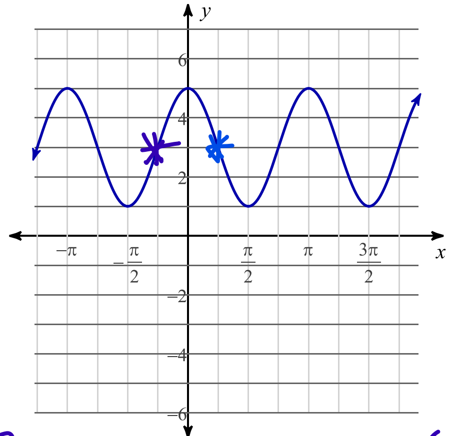
Precalculus Name________________________

More Equations from Graphs, L.o.S & Word Problem Notes

Date________________

Determine the equation of the function.

1) In terms of $\sin x$



Amp 2

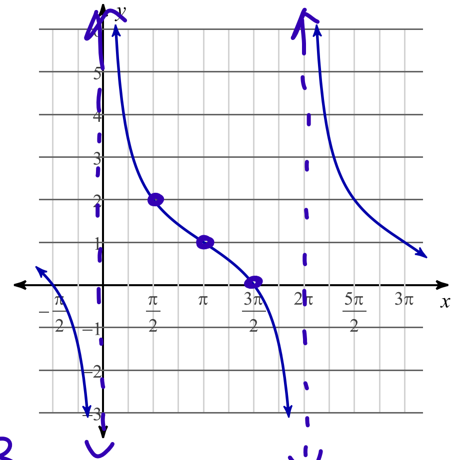
Period: π

mid 3

$y = 2\sin 2\left(x + \frac{\pi}{4}\right) + 3$

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

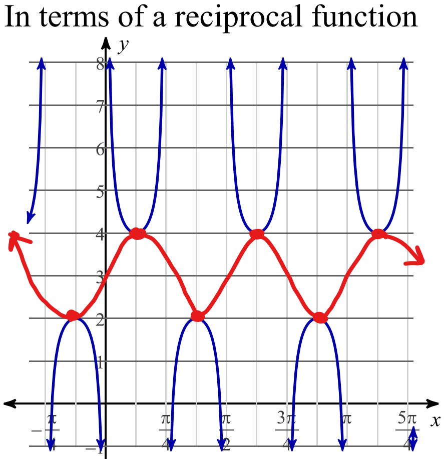
2) In terms of $\cot x$



$\boxed{y = \cot \frac{1}{2}(x) + 1}$

$\boxed{y = 4\cos \frac{1}{3}\left(x - \frac{3\pi}{2}\right) - 1}$

3) In terms of a reciprocal function

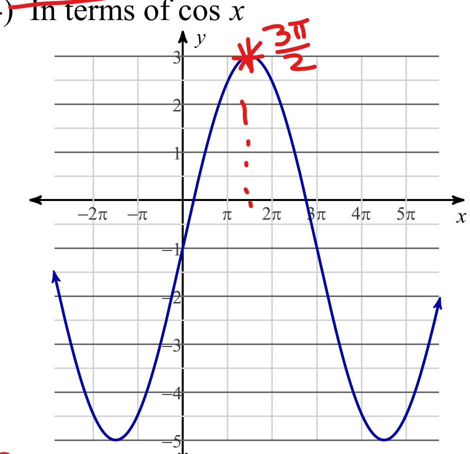


$\sin x \rightarrow$ shift up 3

Period $\frac{5\pi}{8} - \frac{\pi}{8} = \frac{4\pi}{8} = \frac{\pi}{2}$

$\boxed{y = \csc(4x) + 3}$

4) In terms of $\cos x$



$\frac{3 + -5}{2} = \frac{-2}{2} = -1 \rightarrow$ midline

So amplitude $= 4$

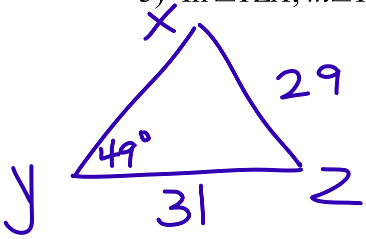
Period: $4.5\pi - -1.5\pi = 6\pi$

Period $= \frac{2\pi}{k} = 6\pi \rightarrow 2\pi = 6\pi k$

$k = \frac{2\pi}{6\pi} = \frac{1}{3}$

Solve each triangle. Round your answers to the nearest tenth.

5) In $\triangle YZX$, $m\angle Y = 49°$, $x = 31$ mi, $y = 29$ mi



$\angle X = 53.8°$

$\angle Z = 77.2°$

$z = 37.5$

$\dfrac{29}{\sin(49°)} = \dfrac{31}{\sin X}$

$29\sin X = 31\sin 49°$

$\sin X = \dfrac{31\sin 49°}{29}$

$X = \sin^{-1}\left(\dfrac{31\sin 49°}{29}\right)$

$\dfrac{29}{\sin(49°)} = \dfrac{z}{\sin(77.2°)}$

$\dfrac{29\sin(77.2°)}{\sin(49°)} = z_1$

$\dfrac{29}{\sin 49°} = \dfrac{z}{\sin(4.8)}$

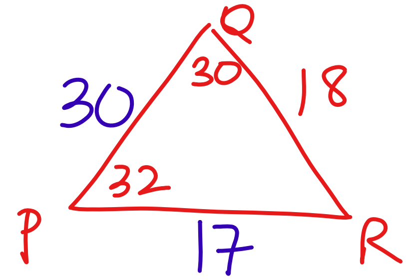
$\dfrac{29\sin(4.8)}{\sin(49)} = z_2$

$\angle X = 126.2°$

$\angle Z = 4.8°$

$z = 3.2$

6) In $\triangle PQR$, $m\angle P = 32°$, $m\angle Q = 30°$, $p = 18$ m



$\angle R = 118°$

$\dfrac{\sin 118°}{r} = \dfrac{\sin 32°}{18}$

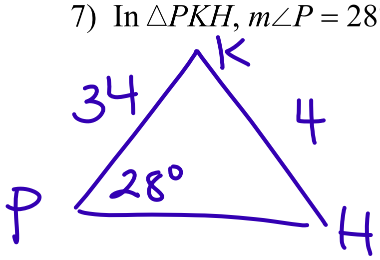
$r = \dfrac{18\sin(118°)}{\sin(32°)}$

$r = 30$

$q = \dfrac{18\sin(30°)}{\sin(32°)}$

$q = 17$

7) In $\triangle PKH$, $m\angle P = 28°$, $h = 34$ m, $p = 4$ m



$\dfrac{4}{\sin(28°)} = \dfrac{34}{\sin H}$

$4\sin H = 34\sin 28$

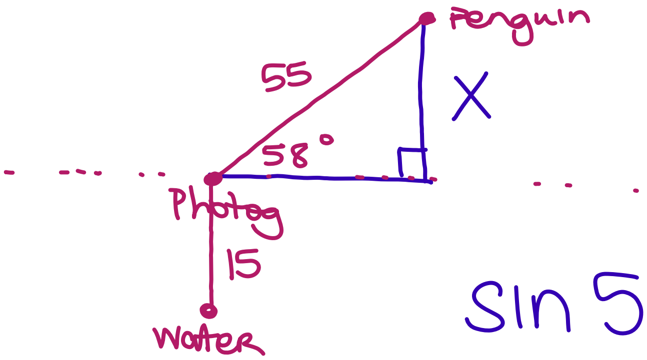
$\sin H = \dfrac{34\sin 28}{4}$

$H = \sin^{-1}\left(\dfrac{34\sin 28}{4}\right)$

No triangle

angle to the horizon

8) A person standing on a rock that is 15 meters above the water is photographing penguins on a higher cliff across the water. If the straightline distance to the penguins from the photographer is 55 meters and the $\boxed{\text{angle of elevation}}$ from the photographer and penguins is 58°, what is the penguin's height above water?



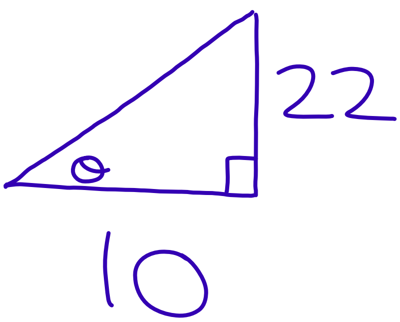
+15 to this

$$= \boxed{61.643\text{m}}$$

$$\sin 58^\circ = \frac{X}{55}$$

$$X = 55\sin 58^\circ = 46.643$$

9) If a ladder is used to allow a contractor access to the roof, and is positioned so that the top is 22 feet above the ground and the bottom is 10 feet from the base of the house, what the ladder's angle of elevation (always measured to the horizontal)?



$$\tan\theta = \frac{22}{10}$$

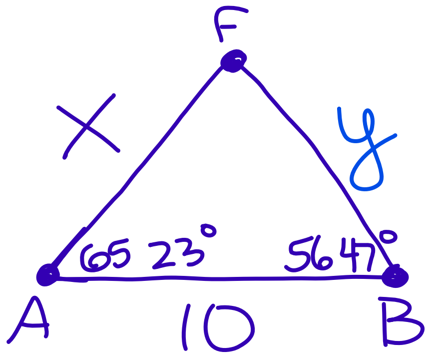
$$\theta = \tan^{-1}\left(\frac{22}{10}\right) = 65.556^\circ$$

10) How long is the ladder?

$$10^2 + 22^2 = L^2$$

$$\boxed{L = 24.166\text{ ft}}$$

11) Two rangers, one at station A and one at station B, observe a fire in the forest. The angle at station A formed by the lines of sight to station B and to the fire is 65.23°. The angle at station B formed by the lines of sight to station A and to the fire is 56.47°. The stations are 10 km apart. How far from station A is the fire?



$$\angle F = 180° - 65.23° - 56.47°$$
$$= 58.3°$$

$$\frac{10}{\sin(58.3)} = \frac{x}{\sin(56.47)}$$

$$x = \frac{10\sin(56.47)}{\sin(58.3)}$$

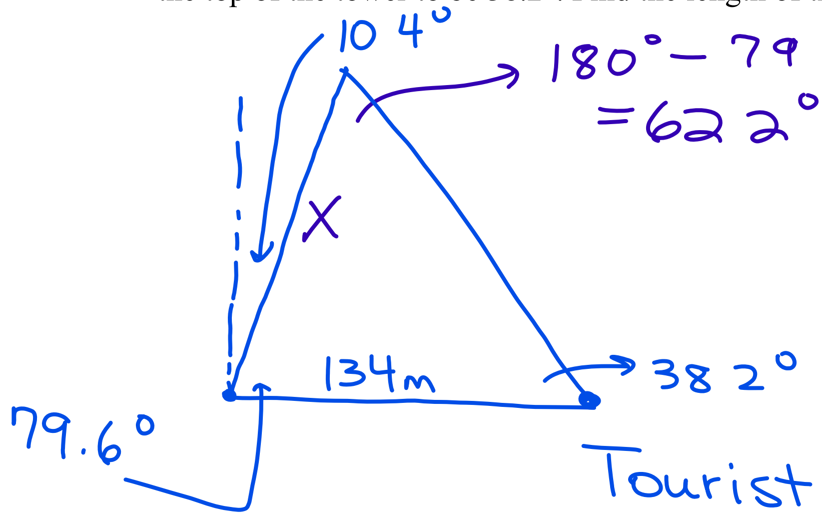
$$\boxed{x = 9.798 \text{ km}}$$

12) How far from station B is the fire?

$$\frac{10}{\sin(58.3)} = \frac{y}{\sin(65.23)}$$

$$y = \frac{10\sin(65.23)}{\sin(58.3)} \Rightarrow \boxed{y = 10.672 \text{ km}}$$

13) The bell tower of the cathedral in Pisa, Italy, leans 10.4° from the vertical. A tourist stands 134 m from its base, with the tower leaning directly toward her. She measures the angle of elevation to the top of the tower to be 38.2°. Find the length of the tower to the nearest tenth of a meter.



$$180° - 79.6° - 38.2°$$
$$= 62.2°$$

$$\frac{134}{\sin 62.2°} = \frac{x}{\sin 38.2°}$$

$$x = \frac{134\sin 38.2°}{\sin 62.2°}$$

$$\boxed{x = 93.679 \text{ m}}$$