

This quiz reviews some basic trigonometry used in some soon-to-be-covered sections.

You may work this quiz either:

- (1) on your own paper, in which case, box your answer and show your work
- (2) on this paper, in which case, put your answer in the provided box and justify your answer by showing your work beneath the box.

1. We know that

$$1 \quad \& \quad \cos \theta \quad \& \quad \sin \theta$$

satisfies the well-known equation

$$\cos^2 \theta + \sin^2 \theta = 1. \quad (1)$$

DERIVE a similar equation (which you will need to know) relating

$$1 \quad \& \quad \tan \theta \quad \& \quad (\text{one other trigometric function})(\theta).$$

ANSWER:<sup>1</sup>

2. Express  $\arctan \sqrt{3}$  in radians.

ANSWER:<sup>2</sup>  $\arctan \sqrt{3} =$

3. Express  $\arctan (-\sqrt{3})$  in radians.

ANSWER:<sup>2</sup>  $\arctan (-\sqrt{3}) =$



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<sup>1</sup>Justify your answer beneath the box. To Derive  $\neq$  to look up in a book. Start with the well-known equation in (1) and perform a few algebraic steps to quickly arrive at an equation involving tan. Would you rather memorize this need-to-know equation or just remember how to quickly derive it from the well-known equation (1)? Just for fun: in this problem replace tan with cot and give it a try.

<sup>2</sup>Justify your answer beneath the box, e.g., a properly marked reference triangle or an explanation of how you see it from a properly marked unit circle.

4. Let  $x = 5 \sec \theta$  and  $0 < \theta < \frac{\pi}{2}$ .

Without using inverse trigonometric functions, express  $\tan \theta$  as a function of  $x$ .

ANSWER:<sup>3</sup>  $\tan \theta =$

5. Let  $x = 5 \sec \theta$  and  $\frac{\pi}{2} < \theta < \pi$ .

Without using inverse trigonometric functions, express  $\tan \theta$  as a function of  $x$ .

ANSWER:<sup>3</sup>  $\tan \theta =$

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<sup>3</sup>Justify your work either by some algebra or by a properly marked unit circle/reference triangle, along with a brief explanation of what you are thinking.

6. Let  $u = 5 \tan \theta$ . Without using inverse trigonometric functions, fill out the below chart to express  $\sin \theta$  as a function of  $u$ .

$$\text{ANSWER : } \sin \theta = \begin{cases} \boxed{\phantom{0}} & ; \text{if } 0 \leq \theta < \frac{\pi}{2} \\ \boxed{\phantom{0}} & ; \text{if } \frac{\pi}{2} < \theta < \pi \\ \boxed{\phantom{0}} & ; \text{if } \pi \leq \theta < \frac{3\pi}{2} \\ \boxed{\phantom{0}} & ; \text{if } \frac{3\pi}{2} < \theta < 2\pi. \end{cases}$$

Hint: For each quadrant, compare the sign (i.e., positive or negative) of  $\sin \theta$  with the sign of  $\tan \theta$ .