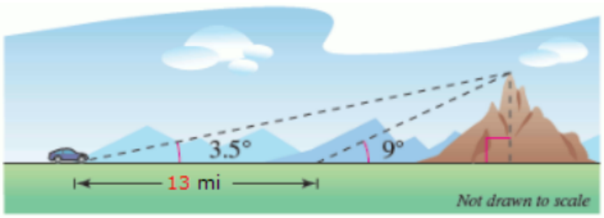
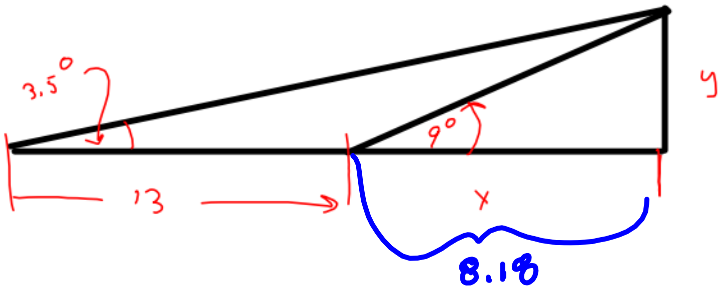


This is pretty cool.
Mostly just being clever with algebra.



$a = \tan 3.5^\circ$
$b = \tan 9^\circ$

$$\frac{y}{x+13} = \tan 3.5^\circ \qquad \frac{y}{x} = \tan 9^\circ$$

$$\boxed{y \approx 8.18 \tan 9^\circ}$$

$$y = a(x+13) \qquad y = bx$$

$$y = y$$

$$a(x+13) = bx$$

$$ax + 13a = bx$$
$$-bx \quad -13a = -bx \quad -13a$$

$$ax - bx = -13a$$

$$x(a-b) = -13a$$

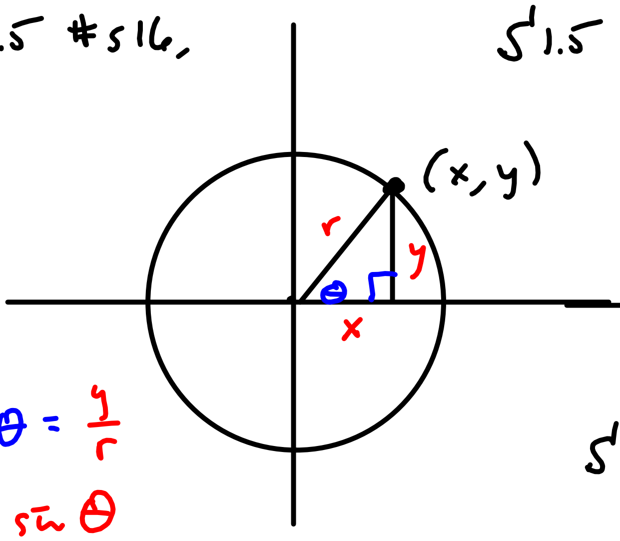
$$x = \frac{-13a}{a-b} = \frac{-13\tan(3.5^\circ)}{\tan(3.5^\circ) - \tan(9^\circ)}$$

$$\approx 8.18$$

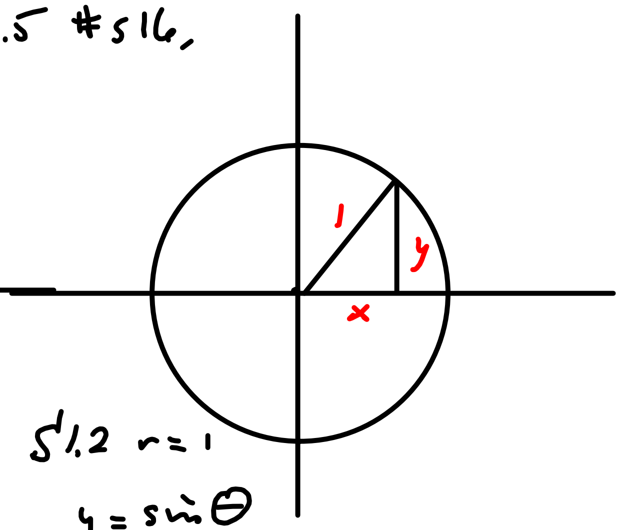
```
3.5)-tan(9))
     1.887311512
tan(9)*Ans
      .2989207776
-13tan(3.5)/(tan
(3.5)-tan(9))
      8.178349886
```

§1.4

§1.5 #s 16,



§1.5 #s 16,



$\sin\theta = \frac{y}{r}$

$\frac{y}{r} = \sin\theta$

$y = r\sin\theta$

$x = r\cos\theta$

$\frac{y}{x} = \tan\theta$

§1.2 $r = 1$

$y = \sin\theta$

$x = \cos\theta$

on unit circle!

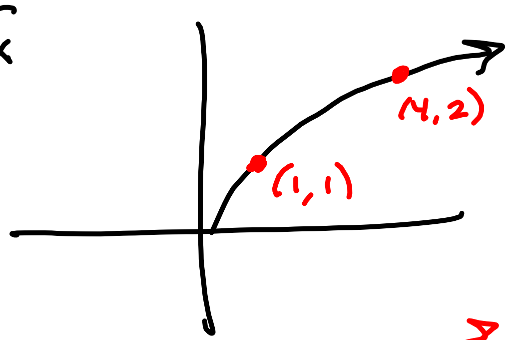
§1.5 #16 $y_1 = \sin(3x)$

$y_2 = \sin(-3x)$

$f(3x)$: argument 3 times faster

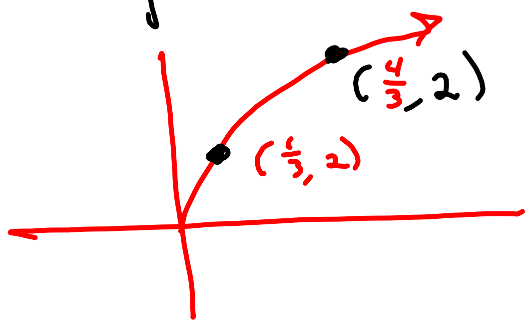
cover ground in $\frac{1}{3}$ as much time.

$\sqrt{x}$

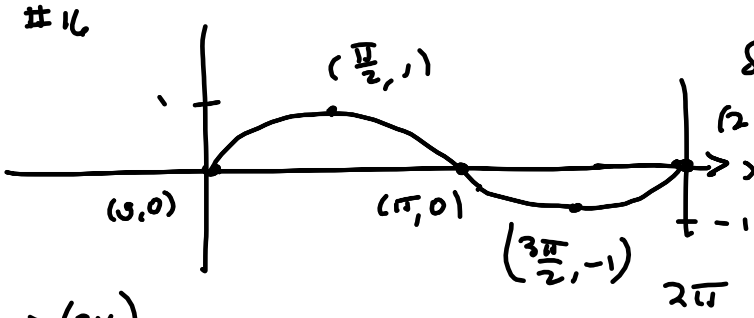


$\sqrt{3\left(\frac{4}{3}\right)} = \sqrt{4} = 2$

$\sqrt{3x}$



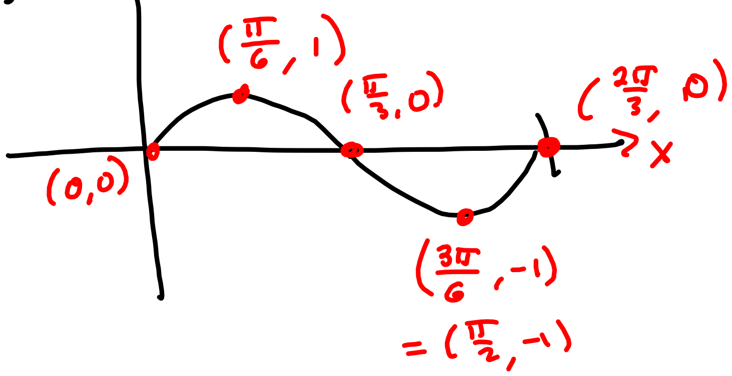
#16



$\sin x$

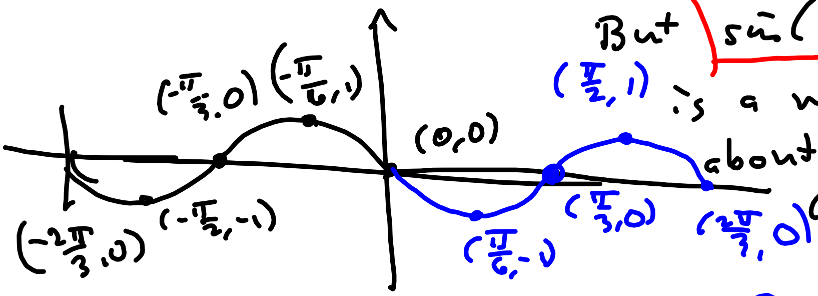
$T = 2\pi$

$\sin(3x)$



$\sin(-3x) =$ is a reflection about the y-axis

But $\boxed{\sin(-\square) = -\sin(\square)}$ is a vertical reflection about the x-axis.



← Blue

Sine is ODD.

In general

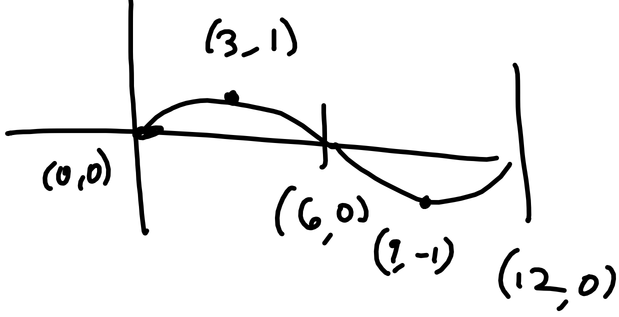
$\sin(x)$ is of period $2\pi = 360^\circ$

Period of $\sin(\frac{\pi}{6} x)$

when is $\frac{\pi}{6} x = 2\pi$?

$x = \frac{2\pi}{1} \cdot \frac{6}{\pi} = 12$

$\sin(\frac{\pi}{6} x)$



$y = \sin\left(\frac{\pi}{6}x - \frac{2\pi}{3}\right)$

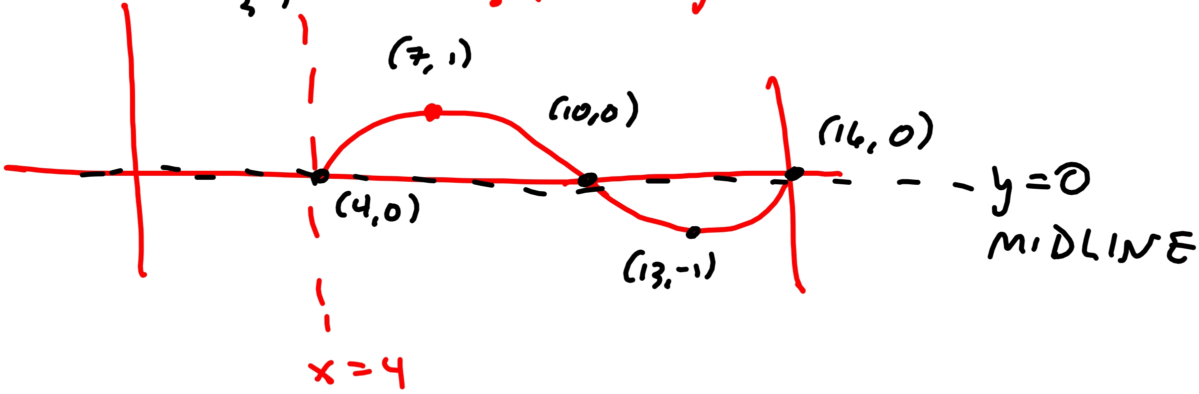
$\frac{\pi}{6}x - \frac{2\pi}{3} = \frac{\pi}{6}(x - 4)$

$\frac{\frac{2\pi}{3}}{\frac{\pi}{6}} = \frac{2\pi}{3} \cdot \frac{6}{\pi} = 4$

Period

Delay by 4
shift right.

$\sin\left(\frac{\pi}{6}x - \frac{2\pi}{3}\right)$



MIDLINE: Average of high & low.

$\frac{1 + (-1)}{2} = \frac{\text{HIGH} + \text{LOW}}{2}$

Amplitude: Distance from midline to peaks.

$A = 1$, because $A = \frac{\text{HIGH} - \text{LOW}}{2}$

Graph $y = 17\sin\left(\frac{\pi}{6}x - \frac{2\pi}{3}\right) + 25$

$T = 12$

Amp

Period

Relates to horizontal shift

Vertical shift.

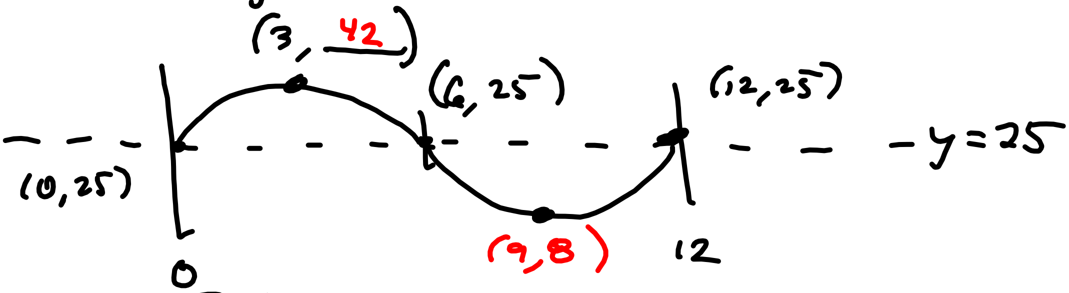
$\frac{\pi}{6}x - \frac{2\pi}{3} = \frac{\pi}{6}(x-4)$

what's the period?

$\frac{\pi}{6}x = 2\pi$ when $x = 12$

Midline: $y = 25$

$25 + 17$



$17\sin\left(\frac{\pi}{6}x\right) + 25$

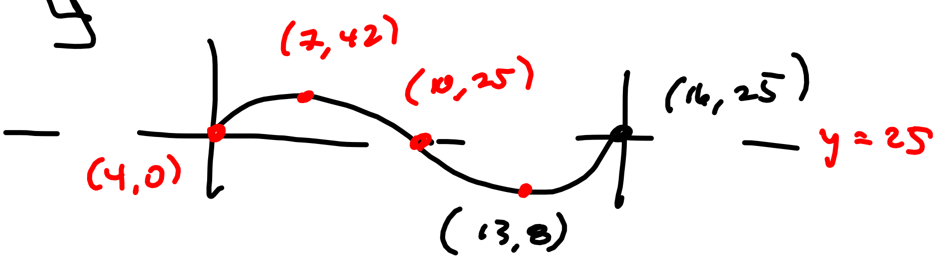
$25 - 17 = 8$

Now: $17\sin\left(\frac{\pi}{6}(x-4)\right) + 25$

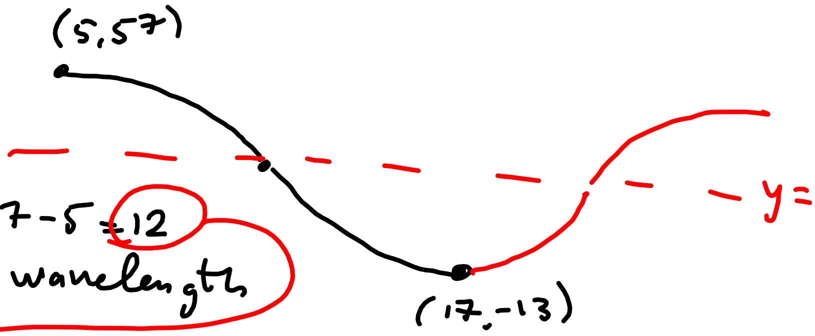
Delay previous by 4 units

Shift right 4 units

$x+4$ would be left shift by 4 units.



Build a cosine function with maximum of 57 at x=5 and a minimum of -13 at x = 17.



T = 24
(from 17-5 = 12 is $\frac{1}{2}$ wavelength

$\frac{\pi}{12}x$ in function.
is the cheat.

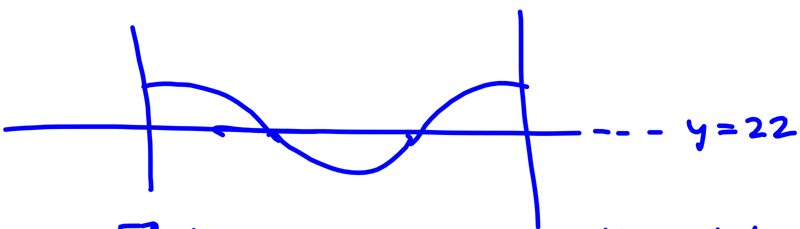
period of cosine is 2π
want bx to be 2π when x=24.

$24b = 2\pi \longrightarrow$

$b = \frac{2\pi}{24} = \frac{\pi}{12}$

Is how to reason out the $\frac{\pi}{12}$ from period.

$A\cos\left(\frac{\pi}{12}(x-5)\right) + D$



Midline: $\frac{57+-13}{2} = \frac{44}{2} = 22 = \frac{HIGH + LOW}{2}$

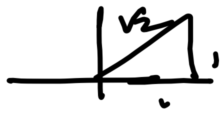
y = 22

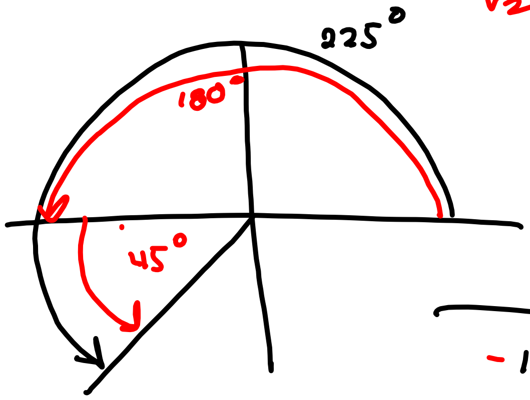
Amplitude:
$\frac{HIGH - LOW}{2} = \frac{57-(-13)}{2} = \frac{70}{2} = 35$

$$\boxed{35\cos\left(\frac{\pi}{12}(x-5)\right) + 22}$$

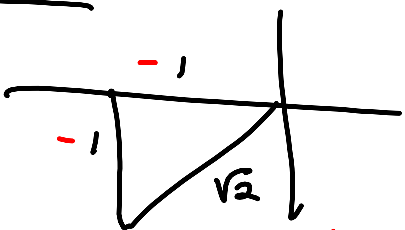
$\cos(225^\circ) = -\frac{1}{\sqrt{2}}$

$\sin 225^\circ = -\frac{1}{\sqrt{2}}$

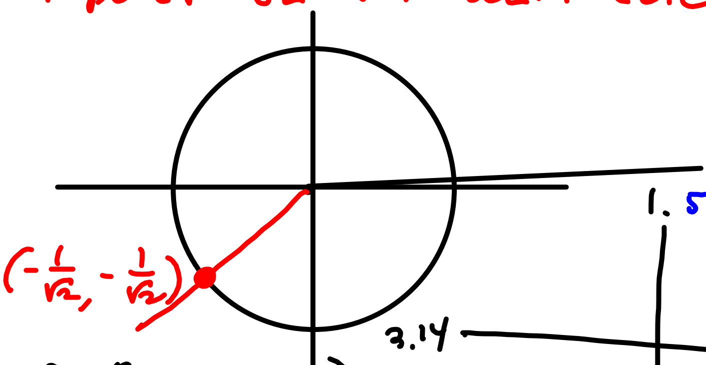


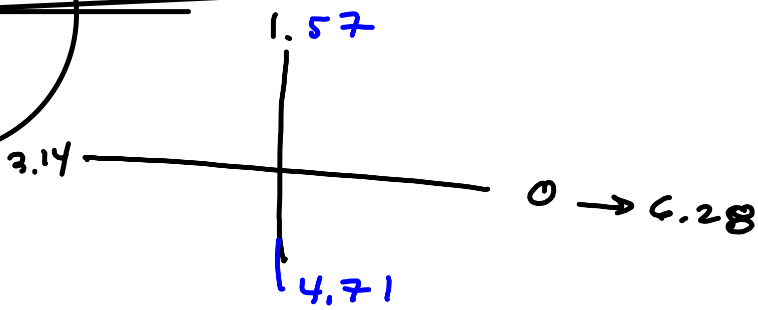


45° is the reference angle



Section 1.2 wants you to know this as a point on the unit circle.





$= (\cos 225^\circ, \sin 225^\circ)$

$(225^\circ)\left(\frac{\pi \text{ rad}}{180^\circ}\right) = \frac{5\pi}{4}$ radians.