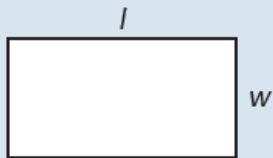


HIGHER LEARN SHEET

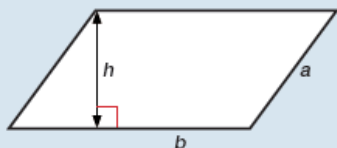
GCSE Maths – Higher Tier: **LEARN THESE FACTS!** You need them for the exam.

Areas

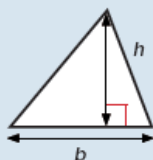
Rectangle = $l \times w$



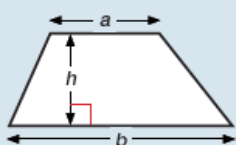
Parallelogram = $b \times h$



Triangle = $\frac{1}{2} b \times h$



Trapezium = $\frac{1}{2}(a + b)h$

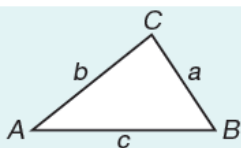


Trigonometric formulae

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$

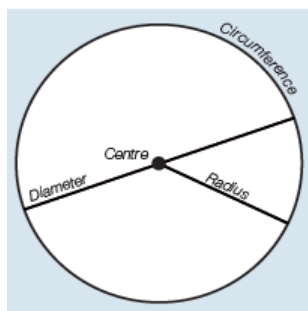


Circles

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

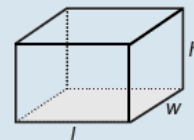
Circumference = $2 \times \pi \times \text{radius}$, $C = 2\pi r$

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

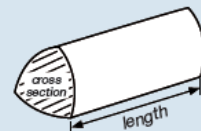


Volumes

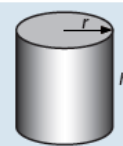
Cuboid = $l \times w \times h$



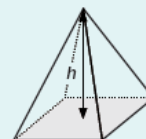
Prism = area of cross section \times length



Cylinder = $\pi r^2 h$



Volume of pyramid = $\frac{1}{3} \times \text{area of base} \times h$



Speed

speed = $\frac{\text{distance}}{\text{time}}$



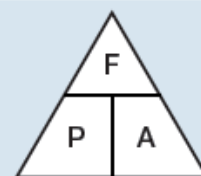
Density

density = $\frac{\text{mass}}{\text{volume}}$



Pressure

pressure = $\frac{\text{force}}{\text{area}}$



Quadratic equations

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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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

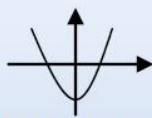
Estimating Mean from a table

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.

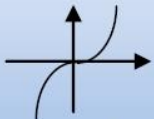
Types of Graph



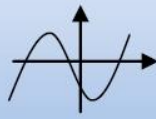
Linear ($y=mx+c$)



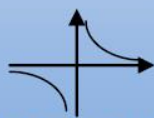
Quadratic (contains x^2)



Cubic (contains x^3)



or



Reciprocal (Look for $1/x$)

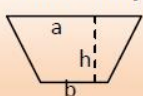


Circle ($x^2+y^2=r^2$)

$y = mx + c$

$m =$ gradient $c =$ y-intercept
gradient (steepness) = $\frac{\text{change in } y}{\text{change in } x}$

Area of a Trapezium (LEARN this)



Area = $\frac{1}{2} (a + b) h$

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

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

Simultaneous Equations

Linear eg $2x + 3y = 1$
 $3x - 5y = 11$

Make y terms (or x) equal
Same Signs Subtract
Different Signs Add

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

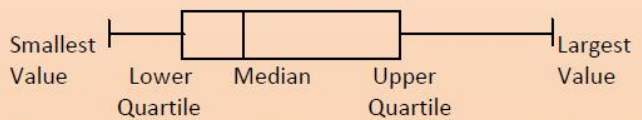
$$\sqrt{a} \times \sqrt{a} = a \quad \sqrt{a} \times \sqrt{b} = \sqrt{a \times b} \quad \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

Displaying Statistics:

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

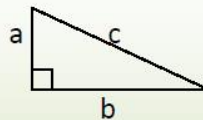
Box Plots



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

Triangles:

Right-angled



3 sides use **Pythagoras**

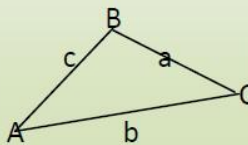
$$a^2 + b^2 = c^2$$

2 sides and an angle use **SOHCAHTOA**

Area = base x height $\div 2$

Not right-angled

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



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

$$\text{Area} = \frac{1}{2} ab \sin C$$

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 \div 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.

Angle Rules: Angles in the same segment are equal



Angle in a semicircle is 90°



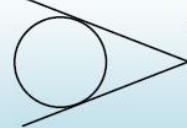
Angle in the centre is double the angle at the circumference

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