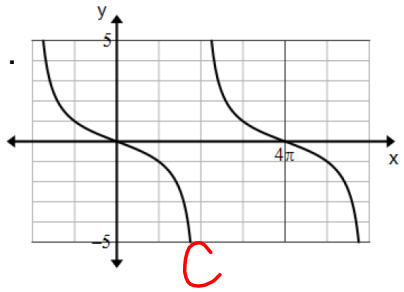
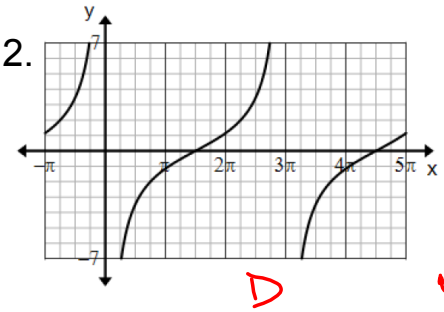
Match the following graphs with their equations.

1. 

C

2. 

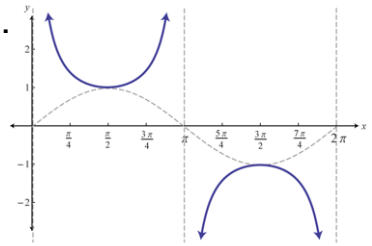
D

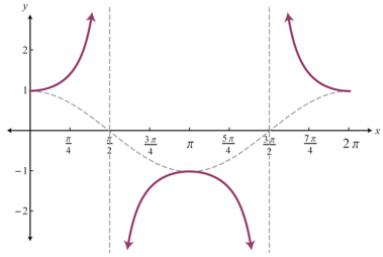
A. $y = \csc x$

B. $y = \sec x$

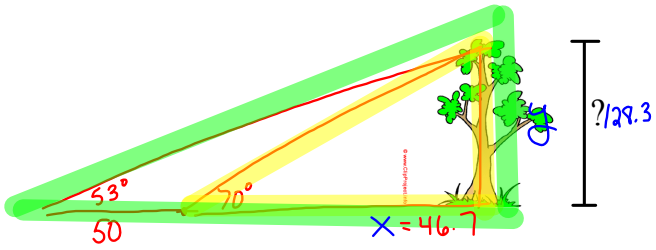
C. $y = -\tan\frac{1}{4}x$

D. $y = -\cot\frac{1}{3}x$

3. 
A

4. 
B

The angle of elevation to the top of a tree is 70°. After moving 50 feet farther away, the angle of elevation is 53°. How tall is the tree?



$\tan 70° = \frac{y}{x}$ $\tan 53° = \frac{y}{(50+x)}$

$x\tan 70° = y$ $(50+x)\tan 53° = y$

$x\tan 70° = (50+x)\tan 53°$

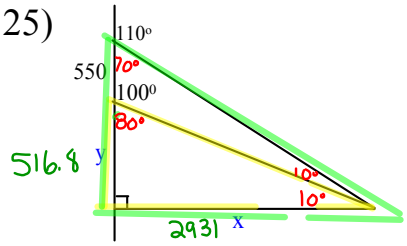
$x\tan 70° = 50\tan 53° + x\tan 53°$

$x\tan 70° - x\tan 53° = 50\tan 53°$

$x(\tan 70° - \tan 53°) = 50\tan 53°$

$x = \frac{(50\tan 53°)}{(\tan 70° - \tan 53°)} = 46.7$

25)



$\tan 10° = \frac{y}{x}$ $\tan 20° = \frac{550+y}{x}$

$x\tan 10° = y$ $x\tan 20° = 550 + y$

$x\tan 10° = y$ $x\tan 20° - 550 = y$

$x\tan 10° = x\tan 20° - 550$

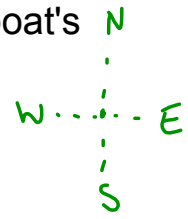
$x\tan 10° - x\tan 20° = -550$

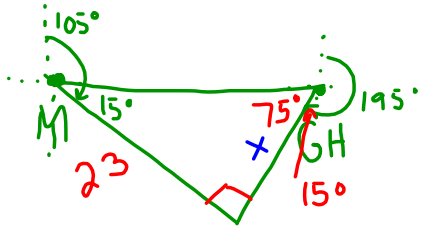
$x(\tan 10° - \tan 20°) = -550$

$x = \frac{-550}{\tan 10° - \tan 20°}$

$x = 2931$

26. Milwaukee, Wisconsin, is directly west of Grand Haven, Michigan, on opposite sides of Lake Michigan. On a foggy night, a law enforcement boat leaves from Milwaukee on a bearing of 105° at the same time that a small smuggling craft steers a bearing of 195° from Grand Haven. The law enforcement boat averages 23 knots and collides with the smuggling craft. What was the smuggling boat's average speed?





$\tan 15° = \frac{x}{23}$

$23\tan 15° = x$

6.16 knots

Simple Harmonic Motion

amp b

$d = a\sin\omega t$ or $d = a\cos\omega t$

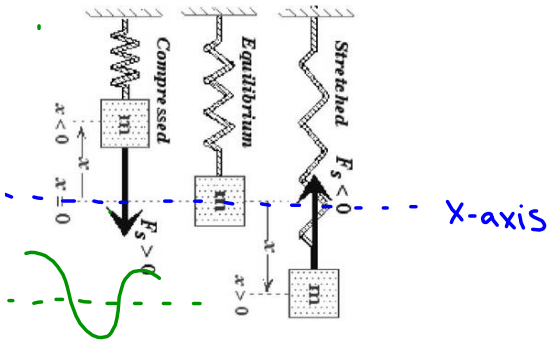
$y = a\sin b\theta$

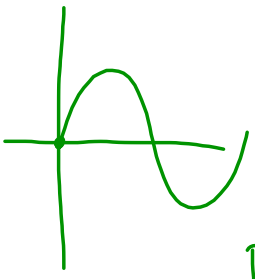
d = distance from origin

a & ω real #'s $\omega > 0$

$$\text{Motion f} = \frac{\omega}{2\pi} \quad \frac{\#\text{ oscillations}}{\text{time}}$$

A mass oscillating up and down on the bottom of a spring (assuming perfect elasticity and no friction or air resistance) can be modeled as harmonic motion. If the weight is displaced a maximum of 5 cm, find the modeling equation if it takes 2 seconds to complete one cycle.





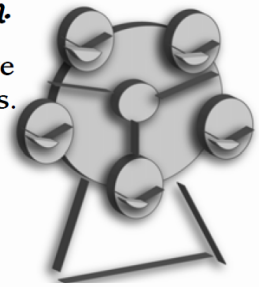
$y = 5\sin\pi t$

$P = \frac{2\pi}{b}$

$b2 = \frac{2\pi}{b}(b)$

$b = \pi$

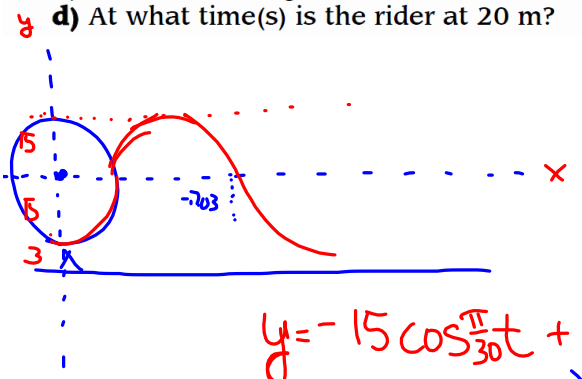
One of the most common application questions for graphing trigonometric functions involves Ferris wheels, since the up and down motion of a rider follows the shape of a sine or cosine graph.

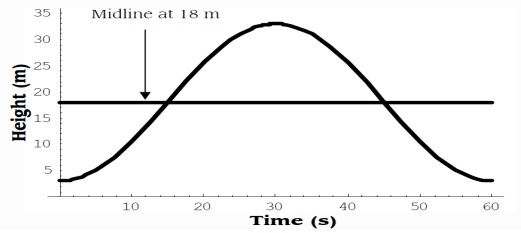


Example: A Ferris wheel has a diameter of 30 m, with the centre 18 m above the ground. It makes one complete rotation every 60 s.

a) Draw the graph of one complete cycle, assuming the rider starts at the lowest point.
b) Find the cosine equation of the graph.
c) What is the height of the rider at 52 seconds?
d) At what time(s) is the rider at 20 m?

8





$y = -15\cos\frac{\pi}{30}t + 18$

$y = -15\cos\left(\frac{\pi}{30}(52)\right) + 18$

$p = \frac{2\pi}{b}$

$60 = \frac{2\pi}{b}$

$b = \frac{\pi}{30}$

Section 4.8 Pg. 431
EX: 1-9 odd, 14, 15, 16, 19, 23, 25, 29, 31-32, 39-42, 45, 48

31)

$P = \frac{2\pi}{b}$

$20 = \frac{2\pi}{b}$

$b = \frac{\pi}{10}$

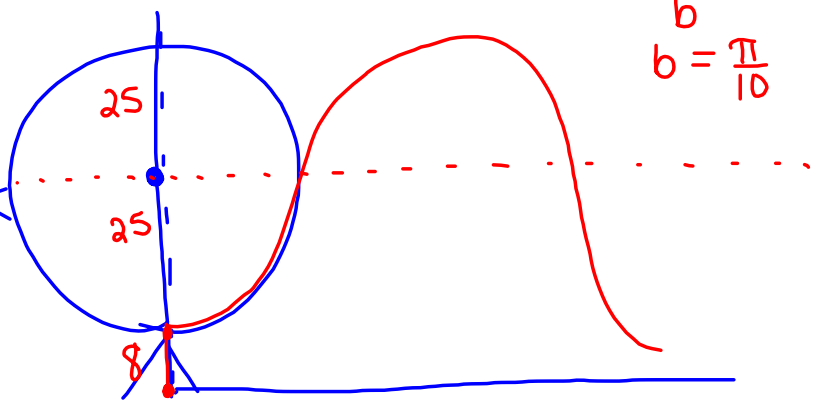
1 turn 20 sec

$h = 25 \sin \frac{\pi}{10} t + 33$

$h = a \sin \omega t + k$

Radius 25

8 ft off ground



32)

$P = \frac{2\pi}{b}$

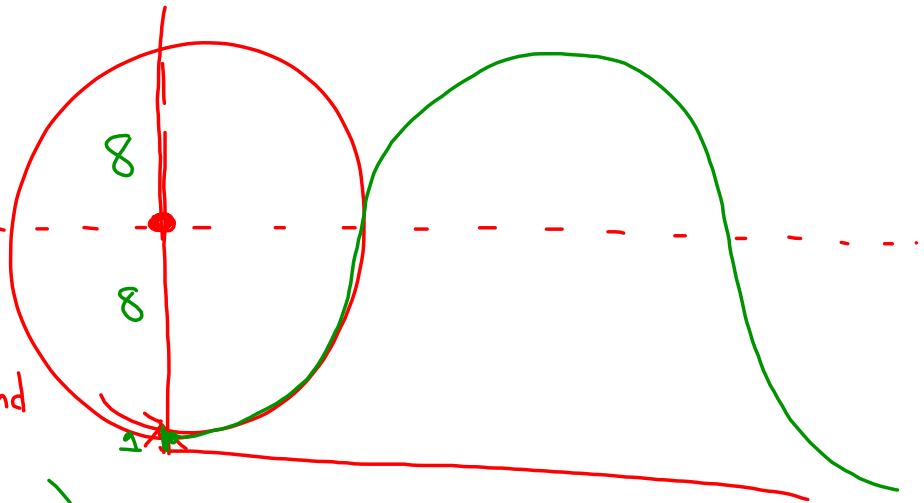
$20 = \frac{2\pi}{b}$

turns $\frac{3 \text{ rev}}{\text{min}}$

P = 20 sec

16 m diameter

1 m above ground



$y = -8 \cos\left(\frac{\pi}{10} t\right) + 9$