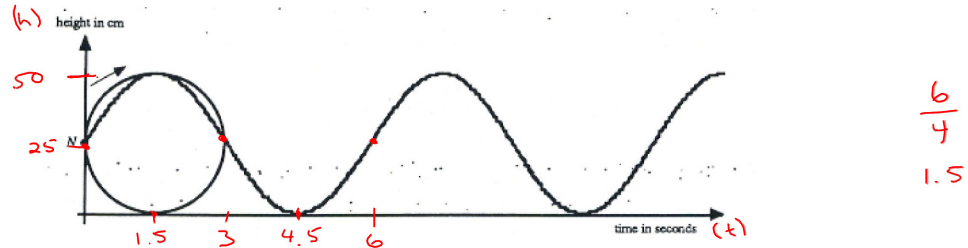


Pre-Calculus 12 Trigonometric Applications I

1. A nail is caught in the tread of a rotating tire at point N of the following sketch.



The tire has a diameter of 50 cm and rotates at 10 revolutions per minute. After 4.5 seconds the nail touches the ground.

- a) Complete the sinusoidal graph above which represents the height the nail is above the ground as a function of time.

- b) Determine the cosine equation for the motion of the nail.

$$A = 25 \quad D = 25$$

$$B = \frac{2\pi}{6}$$

$$= \frac{\pi}{3}$$

$$C = 1.5$$

$$h = 25 \cos\left(\frac{\pi}{3}(t - 1.5)\right) + 25$$

10 revs/min
10 revs/60s
1 rev/6s
← period

- c) Determine the sine equation for the motion of the nail.

$$C = 0$$

$$h = 25 \sin \frac{\pi}{3} t + 25$$

- d) How far is the nail above the ground after 6.5 seconds?

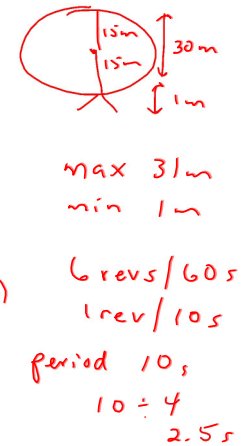
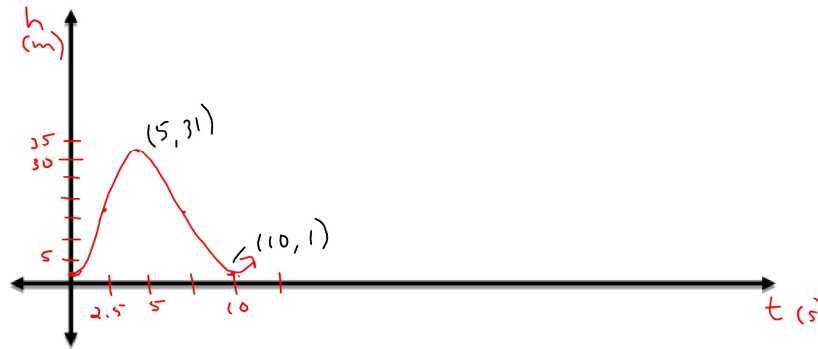
$$h = 25 \sin\left(\frac{\pi}{3}(6.5)\right) + 25$$

$$= 37.5 \text{ cm}$$

Trig Apps I.notebook

2. A Ferris wheel ride can be represented by a sinusoidal function. A Ferris wheel at Westworld Theme Park has a radius of 15 m and travels at a rate of six revolutions per minute in a clockwise rotation. You and your friend board the ride at the bottom chair from a platform one metre above the ground.

a) Sketch a sinusoidal graph to represent the Ferris wheel ride.



b) Write the cosine equation to represent this function.

$$A = \frac{\text{max} - \text{min}}{2} \quad D = 16 \quad B = \frac{2\pi}{10} \quad C = 5$$

$$A = \frac{31 - 1}{2} \quad = \frac{\pi}{5}$$

$$= 15$$

$$h = 15 \cos\left(\frac{\pi}{5}(t - 5)\right) + 16$$

or

$$h = -15 \cos\left(\frac{\pi}{5}t\right) + 16$$

c) If the Ferris wheel does not stop, determine the height you and your friend are above the ground after 28 seconds. Round your answer to the nearest tenth.

$$h = 15 \cos\left(\frac{\pi}{5}(28 - 5)\right) + 16$$

$$h = 11.4m$$

Assignment: Worksheet "Application Exercises"