

Example 1:

A Ferris wheel with a radius of seven meters makes one complete revolution every minute.

The bottom of the wheel is 1.5 meters above the ground. Assume rider gets on at this point.

- Determine two possible trigonometric functions that model a person's height above the ground, h after t seconds.
- Determine the time(s) when the rider is 12m above the ground.

amp: 7

period: 60 seconds

key points: $\frac{60}{4} = 15$ sec

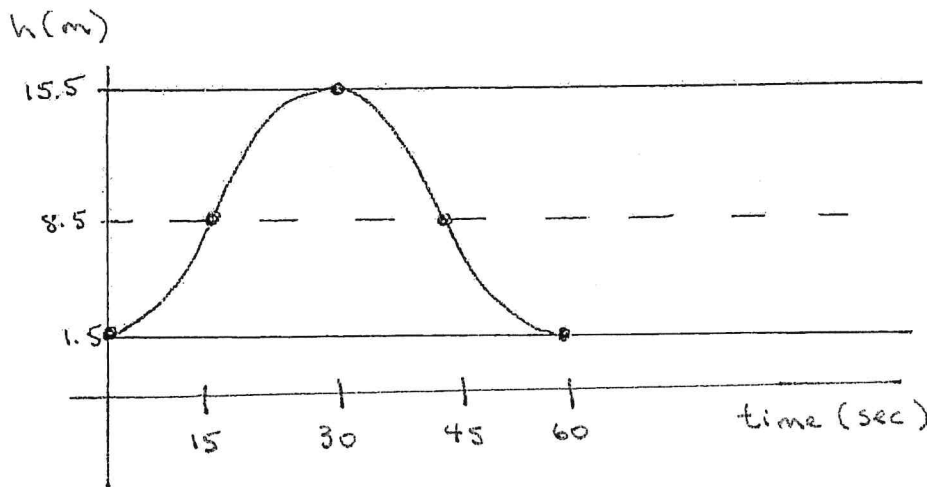
min at 1.5

axis of curve: $1.5 + 7 = 8.5$

$$* k = \frac{2\pi}{60 \text{ (sec)}} = \frac{\pi}{30}$$

* k-value is the conversion factor

- only needed for the eqn.



Let x rep. time (sec)
Let y rep height (m)

cos curve with reflection, no phase shift,
amp: 7, axis: 8.5

$$y = -7 \cos \frac{\pi}{30} x + 8.5 \quad \text{OR} \quad y = 7 \sin \frac{\pi}{30} (x - 15) + 8.5$$

↑
(in secs.)

b) $12 = -7 \cos \frac{\pi}{30} x + 8.5$

$$-\frac{1}{2} = \cos \frac{\pi}{30} x$$

$$\text{let } \theta = \frac{\pi}{30} x$$

$$\theta = \frac{4\pi}{3}$$

$$-\frac{1}{2} = \cos \theta$$

$$\theta = \frac{2\pi}{3}$$

$$\frac{\pi x}{30} = \frac{4\pi}{3}$$

$$\theta = \frac{2\pi}{3}, \frac{4\pi}{3}$$

$$\frac{\pi x}{30} = \frac{2\pi}{3}$$

$$x = 40 \text{ sec.}$$

$$x = 20 \text{ sec.}$$

\therefore Rider above ground at 20 and 40 secs.