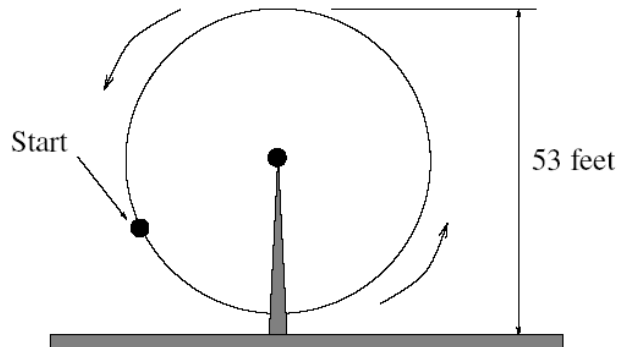


Instructions: No books or notes allowed. Do not talk to, give help to, or receive help from anyone. Some identities are given on the back of the quiz.

- 1** [7 points] Find the exact value of  $\sin(75^\circ)$ . (Hint:  $75^\circ = 30^\circ + 45^\circ$ )  
 No credit will be given for an approximate decimal value.

**Answer:**  $\sin(75^\circ) =$  \_\_\_\_\_

- 2** [13 points] At  $t = 0$  you are seated on a Ferris wheel at the position shown, which is 0.8 radians below the leftmost point on the ride. The wheel is rotating at 12 revolutions per minute (RPM) and the radius is 25 feet. The highest point on the ride is 53 feet above the ground.



Let the origin of a coordinate system be at the center of the wheel with the  $+x$ -axis pointing right and the  $+y$ -axis pointing upward. Let  $t$  be the number of minutes elapsed after the wheel begins rotating counterclockwise.

- (a) Find a formula for  $\theta(t)$ , the angle (in radians) that you are at after  $t$  minutes, measured in standard position (i.e. from above the  $+x$ -axis)

**Answer:**  $\theta(t) =$  \_\_\_\_\_

- (b) Find a formula for  $h(t)$ , your height above the ground (in feet) after  $t$  minutes.

**Answer:**  $h(t) =$  \_\_\_\_\_

**3** [4 points extra credit, no partial credit]

Consider the equation  $\tan(x) = 15$ .

Give a formula for all solutions to the equation. Your formula should give exact  $x$  values in radians, not approximate decimals from your calculator, and should involve the integer  $n = 0, \pm 1, \pm 2, \dots$  and the function  $\tan^{-1}$ .

Answer:  $x =$  \_\_\_\_\_

### Sum and Difference Formulas

$$\sin(u + v) = \sin u \cos v + \cos u \sin v$$

$$\sin(u - v) = \sin u \cos v - \cos u \sin v$$

$$\cos(u + v) = \cos u \cos v - \sin u \sin v$$

$$\cos(u - v) = \cos u \cos v + \sin u \sin v$$