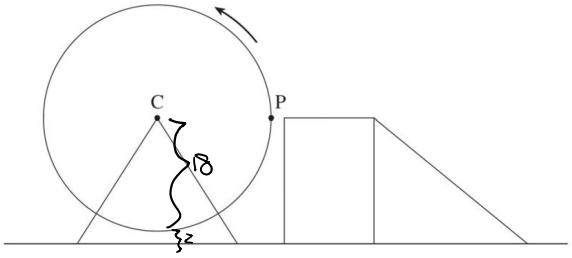
Trig 1 Review A

1. A Ferris wheel has a radius of 18m and a centre C which is 20m above the ground. It rotates once every 30 seconds. A platform allows a passenger to get on the wheel at a point P which is 20m above the ground.



a) If the ride begins at point P, when the time is t = 0 seconds, determine a sine function that gives the passenger's height, h metres, above the ground as a function of t.

amp = 18
V.D. = 20
period = 30
$\frac{2\pi}{b} = 30, b = \frac{\pi}{15}$

$y = 18\sin(\frac{\pi}{15}x) + 20$

b) What is the height of this passenger 10 seconds after it starts to rotate?

$y = 18\sin(\frac{\pi}{15}(10)) + 20 = 18\sin\frac{2\pi}{3} + 20 = 18(\frac{\sqrt{3}}{2}) + 20$

$= 9\sqrt{3} + 20\text{m}$

c) After how many seconds will the person be exactly at the height of 30m above ground?

$30 = 18\sin(\frac{\pi}{15}x) + 20$

$\frac{10}{18} = \sin\frac{\pi}{15}x$

$\frac{5}{9} = \sin\frac{\pi}{15}x$

let $\frac{\pi}{15}x = A$

$\sin A = \frac{5}{9}$

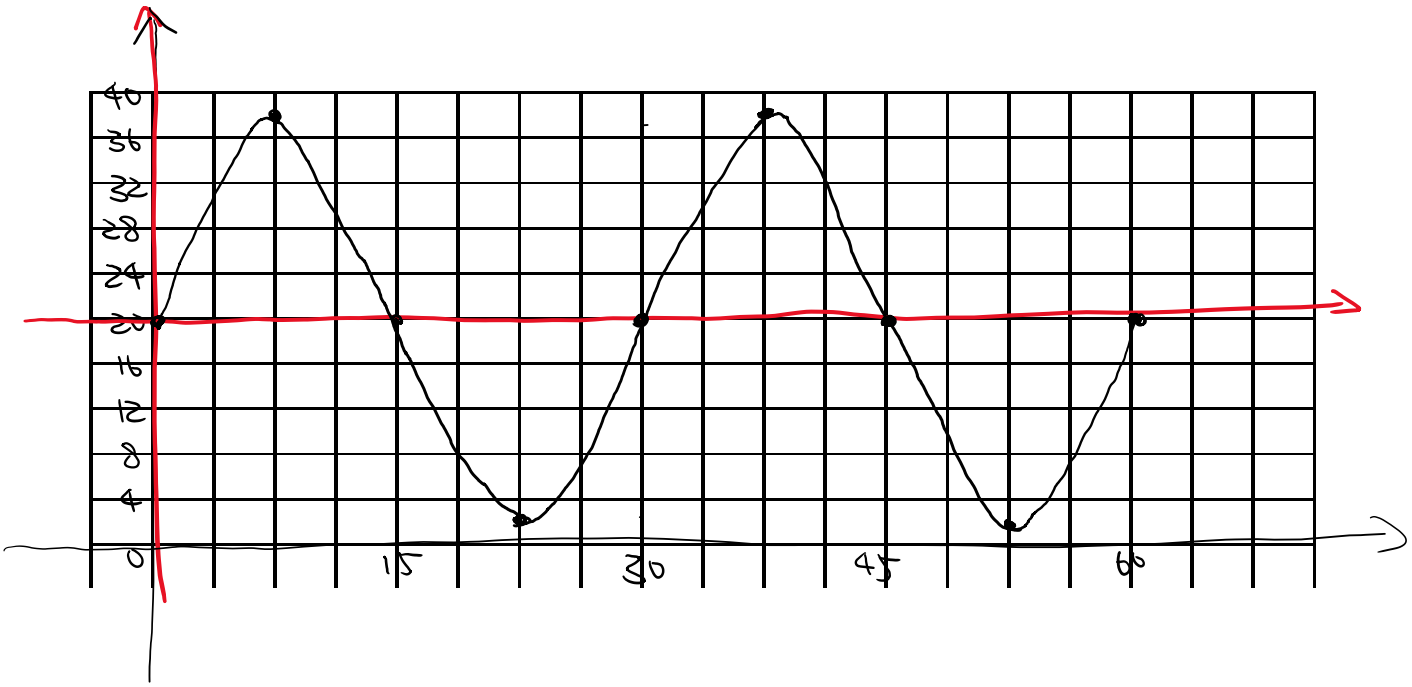
$A_R = 0.589$

$A_1 = 0.589, A_2 = \pi - 0.589$

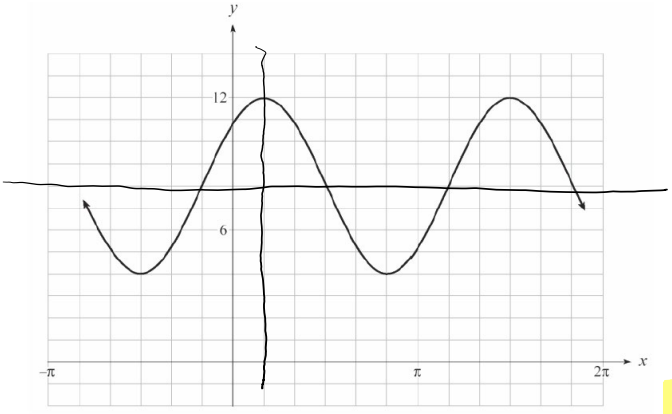
$x_1 = 0.589 \cdot \frac{15}{\pi}, x_2 = (\pi - 0.589)\cdot\frac{15}{\pi}$

$= 2.8125$ $= 12.1885$

d) Graph two cycles with 9 key points



2. Write a cosine function for the graph shown below.



amp = 4

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

$\frac{2\pi}{b} = \frac{4}{3}\pi$ $b = \frac{2\pi}{\frac{4\pi}{3}} = 2 \cdot \frac{3}{4\pi} = \frac{3}{2}$

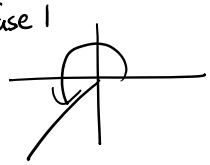
V.D. = 8

P.S. = $\frac{\pi}{6}$

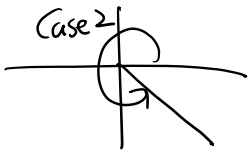
$y = 4\cos\left(\frac{3}{2}\left(x - \frac{\pi}{6}\right)\right) + 8$

3. Solve the equation $2\sin x = -1.234$ for $-3\pi \le x \le \pi$

Case 1



Case 2



$\sin x = \frac{-1.234}{2}$

$\angle R = \sin^{-1}\left(\frac{1.234}{2}\right)$

$\angle R = 0.66$

$x_1 = \pi + 0.66 = 3.81$ (both more than π)

$x_2 = 2\pi - 0.66 = 5.62$

Co-terminal angles.

$x_3 = 3.81 - 2\pi = -2.48$

$x_4 = 5.62 - 2\pi = -0.66$

$x_5 = -2.48 - 2\pi = -8.76$

$x_6 = -0.66 - 2\pi = -6.95$

4. Determine the number of solutions for $(a\sin x + a)(b\cos x - c) = 0$ for $0 \le x \le 2\pi$, if $1 < a < b < c$

$a\sin x = -a$

$\sin x = -1$

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

$b\cos x = c$

$\cos x = \frac{c}{b}$

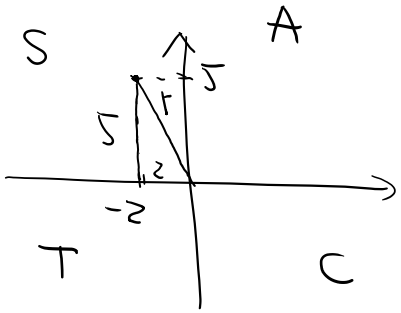
$\because c > b$

$\therefore \frac{c}{b} > 1$

$\therefore$ no solution

$\therefore$ there's only 1 solution

5. The terminal arm of angle θ in standard position passes through the point (-2, 5). Determine the value of $\sec\theta$.



$r = \sqrt{5^2 + 2^2} = \sqrt{25 + 4} = \sqrt{29}$

$\sec\theta = \frac{1}{\cos\theta} = \frac{1}{\frac{2}{\sqrt{29}}} = \frac{\sqrt{29}}{2}$