Year 10 – Foundation Knowledge Organiser HT1

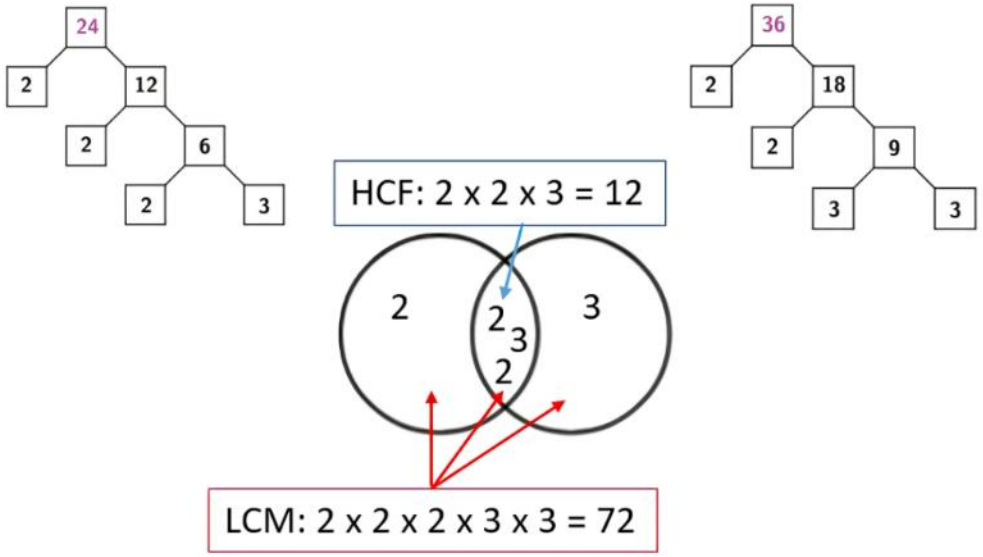
Prime number: only factors 1 and its self
2,3,5,7,11,13,17……..

Factor: is a number that divides into another number exactly and without leaving a remainder
e.g factors of 8= 1, 8,2,4

Multiples: The result of multiplying a number by an integer
e.g multiplies of 10
10,20,30,40

HCF and LCM

Find the HCF and LCM of 24 and 36



Percentages

on a calculator

39% of 82
0.39 x 82

Change to a decimal and multiply

fraction to %

$\frac{15}{20} \overset{\times 5}{=} \frac{75}{100}$ = 75%

OR

15 ÷ 20 x 100 = 75%

increasing

Increase £60 by 12%

12% of 60 = 0.12 x 60 = £7.20

New amount = £60 + £7.20
= £67.20

ADD

decreasing

decrease £60 by 12%

12% of 60 = 0.12 x 60 = £7.20

New amount = £60 - £7.20
= £52.80

SUBTRACT

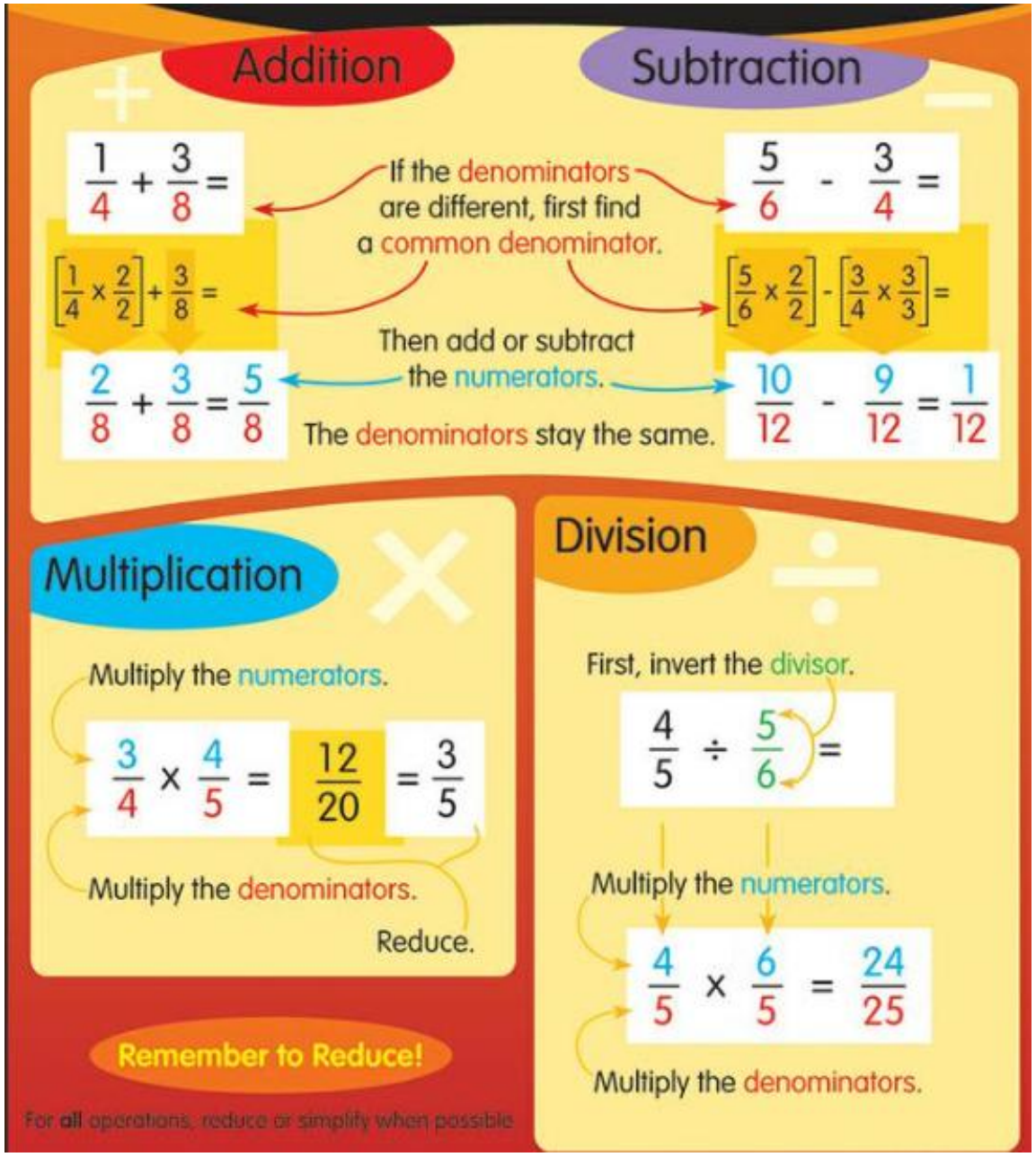
without a calculator

50% - half
25% - half and half
75% - 50% + 25%

10% - divide by 10
5% - half 10%
20% - double 10%

$compound\ interest = original \times multiplier^{n}$
Where n is the number of years

Year 10 – Foundation Knowledge Organiser HT1



Mixed number to Improper Fraction

Denominator stays the same

Numerator = Whole number × Denominator + Numerator

Improper Fraction — Mixed Number

$$21\frac{2}{3} = \frac{21 \times 3 + 2}{3} = \frac{65}{3}$$

Improper Fraction to Mixed number

Denominator stays the same

Numerator ÷ Denominator = Whole number R Numerator

Improper Fraction — Mixed Number

$$\frac{47}{4} = 11\frac{3}{4}$$

$$4\overline{)47} \quad 11 \quad -44 \quad 3$$

Year 10 – Foundation Knowledge Organiser HT2

Rounding

Rounding to a given number of 1 decimal places	To do this put a line in 1 **number** after the **decimal point** (after the tenths). If the **number** after this line is less than 5 **round** down, or **round** up if the **number** is 5 or above.
Rounding to 1 significant figure.	The first non zero number is the first significant figure. All numbers after this should be zero.
Rounding to 'n' significant figures.	The first non zero number is the first significant figure all other numbers including zero are significant. Write the first n numbers then all the rest are zero.
ESTIMATE a calculation,	Round every individual number to 1 significant figure then calculate the answer.

Bounds:

How to find the upper and lower bound?

1. Half the degree of accuracy specified
2. Add to get the upper bound.
3. Subtract to get lower bound.

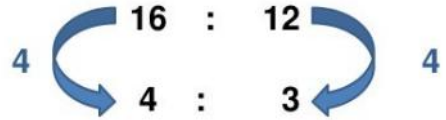
Find the lower and upper bound of 5.7 to 1 decimal place.

1. Half the degree of accuracy = 0.1 ÷ 2 = 0.05.
2. Upper bound = 5.7 + 0.05 = 5.75.
3. Lower bound = 5.7 – 0.05 = 5.65.

Ratio- a way of comparing 2 or more quantities

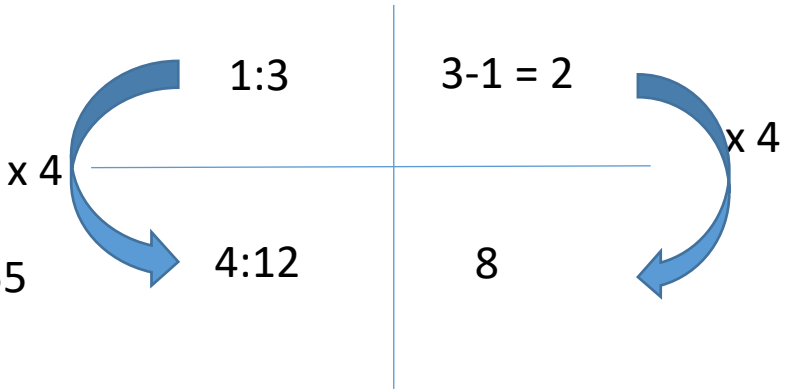
Simplify ratio:

Divide by common factors.



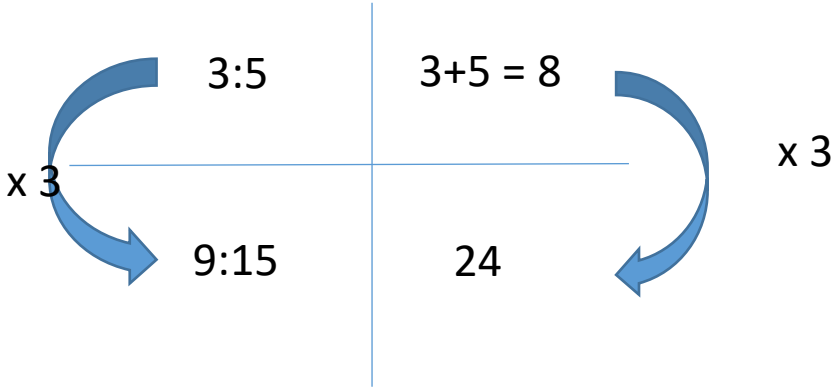
Ratio- difference between:

A bag contains yellow +blue blocks in the ratio 1:3 There are 8 more blue blocks than yellow blocks. How many yellow blocks are there?



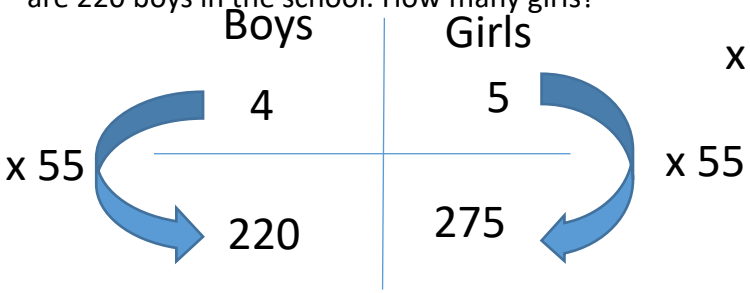
Share in a ratio:

James and Helen get pocket money in the ratio **3 : 5**. The total amount of pocket money they are given is £24. How much money do they each get?

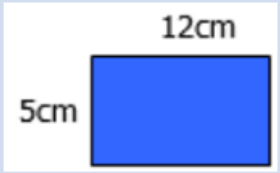
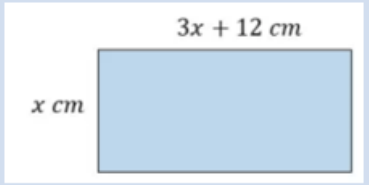
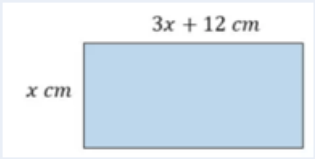
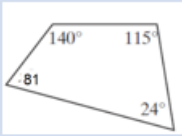
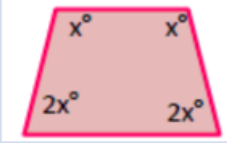


Ratio- finding on quantity:

The ratio of boys to girls in a school is 4 : 5 There are 220 boys in the school. How many girls?



Year 10 Foundatation – Half Term 3 Maths Knowledge Organiser

Forming Equations		
Area of Rectangle Base x Height	 60cm^2	 x(3x + 12) = 3x^2 + 12x
Perimeter of Rectangle 2(l+w) or 2(b+h) or l+w+l+w	 32cm	 3x + 12 + x + 3x + 12 + x = 8x + 24
Angles in a quadrilateral Sum to 360	 81+140+115+24 = 360	 x + x + 2x + 2x = 6x 6x = 360 degrees x = 60 degrees

Rearrange Formula

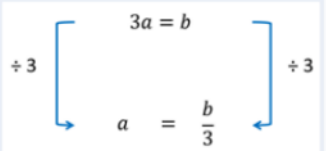
$a + 6 = b$

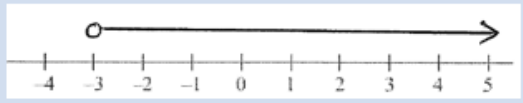
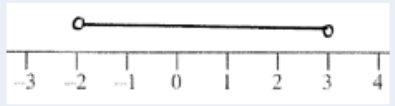
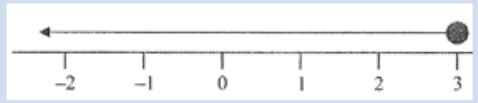
Make "a" the subject

1 step

$3a = b$

Make "a" the subject

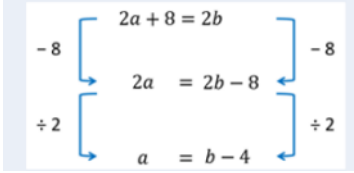


Inequalities	meaning	integers	On a number line	Circle
x > -3	x is greater than -3	x could be 4, 5, 6		Open > or <
-2 < y < 3	y is greater than -2 but smaller than 3	x could be -1, 0, 1, 2		Open > or <
x ≤ 3	x is less than or equal to 3	x could be 3 , 2 , 1 ...		Closed ≤ or ≥

2 step

$2a + 8 = 2b$

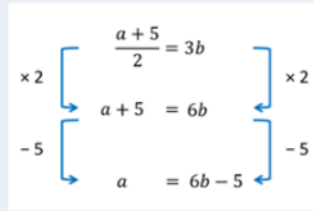
Make "a" the subject



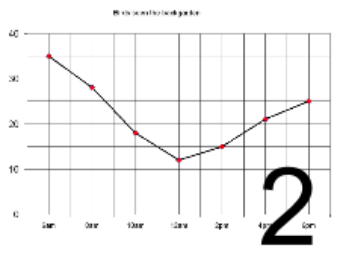
2 step

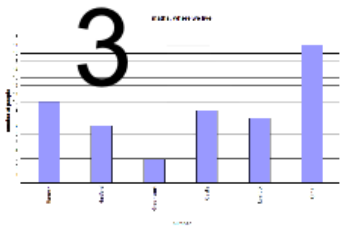
$\frac{a+5}{2} = 3b$

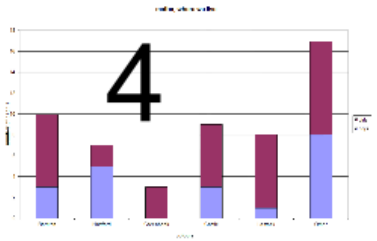
Make "a" the subject

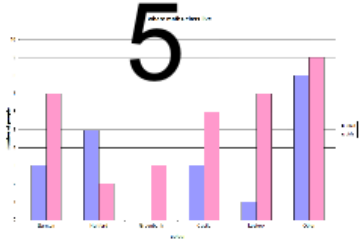


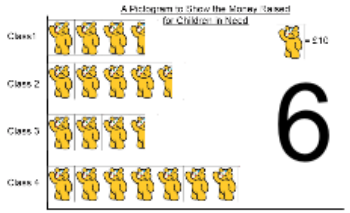
Year 10 Foundation – Half Term 4 Maths Knowledge Organiser

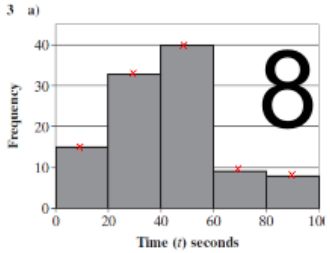












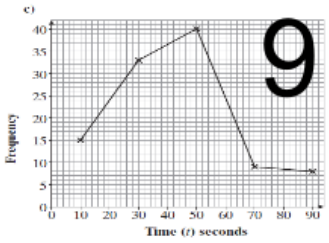


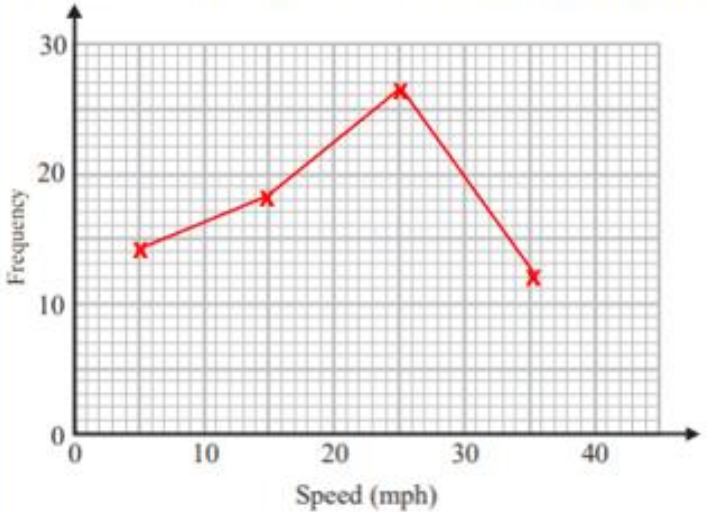
	Chart
1	Pie Chart
2	Time Series
3	Bar Chart
4	Composite Bar
5	Comparative (Dual) Bar Chart
6	Pictogram
7	Stem and Leaf
8	Histogram
9	Frequency Polygon

Drawing Frequency Polygons

This table gives information about the speeds of 70 cars.

Speed (s mph)	Frequency (f)	Midpoint
$0 < L \leq 10$	14	5
$10 < L \leq 20$	18	15
$20 < L \leq 30$	26	25
$30 < L \leq 40$	12	35

a) Draw a frequency polygon for this information.



Step 1 – Find the midpoint of each class interval
Step 2 – Label your axes and choose an appropriate scale
Step 3 – Plot each point at the midpoint for that interval
Step 4 – Connect each point with a straight line

Do not extend the line beyond the points you have

Year 10 Foundation – Half Term 4 Maths Knowledge Organiser

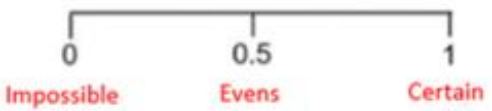
Calculating Basic Probability:

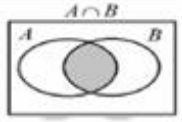
P (event) = $\frac{\text{Number of ways the event can occur}}{\text{Total number of outcomes}}$

$$P(\text{rolling a } 6) = \frac{1}{6}$$

P (event **not** happening) = 1 - P (event happening).

$$P(\text{not rolling a } 6) = 1 - \frac{1}{6} = \frac{5}{6}$$

Key Word	Definition / Rule	Example
Probability	Used to describe the chance of something happening.	The probability it will rain this month is very high
Probability scale	All probabilities lie between 0 and 1	

Key Word	Definition / Rule	Example
Sample space	In the space diagram …. P(4) = 3/16 There are three ways of getting a number 4 from a possible 16 outcomes	× 1 2 3 4 1 1 2 3 4 2 2 4 6 8 3 3 6 9 12 4 4 8 12 16
Venn Diagrams	Outcomes are listed inside each circle – This venn diagram shows outcomes that fulfil set A and set B – the intersection	
Tree diagrams	These help determine probabilities from INDEPENDENT events – we MULTIPLY outcomes as we move from left to right	

Key Word	Definition / Rule	Example
Theoretical probability	Theoretical probabilities predict what SHOULD happen – It can be expressed as a fraction / decimal / percentage	1 A 2 B 3 C 4 D 5 E P(picking number) = 3/10 (0.3 or 30%) P(picking a vowel) = 2/10 (0.2 or 20%)
Experimental probability	Experimental probabilities are based on the results of an experiment	I survey 100 cars and 24 of them are blue. The experimental probability of the next car being blue is 24/100 (24%).
Independent event	When the probability of one event does not depend on the outcome of another event	Rolling a 6 on a dice does not change the probability of a coin landing on heads or tails
Dependent event	When the probability of one even depends on the outcome of another event.	If you miss the bus, the probability of being late for school increases.

Year 10 Foundation – Half Term 5 Maths KO

STRAIGHT LINE GRAPHS AND EQUATION OF A LINE

Key Words

Intercept: Where two graphs cross.
Gradient: This describes the steepness of the line.
y-intercept: Where the graph crosses the y-axis.
Linear: A linear graph is a straight line.
Quadratic: A quadratic graph is curved, u or n shape.

Key Concepts

Coordinates in 2D are written as follows:

(x, y)

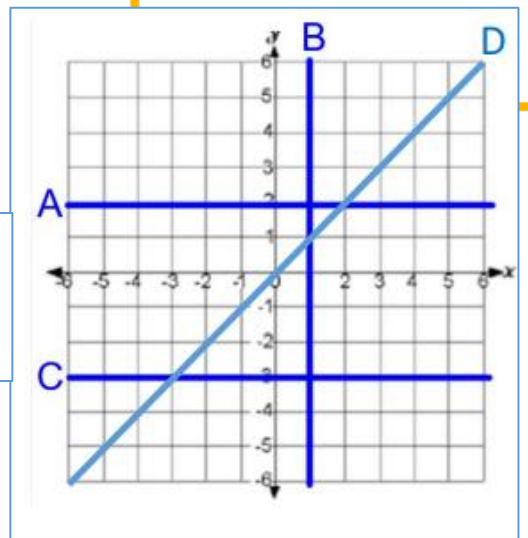
x is the value that is to the left/right

y is the value that is to up/down

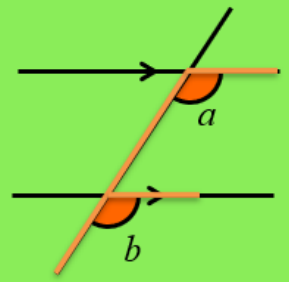
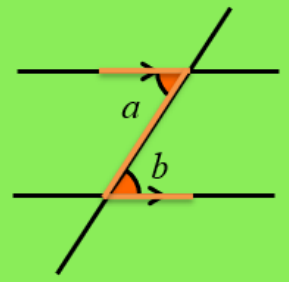
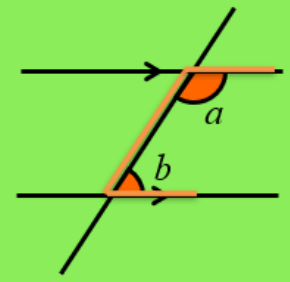
Straight line graphs always have the equation:

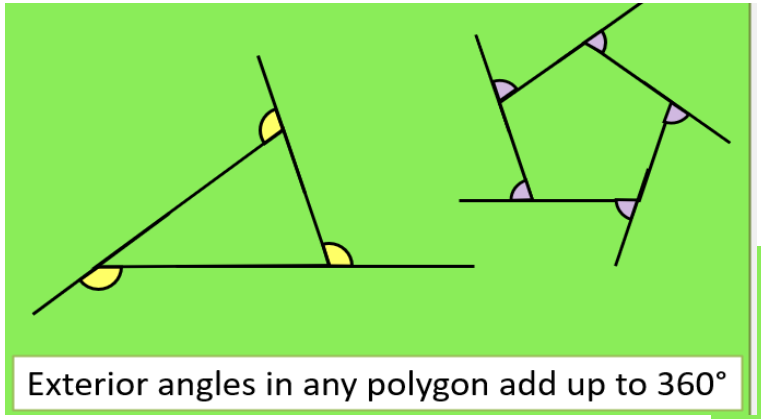
$$y = mx + c$$

m is the **gradient** i.e. the steepness of the graph.
c is the **y intercept** i.e. where the graph cuts the y axis.

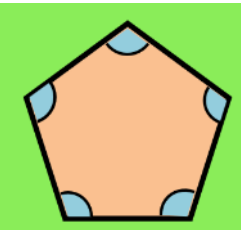


A: y = 2 B: x = 1
C: y = -3 D: y = x

Corresponding angles are equal	Alternate angles are equal	Interior angles add up to 180°
		
$a = b$	$a = b$	$a + b = 180°$
Look for an F-shape	Look for a Z-shape	Look for a C- or U-shape



Exterior angles in any polygon add up to 360°



Interior angles in any polygon with **n** sides add up to $(n - 2) \times 180°$

Y10 F – Half Term 5 Maths KO

SEQUENCES

Key Concepts

Arithmetic sequences increase or decrease by a common amount each time.

Quadratic sequences have a common 2nd difference.

Fibonacci sequences Add the two previous terms to get the next term

Geometric series has a common multiple between each term

Below are some of the most common sequences.

Even numbers 2, 4, 6, 8, 10, … **nth term = 2n**

Odd Numbers 1, 3, 5, 7, 9, … **nth term = 2n - 1**

Square Numbers 1, 4, 9, 16, 25, … **nth term = n^2**

Cube Numbers **1, 8, 27, 64, 125, … nth term = n^3**

Triangle Numbers **1, 3, 6, 10, 15, … nth term = ½ n (n + 1)**

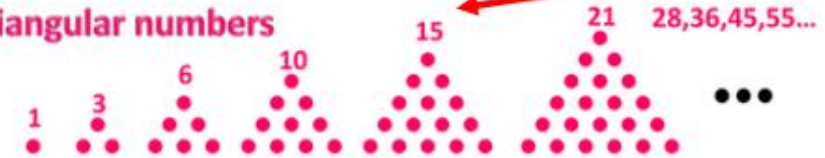
Prime Numbers **2, 3, 5, 7, 11, 13, etc. No known formula!**

Fibonacci Numbers **1, 1, 2, 3, 5, 8, 13, … Formula not needed for GCSE. Each term is found by adding the previous term!**

Special sequences

Sometimes sequences do not increase or decrease by a consistent number. These can be quadratic sequences which include an n^2 term or they can be other special sequences some of which are shown below,

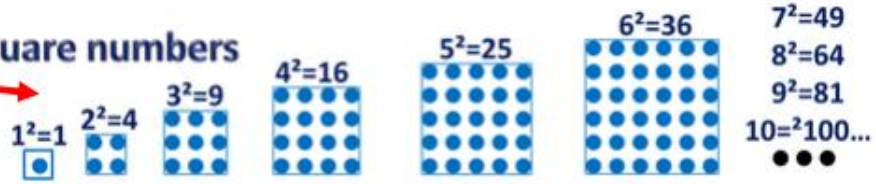
Triangular numbers



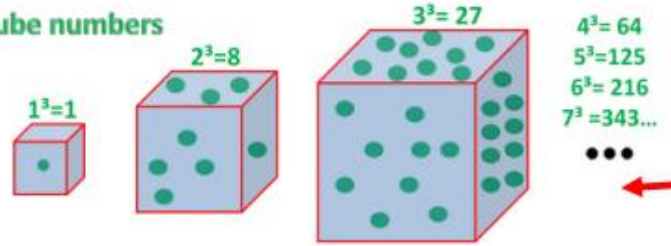
To get from one term to the next you can see that the difference increases by 1 more each time so 2, 3, 4, 5 etc.

These are the square numbers written as a sequence so 1x1, 2x2, 3x3 etc..

Square numbers



Cube numbers



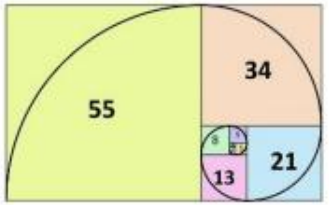
These are the cube numbers written as a sequence so 1x1x1, 2x2x2, 3x3x3 etc..

The Fibonacci Sequence

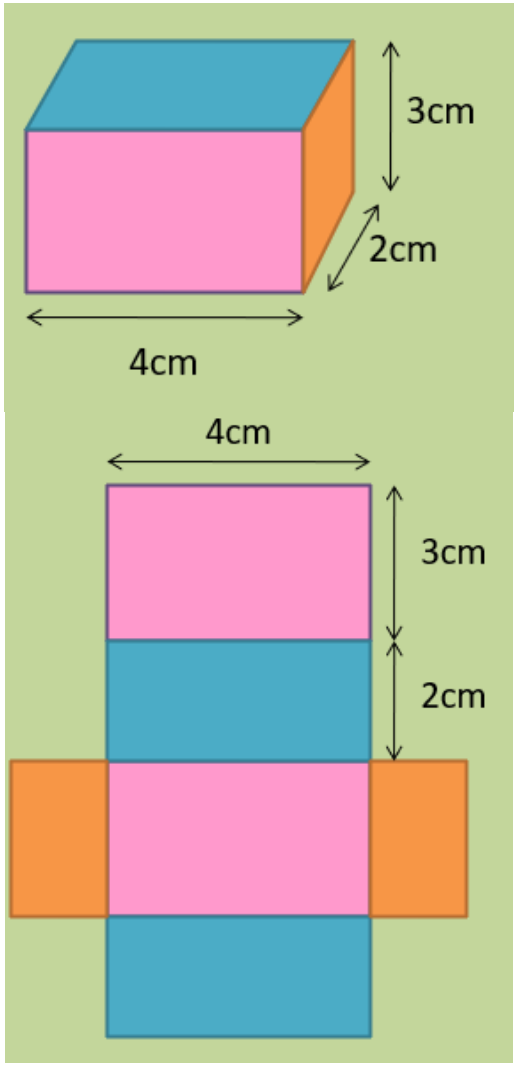
1,1,2,3,5,8,13,21,34,55,89,144,233,377…

The Fibonacci sequence is when we add the second number in the sum to the answer to get the next term.

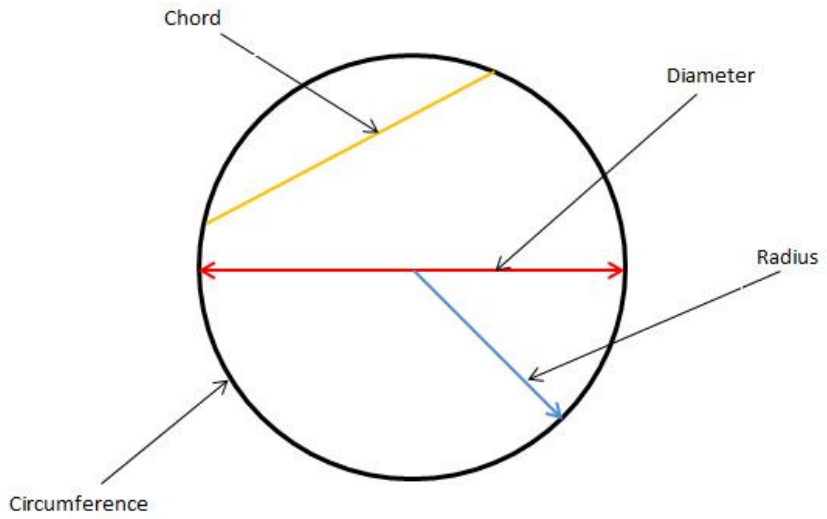
1+1=2
1+2=3
2+3=5
3+5=8
5+8=13
8+13=21
13+21=34
21+34=55
34+55=89
55+89=144
89+144=233
144+233=377



Year 10 Foundation – Half Term 6 Maths Knowledge Organiser

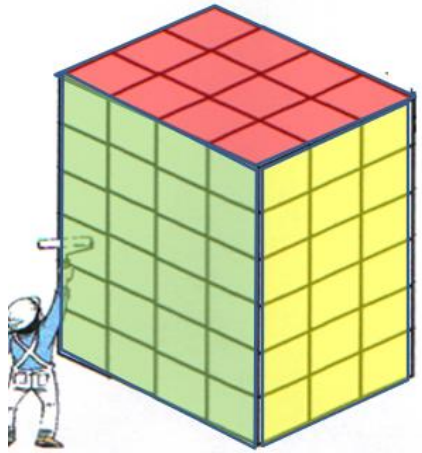


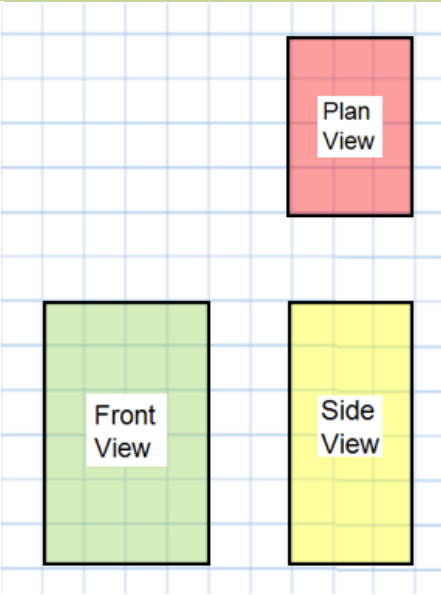
Parts of a circle



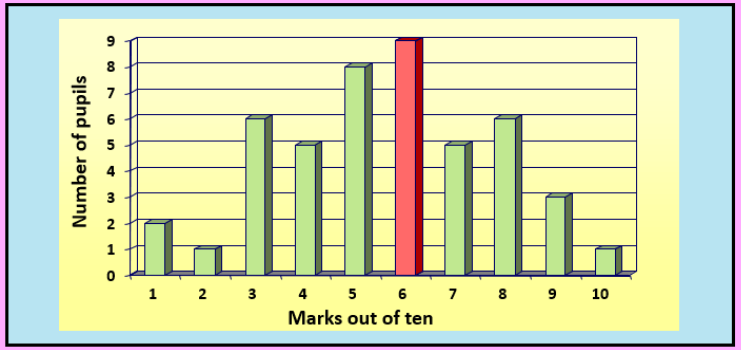
Plans and Elevations

- Shows what a 3D object looks like from different directions
  - PLAN – from above
  - FRONT – from the front
  - SIDE – from the side





This bar chart shows the scores in a science test:



What was the modal score?

6 is the modal score because it has the highest bar.