Red/ Purple Class

Addition and Subtraction: Stage 5

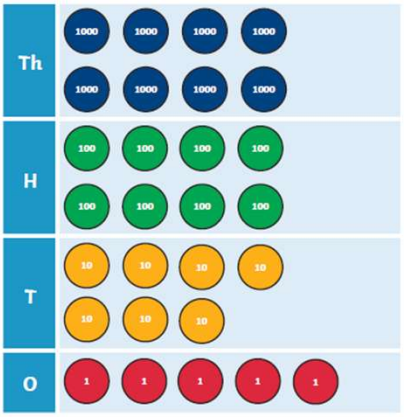
Addition and Subtraction — Knowledge Organiser

Key Vocabulary

- Add
- Total
- Make
- Plus
- Sum
- More
- Altogether
- Difference
- Subtract
- Less
- Minus
- Take away
- Column addition
- Column subtraction
- Estimate
- Inverse operation
- Number facts
- Place value
- Complex

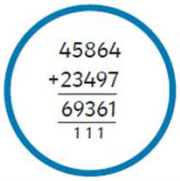
Addition

Place Value Grid: 3274 + 5601 = 8875



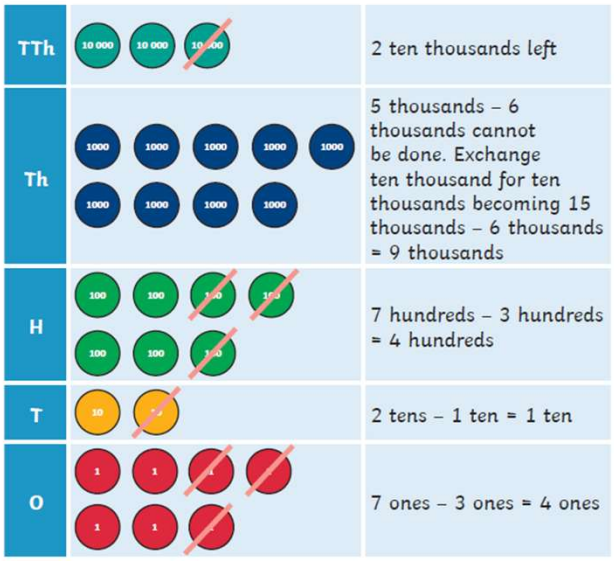
Column Method

Starting with the ones, add each column in turn. Regroup tens, hundreds, thousands, ten thousands and/or as required.



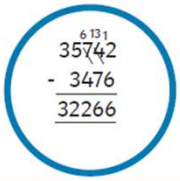
Subtraction

Place Value Grid: 35 727 – 6313 = 29 414



Column Method

Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.



Addition and Subtraction — Knowledge Organiser

Estimate and Approximate

Rounding to Estimate

41 635 + 7386 = 49 021

Round to ten:

41 630 + 7380 = 49 010

41 630 + 7390 = 49 020

41 640 + 7390 = 49 030

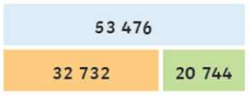
Rounding is not as accurate when both numbers are rounded up. A better estimate comes from "rounding" one down and one up.

Estimating on a Number Line

The arrow is about $\frac{3}{4}$ of the way across the line so it is 40 000.

Inverse Operations

Use the inverse to check:



To check 53 476 – 32 732 = 20 744 use 32 732 + 20 744 = 53 476

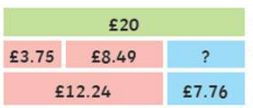
Start with a number, subtract 409 and double. I end with 6264. To find the starting number use the inverse: halve, then add 409. Half of 6264 = 3132. 3132 + 409 = 3541. The starting number was 3541.

Multistep Problems

Using a Bar Model

The sum of two numbers is 25 567.
The difference is 1875.

Subtract 1875 from 25 567 = 23 692.
Halve 23 692 to find smaller number = 11 846.
Add 1875 to find larger number = 13 721.



£20 is used to buy 2 books costing £3.75 and £8.49. How much change is given?

£3.75 + £8.49 = £12.24
£20.00 - £12.24 = £7.76

Multiplication and Division: Stage 5

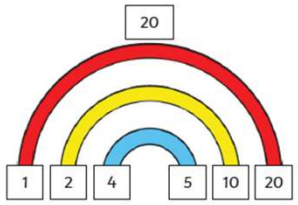
Multiplication and Division — Knowledge Organiser

Key Vocabulary

- multiply
- groups of
- lots of
- times
- divide
- share
- remainder
- factor
- multiple
- product

Factors

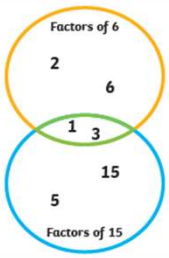
A factor is a number that divides into another number exactly, without leaving a remainder.



The factors of 20 are 1, 2, 4, 5, 10 and 20.

The factor pairs are:
1 and 20
2 and 10
4 and 5

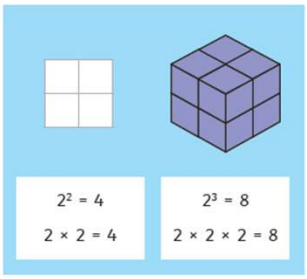
A common factor is a factor of 2 or more numbers.



Prime Numbers

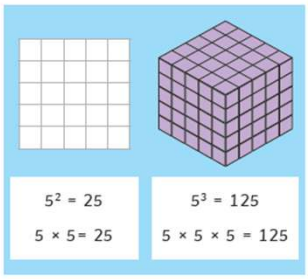
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Squared² and Cubed³ Numbers



$2^2 = 4$ — $2 \times 2 = 4$

$2^3 = 8$ — $2 \times 2 \times 2 = 8$



$5^2 = 25$ — $5 \times 5 = 25$

$5^3 = 125$ — $5 \times 5 \times 5 = 125$

Related Calculations

$8 \times 9 = 72$ $80 \times 9 = 720$	$9 \times 8 = 72$ $90 \times 8 = 720$
$72 \div 9 = 8$ $720 \div 9 = 80$	$72 \div 8 = 9$ $720 \div 8 = 90$

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Multiplication and Division — Knowledge Organiser

Short Multiplication

$2543 \times 7 = 17\,801$

	2	5	4	3
×				7
1	7	8	0	1
1	3	3	(2)	

Remember to move any regrouped digits into the next column. After the next multiplication, add the regrouped number to the answer.

Long Multiplication

$2543 \times 67 = 170\,381$

		2	5	4	3
	×			6	7
	1 1	7 3	8 3	0 2	1
1 1	5 3	2 2	5 1	8	(0)
1	7	0	3	8	1
	1	1			

Before multiplying by the number in the tens column, remember to use zero as a placeholder because the 6 in 67 is 6 tens (60).

Division

$136 \div 4 = 34$

		3	4	
4	1	3	6	
−	1	2	0	→ 30 × 4
		1	6	
	−	1	6	→ 4 × 4
			0	

Short Division

		3	8
4	1	1 5	(3) 2

$15 \div 4 = 3$ remainder 3

Remember to regroup any remainders and move them into the next column.

		4	5	5	r	3
5	2	2	2 7	2 8		

$28 \div 5 = 5$ remainder 3

If your calculation has a remainder, remember to record it in the answer using the letter r.

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Four Operations: Stage 6

Four Operations — Knowledge Organiser

Key Vocabulary

- Add
- Total
- Make
- Plus
- Sum
- More
- Altogether
- Difference
- Leave
- Subtract
- Difference between
- Less
- Minus
- Take away
- Mentally, Orally
- Column Addition
- Column Subtraction
- Estimate
- Inverse operation
- Solve problems
- Number facts
- Place Value
- Complex

Add and Subtract Whole Numbers

Column Method

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

Starting with the ones, add each column in turn. Regroup tens, hundreds, thousands, ten thousands as required.

	3	5	$^{6}\not{7}$	$^{13}\not{4}$	$^{1}\not{2}$
-		3	4	7	6
	3	2	2	6	6

Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.

Multiply up to 4-digit by 2-digit

1	$\not{3}$	$\not{2}$	
	1	5	4
×		2	6
	9	2	4
3	0	8	0
4	0	0	4
1	1		

Start with the ones.

154 × 6 = 924

154 × 20 = 3080

3080 + 924 = 4004

Order of Operations

B	Brackets	10 × (4 + 2) = 10 × 6 = 60
O	Order	5 + 2^2 = 5 + 4 = 9
D	Division	10 + 6 ÷ 2 = 10 + 3 = 13
M	Multiplication	10 - 4 × 2 = 10 - 8 = 2
A	Addition	10 × 4 + 7 = 40 + 7 = 47
S	Subtraction	10 ÷ 2 - 3 = 5 - 3 = 2

Four Operations — Knowledge Organiser

Short Division

Start from the left.

		4	4	0	5
12	5	$^{5}2$	$^{4}8$	6	$^{6}0$

5 ÷ 12 = 0 r5

52 ÷ 12 = 4 r4

48 ÷ 12 = 4

6 ÷ 12 = 0 r6

Long Division

		1	2	0	r	3
14	1	6	8	3		
	1	4	0	0		
		2	8	3		
		2	8	0		
				3		

Common Factors

Factors of 48

1	2	3	4	6	8	12	16	24	48

Factors of 30

1	2	3	5	6	10	15	30

Common factors: 1, 2, 3, 6

Common Multiples

Multiples of 3

3	...	18	21	24	...	39	42

Multiples of 7

7	14	21	28	35	42

Common multiples: 21, 42...

Primes

A prime number has only 1 and itself as factors: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 33, 37, 41, 43

A composite number has factors other than 1 and itself.

Squares and Cubes

Square numbers result from a number being multiplied by itself (e.g. 5 × 5 = 25):

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Cube numbers result from a number being multiplied by itself twice (2 × 2 × 2 = 8):

1, 8, 27, 64, 125

Mental Calculations and Estimation

Order of calculations:

50 × 34 × 2 = 50 × 2 × 34 = 100 × 34 = 3400

Money: £8.99 + £3.49 = £12.48

Use £9 + £3.50 = £12.50 and subtract 2p

Estimate on a number line

Subdivide line to estimate: 17

Reason from Known Facts

90 ÷ 10 = 9 so 90 ÷ 20 = 4.5 and 90 ÷ 5 = 18

16 × 9 = 144 so 1.6 × 9 = 14.4

4352 ÷ 17 = 256
so 256 × 18 = 4352 + 256 = 4608

3786 + 2850 = 6636
so 4786 + 2850 = 7636
and 2786 + 3850 = 6636
and 8636 – 3786 = 4850

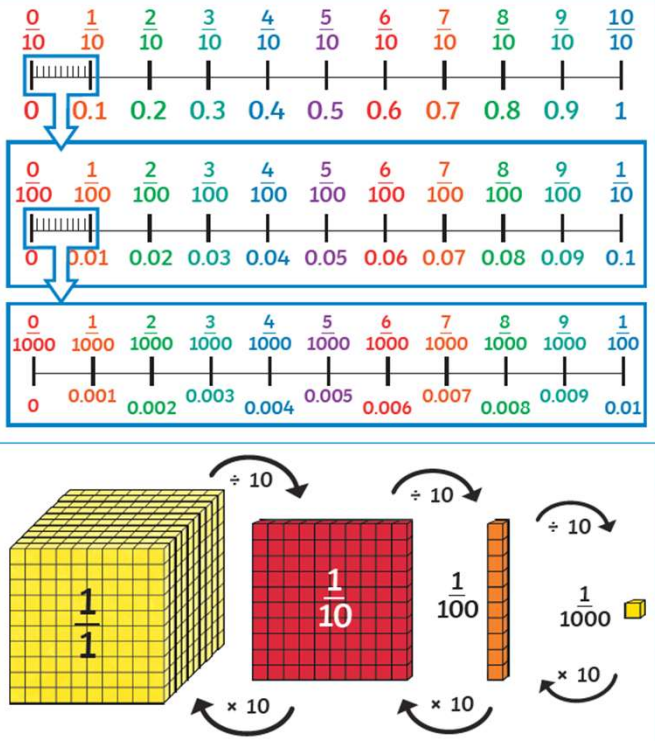
Decimals: Stage 5

Decimals — Knowledge Organiser

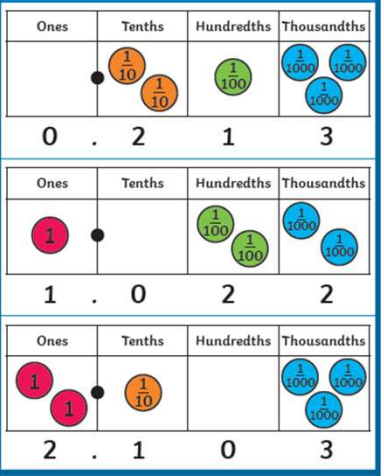
Key Vocabulary

- tenths
- hundredths
- decimal tenths
- decimal hundredths
- decimal equivalents
- part-whole model
- rounding
- decimal point
- place value

Tenths, Hundredths and Thousandths



Order and Compare Numbers with Three Decimal Places



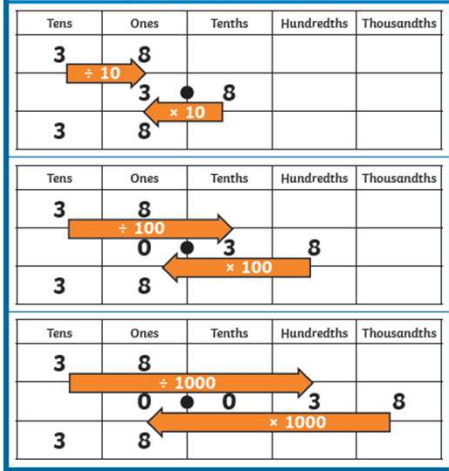
Decimal Numbers as Fractions

$0.71 = \frac{71}{100} = \frac{7}{10} + \frac{1}{100}$

$0.37 = \frac{37}{100} = \frac{3}{10} + \frac{7}{100}$

Decimals — Knowledge Organiser

Multiplying and Dividing by 10, 100 and 1000



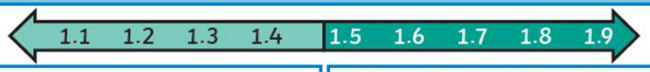
Adding and Subtracting Decimals

0.8 + 0.001 = 0.801

1.031 - 0.23 = 0.801

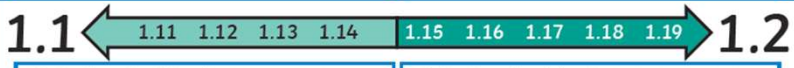
0.4005 + 0.4005 = 0.801

Rounding Decimals



If the tenths digit is 1, 2, 3 or 4, we round down to the nearest whole number.

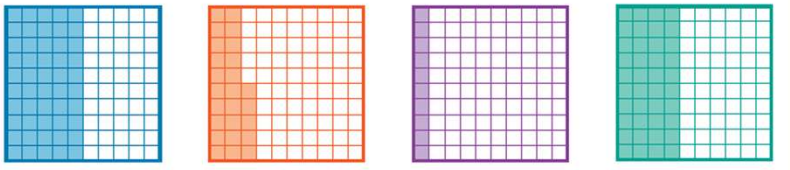
If the tenths digit is 5, 6, 7, 8 or 9, we round up to the nearest whole number.



If the hundredths digit is 1, 2, 3 or 4, we round down to the nearest tenth.

If the hundredths digit is 5, 6, 7, 8 or 9, we round up to the nearest tenth.

Percentage and Decimal Equivalents

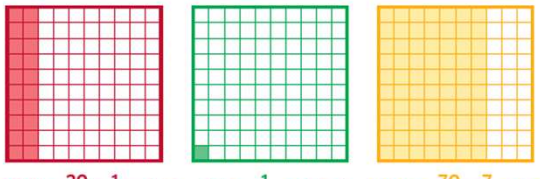


$50\% = \frac{50}{100} = \frac{1}{2} = 0.5$ $25\% = \frac{25}{100} = \frac{1}{4} = 0.25$ $10\% = \frac{10}{100} = \frac{1}{10} = 0.1$ $40\% = \frac{40}{100} = \frac{2}{5} = 0.4$

Crossing the Whole

0.82 + 0.63 = 1.45

2.531 - 0.6 = 1.931



$20\% = \frac{20}{100} = \frac{1}{5} = 0.2$ $1\% = \frac{1}{100} = 0.01$ $70\% = \frac{70}{100} = \frac{7}{10} = 0.7$

Decimals: Stage 6

Decimals — Knowledge Organiser

Key Vocabulary

- decimal place
- decimal fraction
- recurring decimal
- equivalent fraction
- tenth
- sharing
- partitioning
- exchanging
- rounding to 3d.p.
- hundredth
- thousandth
- equal to
- remainder
- grouping

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Place Value

Tens	Ones	.	tenths	hundredths	thousandths
	1 1 1		0.1 0.1 0.1 0.1	0.01 0.01	0.001 0.001 0.001 0.001 0.001 0.001

$3 + \frac{4}{10} + \frac{2}{100} + \frac{6}{1000}$ ⟷ 3.426 ⟷ $3 + 0.4 + 0.02 + 0.006$

1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Fractions to Decimals

$\frac{7}{20} = \frac{35}{100}$ or 0.35 (×5)

$\frac{7}{25} = \frac{28}{100}$ or 0.28 (×4)

$\frac{7}{50} = \frac{14}{100}$ or 0.14 (×2)

$\frac{8}{200} = \frac{4}{100}$ or 0.04 (÷2)

When the denominator is not a factor or multiple of 100

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

	0	.	8	7	5
8	7	7	0	6	0	4	0

Dividing Decimals by Integers

8.12 ÷ 4

	2	.	0 3
4	8	.	1 2

6.93 ÷ 3 = 2.31

Ones	.	tenths	hundredths
1 1		0.1 0.1 0.1	0.01
1 1		0.1 0.1 0.1	0.01
1 1		0.1 0.1 0.1	0.01

Decimals — Knowledge Organiser

Multiplying and Dividing by 10, 100 and 1000

Thousands	Hundreds	Tens	Ones	.	tenths	hundredths	thousandths
			2	.	0	8	
		2	0	.	8		
			2	.	0	8	

× 10 ÷ 10

Thousands	Hundreds	Tens	Ones	.	tenths	hundredths	thousandths
		4	3	.	5		
4	3	5	0	.			
		4	3	.	5		

× 100 ÷ 100

Thousands	Hundreds	Tens	Ones	.	tenths	hundredths	thousandths
			1	.	3	5	1
1	3	5	1	.			
			1	.	3	5	1

× 1000 ÷ 1000

Multiplying Decimals by Integers

	3	. 4	5
×			3
1	0	. 3	5
	1		1

3.21 × 3 = 9.63

Ones	.	tenths	hundredths
1 1 1		0.1 0.1	0.01
1 1 1		0.1 0.1	0.01
1 1 1		0.1 0.1	0.01

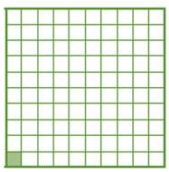
Decimal Numbers as Fractions

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

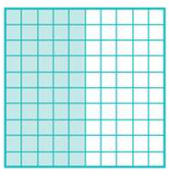
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

$\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{4}{10}$ $\frac{5}{10}$ $\frac{6}{10}$ $\frac{7}{10}$ $\frac{8}{10}$ $\frac{9}{10}$ 1

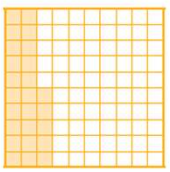
$\frac{1}{5}$ $\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{5}$ $\frac{4}{5}$



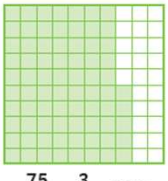
$\frac{1}{100} = 0.01$



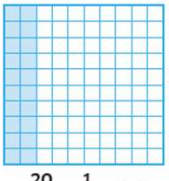
$\frac{50}{100} = \frac{1}{2} = 0.5$



$\frac{25}{100} = \frac{1}{4} = 0.25$



$\frac{75}{100} = \frac{3}{4} = 0.75$



$\frac{20}{100} = \frac{1}{5} = 0.2$

$\frac{1}{3} = 0.33$ $\frac{1}{8} = 0.125$ $\frac{1}{1000} = 0.001$

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Fractions: Stage 5

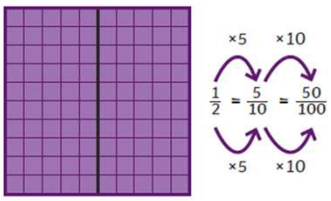
Fractions — Knowledge Organiser

Key Vocabulary

- numerator
- denominator
- unit fraction
- non-unit fraction
- whole
- equivalent
- mixed number
- improper fraction
- simplest form
- multiple
- common denominator
- common numerator

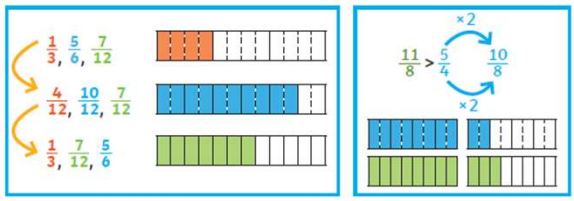
Equivalent Fractions

To find equivalent fractions, we multiply or divide the numerator and denominator by the same number.



Compare and Order Fractions

We can compare and order fractions by using common denominators.



Mixed Numbers

Mixed numbers contain a whole number and a fraction.

whole → $2\frac{1}{4}$ ← fraction

Improper Fractions

An improper fraction has a numerator which is greater than or equal to the denominator.

$\frac{5}{3}$

Convert an Improper Fraction to a Mixed Number

$\frac{9}{4}$

$9 \div 4 = 2r1$ → $2\frac{1}{4}$

Divide the numerator by the denominator.

This shows you the whole number and the fraction.

Convert a Mixed Number to an Improper Fraction

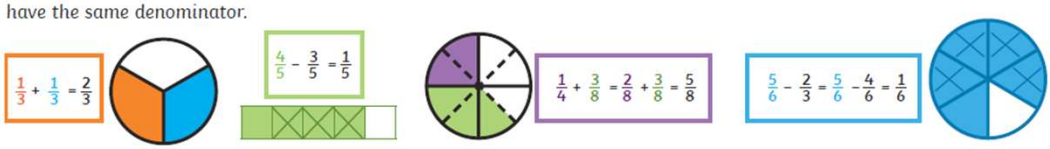
Multiply the whole by the denominator to make an improper fraction.

$2\frac{5}{6} = \frac{12}{6} + \frac{5}{6} = \frac{17}{6}$

Add the fractions together.

Adding and Subtracting Fractions

To add or subtract fractions with denominators that are multiples of the same number, we must change one fraction to have the same denominator.



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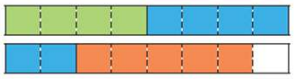
Fractions — Knowledge Organiser

Add Fractions Where the Total is Greater Than 1

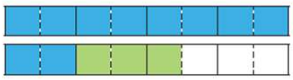
$\frac{1}{2} + \frac{3}{4} + \frac{5}{8} = \frac{4}{8} + \frac{6}{8} + \frac{5}{8} = \frac{15}{8} = 1\frac{7}{8}$



Add Mixed Numbers

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

$1\frac{1}{4} + \frac{3}{8} = \frac{5}{4} + \frac{3}{8} = \frac{10}{8} + \frac{3}{8} = \frac{13}{8} = 1\frac{5}{8}$



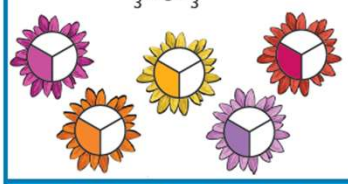
Subtract from a Mixed Number

$1\frac{2}{3} - \frac{2}{9} = 1\frac{6}{9} - \frac{2}{9} = 1\frac{4}{9}$

starting number	find the equivalent fraction	subtract

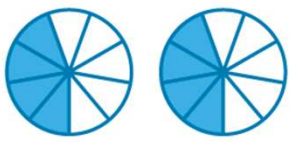
Multiply Unit Fractions by an Integer

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



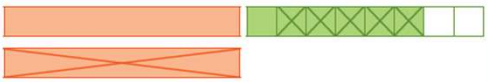
Multiply Non-Unit Fractions by an Integer

$2 \times \frac{4}{9} = \frac{8}{9}$



Subtract Two Mixed Numbers

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



$2 - 1 = 1$

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

Multiply Mixed Numbers by Integers

Convert to an improper fraction and multiply the numerator by the integer.

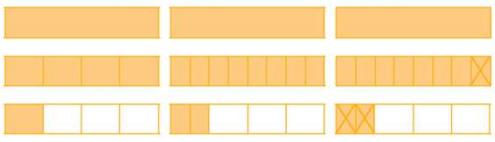
$2\frac{1}{4} \times 2 = \frac{9}{4} \times 2 = \frac{18}{4} = 4\frac{2}{4} = 4\frac{1}{2}$

Use repeated addition.

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

Subtract from a Mixed Number - Breaking the Whole

$2\frac{1}{4} - \frac{3}{8} = 2\frac{2}{8} - \frac{3}{8} = 1\frac{10}{8} - \frac{3}{8} = 1\frac{7}{8}$



Fractions: Stage 6

Fractions — Knowledge Organiser

Key Vocabulary

- numerator
- denominator
- proper fraction
- improper fraction
- factor
- highest common multiple
- lowest common multiple
- equivalents
- common numerator
- common denominator
- decimal equivalent
- simplify
- simplest form
- mixed number
- whole number
- mixed number

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Simplify Fractions

$\frac{9}{12}$

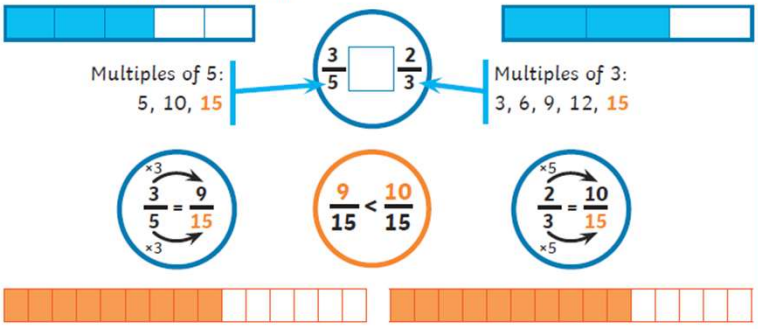
Factors of 9: 1, 3, 9

Factors of 12: 1, 2, 3, 4, 6, 12

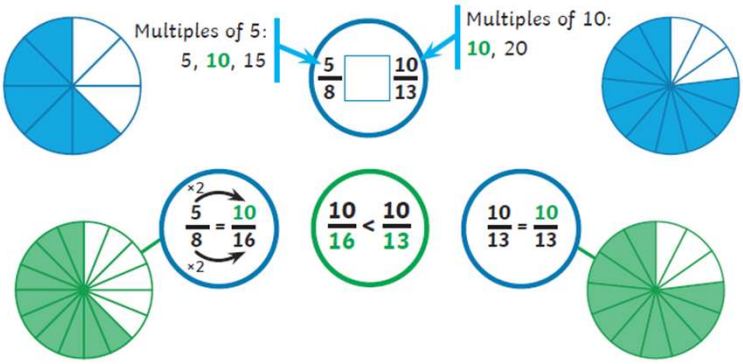
$\frac{9}{12} = \frac{3}{4}$ (÷3)

Compare and Order Fractions

Use the Common Denominator



Use the Common Numerator



Fractions — Knowledge Organiser

Adding and Subtracting Proper Fractions

Same Denominators

$\frac{4}{7} + \frac{2}{7} = \frac{6}{7}$

$\frac{8}{11} - \frac{3}{11} = \frac{5}{11}$

Different Denominators

$\frac{2}{7} + \frac{3}{5}$

Multiples of 7: 7, 14, 21, 28, **35**
Multiples of 5: 5, 10, 15, 20, 25, 30, **35**

$\frac{2}{7} = \frac{10}{35}$, $\frac{3}{5} = \frac{21}{35}$

$\frac{10}{35} + \frac{21}{35} = \frac{31}{35}$

$\frac{9}{10} - \frac{1}{4}$

Multiples of 10: 10, **20**
Multiples of 4: 4, 8, 12, 16, **20**

$\frac{9}{10} = \frac{18}{20}$, $\frac{1}{4} = \frac{5}{20}$

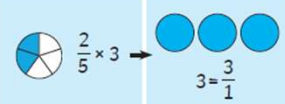
$\frac{18}{20} - \frac{5}{20} = \frac{13}{20}$

Multiplying Proper Fractions

Multiplying Fractions by Fractions

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

Multiplying Fractions by Whole Numbers



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

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Adding and Subtracting Mixed Numbers

Add or subtract the whole numbers and fractions separately.

$2\frac{2}{5} + 1\frac{3}{10}$

$2+1=3$

$\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$

$3 + \frac{7}{10} = 3\frac{7}{10}$

$2\frac{1}{2} - 1\frac{1}{4}$

$2-1=1$

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

$1 + \frac{1}{4} = 1\frac{1}{4}$

Convert the mixed numbers to improper fractions.

$2\frac{2}{5} + 1\frac{3}{10}$

$2\frac{2}{5} = \frac{12}{5}$ $\quad 1\frac{3}{10} = \frac{13}{10}$

$\frac{12}{5} + \frac{13}{10} = \frac{24}{10} + \frac{13}{10} = \frac{37}{10}$

$\frac{37}{10} = 3\frac{7}{10}$

$2\frac{1}{2} - 1\frac{1}{4}$

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

$\frac{5}{2} - \frac{5}{4} = \frac{10}{4} - \frac{5}{4} = \frac{5}{4}$

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

Dividing Fractions by Whole Numbers

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

Multiplication and division are the inverse of one another so:

÷ 2 is the same as × $\frac{1}{2}$

$\frac{2}{5} \times \frac{1}{2} = \frac{2}{10}$

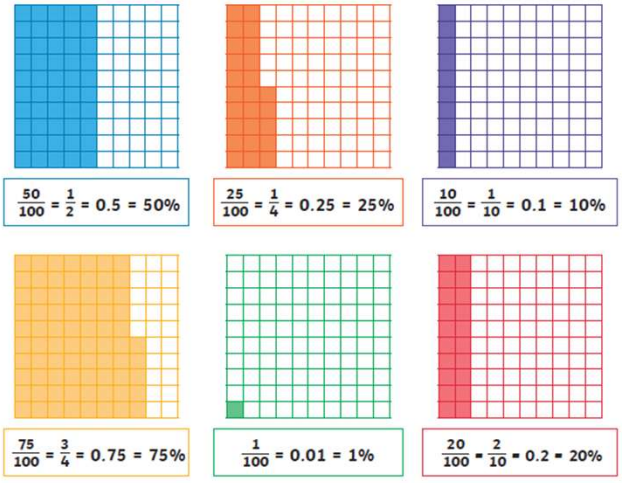
Percentages: Stage 6

Percentages — Knowledge Organiser

Key Vocabulary

- per cent (%) = 'out of 100'
- percentage
- discount
- equivalent fraction
- equivalent decimal
- convert
- compare
- order
- the whole

Equivalent Fractions, Decimals and Percentages



$\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$ | $\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$ | $\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$

$\frac{75}{100} = \frac{3}{4} = 0.75 = 75\%$ | $\frac{1}{100} = 0.01 = 1\%$ | $\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$

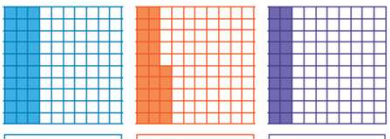
Fractions to Percentages

$\frac{15}{50} \xrightarrow{\times 2} \frac{30}{100} = 0.3 = 30\%$

$\frac{60}{200} \xrightarrow{\div 2} \frac{30}{100} = 0.3 = 30\%$

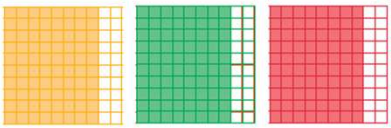
Order Fractions, Decimals and Percentages

$\frac{3}{10} > 25\% > 0.2$



$\frac{30}{100} = 30\%$ | $\frac{25}{100} = 25\%$ | $\frac{20}{100} = 20\%$

$80\% = 0.8 = \frac{4}{5}$

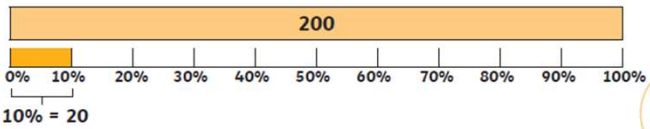


$\frac{80}{100} = 80\%$ | $\frac{80}{100} = 80\%$ | $\frac{80}{100} = 80\%$

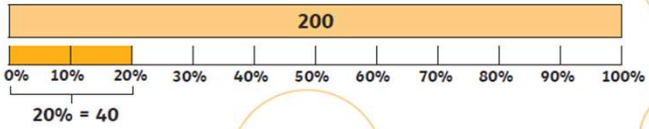
Percentages — Knowledge Organiser

Finding a Percentage of an Amount

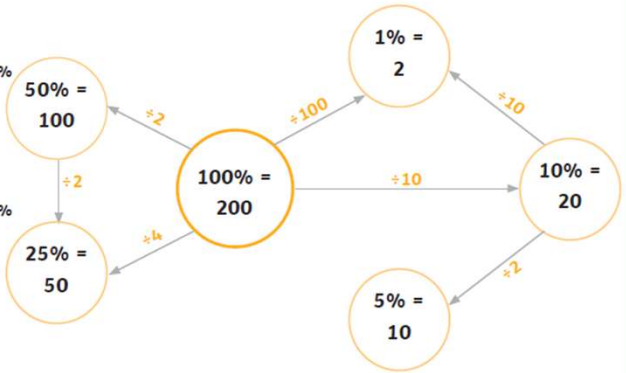
50% = $\frac{1}{2}$ so we can divide by 2	10% = $\frac{1}{10}$ so we can divide by 10	25% = $\frac{1}{4}$ so we can divide by 4	1% = $\frac{1}{100}$ so we can divide by 100

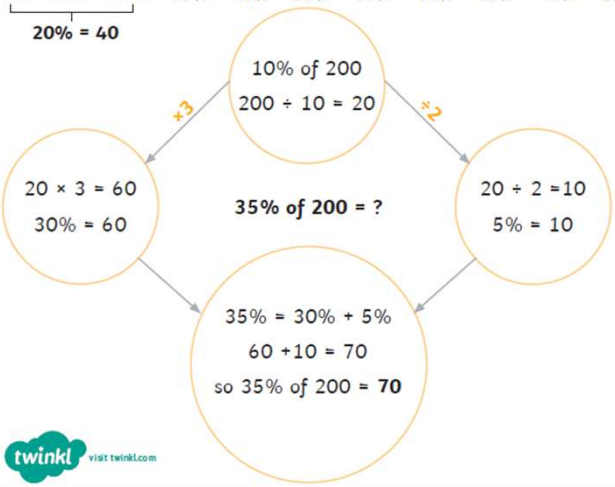


10% = 20



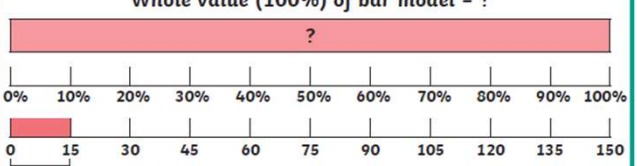
20% = 40





Percentages – Missing Values

Whole value (100%) of bar model = ?



10% = 15

We know 10% = 15 | 10% × 10 = 100% (the whole) | so 15 × 10 = 150

Perimeter and Area: Stage 5

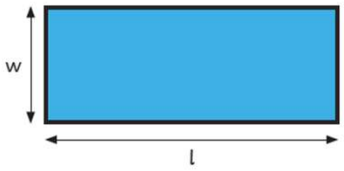
Perimeter and Area — Knowledge Organiser

Key Vocabulary

- metre
- kilometre
- perimeter
- length
- width
- rectangle
- rectilinear
- dimensions

Measure Perimeter

Measure the perimeter of a rectangle:



Measure the length (l) and width (w).

Perimeter = l + w + l + w or (l + w) × 2

Measure the perimeter of regular shapes:

Measure the length (l) and count the number of sides (s) on the shape.

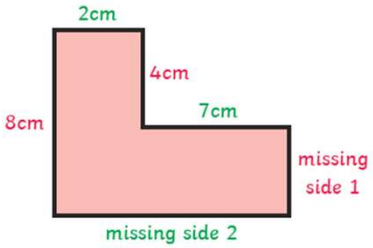
Perimeter = l × s

Measure the perimeter of irregular shapes:

Measure the length of each side and add them together.

Calculate Perimeter

Calculate the missing sides of this rectilinear shape to find the perimeter:



** This shape is not drawn to the dimensions specified.*

Missing side 1 + 4cm = 8cm,
so missing side 1 = 4cm.

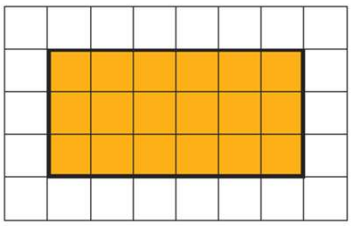
Missing side 2 = 2cm + 7cm = 9cm

Perimeter = sum of all sides =
2cm + 4cm + 7cm + 4cm + 9cm + 8cm = 34cm

Length and Perimeter — Knowledge Organiser

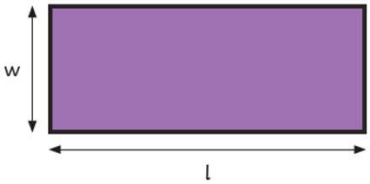
Area of Rectangles

The area of a rectangle on a grid:



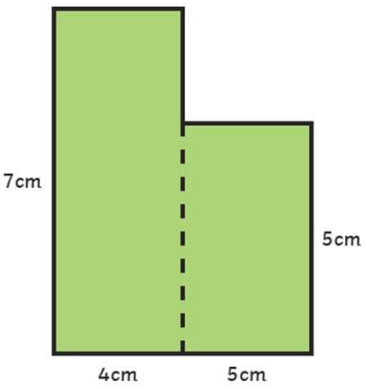
Multiply the length × width
= 6 × 3 = 18 squares.

The area of a rectangle = length (l) × width (w).



Area of Compound Shapes

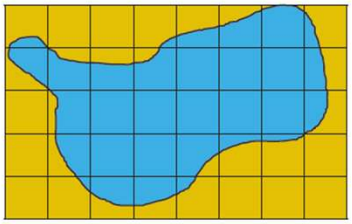
To find the area of a compound shape, divide the shape into rectangles with known dimensions:



Area = 7cm × 4cm + 5cm × 5cm
= 28cm² + 25cm²
= 53cm²

Area of Irregular Shapes

To find the area of an irregular shape, find the number of whole squares and part squares.



Whole squares = 10
Part squares = 22

Estimate of area = whole squares + half part squares

= 10cm² + 11cm² = 21cm²

*There are other ways to estimate the area of irregular shapes.

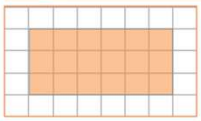
Perimeter, Area and Volume: Stage 6

Key Vocabulary

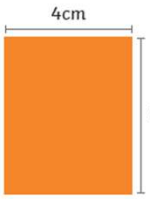
- perimeter
- area
- volume
- cubic units (e.g. cm³)
- cuboid
- width
- length
- rectangle
- rectilinear
- parallelogram
- perpendicular height

Area of Rectangles

length × width = area of a rectangle



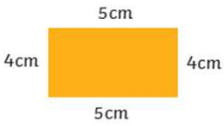
Counting squares:
area = 18cm²
Use formula:
6cm × 3cm
area = 18cm²



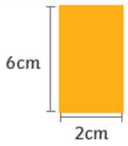
8cm × 4cm area = 32cm²

Perimeter of Rectangles

perimeter = length + width + length + width or (length + width) × 2



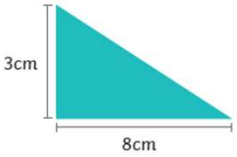
5cm + 4cm + 5cm + 4cm
area = 18cm²



(6 + 2) × 2
area = 16cm²

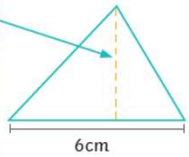
Area of Triangles

base × perpendicular height ÷ 2 = area of a triangle

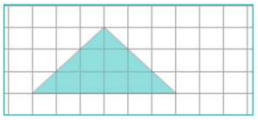


8cm × 3cm ÷ 2
area = 12cm²

perpendicular height = 5cm



6cm × 5cm ÷ 2
area = 15cm²

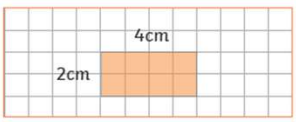


Counting squares:
6 whole squares = 6cm²
6 half squares = 3cm²
6cm² + 3cm² = 9cm²
area = 9cm²

Using formula:
6cm × 3cm
÷ 2 = 9cm²

Perimeter and Area

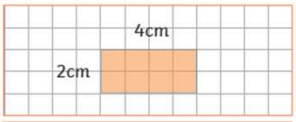
Shapes with the same area can have different perimeters.



area = 8cm² perimeter = 12cm

area = 8cm² perimeter = 18cm

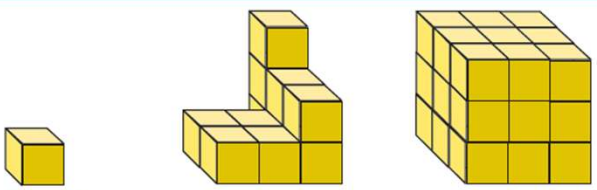
Shapes with the same perimeter can have different areas.



area = 8cm² perimeter = 12cm

area = 5cm² perimeter = 12cm

Volume - Counting Cubes

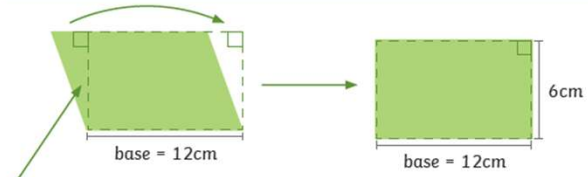


= 1cm³ 11cm³ 27cm³

Area of Parallelograms

base × perpendicular height = area of a parallelogram

A parallelogram can be transformed into a rectangle.

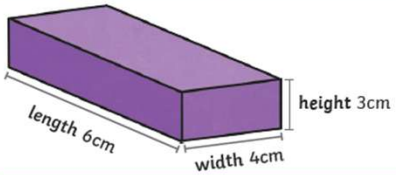


perpendicular height = 6cm

12cm × 6cm = 72cm²

Volume of Cuboids

length × width × height = volume of a cuboid



Multiply dimensions in **any** order:
3cm × 6cm × 4cm
volume = 72cm³

Statistics: Stage 5

Statistics — **Knowledge Organiser**

Key Vocabulary

- axis
- continuous data
- horizontal
- data
- interpret
- label
- line graph
- maximum value
- minimum value
- pattern
- predict
- relationship
- represent
- scale
- survey
- table
- tally
- timetable
- vertical
- x-axis
- y-axis

Reading and Understanding Tables

A table to show ticket prices at a local cinema.

Ticket Type	Weekday Price	Weekend Price
Adult	£6	£7.50
Child	£4	£4.50
Student	£5.50	£6

In order to understand the data presented in a table, you must read the table's title and the headings. Remember to always look at the heading that each piece of information falls under.

Completing Tables

Here is a table showing the favourite drink flavours of some children.

	Boys	Girls	Total
Orange	8		18
Blackcurrant		6	
Total	15		

To find how many boys voted for blackcurrant, look at the total number of boys who voted and subtract the number of votes for orange.

To find how many girls voted for orange, look at the total number of votes for orange and subtract the number of votes from boys.

To find the total number of votes for blackcurrant, the total number of girls or the total number of voters, simply add up the values from the appropriate row or column.

Timetables

Here is a bus timetable:

Bus stop locations	Three different buses		
Mill Road	0726		0842
High Street	0729	0803	
Pitsmoor Road	0759	0833	
Fulwood	0845	0919	0946

The bus starts at this time and location.

The bus does not stop here.

The bus terminates at this time and location.

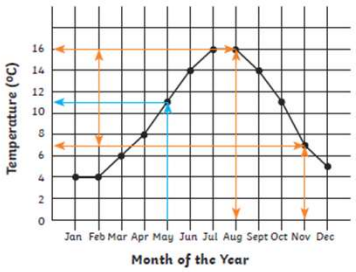
Statistics — **Knowledge Organiser**

Read and Interpret Line Graphs

Here is a line graph showing the average temperature for each month.

The y-axis shows temperature in intervals of 2°C on a scale of 0°C to 16°C.

The points show the average temperature for each month.



The x-axis shows the months of the year.

Use Line Graphs to Solve Problems

To find the average temperature in May, follow the arrow up from May and across to the temperature. As this is halfway between 10°C and 12°C, the average temperature in May is 11°C.

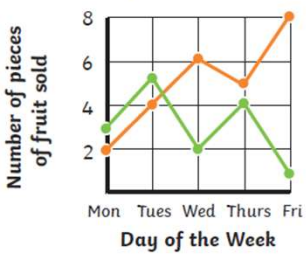
To find the difference between the average temperatures in August and in November, find the temperature for each month and calculate the difference between the two. The shape of the line graph can show how the temperature changed. he average temperature falls 9°C from August to November.

Draw Line Graphs

Here is a table showing the number of different types of fruit sold each day.

	Bananas	Apples
Mon	2	3
Tues	4	5
Wed	6	2
Thurs	5	4
Fri	8	1

This graph can be used to represent the data from the table.



Mark each point for the number of bananas sold each day and join each point with a line.

Mark each point for the number of apples sold each day and join each point with a line.

Statistics: Stage 6

Statistics — Knowledge Organiser

Key Vocabulary

- bar chart
- pictogram
- frequency table
- tally chart
- pie chart
- discrete data
- continuous data
- line graph
- sum
- difference
- comparison
- interpret
- mean average

Interpreting Data

Information can be show in tables, charts or graphs.

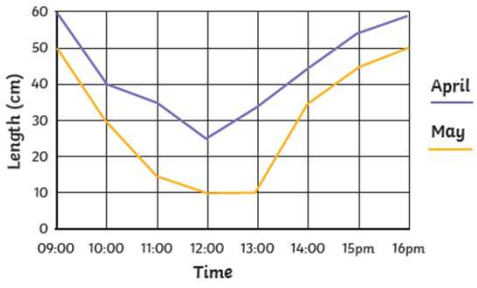
Interpreting data simply means understanding or working out what is being shown by a table, graph or chart and being able to answer questions about that information.

Line Graph

Line graphs are used to show changes to a measurement over time.

Data shown in a line graph is continuous.
Sets of points are joined together to make the line.

A line graph to show the length of shadows over time

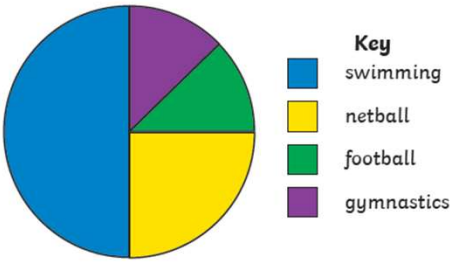


Pie Charts

Pie charts represent discrete data.

A circle is divided into segments, where each segment represents a data category. The size of each segment matches its proportion of the total amount.

A pie chart to show children's favourite sports



24 children were asked in total.

Swimming = $\frac{1}{2}$ so $\frac{1}{2}$ of 24 = 12 children

Netball = $\frac{1}{4}$ so $\frac{1}{4}$ of 24 = 6 children

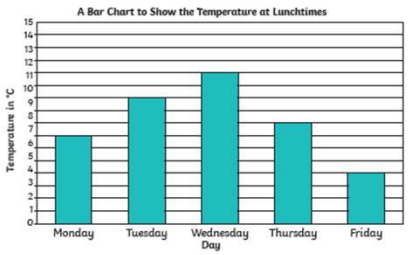
Football = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children

Gymnastics = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children

Statistics — Knowledge Organiser

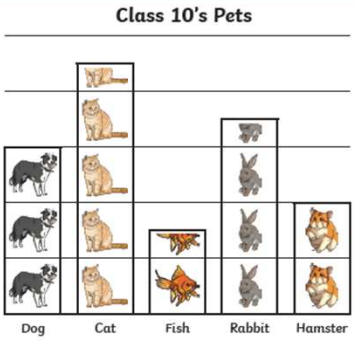
Bar Chart

A bar chart has a horizontal axis and a vertical axis. Bars show the data value of each category. There must be a gap between each bar. The scale of the bar chart is chosen based on the data range.



Pictogram

This graph uses pictures or symbols to represent the data. The pictogram uses one picture or symbol to represent a value.



Frequency Table

Eye Colour	Tally	Frequency
brown	𝍸 I	6
blue	𝍸 III	8
green	III	3
grey	IIII	4
hazel	𝍸	5

Tally marks are used to help count things. Each vertical line represents one unit. The fifth tally mark goes down across the first four to make it easier to count.

The frequency column is completed after all the data has been collected.

Mean Average

The mean is the average of a set of data.

To find the mean or average, add up all of the values to find the total. Divide the total by the number of values that you added together. This will give you the mean.

12	15	10	8	15

12 + 15 + 10 + 8 + 15 = 60

60 ÷ 5 = 12

The mean of this data is 12.