Swaffham Primary Academy

Year 6 Knowledge Organiser

SPAG Knowledge Organiser (Year 6)			
No.	**Topic**	**Explanation**	**Example**
1	**Verbs**	A verb is an action word or a state of being. Verbs change the tense of a sentence.	The dog caught the bone. Actions: jump, run, cook, think States of being: is strange, was upstairs
2	**Subject**	The person or thing doing the verb.	The dog caught the bone.
3	**Object**	The person or thing having something done to it.	The dog caught the bone.
4	Types of sentence: **command** (imperative)	A command (imperative) sentence is one that tells someone to do something. It can end with a full stop or question mark.	Close the door.
5	Types of sentence: **statement** (declarative)	A statement (declarative) sentence is one that tells you about something. It always ends with a full stop.	It is a hot day today.
6	Types of sentence: **question** (interrogative)	A question sentence is one that asks something. It always ends with a question mark.	What is the weather like outside?
7	Types of sentence: **exclamatory**	An exclamatory sentence is one that shows surprise or strong feeling. It normally starts with what or how and ends with an exclamation mark.	What a beautiful dress you have on!
8	**Concrete** nouns	A **concrete noun** names a person, place, or thing that is a physical object. This means that you can see, hear, smell, taste, or touch it.	friend house Leslie flower
9	**Abstract** nouns	An **abstract noun** names an idea, feeling, quality, or concept. It is not a physical object. This means you can think about an abstract noun, but you can't see, hear, smell, taste, or touch it.	power fear wisdom Sunday
10	**Common** nouns	**Common nouns describe a class of objects. They do no start with a capital letter (unless at the start of a sentence)**	car toys books
11	**Proper** nouns	**A proper noun is the name of a person, place or object. They start with a capital letter.**	Selina England Aston Villa
12	**Adjectives**	**Adjectives describe/add detail to a noun. They can come before or after the noun.**	cloudy skies pristine book The noisy baby was hungry.

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13	**Adverbs**	**Adverbs add detail to verbs, adjectives and other adverbs.**	**TRaMP** **Time**: first, then, next **Reason**: because, so, therefore **Manner**: angrily, quickly **Place**: on, under, over
14	Tenses: **past**	The past tense describes something that took place at a specific time and has finished.	I walked to school yesterday.
15	Tenses: **past perfect**	The past perfect describes an event that was completed in the past before something else happened.	I had been at home all day when the postman finally arrive in the afternoon.
16	Tenses: **past progressive** (past continuous)	The past progressive describes actions that took place in the past over a period of time.	They were walking their dog when it started raining.
17	Tenses: **present perfect**	The present perfect describes something that happened in the past with a result in the present.	She has lost her passport.
18	Tenses: **present**	The present tense describes actions that happen regularly.	They walk to school.
19	Tenses: **present progressive** (present continuous)	The present progressive describe actions that are happening now.	I am phoning my parents.
20	Tenses: **future**	The future tense describes something that will happen in the future.	My dad will cook dinner for me tonight.
21	Tenses: **subjunctive**	The subjunctive is a verb form or mood used to express things that could or should happen. It is used to express wishes, hopes, commands, demands or suggestions.	If I were to win the lottery, I would go on holiday.
22	**Modal verbs**	**Modal verbs show possibility, indicate ability, show obligation or give permission. Modal verbs include: will, would, should, could, may, might, can, shall, ought to, must**	You should pick up that rubbish.
23	**Active voice**	A sentence is written in active voice when the subject of the sentence is performing the action to the object.	My dad baked cookies. S V O
24	**Passive voice**	A sentence is written in passive voice when the subject of the sentence is having something done to it by the object.	The cookies were baked S V by my dad. O

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25	**Co-ordinating conjunctions**	**Conjunctions are words that link two clauses in a sentence. A co-ordinating conjunction links two clauses with equal weighting.**	**FANBOYS** for, and, nor, but, or, yet, so
25	**Subordinating conjunctions**	**Conjunctions are words that link two clauses in a sentence.** A **subordinating conjunction** introduces a subordinate clause (a clause that does not make sense on its own).	**AWHITEBUS** after, when/where/while, however, if, to, even though, because, until/unless, since
26	**Determiners**	**A determiner introduces a noun.**	Definite article: a, an Indefinite article: the Possessive: my, your, his, her, our, their Demonstrative: this, that, those Quantifier: some, many, every, one, two
27	**Personal Pronouns**	**A pronoun replaces a noun that has already been introduced.**	I, you, he, she, it, we, they, me, him, her, us and them.
28	**Possessive Pronouns**	**A pronoun replaces a noun that has already been introduced. Possessive pronouns show ownership/ belonging.**	Some pronouns can be used on their own (mine, yours, his, hers, ours, theirs, whose) Others must be used with a noun (my, your, his, her, its, our, their, whose
29	**Relative Clauses/Pronouns**	**Relative clauses add information to a sentence using a relative pronoun.**	who, which, that, whose My dad, who is a fantastic cook, made curry last night.
30	**Phrases**	A phrase is a small group of words that does not contain a verb (as soon as a verb is included, the group of words become a clause). **Noun phrases include a noun and adjective.** **Prepositional phrases show place and include a preposition.** **Adverbial phrases are built around an adverb.**	Noun phrase: the fluffy kitten Prepositional phrase: under the stairs Adverbial phrase: as quickly as possible

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No.	**Topic**	**Explanation**	**Example**
31	**Semi-colon**	**A semi-colon is used to separate two independent (main) clauses that are closely related.** The clauses must be on the same theme and not be joined together with a conjunction; the semi-colon takes the place of the conjunction within the sentence.	I love to draw; Sally loves to paint.
32	**Colon**	**A colon is used to introduce a list or to separate two independent but linked clauses** (colons are used to show that both clauses in the sentence are closely linked and the second clause emphasises, adds clarification, or adds further detail to the first clause).	To make the cake, you will need: 100g of sugar, 2 eggs, 300g of flour and 100g of butter. I decided it was time to leave: my bus was due soon.
33	**Dashes**	**A dash is used for parenthesis (to show extra information)**	The Concorde was the fastest plane in the word – it travelled at the speed of sound.
34	**Brackets**	**Brackets are used for parenthesis (to show extra information)**	The Concorde was the fastest plane in the word (it travelled at the speed of sound).
35	**Main (independent) clause**	**A main clause includes a subject and a verb and make sense by itself.**	I like biscuits and I like ice cream.
36	**Subordinate clause**	**A subordinate clause does not makes sense by itself and adds information to a main clause.**	After going to the shops, I unpacked the groceries.
37	**Apostrophes to show contraction**	When two words are put together and some letters are missed out, we need to add an apostrophe where the missing letters are.	do not = don't will not = won't
38	**Apostrophes to show possession**	**Apostrophes can be used to show that something belongs to someone.** **When the noun is singular, add 's.** **When the noun is plural, add '**	Hannah's football (the football belongs to Hannah) James's coat (the coat belongs to James) The girls' pencils (the pencils belong to the girls)
39	**Inverted commas**	**Inverted commas:** **Speech marks** **Capital letter** **Actual speech** **Punctuation** **Speech marks**	"Pass me the salt," said John.
SPAG Knowledge Organiser (Year 6)			

No.	Topic	Explanation	Example
40	**Hyphen**	**A hyphen is used to join two words or separate syllables within a word.**	re-enter co-operation one-to-one
41	**Prefixes and Suffixes**	Prefixes are groups of letters added to the beginning of a word, changing its meaning. **Suffixes are word endings.**	unhappy re-enter helpful referring
42	**Synonyms**	**Words that have the same or similar meaning**	Happy: jovial, content, cheerful, merry
43	**Antonyms**	**Words that have the opposite meaning.**	Happy: sad, dejected, unhappy, miserable

YEAR 6 MATHS KNOWLEDGE ORGANISER

Multiplication and division vocabulary

Term	Definition	Example
factor	a number that divides exactly into another number	factors of 12 = 1, 2, 3, 4, 6, 12
common factor	factors of two numbers that are the same	common factors of 8 and 12 = 1, 2, 4
prime number	a number with only 2 factors: 1 and itself	2, 3, 5, 7, 11, 13, 17, 19...
composite number	a number with more than two factors	12 (it has 6 factors)
prime factor	a factor that is prime	prime factors of 12 = 2, 3
multiple	a number in another number's times table	multiples of 9 = 9, 18, 27, 36...
common multiple	multiples of two numbers that are the same	common multiples of 4 and 6 = 12, 24...
square numbers	the result when a number has been multiplied by itself	25 (5^2 = 5x5) 49 (7^2 = 7x7)
cube numbers	the result when a number has been multiplied by itself 3 times	8 (2^3 = 2x2x2) 27 (3^3 = 3x3x3)

Roman numerals

1	I	100	C
5	V	500	D
10	X	1000	M
50	L		

Measurement conversions

Month	Days
January	31
February	28 (29 in leap year)
March	31
April	30
May	31
June	30
July	31
August	31
September	30
October	31
November	30
December	31
1 year = 365 days (≈ 52 weeks) Leap year = 366 days	

1 **centi**metre	10mm
1 metre	100cm
1 **kilo**metre	1,000 m
1 mile	1.6 km
1 kilometre	0.625 ($^5/_8$) mile
1 **kilo**gram	1,000 grams
1 litre	1,000 **milli**litres

Co-ordinates

Read co-ordinates along the x axis (horizontal) first, then the y axis (vertical). E.g. (3,-4) = go right 3, down 4.

Fractions, decimals & percentages

$^1/_{100}$	0.01	1%	÷ 100
$^1/_{20}$	0.05	5%	÷ 20
$^1/_{10}$	0.1	10%	÷ 10
$^1/_5$	0.2	20%	÷ 5
¼	0.25	25%	÷ 4
½	0.5	50%	÷ 2
¾	0.75	75%	÷ 4, x3
1	1	100%	÷ 1

Angles

full turn	360°
half turn	180°
right angle	90°
acute angle	< 90°
obtuse angle	> 90°
reflex angle	>180°
angles on a straight line	180°
angles inside a triangle	180°
angles inside a quadrilateral	360°

2D shapes

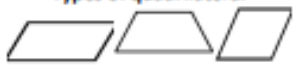
Name	No. of sides
quadrilateral	4
pentagon	5
hexagon	6
heptagon	7
octagon	8
nonagon	9
decagon	10

polygon = shape with straight sides
regular = all sides/angles the same
irregular = sides/angles **not** same

Types of triangle

scalene equilateral isosceles

Types of quadrilateral



parallelogram trapezium rhombus

AREA

is the amount of space inside a 2D shape usually measured in cm² or m².

Area of a triangle = (base x height) ÷ 2
Area of a parallelogram = base x height
(Height = perpendicular height)

3D shapes

	square-based pyramid	triangular-based pyramid	triangular prism
faces (the flat sides)	**5**	**4**	**5**
edges	**8**	**6**	**9**
vertices (the points where the edges meet)	**5**	**4**	**6**

Volume = the amount of space a 3D shape takes up, usually measured in cm³ or m³

Volume of a cuboid = length x width x height

Shape vocabulary

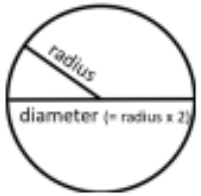
perimeter = measure around the edge (**circumference** = perimeter of a circle)

horizontal line

vertical line

parallel lines

perpendicular lines (at right angles)



The mean

The mean is a type of average. To find the mean, add up all the numbers and divide by how many there are. E.g. the mean of 4, 5, 3, 4 is 4.
(Because 4 + 5 + 3 + 4 = 16, and 16 ÷ 4 = 4)

made by Sophie Bartlett @_MissieBee

Arithmetic Knowledge Organiser (Year 6)		
No.	**Topic**	**Example**
1	When **multiplying a number by 0**, the answer is always 0.	435 x 0 = 0
2	When **multiplying a number by 1**, the answer is always itself.	6,756 x 1 = 6,756
3	When **dividing a number by 1**, the answer is always itself.	729 ÷ 1 = 729
4	To **add fractions with the same denominator**, simply add the numerators and leave the denominator.	$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$
5	To **subtract fractions with the same denominator**, simply subtract the numerators and leave the denominator.	$\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$
6	To **multiply two fractions**, multiply the numerators and multiply the denominators. Then simplify.	$\frac{7}{9} \times \frac{3}{4} = \frac{21}{36} = \frac{7}{12}$
7	To **divide two fractions**, turn the second fraction upside down (it becomes a reciprocal) and change the operation to multiply. Multiply the numerators. Multiply the denominators. Then simplify.	$\frac{1}{2} \div \frac{1}{6}$ becomes $\frac{1}{2} \times \frac{6}{1}$ $\frac{1}{2} \times \frac{6}{1} = \frac{6}{2} = 3$
8	To **multiply a fraction by a whole number**, write your whole number as a fraction over 1. Multiply the numerators and multiply the denominators. Then simplify.	$\frac{2}{4} \times 5 = \frac{2}{4} \times \frac{5}{1}$ $\frac{2}{4} \times \frac{5}{1} = \frac{10}{4} = 2\frac{1}{2}$
9	To **divide a fraction by a whole number**, multiply the denominator by the whole number. Leave the numerator. Simplify if necessary.	$\frac{1}{2} \div 3 = \frac{1}{2 \times 3} = \frac{1}{6}$
10	To **find a fraction of an amount**, divide the whole number by the denominator, then multiply by the numerator.	$\frac{2}{5}$ of 2,200 = 880 2,200 ÷ 5 = 440 440 x 2 = 880
11	A **square number** is the result of multiplying a number by itself.	$5^2 = 5 \times 5 = 25$
12	A **cube number** is the result of multiplying a number by itself and then by itself again.	$5^3 = 5 \times 5 \times 5 = 125$
13	To solve **mixed operation equations**, use BIDMAS to decide on the order. Brackets Indices Division Multiplication Addition Subtraction	$5^2 - 6 \times 4 = 1$ **B:** no brackets to solve **I:** do 5^2 first = 25 *The calculation becomes: 25 - 6 x 4 =* **D:** no division to solve **M:** solve 6 x 4 = 24 *The calculation becomes: 25 - 24 =* **A:** no addition **S:** do $5^2 - 24 = 1$

Arithmetic Knowledge Organiser (Year 6)		
No.	**Topic**	**Example**
14	To **multiply a number by 10, 100 or 1,000**, move the digits 1, 2 or 3 places to the left. Use placeholders (0) to fill empty columns.	2.3 x 100 = 230 2 . 3 2 3 . 0 (one place to the left) 2 3 0 . 0 (two places to the left) Tip: the decimal point must not move.
15	To **divide a number by 10, 100 or 1,000**, move the digits 1, 2 or 3 places to the right. Use placeholders (0) to fill empty columns.	14 ÷ 1,000 = 0.014 1 4 . 0 (write the whole number with a decimal point and placeholder) 1 . 4 (one place to the right) 0 . 1 4 (two places to the right) 0 . 0 1 4 (three places to the right) Tip: the decimal point must not move.
16	When **adding using the column method**, ensure the digits are lined up in the correct place value column. Start adding from the right.	19,245 + 2,347 = 21,592 TTh Th H T O 1 9 2 4 5 2 3 4 7 + 2 1 5 9 2 1 1 (5+7=12, so 2 stays in the ones column and the 1 ten moves to the tens column)
17	When **subtracting using the column method**, ensure the digits are lined up in the correct place value column. Start subtracting from the right.	24,861 - 2,189 = 22,672 TTh Th H T O 7 15 1 2 4 ~~8~~ ~~6~~ 1 2 1 8 9 - 2 2 6 7 2 (1-9 is not possible, so regroup from the column next door)
18	When **solving missing number equations involving addition**, take the result and subtract (inverse) the value you have. Check that your answer completes the equation correctly.	☐ + 50 = 643 643 - 50 = 593 (use column method if necessary) Check: 593 + 50 = 643 ✓
19	When **solving missing number equations involving subtraction where the missing value is the first number**, take the result and add (inverse) the value you have. Check that your answer completes the equation correctly.	☐ - 567 = 243 243 + 567 = 810 (use column method if necessary) Check: 810 - 567 = 243 ✓
20	When **solving missing number equations involving subtraction where the missing value is the second number**, take the first number and subtract the result. Check that your answer completes the equation correctly.	4,492 - ☐ = 2,350 4,492 - 2,350 = 2,142 (use column method if necessary) Check: 4,492 - 2,142 = 3,350 ✓

Arithmetic Knowledge Organiser (Year 6)		
No.	**Topic**	**Example**
21	When **solving equations where the missing answer comes before the equals sign**, do exactly as you would normally! It doesn't matter where the equals sign comes, as long as what's on either side are equal!	$\square = 3{,}990 + 258$ $3{,}990 + 258 = 4{,}248$ (use column method if necessary)
22	To complete equations involving partitioning, label the place value of each digit. Tick the values that have already been included in the equation. Write the missing value in the equation.	$8{,}030{,}040 = 8{,}000{,}000 + \square + 40$ M HTh TTh Th H T O 8 0 3 0 0 4 0 ✓ ✓ Missing value: 30,000
23	When **adding or subtracting decimal numbers**, ensure the digits are lined up in the correct place value column. With numbers written to different decimal places, fill in any gaps with placeholders. Add/subtract each digit, starting from the right.	12.45 + 3.672 = 15.122 12.450 (fill in any gaps with placeholders) 03.672 + (the decimal points must line up) 16.122 1 1
24	When **adding or subtracting a whole number and a decimal number**, first write the whole number with a decimal point and placeholder(s). Add/subtract each digit, starting from the right.	15 - 2.46 = 12.54 4 9 1 15.00 (0-6 is not possible, so regroup from the column next door. As there are 0 tenths, regroup from the next column along) 02.46 - (fill in any gaps with placeholders) 12.54 (the decimal points must line up)
25	To **add/subtract fractions with different denominators**, first make the denominators the same. This can be done by multiplying them together. Whatever you do to the denominators, you must then do to the numerators. Then, add/subtract the numerators, leaving the denominators the same. Simplify if necessary.	$\frac{3}{7} + \frac{5}{9}$ (multiply 7 and 9) $\frac{\quad}{63} + \frac{\quad}{63} =$ (As you multiplied the denominator by 9 (7x9=63), you must multiply the numerator by 9 (3x9=27)) $\frac{27}{63} + \frac{35}{63}$ (As you multiplied the denominator by 7 (9x7=63), you must multiply the numerator by 7 (5x7=35)) $\frac{27}{63} + \frac{35}{63} = \frac{62}{63}$

Arithmetic Knowledge Organiser (Year 6)		
No.	**Topic**	**Example**
26	When **adding/subtracting mixed numbers and fractions with different denominators**, convert the mixed number into an improper fraction first. Do this by multiplying the denominator by the whole number and then adding on to the numerator. Then make the denominators the same. This can be done by multiplying them together. Whatever you do to the denominators, you must then do to the numerators. Then, add/subtract the numerators, leaving the denominators the same. Simplify if necessary.	$3\frac{1}{12} + \frac{2}{4} =$ 12 x 3 = 36 36 + 1 = 37 So the calculation becomes: $\frac{37}{12} + \frac{2}{4} =$ (multiply 12 and 4) $\frac{\quad}{48} + \frac{\quad}{48} =$ (As you multiplied the denominator by 4 (12x4=48), you must multiply the numerator by 4 (37x4=148)) $\frac{148}{48} + \frac{24}{48}$ (As you multiplied the denominator by 12 (4x12=48), you must multiply the numerator by 12 (2x12=24)) $\frac{148}{48} + \frac{24}{48} = \frac{172}{48} = 3\frac{7}{12}$
27	To **multiply a mixed number by a fraction**, first convert the mixed number into an improper fraction. Do this by multiplying the denominator by the whole number and then adding on to the numerator. Then, multiply the numerators and multiply the denominators. Then simplify.	$2\frac{1}{12} \times \frac{2}{3} =$ 12 x 2 = 24 24 + 1 = 25 So the calculation becomes: $\frac{25}{12} \times \frac{2}{3} = \frac{50}{36} = 1\frac{7}{18}$
28	To **multiply a mixed number by a whole number**, first convert the mixed number into an improper fraction. Do this by multiplying the denominator by the whole number and then adding on to the numerator. Then, write your whole number as a fraction over 1. Multiply the numerators and multiply the denominators. Then simplify.	$2\frac{1}{12} \times 4 =$ 12 x 2 = 24 24 + 1 = 25 So the calculation becomes: $\frac{25}{12} \times 4 = \frac{25}{12} \times \frac{4}{1}$ $\frac{25}{12} \times \frac{4}{1} = \frac{100}{12} = 8\frac{1}{3}$
29	When **multiplying multiples of 10**, make the numbers 10, 100 or 1,000 times smaller so they are single digits. Multiply the single digits together. Then make the answer 10, 100, 1,000 times larger (the reverse of when you made the numbers smaller).	50 x 700 = 10 times smaller = 5 100 times smaller = 7 5 x 7 = 35 10 times larger = 350 100 times larger = 35,000 So 50 x 700 = 35,000

Arithmetic Knowledge Organiser (Year 6)		
No.	**Topic**	**Example**
30	When **multiplying three numbers**, multiply the first two, then multiply this answer by the last number.	4 x 5 x 30 = (4 x 5) x 30 = 20 x 30 = 600
31	To **multiply a number by a single digit**, set out the single digit below the number. Multiply the single digit by the digit in the ones column, then the tens column, and so on.	346 x 7 = 2,422 Th H T O 3 4 6 x 7 2 4 2 2 2 3 4
32	To **multiply a number by a two-digit number**, set out the two-digit number below the number. Multiply by the digit in the ones column by each digit of the top number. Add a placeholder (0) to the line below to hold the 10s value. Multiply the digit in the tens column by each digit of the top number. Add your two answers together to get your final answer.	469 x 32 = 15,008 4 6 9 x 3 2 9 3 8 1 1 + 1 4 0 7 0 1 2 2 1 5 0 0 8 1 1
33	To **multiply a decimal number by a whole number**, multiply the two numbers exactly as you would if they were both whole numbers. Add the decimal point to your answer ensuring it is vertically in line with where it appears in the decimal number in the question.	4.2 x 34 = 142.8 4 . 2 x 3 4 1 6 8 1 + 1 2 6 0 1 1 4 2 . 8 1
34	To **multiply two decimal numbers**, multiply the numbers as if they were whole numbers. Line up the numbers on the right - do not align the decimal points. Starting on the right, multiply each digit in the top number by each digit in the bottom number, just as with whole numbers. Add the products. Place the decimal point in the answer by starting at the right and moving a number of places equal to the sum of the decimal places in both numbers multiplied.	2.13 x 2.4 = 5.112 2 . 1 3 (two decimal places) x 2 . 4 (one decimal place) 8 5 2 1 + 4 2 6 0 5 . 1 1 2 (three decimal places) 1 1

Arithmetic Knowledge Organiser (Year 6)		
No.	**Topic**	**Example**
35	To **calculate a percentage of an amount**, divide the number by 100, then multiply by the percentage. **Remember:** 'x' is the same as 'of', so 24% of 3,600 is the same as 24% x 2,600	24% of 3,600 = 864 3,600 ÷ 100 = 36 (you've found 1%) 36 x 24 = 864
36	To **calculate familiar percentages of an amount**, do the following: - To find 50%, divide the number by 2 - To find 25%, divide the number by 4 To find 10%, divide the number by 10	50% of 640 = 640 ÷ 2 = 320 25% of 640 = 640 ÷ 4 = 160 10% of 640 = 640 ÷ 10 = 64
37	To **calculate 99% of an amount**, divide the number by 100 (to find 1%), then take this amount away.	99% of 650 = 643.5 650 ÷ 100 = 6.5 (you've found 1%) 650 – 6.5 = 643.5 (this is 99%)
38	To **divide a number by a single digit**, set out using the 'bus stop' method.	256 ÷ 8 = 32 0 3 2 8 | 2 ~~2~~ ~~5~~ ¹6 8 doesn't go into 2, so carry the 2 over. 8 goes into 25 three times (8x3=24 with 1 left over). Carry the 1 over to the 6. 8 goes into 16 twice.
39	To **divide a number by a two-digit number**, set out using the 'coin method'. Work out your coins by using your times tables to help you.	1,968 ÷ 16 = 16 | 1968 1600 - (100) 0368 320- (20) 048 32- (2) 16 16 - (1) 00 1 x 16 = 16 2 x 16 = 32 5 x 16 = 80 10 x 16 = 160 20 x 16 = 320 50 x 16 - 800 100 x 16 = 1,600 Firstly, find out your 'coins' for the number that you are dividing by. Jot these down at the side as you will help them to divide. Subtract your coins away from the

		number you are dividing. Subtract value of the largest coin first. Here we can subtract the value of our hundred coin first. Make sure you write your coin down beside it. Keep subtracting your coins until you cannot take anymore away or you have reached zero. To find your answer add up the amount of coins that you subtracted and if you have any remaining, add this to the end.

Number and Place Value — Knowledge Organiser

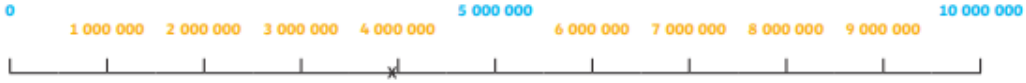
Numbers to Ten Million

3 926 471

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	9	2	6	4	7	1

three million, nine hundred and twenty-six thousand, four hundred and seventy-one

3 926 471	
3 926 000	471



Round Any Number

Rounding to the nearest 1000

2000 ← 2499 | 2500 → 3000

round down | round up

Rounding to the nearest 100 000

200 000 ← 249 999 | 250 000 → 300 000

round down | round up

Rounding to the nearest 10 000

20 000 ← 24 999 | 25 000 → 30 000

round down | round up

Rounding to the nearest 1 000 000

2 000 000 ← 2 499 999 | 2 500 000 → 3 000 000

round down | round up

Number and Place Value — Knowledge Organiser

Key Vocabulary

- ten million
- millions
- thousands
- hundreds
- tens
- ones
- zero
- place value
- greater than
- less than
- order
- round
- rounded
- negative number
- partition
- digit
- interval
- sequence
- linear sequence

Compare and Order

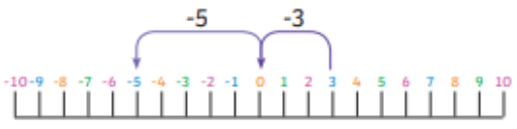
equals	greater than	less than
26 + 38 = 8 × 8	223 873 > 98 256	901 198 < 1 091 098
Both calculations have the value 64.	The number on the left has 2 hundred thousands and the number on the right has 0 hundred thousands.	The number on the right has 1 million and the number on the left has 0 millions.

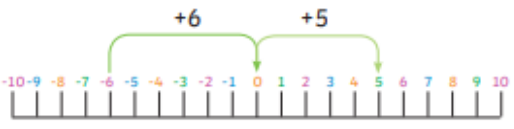
smallest — 81 782 — 127 352 — 127 835 — 137 019 — 200 002 — greatest

Negative Numbers

3 - 8 = -5

-6 + 11 = 5





Algebra — Knowledge Organiser

Key Vocabulary

- term to term rule
- variable
- unknown
- expression
- equation
- formula
- one-step equation
- two-step equation
- substitution
- pairs of unknowns
- enumerate

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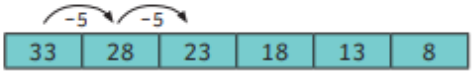
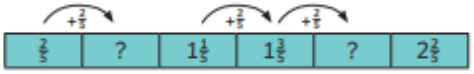
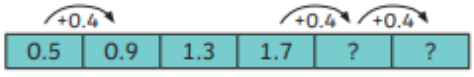
Linear Number Sequences

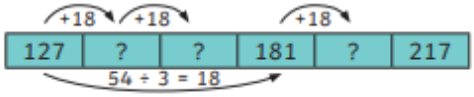
A linear number sequence is a sequence where each value increases or decreases by the same amount each time. Each number in a linear number sequence is called a **term**. The constant change between each number is called the term to term rule. To identify the **term to term rule**, find the difference between two adjacent terms.

When you know the term to term rule, you can use it to find the next number in the sequence. It can also be used to find a missing number within a sequence.









Forming Expressions

An expression is a group of numbers, letters and operation symbols.

Add 14 to a	$a + 14$
Subtract 20 from b	$b - 20$
Multiply c by 4	$4c$
12 more than d	$d + 12$
Multiply e by 3 and subtract 5	$3e - 5$
Add 12 to f and then multiply by 2	$2(f + 12)$

Forming Equations

$a + 14 = 20$
$b - 20 = 15$
$4c = 28$
$d + 12 = 30$
$3e - 5 = 10$
$2(f + 12) = 44$

An equation is a number statement with an equal sign (=). Expressions on either side of the equal sign are of equal value.

Formulas / Formulae

(The word formula has two possible plural forms, formulae and formulas.)

A formula is a special type of equation that shows the relationship between different substituted variables. Formulas are often used in geometry to find area and volume.

- Area of triangle = (base × height) ÷ 2
- Area of rectangle = length × width
- (12.5 × hours worked) + 25 = cost of job

Algebra — Knowledge Organiser

Equations with Pairs of Unknowns

In an equation with two unknown numbers, there may be **several** possible values for the unknowns that will balance the equation.

$ab = 18$

a	b
1	18
2	9
3	6
6	3
9	2
18	1

$2a + b = 10$

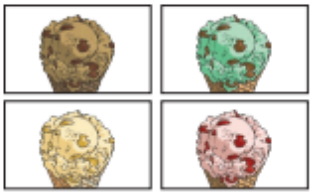
a	b
2	6
3	4
4	2
5	0

Enumerating Possibilities

Enumerating means making a complete list of answers to a problem.

- Use a system for finding the possibilities.
- Organise your findings in an ordered list or table.
- Have a way of deciding when all possibilities have been found.

There are four ice cream flavours.



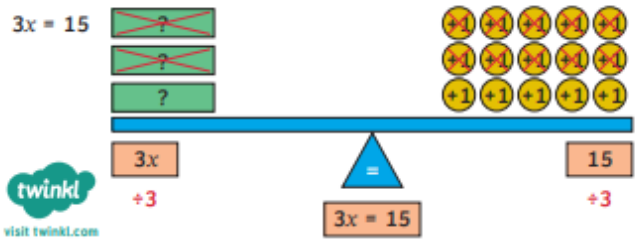
Two scoops of two different flavours give six possible combinations.

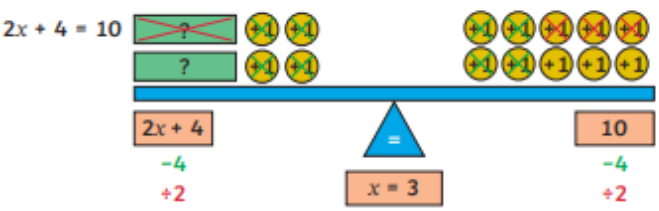
- chocolate and strawberry
- chocolate and vanilla
- chocolate and mint
- strawberry and vanilla
- strawberry and mint
- vanilla and mint

Solving One-Step and Two-Step Equations

In algebra, missing numbers in equations are represented by letters. Any letter can be used but often the letter x is used. An algebraic x is written to look different to a normal letter 'x' to avoid confusion.

The multiplication sign is not used in algebra to avoid confusing it with the algebraic x used to show a missing number. Inverse operations are used to isolate the letter on one side of the equation.





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Key Vocabulary

mass
gram
kilogram
capacity
volume
millilitre
litre
millimetre
centimetre
kilometre
foot
inch
ounce
pound
stone
pint
gallon

Converting Mass

1 tonne = 1000kg

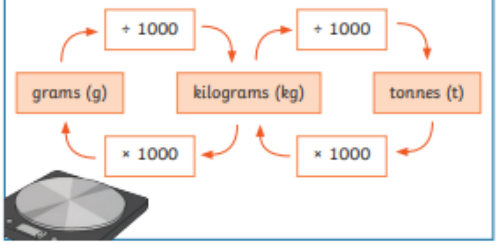
1000g = 1kg

$\frac{1}{10}$ kg = 0.1kg = 100g

$\frac{1}{4}$ kg = 0.25kg = 250g

$\frac{1}{2}$ kg = 0.5kg = 500g

$\frac{3}{4}$ kg = 0.75 = 750g



Converting Capacity

1000ml = 1l

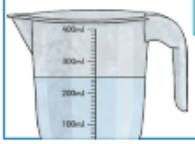
$\frac{1}{10}$ l = 0.1l = 100ml

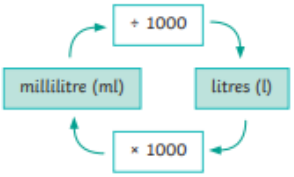
$\frac{1}{4}$ l = 0.25l = 250ml

$\frac{1}{2}$ l = 0.5l = 500ml

$\frac{3}{4}$ l = 0.75l = 750ml

$\frac{1}{100}$ l = 0.01l = 10ml





Converting Length

1000m = 1km

100cm = 1m

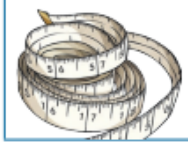
10mm = 1cm

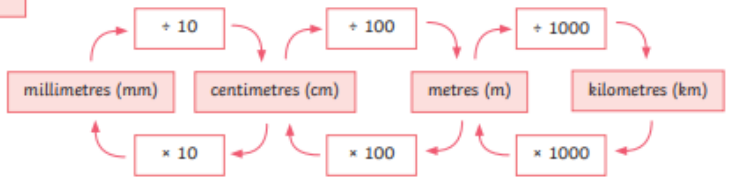
$\frac{1}{2}$ m = 0.5m = 50cm

$\frac{1}{4}$ m = 0.25m = 25cm

$\frac{3}{4}$ m = 0.75m = 75cm

$\frac{1}{10}$ m = 0.01m = 10cm

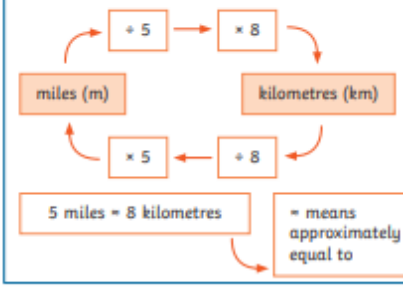


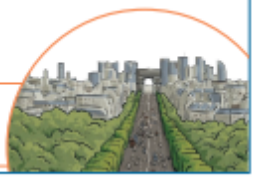


Converting Units — Knowledge Organiser

Miles to Kilometres

You might measure the length of a road or the distance between two cities in miles or kilometres.





Time

Minute 1 minute = 60 seconds

Hour 1 hour = 60 minutes

Day 1 day = 24 hours

Week 1 week = 7 days

Year 1 year = 12 months = 52 weeks = 365 days

Imperial Measures

Things that could be measured using imperial units:

- Someone's height in feet and inches
- The mass of a bag of sugar in ounces
- The mass of a sack of potatoes in pounds
- A person's mass in stones
- A carton of milk in pints
- The amount of water in a bath in gallons

1 foot = 12 inches

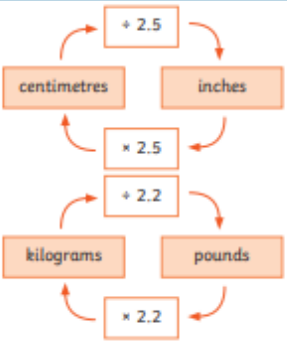
1 pound = 16 ounces

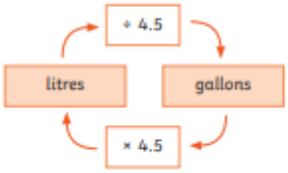
1 stone = 14 pounds

1 gallon = 8 pints

Metric to Imperial Conversions

metric (new)	imperial (old)
2.5 centimetres	1 inch
1 kilogram	2.2 pounds
4.5 litres	1 gallon





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	. $^{1}\not{2}$	$^{1}2$

6.93 ÷ 3 = 2.31

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

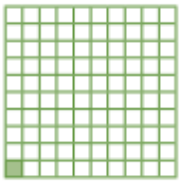
Decimal Numbers as Fractions

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

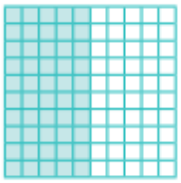
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

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

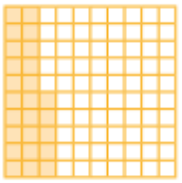
$\frac{1}{5}$ $\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{5}$ $\frac{4}{5}$



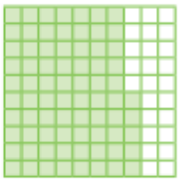
$\frac{1}{100} = 0.01$



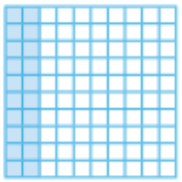
$\frac{50}{100} = \frac{1}{2} = 0.5$



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



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



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

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

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Fractions — 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

Simplify Fractions

$\frac{9}{12}$

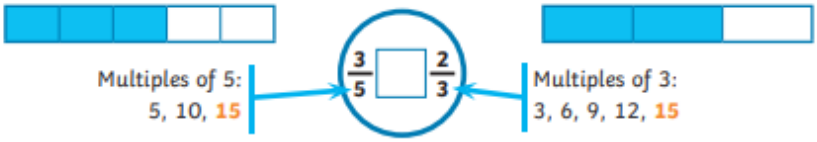
Factors of 9: 1, 3, 9

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

$\frac{9}{12} = \frac{3}{4}$ (÷3)

Compare and Order Fractions

Use the Common Denominator



Multiples of 5: 5, 10, 15

$\frac{3}{5} \square \frac{2}{3}$

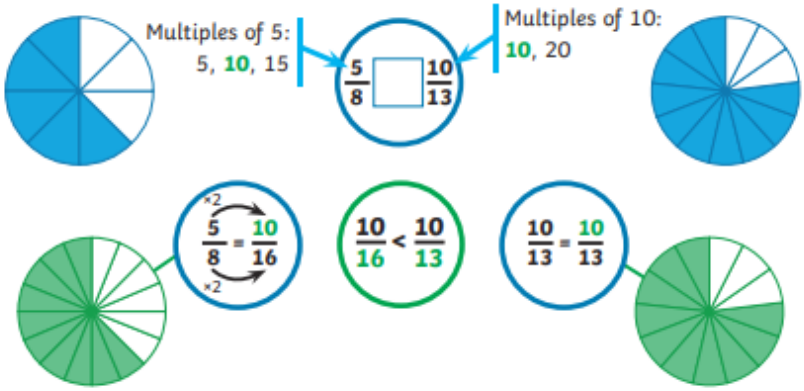
Multiples of 3: 3, 6, 9, 12, 15

$\frac{3}{5} = \frac{9}{15}$ (×3)

$\frac{9}{15} < \frac{10}{15}$

$\frac{2}{3} = \frac{10}{15}$ (×5)

Use the Common Numerator



Multiples of 5: 5, 10, 15

$\frac{5}{8} \square \frac{10}{13}$

Multiples of 10: 10, 20

$\frac{5}{8} = \frac{10}{16}$ (×2)

$\frac{10}{16} < \frac{10}{13}$

$\frac{10}{13} = \frac{10}{13}$

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**

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

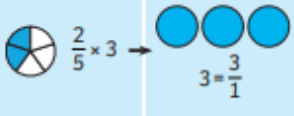
$\frac{18}{20} - \frac{5}{20} = \frac{13}{20}$

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



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

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

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.

$2\frac{2}{5} + 1\frac{3}{10}$ $\quad$ $2\frac{1}{2} - 1\frac{1}{4}$

$2\frac{2}{5} = \frac{12}{5}$ $\quad$ $1\frac{3}{10} = \frac{13}{10}$ $\quad$ $2\frac{1}{2} = \frac{5}{2}$ $\quad$ $1\frac{1}{4} = \frac{5}{4}$

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

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

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

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

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 × $\frac{1}{2}$

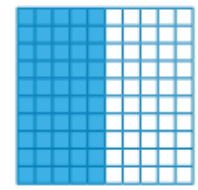
$\frac{2}{5} \times \frac{1}{2} = \frac{2}{10}$

Percentages — Knowledge Organiser

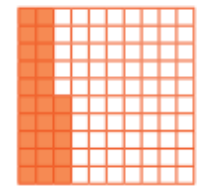
Key Vocabulary

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

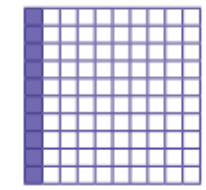
Equivalent Fractions, Decimals and Percentages



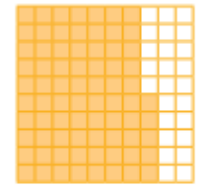
$\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$



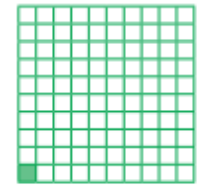
$\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$



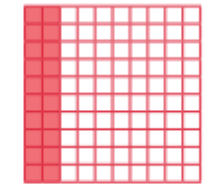
$\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$



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

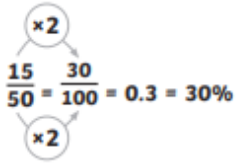


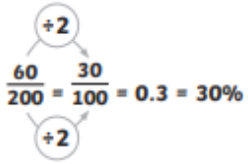
$\frac{1}{100} = 0.01 = 1\%$



$\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$

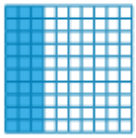
Fractions to Percentages



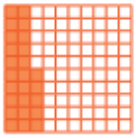


Order Fractions, Decimals and Percentages

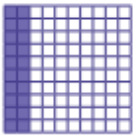
$\frac{3}{10} > 25\% > 0.2$



$\frac{30}{100} = 30\%$

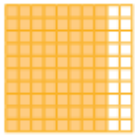


$\frac{25}{100} = 25\%$

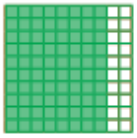


$\frac{20}{100} = 20\%$

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



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



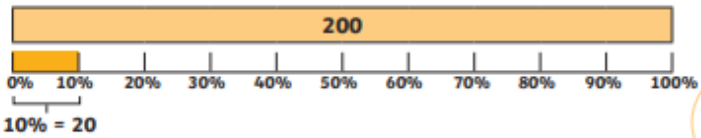
$\frac{80}{100} = 80\%$

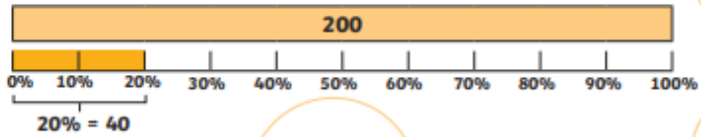
$\frac{80}{100} = 80\%$

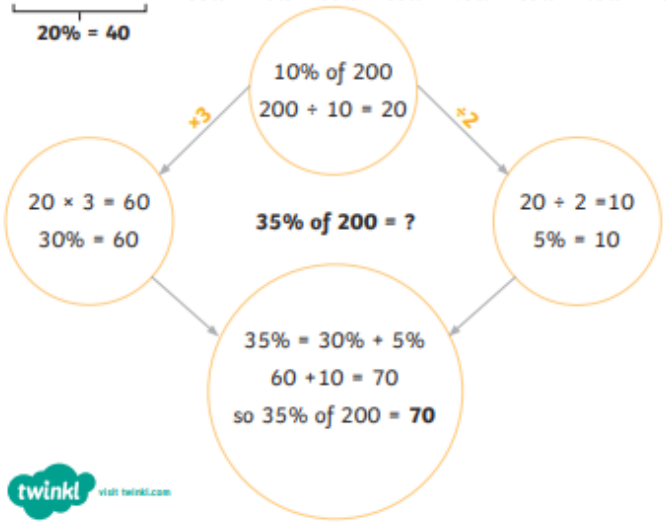
Percentages — Knowledge Organiser

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

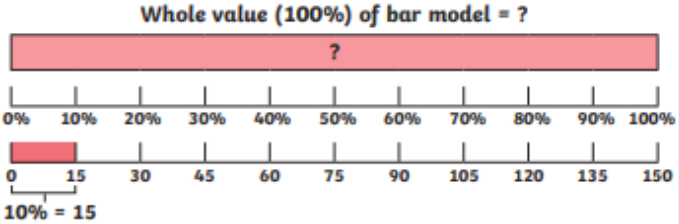






Percentages – Missing Values

Whole value (100%) of bar model = ?



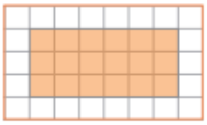
We know 10% = 15 | 10% × 10 = 100% (the whole) | so 15 × 10 = 150

Key Vocabulary

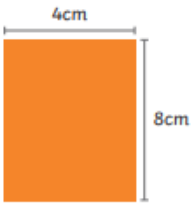
- perimeter
- area
- volume
- cubic units (e.g. cm^3)
- cuboid
- width
- length
- rectangle
- rectilinear
- parallelogram
- perpendicular height

Area of Rectangles

length × width = area of a rectangle



Counting squares:
area = $18cm^2$
Use formula:
6cm × 3cm
area = $18cm^2$

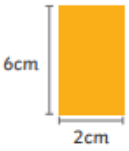


8cm × 4cm area = $32cm^2$

Perimeter of Rectangles

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

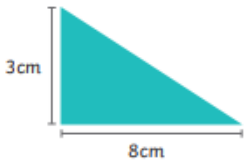
5cm + 4cm + 5cm + 4cm
area = $18cm^2$



(6 + 2) × 2
area = $16cm^2$

Area of Triangles

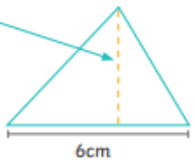
base × perpendicular height ÷ 2 = area of a triangle

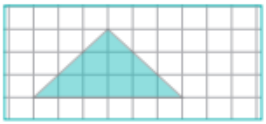


8cm × 3cm ÷ 2
area = $12cm^2$

perpendicular height = 5cm

6cm × 5cm ÷ 2
area = $15cm^2$





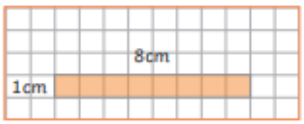
Counting squares:
6 whole squares = $6cm^2$
6 half squares = $3cm^2$
$6cm^2 + 3cm^2 = 9cm^2$
area = $9cm^2$

Using formula:
6cm × 3cm
÷ 2 = $9cm^2$

Perimeter and Area

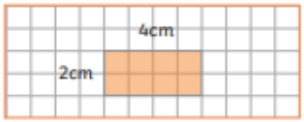
Shapes with the same area can have different perimeters.

area = $8cm^2$ perimeter = 12cm

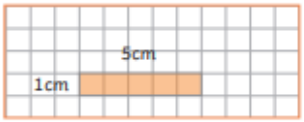


area = $8cm^2$ perimeter = 18cm

Shapes with the same perimeter can have different areas.

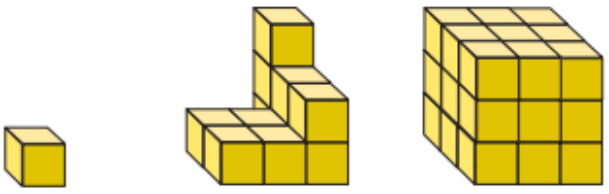


area = $8cm^2$ perimeter = 12cm



area = $5cm^2$ perimeter = 12cm

Volume - Counting Cubes

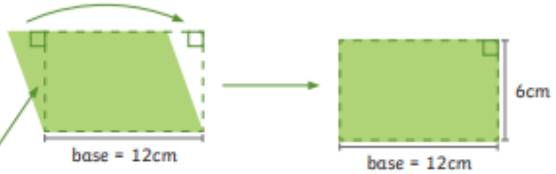


= $1cm^3$ | $11cm^3$ | $27cm^3$

Area of Parallelograms

base × perpendicular height = area of a parallelogram

A parallelogram can be transformed into a rectangle.

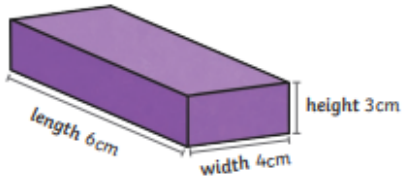


perpendicular height = 6cm

12cm × 6cm = $72cm^2$

Volume of Cuboids

length × width × height = volume of a cuboid



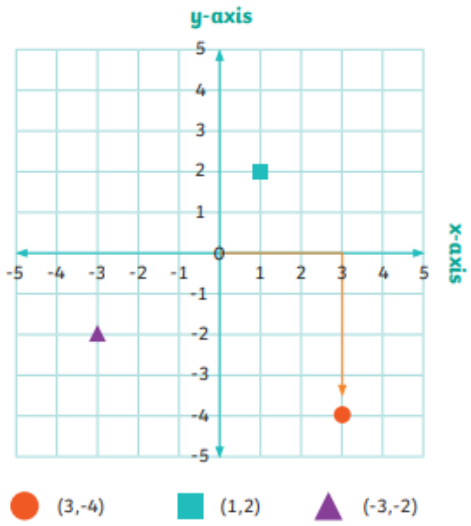
Multiply dimensions in **any** order:
3cm × 6cm × 4cm
volume = $72cm^3$

Key Vocabulary

translate
translation
reflect
reflection
up
down
right
left
coordinates
quadrant
x-axis
y-axis
horizontal
vertical

Four Quadrants

Coordinates can use positive and negative numbers. Whether positive or negative, the x-axis coordinate is written first, followed by the y-axis coordinate.

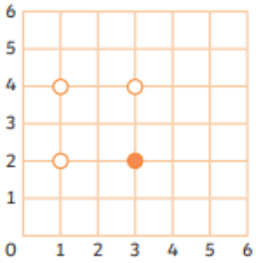


Look at the circle. It is 3 units along the x-axis and 4 down the y-axis. Its coordinates are (3,-4).

Completing Shapes

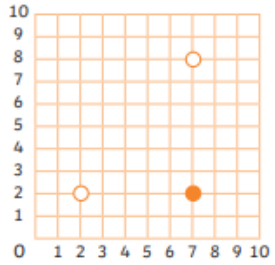
Using the properties of a shape, a polygon can be completed on a grid.

To make a square, think of the square's properties.



All of a square's sides are the same length. If the completed sides are 2 units in length, the missing point must complete two more sides of 2 units.

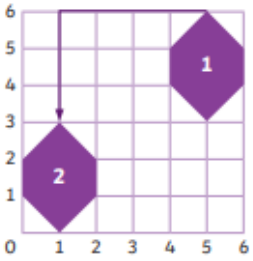
To make a right-angled triangle, think of the triangle's properties.



A right-angled triangle should have three sides with one 90° angle.

Translation

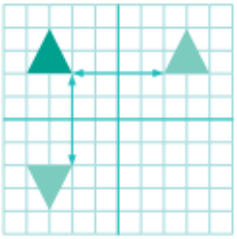
A shape is translated when it is moved without being rotated or resized. Every point of the shape moves the same distance and in the same direction.



Shape 1 has been translated 4 units left and 3 units down.

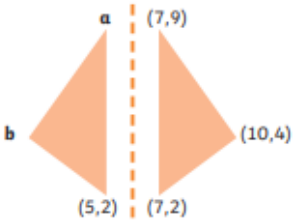
Reflections

A shape is reflected when it is flipped over a line which acts as a mirror. Every point on the original shape is the same distance from the mirror line as the same point on the reflected shape. The original triangle has been reflected in the x-axis and in the y-axis.



Missing Coordinates

Shapes can be shown on unmarked grids.



Point a is in the same position along the x-axis as (5,2) and in the same position on the y-axis as (7,9).

Point a (5,9)

Point b is in the same position on the y-axis as (10,4). Both triangles will have the same width. The width of the right-hand triangle is 3. This means that the width of the left-hand triangle is also 3.

Point b (2,4)

Properties of Shapes — Knowledge Organiser

Key Vocabulary

- angle
- right angle
- acute
- obtuse
- reflex
- protractor
- horizontal
- vertical
- parallel
- perpendicular
- polygon
- regular
- irregular
- two-dimensional
- three-dimensional
- flat face
- curved surface
- edge
- curved edge
- vertex
- vertices
- apex
- radius
- diameter
- circumference

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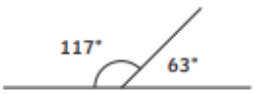
Angle Types

Acute Angles
Any angle that measures less than 90° is called an **acute** angle.

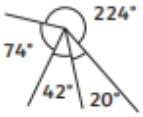
Obtuse Angles
Any angle that measures greater than 90° and less than 180° is called an **obtuse** angle.

Reflex Angles
Any angle that measures greater than 180° is called a **reflex** angle.

Calculating Angles

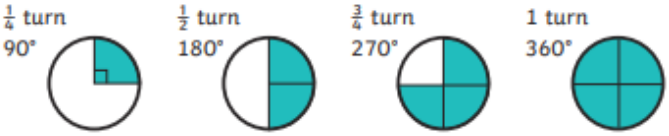


Angles on a straight line always total 180°.



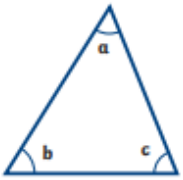
Angles around a point always total 360°.

Opposite angles that share a vertex are equal.



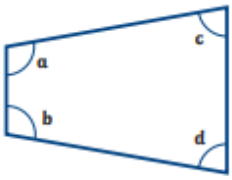
Multiples of 90° can be used as descriptions of a turn.

Angles in a Triangle



a + b + c = 180°

Angles in a Quadrilateral



a + b + c + d = 360°

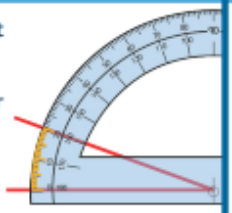
Properties of Shapes — Knowledge Organiser

Using a Protractor

Place the cross or circle at the point of the angle you are measuring.

Read from the zero on the outer scale of your protractor.

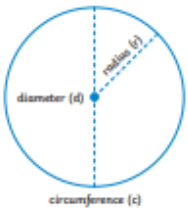
Count the degree lines carefully.



Parts of Circles

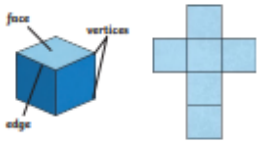
A circle is a 2D shape. The perimeter of a circle is called the **circumference** (c). The distance across the circle, passing through the centre, is called the **diameter** (d).

The distance from the centre of the circle to the circumference is called the **radius** (r).



$r \times 2 = d$ $\frac{d}{2} = r$

Nets of 3D Shapes



A shape net shows which 2D shapes can be folded and joined to make a 3D shape. When you are drawing a net, or solving a problem involving a shape net, think carefully about where the edges of the faces meet.

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Angles in Regular Polygons

As the number of sides of a polygon increases by one, the total of the interior angles increases by 180°. When n = number of sides, this formula can be used to find the size of each angle in a **regular polygon**:

Sum of Interior Angles = (n − 2) × 180°

Each Angle = $\frac{(n-2) \times 180^\circ}{n}$

Pentagon
n = 5
(5 - 2) × 180° = 540°
540° ÷ 5 = 108°

Hexagon
n = 6
(6 - 2) × 180° = 720°
720° ÷ 6 = 120°

Properties of 3D Shapes

3D shapes have three dimensions – **length**, **width** and **depth**.

A **polyhedron** is a 3D shape with flat faces. Spheres, cylinders and cones are not polyhedrons as they have curved surfaces.

Cube  6 square faces, 12 edges, 8 vertices	**Tetrahedron**  4 triangular faces, 6 edges, 4 vertices	**Sphere**  1 curved surface, 0 edges, 0 vertices
Cuboid  6 faces, 12 edges, 8 vertices	**Octahedron**  8 faces, 12 edges, 6 vertices	**Triangular prism**  5 faces, 9 edges, 6 vertices
Square-based pyramid  5 faces, 8 edges, 5 vertices	**Cone**  1 circular face, 1 curved surface, 1 curved edge, 1 apex	**Cylinder**  2 circular faces, 1 curved surface, 2 curved edges, 0 vertices

Ratio — Knowledge Organiser

Key Vocabulary

- ratio
- proportion
- "for every... there are..."
- part
- whole
- scale factor
- enlargement
- similar shapes
- length
- width
- perimeter

Ratio Language

For every 1 circle, there are 2 triangles.

For every 2 bananas, there are 3 apples.

For every 1 football, there are 3 rugby balls.

Ratio and Fractions

For every 1 rugby ball, there are 2 footballs.

Ratio of rugby balls to footballs: 1:2

$\frac{1}{3}$ of the balls are rugby balls.

For every 1 triangle, there are 3 squares.

Ratio of triangles to squares: 1:3

$\frac{1}{4}$ of the shapes are triangles.

The Ratio Symbol

The ratio of footballs to rugby balls: 1:4

The ratio of rugby balls to footballs: 4:1

The ratio of circles to triangles: 2:3

The ratio of triangles to circles: 3:2

The ratio of apples to bananas: 1:2

The ratio of bananas to oranges: 2:3

The ratio of apples to bananas to oranges: 1:2:3

The ratio of oranges to bananas to apples: 3:2:1

Ratio — Knowledge Organiser

Ratio and Proportion Problem-Solving

To use the ingredients for 1 person, you divide all the quantities by 10 (÷ 10).

To use the ingredients for 5 people, you halve all the quantities (÷ 2).

Ingredients for Fruit Smoothie
(serves 10 people)

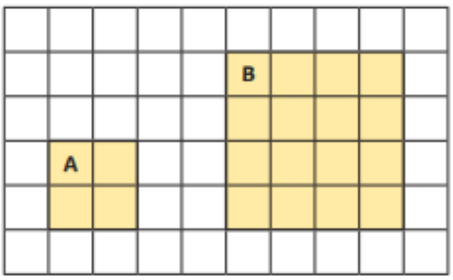
- **800g** of bananas
- **500g** of strawberries
- **200g** of raspberries
- **700ml** of milk
- **300ml** of natural yogurt

To use the ingredients for 20 people, you double all the quantities (× 2).

In a bag of 15 sweets, there is 1 smiley face sweet for every 4 love heart sweets.

Therefore, there will be 3 smiley face sweets and 12 love heart sweets in the bag.

Scale Factors

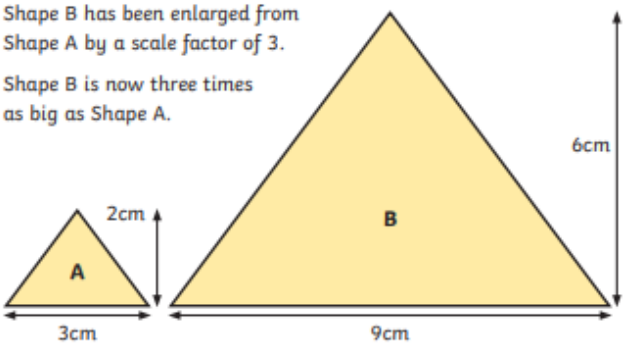


Shape A has been enlarged by a scale factor of 2 to make Shape B.

Shape B is now two times as big as Shape A.

Shape B has been enlarged from Shape A by a scale factor of 3.

Shape B is now three times as big as Shape A.



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.

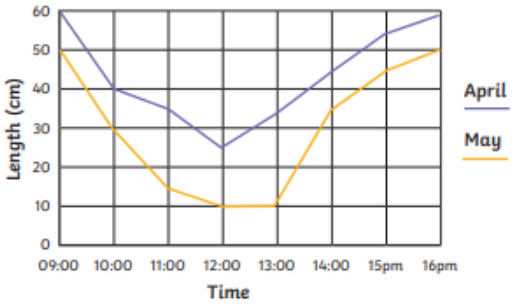
Interpreting data simply means understanding or working out what is being shown by a table, graph or chart and being able to answer questions about that information.

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

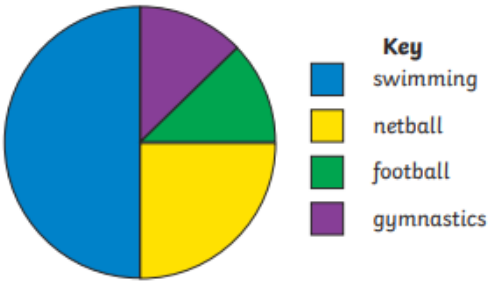


Pie Charts

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

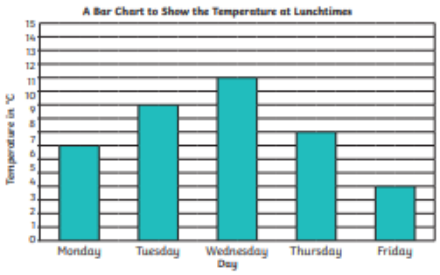
Football = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children

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

Statistics — Knowledge Organiser

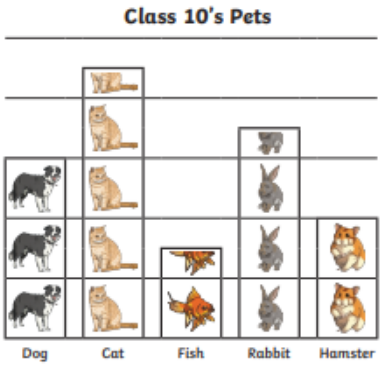
Bar Chart

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.



= 4 Children

Frequency Table

Eye Colour	Tally	Frequency
brown	𝍸 |	6
blue	𝍸 |||	8
green	|||	3
grey	|||	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.