the triangle?

Stem Sentences:

- The area of the right-angled triangle is _____ the area of the rectangle.
- The formula for the area of a triangle is …
- The base is _____cm.
- The perpendicular height is _____cm.
- Area = $\frac{\square}{\square}$ × _____ × _____

Key Vocabulary:

area
right-angled
non-right-angled
triangle
length
perpendicular
height
rectangle
half
formula
multiply
base
width
split
measurement

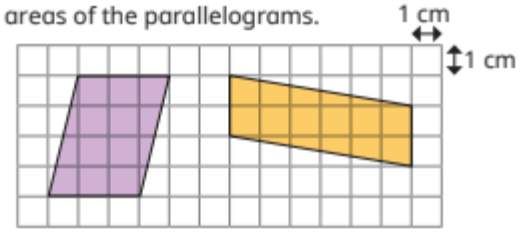
Maths – Area, Perimeter and Volume

YEAR 6

Small Steps:

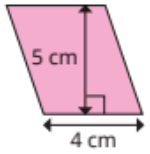
1. Shapes – same area.
2. Area and perimeter.
3. Area of a triangle – counting squares.
4. Area of a right-angled triangle.
5. Area of any triangle.
6. Area of a parallelogram.
7. Volume – counting cubes.
8. Volume of a cuboid.

Work out the areas of the parallelograms.



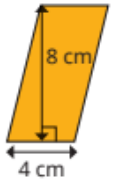
Explain your method to a partner.

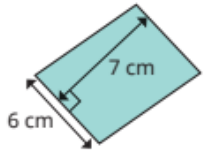
Annie has worked out the area of this parallelogram.

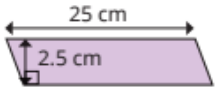


area = base × perpendicular height
= 4 cm × 5 cm
= 20 cm²

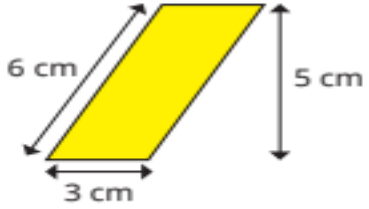
Use Annie's method to find the areas of the parallelograms.

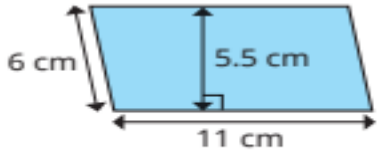






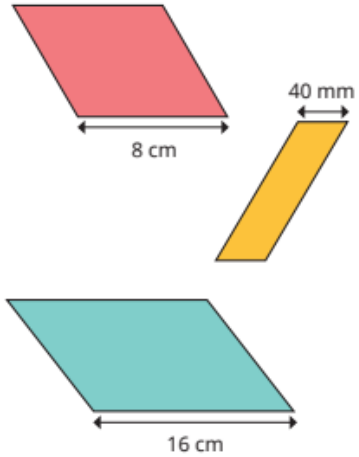
Label the base b and perpendicular height h on each parallelogram.
Then find the area of each shape.





Key Questions:

- How could you change the parallelogram into a rectangle? How will this help you to find the area?
- How can you count the squares accurately to find the area?
- How do you know you have found the base/perpendicular height?
- What is the formula for finding the area of a parallelogram?
- When you have different units, what is your first step?



These parallelograms each have an area of 40 cm²

Find the perpendicular height of each shape.

Stem Sentences:

- The base of the parallelogram is _____cm.
- The perpendicular height of the parallelogram is _____cm.
- The area of the parallelogram is _____ x _____ = _____cm2.

Key Vocabulary:

area
parallelogram
identifying
formula
parallelogram
properties
compare
rectangle
cut-and-move
rearranged
length
width
base
perpendicular
height
multiply
measurements
count
change
different
units

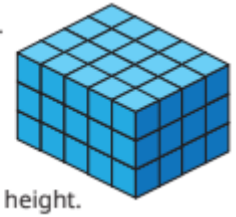
Maths – Area, Perimeter and Volume

YEAR 6

Small Steps:

1. Shapes – same area.
2. Area and perimeter.
3. Area of a triangle – counting squares.
4. Area of a right-angled triangle.
5. Area of any triangle.
6. Area of a parallelogram.
7. Volume – counting cubes.
8. Volume of a cuboid.

The cuboid is made using centimetre cubes.

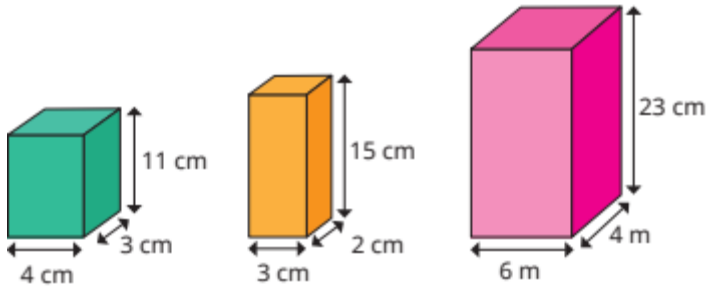


- What is the volume of the cuboid?
- What is the length, width and height of the cuboid?
- Find the product of the length, width and height.

Here is the formula for the volume of a cuboid.

volume = length × width × height

Use the formula to find the volumes of the cuboids.



Does it matter in which order you multiply the numbers?

Find the volumes of the cubes.

Compare methods with a partner.

Key Questions:

- What is volume?
- How is volume different from area?
- How can you count the number of cubes efficiently?
- If each cube has a volume of 1 cubic centimetre, what is the volume of the shape?
- How many cubes are there in this layer? How many equal layers are there? So how can you find the volume?
- What is the length/width/depth of this cuboid?
- How do you find the total volume of a cuboid?
- What is the same and what is different about area and volume?
- What is the most efficient order to multiply the three number together?

Stem Sentences:

- The volume of the shape is _____cubes.
- The volume of the shape is _____cm3.
- There are _____ cubes in each layer and _____ equal layers, so the volume is _____ cubes.
- There are _____ cubes in each layer.
- There are _____ layers.
- The volume of the cuboid is _____.
- The length is _____. The width is _____. The height is _____. The volume of the cuboid is _____ x _____ x _____ = _____.

Key Vocabulary:

volume
amount
space
solid
object
counting
cubes
cubic centimetres
unit
measure
shapes
multiplying
single layer
equal layer
cuboids
prisms
total
length
width
height
depth
formula
area
different
associative law

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

1. Decimal and fraction equivalents.
2. Fractions as division.
3. Understand percentages.
4. Fractions to percentages.
5. Equivalent fractions, decimals and percentages.
6. Order fractions, decimals and percentages.
7. Percentage of an amount – one step.
8. Percentage of an amount – multi-step.
9. Percentages – missing values.

The bar model is split into tenths.

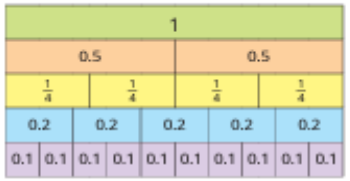
- Complete the sentences.

The whole has been divided into _____ equal parts.

Each part is worth _____

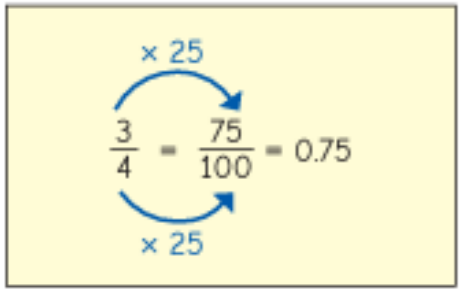
As a fraction, this is written _____

Use the fraction and decimal walls to complete the equivalents.



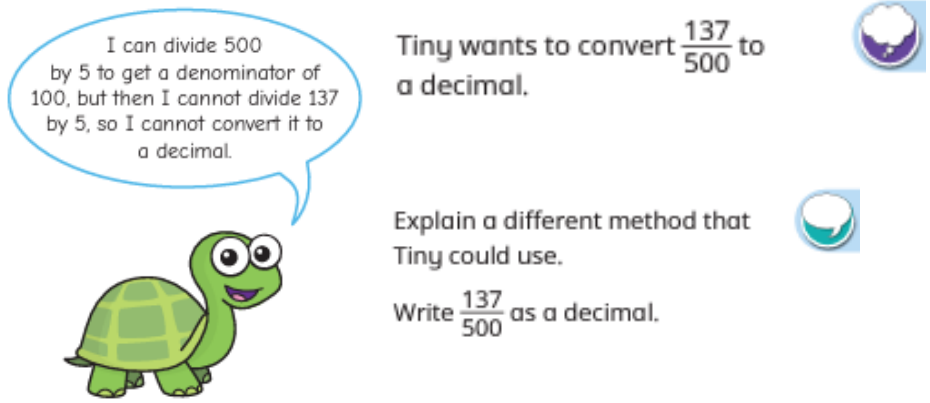
- $\frac{1}{2} = \frac{\square}{4} = \frac{\square}{10} =$ _____.____
- $\frac{3}{4} =$ _____.____ ____
- $0.2 = \frac{1}{\square} = \frac{\square}{10}$
- $\frac{4}{5} = \frac{\square}{\square} =$ _____.____

Rosie has converted three-quarters to a decimal.



Key Questions:

- If the whole has been split into 10/100 equal parts, what is each part worth as a fraction/decimal?
- If you know that ____ is equivalent to ____, what is ____ as a decimal?
- How can you convert fractions with a denominator of 100 to decimals?
- How can you convert fractions with a denominator that is a factor of 100 to decimals?
- How can you find equivalent fractions?
- Why might it be helpful to find an equivalent fraction with a denominator of 100/1,000?



Stem Sentences:

- The first/second digit after a decimal point represents ____.
- To find an equivalent fraction, I need to ____ or ____ the ____ and the ____ by the same number.

Key Vocabulary:

equivalents
fractions
decimals
fraction wall
common denominator
simplify
larger
whole
equal parts
worth
convert
factor
digit
decimal point
common factors
common multiples

Maths – Fractions, Decimals and Percentages

YEAR 6

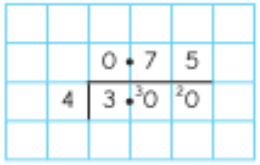
Small Steps:

1. Decimal and fraction equivalents.
2. Fractions as division.
3. Understand percentages.
4. Fractions to percentages.
5. Equivalent fractions, decimals and percentages.
6. Order fractions, decimals and percentages.
7. Percentage of an amount – one step.
8. Percentage of an amount – multi-step.
9. Percentages – missing values.

Aisha uses place value counters to convert $\frac{1}{2}$ to a decimal by dividing 1 whole by 2

$\frac{1}{2} = 0.5$

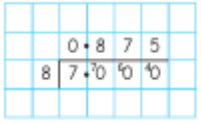
Kim converts $\frac{3}{4}$ to a decimal.



$\frac{3}{4} = 0.75$

Teddy, Rosie and Jack have each found the decimal equivalent of $\frac{7}{8}$

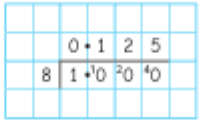
Teddy



$7 \div 8$

$\frac{7}{8} = 0.875$

Rosie



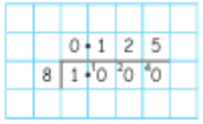
$1 \div 8$

$\frac{1}{8} = 0.125$

$\frac{7}{8} = 7 \times 0.125$

$\frac{7}{8} = 0.875$

Jack



$1 \div 8$

$\frac{1}{8} = 0.125$

$\frac{7}{8} = 1 - 0.125$

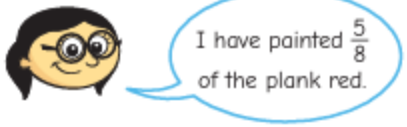
$\frac{7}{8} = 0.875$

- Explain why each method works.
- Whose method do you prefer?

Key Questions:

- If the denominator is ____, how many equal parts are there? What are you dividing by?
- Can you share 1 one into 4 equal parts? What can you exchange the 1 one for?
- What can you exchange the remaining ____ tenths for?
- What do you notice about the decimal parts when dividing 1 by 3?
- What does "recurring" mean?
- How do you know that ½ = 2 or 5/8 = 1.6 cannot be correct?

Annie has a plank of wood that is 1 metre long.



How long is the piece of wood that is painted red?

Give your answer in metres and then in centimetres.

Filip shares 7 large pizzas equally with 7 of his friends.

Esther shares 5 large pizzas with 5 of her friends.

Who gets more pizza, Filip or Esther?

Use decimals to help compare.

Stem Sentences:

- The fraction ____ can be expressed as ____ ÷ ____.
- ____ ÷ ____ is the same as the fraction ____.
- I can exchange 1 ____ for ____.

Key Vocabulary:

fractions
division
converting
decimals
divisions
place value
exchange
tenths
share
equal
groups
multiple
exchanges
equivalents
short division
recurring
denominator
equal parts
same as

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

1. Decimal and fraction equivalents.
2. Fractions as division.
3. Understand percentages.
4. Fractions to percentages.
5. Equivalent fractions, decimals and percentages.
6. Order fractions, decimals and percentages.
7. Percentage of an amount – one step.
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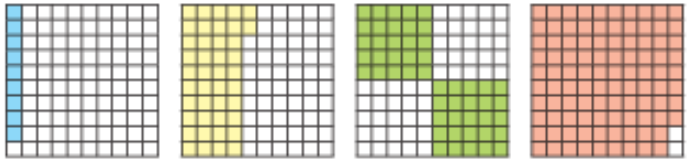
9. Percentages – missing values.

Here are some hundred squares.



- How many parts out of 100 are shaded on each hundred square?
- What percentage of each hundred square is shaded?
- What percentage of each hundred square is **not** shaded?

What do you notice?

What percentage of each bar model is shaded?

Use the sentences to help.

100% has been split into _____ equal parts.

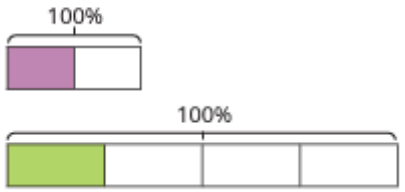
Each part is worth _____%.

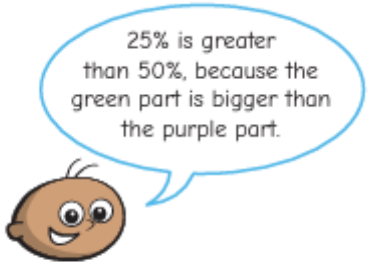
Shade the percentages on the bar models.

Key Questions:

- What does "per cent" mean?
- How many parts are shaded/not shaded?
- What does 100% mean?
- How many equal parts is the bar model split into? What percentage is each part worth?
- How many ways could you make 95% using 50%, 25%, 10%, 5% and 1%?

Tommy is comparing percentages.





Do you agree with Tommy?

Explain your answer.

Stem Sentences:

- If the whole is shared into 100/10/5/4/2 equal parts, each part represents ____%.
- If ____ parts are shaded, the percentage shown is ____%.
- To find ____%, I can halve ____%.

Key Vocabulary:

percentages
per cent
parts per 100
whole
equal parts
bar models
multiples
estimate
splitting
complements to 100
shared
halve

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

1. Decimal and fraction equivalents.
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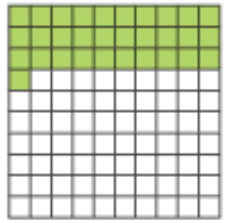
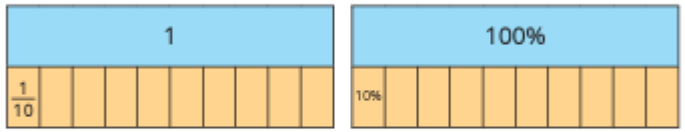
Max uses a hundred square to convert $\frac{31}{100}$ to a percentage.



$\frac{31}{100} = 31\%$

The bar models show that $\frac{1}{10}$ is equal to 10%.



Use the bar models to complete the statements.

- $\frac{3}{10}$ = _____%
- $\frac{9}{10}$ = _____%
- $\frac{\square}{100} = 50\%$
- $\frac{\square}{\square} = 70\%$

Whitney converts $\frac{3}{5}$ to a percentage.

$\frac{3}{5} \times 20 = \frac{60}{100} = 60\%$ (× 20)

Use Whitney's method to convert the fractions to percentages.

$\frac{3}{4}$	$\frac{23}{50}$	$\frac{23}{25}$	$\frac{13}{20}$	$\frac{14}{20}$	$\frac{112}{200}$

Key Questions:

- What is a percentage?
- If the whole is split into 100 equal parts, then what percentage is ____ parts equivalent to?
- How are percentages and fractions similar/different?
- If you know 1/5 is equal to 20%, what percentage is 4/5 equal to?
- How do you find an equivalent fraction?
- How many 20s/25s are there in 100?
- What do you know about the relationship between ¼ and 1/8?

Tiny converts $\frac{13}{25}$ to a percentage.

$\frac{13}{25} = \frac{13}{100} = 13\%$ (× 4)

What mistake has Tiny made?

What is the correct percentage?

Stem Sentences:

- _____% is equivalent to $\frac{\square}{100}$
- $\frac{\square}{\square}$ is equivalent to $\frac{\square}{100}$ because ...
- The fraction $\frac{\square}{\square}$ is equivalent to _____%.

Key Vocabulary:

equivalent fractions
percentages
bar models
equivalents
split
equal parts
non-unit fractions
convert
denominator
multiply
divide
similar/different
equal to

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

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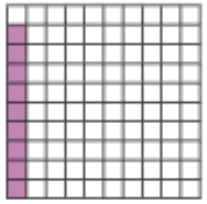
Complete the sentences to describe the hundred square.

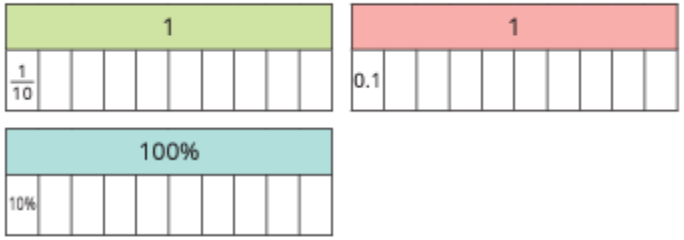


The fraction shaded is $\frac{\square}{100}$

The decimal shaded is _____

The percentage shaded is _____

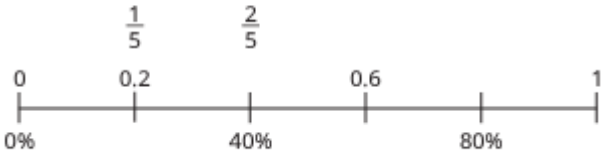
What is the same about each bar model? What is different?



- Shade three parts of each bar model.

  What fraction, decimal and percentage is shaded?
- What other equivalent fractions, decimals and percentages can you find?

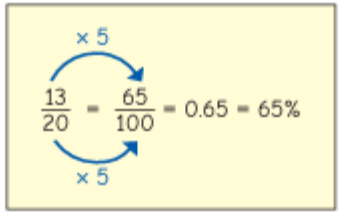
Complete the number line to show the equivalent fractions, decimals and percentages.



Key Questions:

- How many parts has the whole been split up into? What fraction is each part worth?
- If the whole is 100%, what is ½, ¼, 1/5?
- If 1/10 is equal to 10%, what is 3/10 equal to?
- How do you find equivalent fractions?
- How many 5s are there in 100?
- Can the fraction be simplified? How do you know?

Dexter converts $\frac{13}{20}$ to a decimal and a percentage.



Explain Dexter's method.

Stem Sentences:

- If the whole is equal to 100%, then each part is worth ____%.
- If $\frac{1}{\square}$ is equal to ____%, then $\frac{\square}{\square}$ is equal to ____%.
- To find an equivalent fraction with a denominator of 100, I need to ____ by ____.

Key Vocabulary:

fraction
decimal
percentage
equivalents
bar models
number lines
non-unit fractions
converting
denominator
conversion
simplify
parts
whole
split
worth
equal

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

1. Decimal and fraction equivalents.
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Teddy knows that $\frac{11}{20}$ is greater than a half and 42% is less than a half because it is less than 50%, so $\frac{11}{20}$ is greater than 42%.

Use Teddy's method to write "greater" or "less" to complete the sentences.

- 0.45 is _____ than $\frac{16}{30}$
- $\frac{251}{500}$ is _____ than 15%.
- 50% is _____ than 0.309
- $\frac{13}{24}$ is _____ than 0.5

Aisha knows that $\frac{9}{10}$ is closer to 1 whole than a half, but 52% is closer to a half than 1 whole, so $\frac{9}{10}$ is greater than 52%.

Use Aisha's method to write <, > or = to compare the amounts.

0.61 ◯ 95% 0.809 ◯ $\frac{26}{50}$ 61% ◯ $\frac{33}{35}$

Kim converts $\frac{13}{20}$ to $\frac{65}{100}$, which is equivalent to 65%.

She uses this to recognise that $\frac{13}{20}$ < 67%.

Use Kim's method to write <, > or = to compare the amounts.

$\frac{34}{50}$ ◯ 68% $\frac{24}{25}$ ◯ 98% $\frac{4}{10}$ ◯ 38% 44% ◯ $\frac{9}{20}$

Order the numbers from greatest to smallest.

50%	$\frac{2}{5}$	0.45	$\frac{3}{10}$	54%	0.05

Write the values in ascending order.

$\frac{1}{2}$	0.48	2.7	65%	$\frac{21}{20}$	49%

Key Questions:

- What fraction/decimal/percentage is ____ equivalent to?
- Which is the greater amount, ____ or ____? How do you know?
- Which of the amounts are greater than a half?
- Which of the amounts is closer to 1 whole?
- Where do these amounts go on a number line?
- Is it easier to convert the numbers to fractions, decimals or percentages?

Is the statement true or false?

There is no fraction, decimal or percentage that is greater than $\frac{99}{100}$, 0.99 or 99%, but smaller than 1 whole.

Explain your answer.

Explain why $\frac{13}{10}$ is greater than 87%.

Write <, > or = to compare the amounts.

$\frac{2}{3}$ ◯ 1.1 105% ◯ $\frac{19}{20}$ 1.01 ◯ 100%

Key Vocabulary:

compare
order
decimal numbers
3 decimal places
ordered
fractions
numerator
denominator
conversion
percentages
amounts
half
closer/further away
whole
greater/smaller
equivalent

Stem Sentences:

- ____ is greater/smaller than one half, and ____ is smaller/greater than one half, so ____ is greater/smaller than ____.
- ____ is equivalent to ____, so it is greater/smaller than ____.

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

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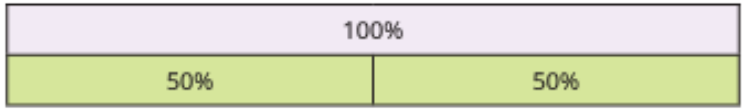
There are two lots of 50% in 100%.

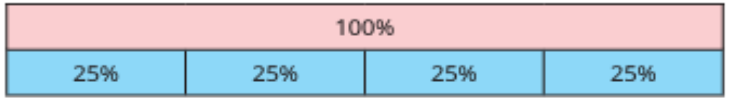


This means that to find 50% of an amount, you divide it by 2

Work out 50% of each number.

240	360	170	1

There are four lots of 25% in 100%.



This means that to find 25% of an amount, you divide it by 4

Work out 25% of each number.

240	360	170	1

What do you notice about your answers?

Why does this happen?

Here is a method for finding 11% of 250

10% of 250 = 25

1% of 250 = 2.5

11% of 250 = 25 + 2.5 = 27.5

Use this method to work out the percentages.

11% of 400	51% of 400	21% of 400	26% of 400

Key Questions:

- How are percentages and fractions similar/different?
- How do you find a fraction of an amount?
- How can you represent this question with a bar model?
- How many lots of 10/20/25/50% are there in 100%?
- What do you need to divide a number by to find 10/20/25/50%?
- What strategies could you use to divide by ____?
- How can you find 1%/10%/20%/25%/50% of a number?
- How can you use 10% to find 30%?
- How can the percentage 36% be made using 1%, 5%, 10%, 20%, 25%, 50% and 100%?
- If you know 1% of an amount, how can you work out 37% of that amount?
- If you know 1% of an amount, how can you work out 99% of that amount?

Stem Sentences:

- There are ____ lots of ____% in 100%.
- To find ____% of a number, I need to divide by ____.
- The whole amount is worth ____%.
- To find ____%, I need to divide the whole by ____.
- If 100% is equal to ____, then ____% is equal to ____.
- ____% is made up of ____%, ____ and ____%.
- ____% of ____ is equal to ____.
- If 100% is equal to ____, then ____% is equal to ____.
- ____% is equal to ____ lots of ____%.

Key Vocabulary:

calculate
percentages
amounts
fractions
one-step
dividing
bar models
efficient
calculation
digits
halving
formal written method
similar/different
lots of
worth
whole
equal to
multi-step
multiples
multiply

Maths – Fractions, Decimals and Percentages

YEAR 6

Small Steps:

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If you know 10% of a number, you can multiply by 10 to find the whole.

100%									
10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

Work out the missing numbers.

- 10% of _____ = 2.8
- 10% of _____ = 709
- 10% of _____ = 45p
- 10% of _____ = 38 g

Tom knows that 30% of a number is 210

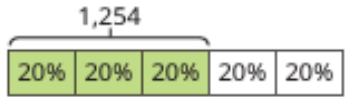
He then works out the whole by finding 10% first.

10% = 210 ÷ 3 = 70
100% = 70 × 10 = 700

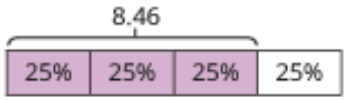
Use Tom's method to work out the missing numbers.

- 30% of _____ = 360
- 70% of _____ = 4.9
- 90% of _____ = 0.36 kg
- 60% of _____ = 92p

Use the bar models to work out the missing numbers.



60% of _____ = 1,254



75% of _____ = 8.46

Key Questions:

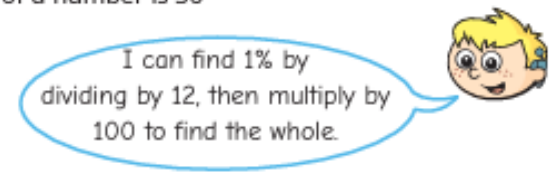
- If you know ____% of a number, how can you work out the whole?
- How many lots of ____% are there in 100%?
- If you know 23%, how can you find 1%? Once you know 1%, how can you find 100%?
- If you know 40%, how can you find 10%
- Once you know 10%, how can you find 100%?
- How can linking percentage's to fractions help you to answer this question?

Fill in the missing values to make the statement correct.

25% of ☐ = ☐ % of 60

Can you find more than one way?

12% of a number is 36



Use Max's method to find the whole.

Stem Sentences:

- If ____% of a number is ____, then the whole is ____.
- There are ____ lots of ____% in 100%.
- If ____% of a number is ____, then 1% of the number is ____, so 100% is ____.

Key Vocabulary:

percentages
whole number
lots of
multiply
divide
fractions