Geometry Overview (24/5/21)

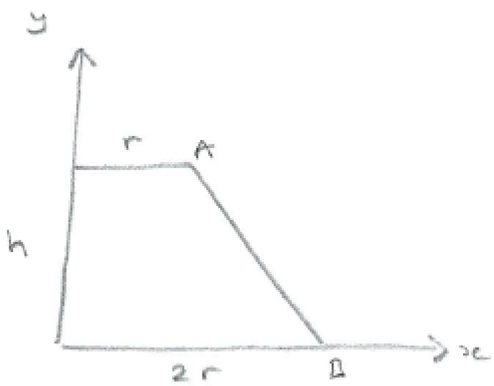
Q1 [Practice/E]

Show that the area of triangle ABC is given by

$$\frac{1}{2}\sqrt{|\overrightarrow{AB}|^2|\overrightarrow{AC}|^2-(\overrightarrow{AB}.\overrightarrow{AC})^2}$$

Q2 [Practice/E]

Find as many ways as possible of deriving the equation of the sloping side of the trapezium shown below.



Q3 [Practice/E]

Find the equation of the circle passing through the points

A (2,8) , B (7,3) and D (5,7)

Q4 [Problem/M]

Show that the shortest distance from the line $ax + by = c$ to the Origin is $\frac{c}{\sqrt{a^2+b^2}}$, for the case where the line has a positive gradient, and a positive y-intercept.

[This is analogous to the shortest distance from the plane

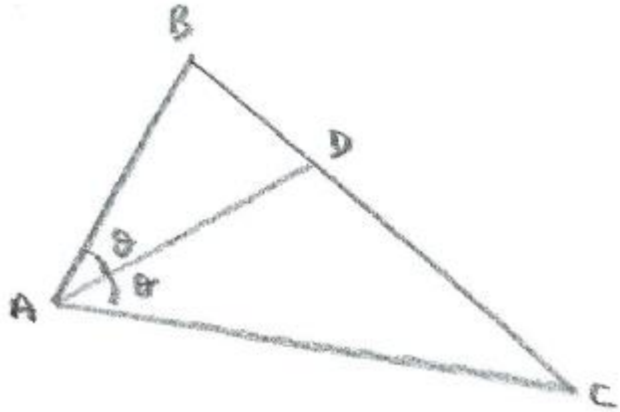
$n_1x + n_2y + n_3z = d$ to the Origin; namely $\frac{d}{\sqrt{{n_1}^2+{n_2}^2+{n_3}^2}}$]

Q5 [Problem/M]

Referring to the diagram below, the Angle Bisector theorem says that

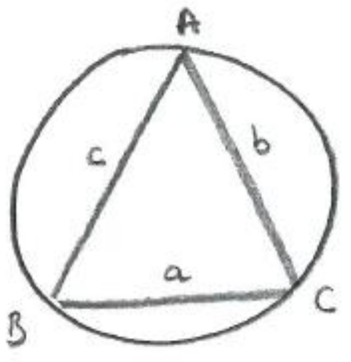
$\frac{BD}{DC} = \frac{AB}{AC}$

Prove the Angle Bisector Theorem.



Q6 [Problem/M]

ABC is a triangle circumscribed by a circle of radius R, as shown in the diagram below.



Show that (i) $\frac{a}{sinA} = 2R$ (ii) the area of the triangle is $\frac{abc}{4R}$