

DEPARTMENT OF MATHEMATICS

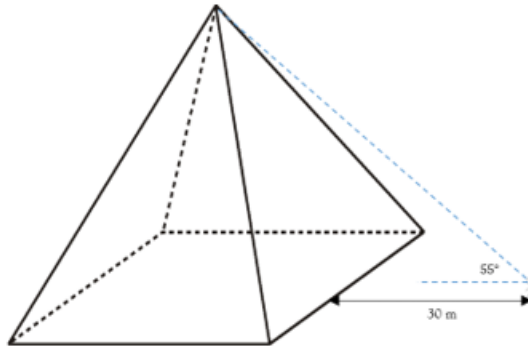
PROBLEM SOLVING CHALLENGE

Q1.

Junior Cycle

(i) On a trip to Egypt Alan comes across a square based pyramid. Alan walks around the pyramid and determines that the perimeter of the pyramid is 160 m using an app on his phone. Find the distance it took Alan to walk one side of the pyramid.

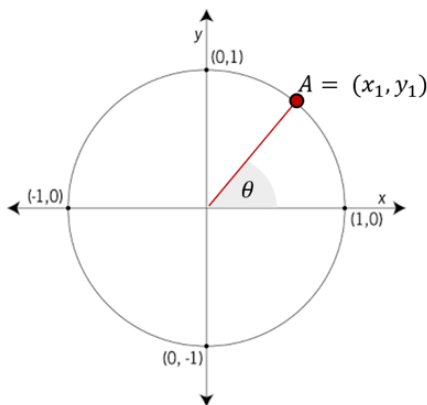
(ii) Alan wants to determine the height of the pyramid. He walks half way along one side of the pyramid until the top is directly in front of him. He then walks 30 metres from here to the location in the diagram below. Alan uses a clinometer to find the angle from where he stands to the top of the pyramid to be 70° . If Alan is 1.8 meters tall, find the height of the pyramid.



Q2.

Senior Cycle

(i) Given the unit circle centred at the origin and $\tan(\theta)$ equal to the slope from the origin to the point A for all points A on the unit circle. Find the equation of the tangent line to the circle when $\theta = 45^\circ$



(ii) Let $\tan(\theta) = \text{slope} = m$ from the origin to any point A on the unit circle. Show that the equation of the tangent line to the circle can be written as:

$$y = -\frac{1}{m}x + \frac{m^2 + 1}{(m)\sqrt{m^2 + 1}}$$

Answers on an A4 sheet with your Name, Year and Class should be given to Mr. McManus or to Mr. McEvoy in room 33 before 4pm on Friday 29th of March.

Monthly Prize for both Junior and Senior Cycle.*

Good Luck.

Junior Cycle students answer question 1 only.

Senior Cycle students answer question 2 only