

YEAR 8 Spring 1

1) Brackets

Form algebraic expressions

Multiply out a single bracket and factorise into a single bracket (A9)

Expand a pair of binomials (A8, A18)

Form and solve equations including brackets (A17)

Form and solve simple inequalities (A20a, A20b)

Form and solve equations and inequalities with unknowns on both sides

Identify and use formulae, expressions, identities and equations. (A2)

2) Sequences

Generate sequences a given rule in words (A11A)

Use term to term rules to generate a sequence (A11B)

Use the nth term to generate a sequence ((A11B)

Find the rule for the nth term of a linear sequence (A11C)

3) Indices

Simplify expressions – collecting like terms (A6)

Adding and subtracting expressions with indices (131)

Addition law for indices (131)

Subtraction law for indices (131)

EXT exploring powers of powers

Inequalities

> greater than

< less than

= equal to

> greater than

< less than

= equal to

$$2x + 1 < 9$$

$$2x < 8$$

$$x < 4$$

$$1 - 2x < 9$$

$$-2x < 8$$

$$x > -4$$

keyfacts

Expand – means to multiply everything on the outside of the bracket, by everything on the inside of the bracket.

Factorise is the opposite of expanding – put the brackets back in

Linear Sequences – increase by addition or subtraction and the same amount each time

Nth term rule – $(n - 2) \times 180$

Brackets – Expanding and factorising

$$1) \quad 7(3 + a) = 21 + 7a$$

$$2) \quad 2(5 + a) + 3(2 + a) = 10 + 2a + 6 + 3a \\ = 5a + 16$$

$$3) \text{ Factorise } 9x + 18 = 9(x + 2)$$

$$4) \text{ Factorise } 6e^2 - 3e = 3e(2e - 1)$$

$$1) \quad (p + 2)(2p - 1) \\ = p^2 + 4p - p - 2 \\ = p^2 + 3p - 2$$

$$2) \quad x^2 - 2x - 3 = (x - 3)(x + 1)$$

Nth term

$$\begin{array}{ccccccc} & +4 & & +4 & & +4 & & +4 \\ & \curvearrowright & & \curvearrowright & & \curvearrowright & & \curvearrowright \\ 3, & 7, & 11, & 15, & 19 \end{array}$$

$$4n: \quad 4 \quad 8 \quad 12 \quad 16 \quad 20$$

$$4n - 1$$

Indices

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

YEAR 8 SPRING 2

1) Standard Index Form

Index Laws (131,154,188)

Converting between Standard form and ordinary numbers (83)

Add and subtract in standard form (N45a,b)

Multiply and divide in standard form (N45a,b)

Compare and order numbers in standard form (N45a,b)

2) Fractions and Percentages

Convert fluently between key fractions, decimals and percentages (N32)

Express one number as a fraction or a percentage of another (R3).

Calculate key fractions, decimals and percentages of an amount. (N24b)

Calculate percentage increase including using a multiplier (R9b)

Calculate percentage decrease including using a multiplier (R9b)

Work with percentage change (N39a)

Choose appropriate methods to solve percentage problems

3) Number Sense

Rounding to powers of 10 (N27a)

Rounding to decimal places (N27b)

Rounding to Significant figures (N38)

Form and complete error intervals (155a)

Estimation calculations (91)

Standard Index Form

$$(4 \times 10^6) \times (2 \times 10^3) = 8 \times 10^9$$

$$(4 \times 10^6) \div (2 \times 10^3) = 2 \times 10^3$$

Must be an Integer

Must be 1 to 10 (but not 10!)

Must be $\times 10$

$$4.2 \times 10^9$$

Fractions and Percentages

on a calculator

$$39\% \text{ of } 82$$

$$0.39 \times 82$$

Change to a decimal and multiply

increasing

Increase £60 by 12%

$$12\% \text{ of } 60 = 0.12 \times 60 = £7.20$$

$$\text{New amount} = £60 + £7.20 = £67.20$$

ADD

fraction to %

$$\frac{15}{20} = \frac{75}{100} = 75\%$$

OR

$$15 \div 20 \times 100 = 75\%$$

Percentages

%

decreasing

decrease £60 by 12%

$$12\% \text{ of } 60 = 0.12 \times 60 = £7.20$$

$$\text{New amount} = £60 - £7.20 = £52.80$$

SUBTRACT

without a calculator

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

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

percentage	fraction	decimal
30%	$\frac{3}{10}$	0.3

to go from a fraction to a percentage we can convert to a decimal first

$$3/5 \rightarrow 0.6 \rightarrow 60\%$$

3rd sig fig

5 6 0 2 7

1st sig fig

1st sig fig

0.00497

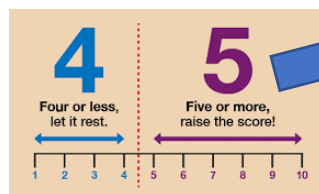
2nd sig fig

keyfacts

$$1. a \times a^m = a^{m+1}$$

$$2. a^m \div a^n = a^{m-n}$$

$$3. (a^m)^n = a^{m \times n}$$



Number Sense

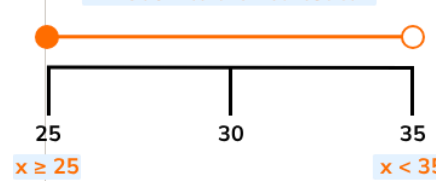
1st decimal place

3rd decimal place

2nd decimal place

$$3.728$$

$x = 30\text{cm to the nearest ten}$



$$25 \leq x < 35$$

Significant is the first non zero digit

Error Intervals

YEAR 8 SUMMER 1

1) Angles in Parallel Lines and Polygons

Properties of Quadrilaterals (G14)

Angle Facts (G13)

Angles in Triangles (G17)

Interior and Exterior Angles (123)

Angles on Parallel lines (120)

2) Area of Shape inc. Circles

Area of a trapezium (56)

Area of a circle (G22b/117)

Circumference of a circle (G22a/118)

Sectors of Circles (167)

3) Lines of Symmetry and Reflection

Lines of symmetry (G3)

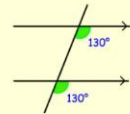
Reflection (G4a,b)

Key Formulae/Rules

- A line of symmetry is **the line that divides a shape or an object into two equal and symmetrical parts**
- In a **reflection** all the points of an object are reflected or flipped on a line called the line of reflection (mirror line)
- πr^2 sounds like area to me, if I need a circumference I'll just use πd
- Polygon Exterior angle add up to 360°
- Polygon Interior Angle $\frac{(n-2) \times 180^\circ}{n}$
where n is the number of sides

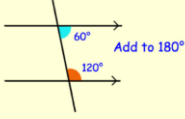
Angles in Parallel Lines and Polygons

Corresponding Angles



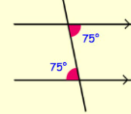
Same side of the traverse

Co-interior Angles

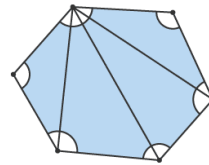


Inside the parallel lines

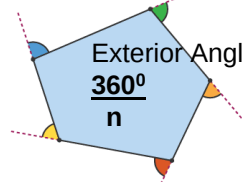
Alternate Angles



Opposite side of the traverse



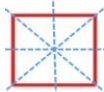
Interior Angle
 $\frac{(n-2) \times 180^\circ}{n}$



Exterior Angle
 $\frac{360^\circ}{n}$

Line Symmetry and Reflection

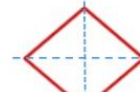
Lines of Symmetry



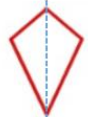
Square
4 lines of symmetry



Rectangle
2 lines of symmetry



Rhombus
2 lines of symmetry



Kite
1 line of symmetry

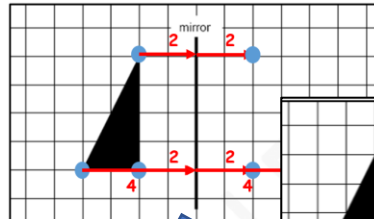


Isosceles Trapezoid
1 line of symmetry



Trapezoid
No lines of symmetry

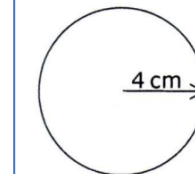
Reflection



Circles

$$\text{arc length } AB = \frac{\theta}{360} \times 2\pi r$$

$$\text{sector area } AOB = \frac{\theta}{360} \times \pi r^2$$



$$\begin{aligned} \text{Circumference} &= \pi \times d \\ &= \pi \times 8 = 25.13\text{cm} \\ \text{Area} &= \pi \times r^2 \\ &= \pi \times 4^2 = 50.27\text{cm}^2 \end{aligned}$$

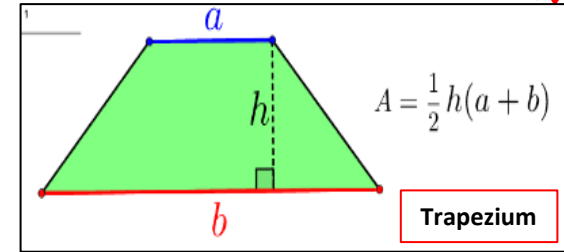
Find the area and circumference to 2dp.

Area of shape Inc. Circles

AREA & PERIMETER

Space in the middle

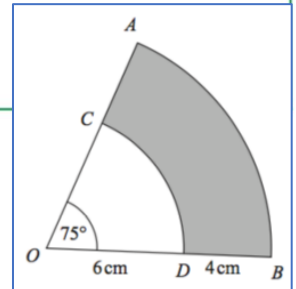
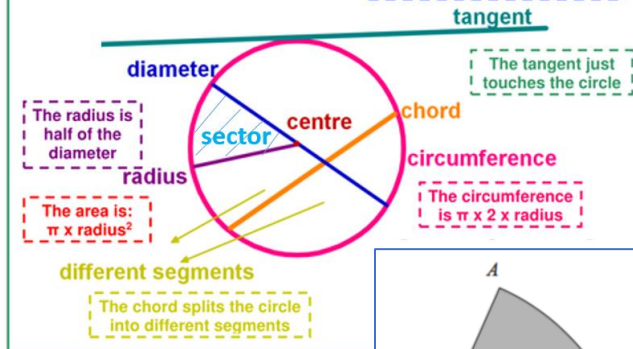
Distance around the edge



Trapezium

Parts of a Circle

The word circle comes from the Latin word 'Circulus' which means disc.



YEAR 8 SUMMER 2

The Data Handling Cycle

Pictograms (S1a, S1b)
 Bar Charts (S2a, S2b)
 Pie Charts (S9)
 Scatter Graph (S8)
 Two Way Tables (P4)
 Stem and Leaf
 Frequency Tables - Ungrouped (S3)
 Frequency Tables - Grouped (S4)
 Mean (S7)
 Mode, Median (S6)
 Range (S6)
 Averages from a table (S10a)
 Estimate the Mean (S10b)

Key Formulae/Rules

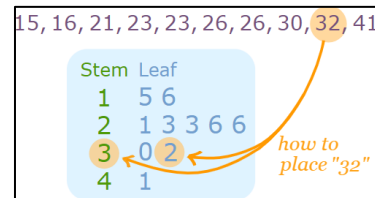
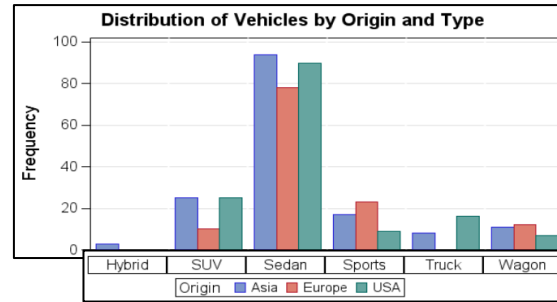
Pie Charts: A pie chart is a circular chart. It shows the proportion of each group at a glance.

Stem and Leaf Diagram: A stem and leaf diagram is drawn splitting a number in to parts

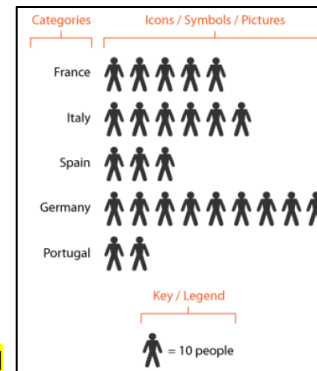
Scatter graphs are a good way of displaying two sets of data to see if there is a correlation, or connection.

Two way tables: Two-way tables are a way of sorting data so that the frequency of each category can be seen quickly and easily.

Representing Data



Keys and Axis Labels are crucial



	like vanilla	like chocolate	Totals
like soccer	18	12	30
like football	32	10	42
Totals	50	22	72



Positive correlation
 As one variable increases so does the other variable.



Negative correlation
 As one variable increases the other variable decreases.



No correlation
 There is no relationship between the two variables.

Time taken (<i>m</i> minutes)	Frequency	Cumulative Frequency
0 < <i>m</i> ≤ 10	3	3
10 < <i>m</i> ≤ 20	8	11
20 < <i>m</i> ≤ 30	11	22
30 < <i>m</i> ≤ 40	9	31
40 < <i>m</i> ≤ 50	9	40

Range: 50 - 0 = 50

Modal Class: Highest Frequency and look left
 20 < *m* ≤ 30

Median: Middle of Cumulative Frequency (40/2 = 20)
 20 < *m* ≤ 30

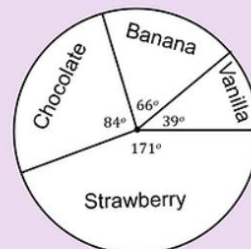
Time taken (<i>m</i> minutes)	Frequency	Mid Point	Mid Point x Frequency
0 < <i>m</i> ≤ 10	5	3	15
10 < <i>m</i> ≤ 20	15	8	120
20 < <i>m</i> ≤ 30	25	11	275
30 < <i>m</i> ≤ 40	9	35	315
40 < <i>m</i> ≤ 50	9	45	405
TOTALS:	40		1130

Estimated Mean
 = 1130 / 40 = 28.25

Scatter Graphs use a **Line of Best Fit** to estimate values
OUTLIER – outside the data set **ANOMOLY** – incorrect data

The information in the pie chart shows sales of 120 ice-creams sold from an ice-cream van one Saturday afternoon in the summer. Calculate the number of each type sold.

Ice cream	Frequency	Angle
Banana	22	66°
Vanilla	13	39°
Strawberry	57	171°
Chocolate	28	84°
Total	120	360°



Check they add up to make the total!

John recorded the amount of goals his football team scored each match.

How can we easily find the Mean, Mode and Median from this data?

Goals	Tally	Total	Total goals
0		8	0
1		7	7
2		5	10
3		4	12
4		1	4
Totals:		25	33

Mean = $\frac{33}{25} = 1.3$ goals

Mode = 0 goals

Median = 1 goal

Averages

Mode

The mode is the value that appears most often in a set of data.

The range is the difference between the lowest value and the highest value.

Range

Median

The median is the middle number in a list of numbers ordered from lowest to highest.

The mean is the total of all the values, divided by the number of values.

Mean