GCSE Maths – Higher Tier. Learn all the Foundation Key Facts and remember these Top Tips!

Laws of Indices

$y^a \times y^b = y^{a+b}$ $\quad y^a \div y^b = y^{a-b}$ $\quad y^0 = 1$

$(y^a)^b = y^{a \times b}$ $\quad y^{-n} = \frac{1}{y^n}$ $\quad y^{a/b} = \sqrt[b]{y^a}$

Congruent Triangles: SSS, SAS, ASA or RHS

Estimating Mean from a table

Create 2 extra columns, one for midpoint and the other for midpoint x frequency. Find the total for mp x f and divide by total frequency.

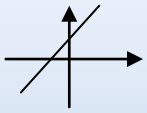
Solving Quadratics:

first rearrange into $ax^2 + bx + c = 0$ then…

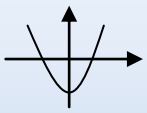
- **Factorise** put into 2 brackets and one of the brackets must = 0
- **Complete the Square** $(x + a)^2 - b = 0$
- **Use the Formula**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

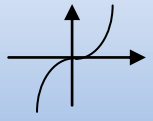
Types of Graph



Linear (y=mx+c)



Quadratic (contains x^2)



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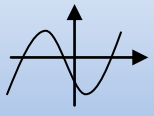
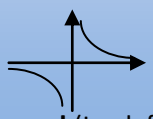
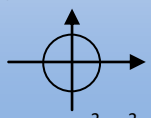


Cubic (contains x^3)



Reciprocal (Look for 1/x)



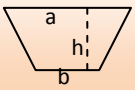
Circle ($x^2+y^2=r^2$)

y = mx + c

m = gradient c = y-intercept

gradient (steepness) = $\frac{\text{change in y}}{\text{change in x}}$

Area of a Trapezium (LEARN this)



Area = ½ (a + b) h

Simultaneous Equations

Linear eg 2x + 3y = 1
3x – 5y = 11

Make y terms (or x) **equal**
Same **S**igns **S**ubtract
Different Signs **A**dd

Quadratic and Linear

Make y (or x) the subject in the linear equation
Substitute into the quadratic equation and solve
Remember to work out the value of both letters

Surds

$\sqrt{a} \times \sqrt{a} = a$ $\quad \sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$ $\quad \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$

Displaying Statistics:

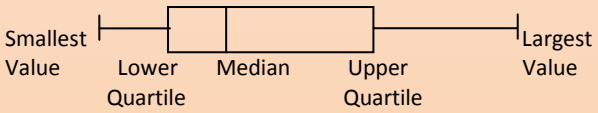
Histograms – remember that the frequency is given by the **area of each bar** not the height. Use the clues given in the question to label the area or to find frequency densities.
Frequency Density = Frequency ÷ Class Width

Frequency Polygons – plot each frequency against the mid-point of the group and join them with straight lines. Don't forget to join to the horizontal axis.

Scatter Graphs – positive or negative correlation? You must draw a **line of best fit** when asked to estimate a value.

Cumulative Frequency- add up frequencies as you go and plot against the **top** of each group

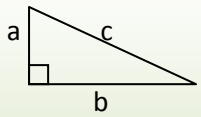
Box Plots



To compare 2 box plots make 1 comment about medians and 1 comment about ranges (or IQR)

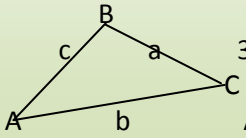
Triangles:

Right-angled



3 sides use **Pythagoras**
$a^2 + b^2 = c^2$
2 sides and an **angle** use **SOHCAHTOA**
Area = base x height ÷ 2

Not right-angled



2 sides, 2 angles use **Sine Rule**

3 sides, 1 angle use **Cosine Rule**

Area = ½ absinC

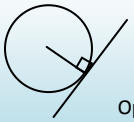
Angle Rules:

Angle in a semicircle is 90°

Angles in the same segment are equal

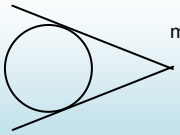
Angle in the centre is double the angle at the circumference

Angle between radius and tangent is 90°



Opposite angles in a cyclic quadrilateral add up to 180°

Alternate Segment Theorem



Tangents meeting at a point are equal in length