

Year 8 Knowledge Organiser

Maths

Algebra

Sequences

Find the nth term: 2, 7, 12, 17

Look at the difference between consecutive terms

$$7 - 2 = 5 \quad 12 - 7 = 5 \quad 17 - 12 = 5$$

So we know the nth term formula will include $5n$

$5n$	5	10	15	20	(5x1, 5x2, 5x3, 5x4)
Sequence	2	7	12	17	

The nth term = $5n - 3$

What do you need to 'do' to the 5 times table to get to your sequence?

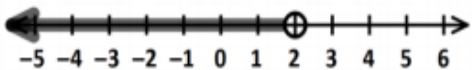
INEQUALITIES

$$3x - 2 < 4$$

$$+2 \quad +2$$

$$3x < 6$$

$$x < 2$$



Expanding Brackets

$$(x - 3)(x + 5)$$

}	x	x	-3
	x	x^2	$-3x$
	+5	$+5x$	-15

$$= x^2 - 3x + 5x - 15$$

$$= x^2 + 2x - 15$$

Don't forget to simplify
 $-3x + 5x = (+)2x$

Algebra – Keywords.

- Substitution – replacing a letter with a number. (Letters next to each other means to multiply.)

Eg. Work out $2g + 3h$ when $g=9$ and $h=4$

$$2 \times 9 + 3 \times 4$$

$$18 + 12$$

$$30$$

- Expression – an algebraic sentence without an equal sign. (You may need to simplify but not solve.)

- Simplify – to make an expression have less terms.

Eg. $2a + b + 3a + 2b - a - 2b = 4a + b$

Eg. $5 \times r \times 2 \times p = 10rp$

- Solve – to work out an answer using algebra, to get $x = \dots$

- Term – one part of an expression separated by a + or -

Eg. $6p + 5q + 2r^2 \rightarrow$ 3 different terms.

- Expand – multiply to get rid of brackets.

Eg. $3(x + 2) = 3x + 6$

- Factorise – opposite of expand, divide and put in brackets.

Eg. $3x + 6 = 3(x + 2)$

$4x + 8 = 4(x + 2)$

- Indices an algebraic term that has a power Eg. $3t^5$

- Sequence – an algebraic pattern going up by the same amount each time. In year 8 work out the formula called the nth term

Calculation

Ratio

Simplify 24 : 60

$$(\div 2) = 12 : 30$$

$$(\div 2) = 6 : 15$$

$$(\div 3) = 2 : 5 \quad \text{or} \quad \text{HCF} = 12 \quad 24 : 60$$

$$(\div 12) = 2 : 5$$

Divide £48 in the ratio 3 : 5

$$3 : 5 \quad 8 \text{ parts in the ratio } (3 + 5)$$

$$£48 \div 8 = £6 \quad 1 \text{ part} = £6$$

$$3 \text{ parts} = 3 \times £6 = £18$$

$$5 \text{ parts} = 5 \times £6 = £30$$

£18, £30

Rounding

Round 2098 to the 2 significant figures

2 is the first significant figure

0 is the second significant figure

(rounding to the nearest 100)

Answer = 2100

Round 0.58 to the 1 significant figure

5 is the first significant figure

(rounding to the nearest tenth (1 dp))

Answer = 0.6

Fractions

$$\frac{3}{5} \times \frac{5}{8} = \frac{15}{40} = \frac{3}{8}$$

Simplify your answer if you can

$$\frac{3}{5} \div \frac{3}{4} = \frac{3}{5} \times \frac{4}{3} = \frac{12}{15} = \frac{4}{5}$$

Standard Form

Express 43000000 in standard form

$$43000000 = 4.3 \times 10000000$$

$$= 4.3 \times 10^7$$

Express 0.000025 in standard form

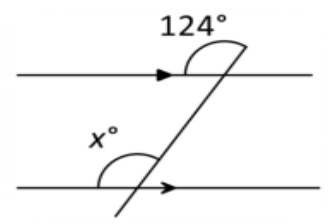
$$0.000025 = 2.5 \div 100000$$

$$= 2.5 \times 10^{-5}$$

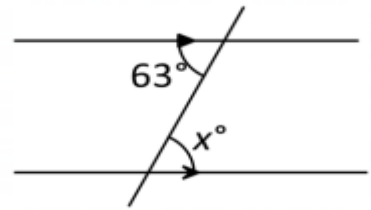
Calculation – Key Words

- Integer - a whole Number
- Fraction - a part of a number has a numerator on the top and a denominator on the bottom
- Equivalent Fraction - two fractions which have the same value but are written differently-
 $\frac{1}{2} = \frac{4}{8}$
- Percent - means out of 100, symbol %
- Multiple - any number in your original times table
- Factor - a number that goes into another number with no remainder
- Highest Common Factor - the biggest number that goes into two numbers - HCF of 12 and 16 is 4
- Lowest Common Multiple - the first number that appears in the times table of 2 different numbers - LCM of 3 and 5 is 15
- Prime Number - a number with only 2 factors, itself and 1
- Square number - the answer to a number multiplied by itself
 $1 \times 1 = 1 \quad 2 \times 2 = 4 \quad 3 \times 3 = 9$
- Cube Number - the answer to a number multiplied by itself twice
 $1 \times 1 \times 1 = 1 \quad 2 \times 2 \times 2 = 8 \quad 3 \times 3 \times 3 = 27$
- Square Root - Opposite of square number. This is the answer to what number multiplied by itself is the square number - $\sqrt{16} = 4 \times 4$ so square root of 16 is 4
- Product means to multiply
- Sum means to add
- Share means to divide
- Difference means to subtract
- Evaluate - work out the answer
- Ratio - is comparing one quantity against another, written as a : b
- Significant figures - Is rounding to the most important (biggest value) digit - 2567 to 1 sf is 3000
- Standard Form - Is a method of writing very large or very small numbers - $a \times 10^n$ Where a is bigger than 1 and smaller than 10

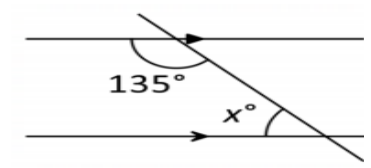
Geometry



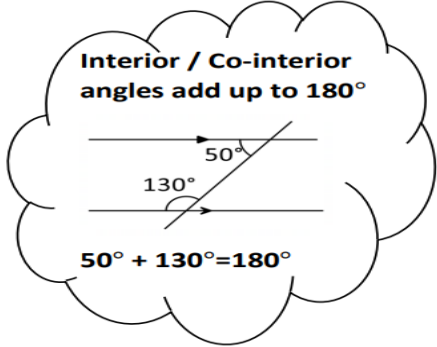
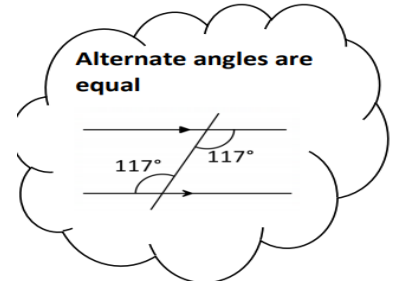
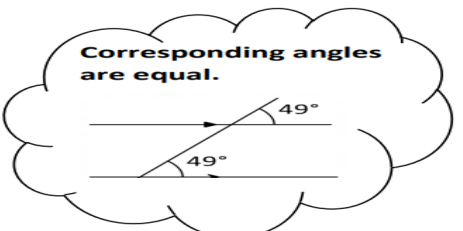
$x^\circ = 124^\circ$



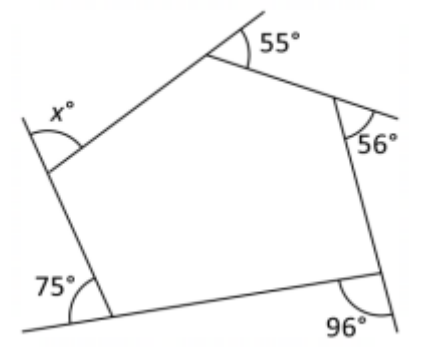
$x^\circ = 63^\circ$



$x^\circ + 135^\circ = 180^\circ$
 $x^\circ = 180^\circ - 135^\circ$
 $x^\circ = 45^\circ$



Calculate x



The sum of the exterior angles of any polygon is 360°

$x^\circ + 96^\circ + 56^\circ + 55^\circ + 72^\circ = 360^\circ$
 $x^\circ + 282^\circ = 360^\circ$
 $x = 78^\circ$

Geometry Key Words and Formula's

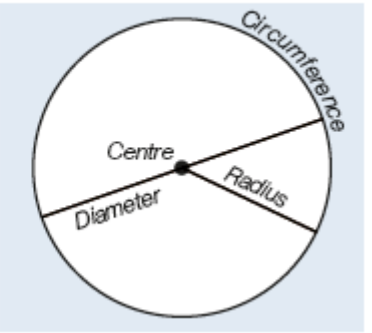
- * Area – the space inside a 2D shape measured in units 2
- * Perimeter - the distance around the outside of a shape (called circumference for circles)
- * Volume – the space inside a 3D shape
- * Surface Area – the area of the flat faces of a 3D shape
- * Angle - The space made when two lines meet, measured in degrees
- * Acute angle – less than 90°, obtuse angle bigger than 90 smaller than 180°. Straight line angle equal to 180°. Reflex angle bigger than 180 but smaller than 360°.
- * Angles in a straight line add to 180°
- * Angles in a triangle add to 180°
- * Angles around a point add to 360°
- * Parallel lines – these lines have the same gradient and they never meet
- * Perpendicular lines – these lines cross at 90°
- * Alternate angles – these two angles are the same in parallel lines (Z angle)
- * Corresponding angles – these two angles are the same in parallel lines (F angles)
- * Co – Interior angles – these two angles add up to 180° (C angles)
- * Scalene triangle – A triangle with three different sides and three different angles
- * Isosceles triangles – A triangle that has the two sides the same length and the base angles the same
- * Equilateral triangle – A triangle that has three sides the same and three angles the same
- * Polygon - A 2D shape that has only straight sides (edges)
- * Interior and Exterior angles – The exterior angles of any polygon always add to 360°. The interior angles + exterior angles always add to 180°

Circles

Circumference = $\pi \times \text{diameter}, C = \pi d$

Circumference = $2 \times \pi \times \text{radius}, C = 2\pi r$

Area of a circle = $\pi \times \text{radius squared}, A = \pi r^2$



Statistics

Probability

$P(\text{Not happening}) = 1 - P(\text{Happen})$

A bag contains only red and blue counters. If the probability of picking a red counter is $\frac{3}{10}$ what is the probability of picking a blue counter.

$$P(\text{blue}) = P(\text{not red}) = 1 - \frac{3}{10} = \frac{7}{10}$$

Mean from a table

Adam is measuring the heights in cm of his tomato plants.

Height (cm)	m.p	Frequency
140 < h ≤ 150	145	7
150 < h ≤ 160	155	10
160 < h ≤ 170	165	15
170 < h ≤ 180	175	19
180 < h ≤ 200	190	9

m.p × f	
	1015
	1550
	2475
	3325
	1710
	10075

(a) Estimate the mean height. Give your answer correct to 1 decimal place.

$$\frac{10075}{60} = 167.9 \text{ (1dp)}$$

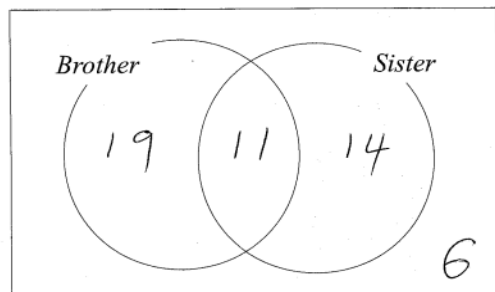
Venn Diagrams

Out of 50 people surveyed:

30 have a brother
25 have a sister
6 have neither a brother or a sister

Use this information to complete the Venn Diagram

$$55 - 44 = 11$$



Statistics Key Words

Range – the difference between the largest and the smallest number from a list of numbers

Mode – The number that appears the most often from a list of numbers

Median – the number in the middle of a list of ordered numbers

Mean – Add all the numbers up and then divide this total by the amount of numbers that were there

Averages – Mean, Median and Mode. Three averages to help determine common or a representative number from a list of numbers

Pie Charts – A way of representing data in a circle. All pie charts add up to 3600.

Probability - the chance of an event happening. Probability has to be written as a fraction, decimal or a percentage. Not as a ratio

Venn Diagrams – Uses two circles often overlapping to show data

Scatter Diagram – A graph that shows the relationship between two variables

Correlation – Used to describe the relationship in scatter diagrams – positive both go up or down, negative – one goes up as the other goes down, no correlation – there is no link between the two variables

Line of best Fit – A straight line drawn through the scatter diagram with roughly half the data points on either side of the line

Frequency Table – Data is put into groups in a table. Used to help find averages