

MTH 202 - Quiz 9

20 November 2015

Name: Solutions.

Show all your work to receive full credit on the following problems; carefully organize your solutions so that the work is clear. No calculators or other electronic devices are allowed on this quiz.

1. (2+2=4 points) Write the equations of the following lines in the stated form:

(a) A line through the points $(-1, 2)$ and $(1, 1)$

$$\text{Slope} = \frac{-1}{2}$$

$$y - 2 = -\frac{1}{2}x - \frac{1}{2}$$

$$\therefore y - 2 = -\frac{1}{2}(x - (-1))$$

$$y = -\frac{1}{2}x + \frac{3}{2}$$

(b) A line through the origin and the point $(5, 4)$

$$\text{Slope} = \frac{4}{5}$$

$$y - 0 = \frac{4}{5}(x - 0)$$

$$y = \frac{4}{5}x.$$

2. (3 points) Show that a line passing through $(7, 2)$ and $(5, 5)$ is parallel to a line through $(3, 1)$ and $(1, 4)$

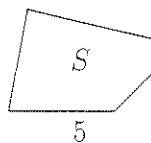
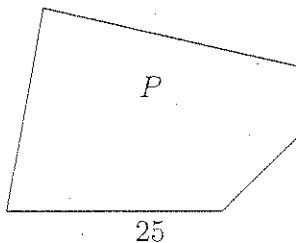
$$\text{First line: } \text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{-3}{-2} \quad (\text{or } \frac{3}{2})$$

$$\text{Second line: } \text{Slope} = \frac{\text{rise}}{\text{run}} = -\frac{3}{2}$$

Same slope

\Rightarrow parallel.

3. (6 points) Find the area of the shape P on the left given it is similar to the original shape S on the right, which has an area of 12 square units.



$$\text{Scale factor} = \frac{25}{5} = 5$$

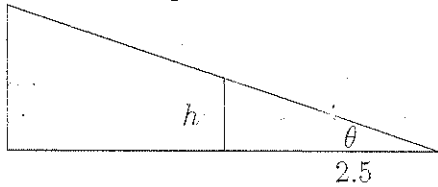
$$\therefore \text{Area} = 5^2 \times 12 \text{ u}^2$$

$$= \underline{\underline{300 \text{ u}^2}}$$

4. ((6+2)+4=12 points) Find the following in terms of trigonometric functions of the angle.

(a) Find the height of a lamppost with a shadow that is 2.5 meters long.

(i) Find the height in terms of θ .

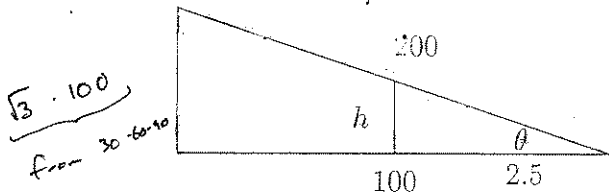


$$\tan = \frac{\text{opp}}{\text{adj.}}$$

$$\tan \theta = \frac{h}{2.5}$$

$$h = \underline{\underline{2.5 \tan \theta}}$$

(ii) If the top of a nearby building is 200 m from the tip of the shadow and itself gives off a 100 m shadow, find the exact values of θ and h .

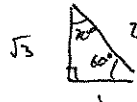


$$\text{Hypotenuse} = 2 \times \text{Leg} \Rightarrow 30-60-90 \Delta.$$

Larger side is opposite θ

$$\rightarrow \underline{\underline{\theta = 60^\circ}}$$

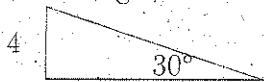
$$\text{By similar } \Delta s, \quad \underline{\underline{h = 2.5 \sqrt{3} \text{ m.}}}$$



Alternative:

$$\tan 60^\circ = \frac{\sqrt{3}}{1}, \quad \sin 60^\circ = \frac{\sqrt{3}}{2}, \quad \cos 60^\circ = \frac{1}{2}.$$

(b) Find the length of a ladder if its top rests 4 m above the ground and it makes an angle of 30° with the ground.

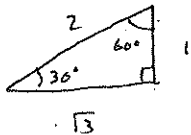


Again, go to trigonometry:

$$\frac{4}{\text{Length}} = \frac{\text{opp}}{\text{hyp}} = \sin 30^\circ$$

$$\therefore \text{Length} = \frac{4}{\sin 30^\circ} = \frac{4}{\frac{1}{2}} = 8$$

$$\underline{\underline{\text{Length} = 8 \text{ m.}}}$$



$$\sin 30^\circ = \frac{1}{2}$$