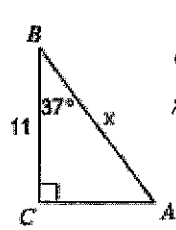


$$\sin(\theta) = \frac{\text{opp}}{\text{hyp}}$$

$$\cos(\theta) = \frac{\text{adj}}{\text{hyp}}$$

$$\tan(\theta) = \frac{\text{opp}}{\text{adj}}$$

1. Find the missing side in each triangle. SHOW ALL WORK.

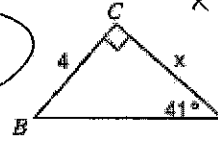


$$\cos 37^\circ = \frac{11}{x}$$

$$x \cdot .799 = \frac{11}{.799}$$

$$x = \frac{11}{.799} = 13.77$$

$$x = 13.77$$



$$\tan 41^\circ = \frac{4}{x}$$

$$x \cdot .870 = \frac{4}{.870}$$

$$x = \frac{4}{.87} = 4.6$$

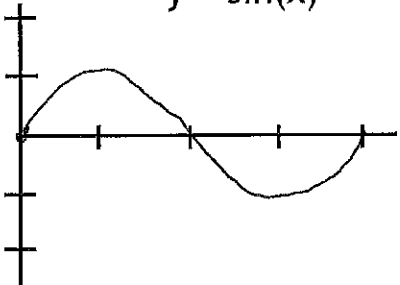
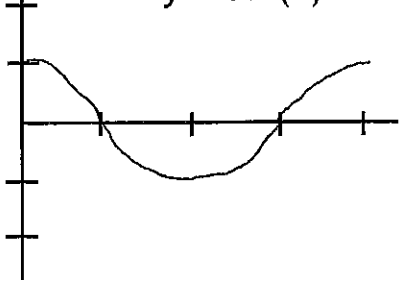
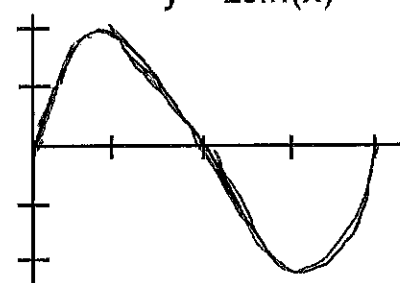
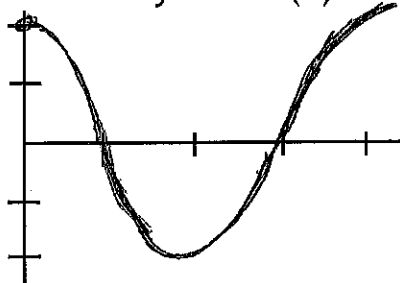
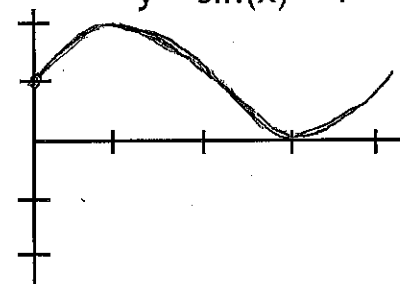
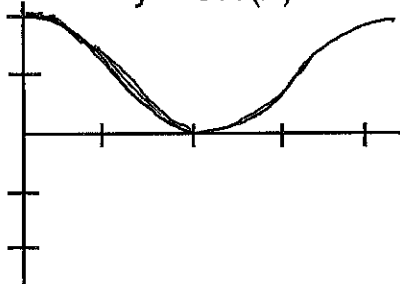
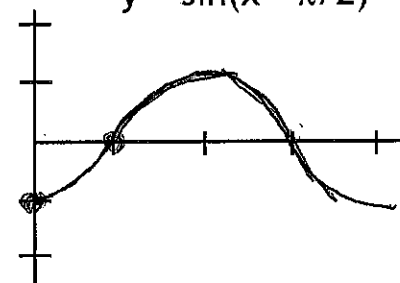
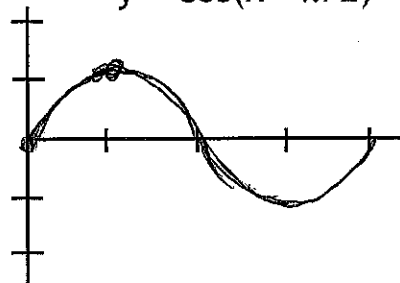
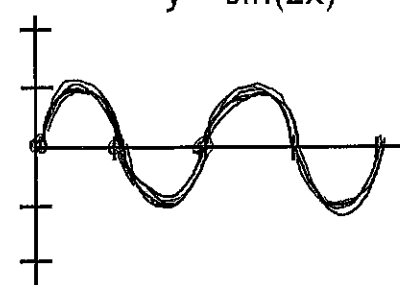
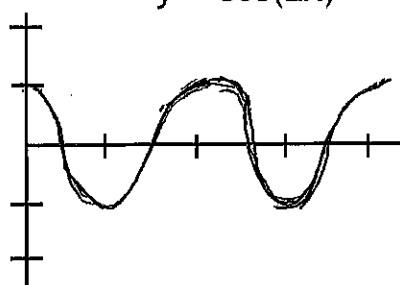
$$x = 4.6$$

2. Locate each angle below on the Unit Circle, then write down the value of the trig function listed. DO NOT use a calculator.

1) $\sin 135^\circ = \frac{\sqrt{2}}{2}$	2) $\cos 225^\circ = -\frac{\sqrt{2}}{2}$	3) $\tan 45^\circ = 1$
4) $\sin \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$	5) $\cos \pi = -1$	6) $\tan \frac{7\pi}{4} = -1$
7) $\sin 510^\circ = \frac{1}{2}$	8) $\cos 600^\circ = -\frac{1}{2}$	9) $\tan -30^\circ = -\frac{1}{\sqrt{3}}$
10) $\sin \frac{7\pi}{4} = -\frac{\sqrt{2}}{2}$	11) $\cos \frac{3\pi}{2} = 0$	12) $\tan \frac{4\pi}{3} = \sqrt{3}$
13) $\sin -120^\circ = -\frac{\sqrt{3}}{2}$	14) $\cos 330^\circ = \frac{\sqrt{3}}{2}$	15) $\tan -180^\circ = 0$
16) $\sin -\frac{\pi}{3} = -\frac{\sqrt{3}}{2}$	17) $\cos -\frac{\pi}{2} = 0$	18) $\tan \frac{9\pi}{4} = 1$

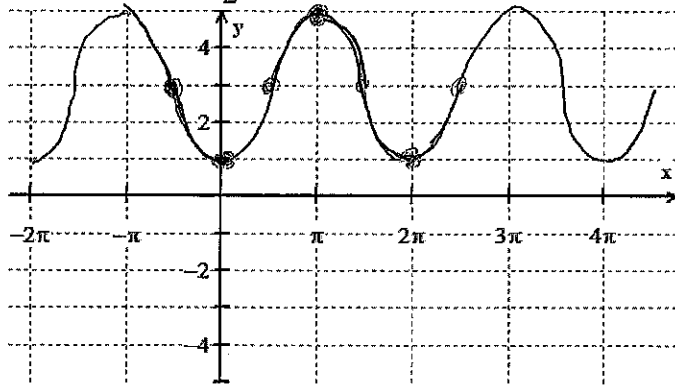
3. Find the angle(s) described below on the Unit Circle, then write down the angle measure(s) in radians. DO NOT use a calculator.

1) $\sin \theta = -\frac{1}{2}$ $\theta = 210^\circ, 330^\circ$ $= \frac{7\pi}{6}, \frac{11\pi}{6}$	2) $\cos \theta = \frac{\sqrt{2}}{2}$ $\theta = \frac{\pi}{4}, \frac{7\pi}{4}$	3) $\tan \theta = 1$ $\theta = \frac{\pi}{4}, \frac{5\pi}{4}$
4) $\sin \theta = \frac{1}{2}$ $\theta = \frac{\pi}{6}, \frac{5\pi}{6}$	5) $\cos \theta = -\frac{\sqrt{2}}{2}$ $\theta = \frac{3\pi}{4}, \frac{5\pi}{4}$	6) $\tan \theta = -1$ $\theta = \frac{3\pi}{4}, \frac{7\pi}{4}$
7) $\sin \theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{\pi}{3}, \frac{2\pi}{3}$	8) $\cos \theta = 0$ $\theta = \frac{\pi}{2}, \frac{3\pi}{2}$	9) $\tan \theta = \text{undefined}$ $\theta = \frac{\pi}{2}, \frac{3\pi}{2}$
10) $\cos \theta = -\frac{\sqrt{3}}{2}$ $\theta = \frac{5\pi}{6}, \frac{7\pi}{6}$	11) $\cos \theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{\pi}{6}, \frac{11\pi}{6}$	12) $\tan \theta = 0$ $\theta = 0, \pi$
13) $\tan \theta = \sqrt{3}$ $\theta = \frac{\pi}{3}, \frac{4\pi}{3}$	14) $\tan \theta = -\sqrt{3}$ $\theta = \frac{2\pi}{3}, \frac{5\pi}{3}$	15) $\tan \theta = \frac{1}{\sqrt{3}}$ $\theta = \frac{\pi}{6}, \frac{7\pi}{6}$
16) $\sin \theta = -1$ $\theta = \frac{3\pi}{2}$	17) $\cos \theta = -1$ $\theta = \pi$	18) $\sin \theta = 0$ $\theta = 0, \pi$

PARAMETER	$y = a \bullet \sin b(x-h) + k$	$y = a \bullet \cos b(x-h) + k$
PARENT GRAPH	$y = \sin(x)$ 	$y = \cos(x)$ 
AMPLITUDE ("a")	$y = 2\sin(x)$ 	$y = 2\cos(x)$ 
VERTICAL POSITION ("k")	$y = \sin(x) + 1$ 	$y = \cos(x) + 1$ 
HORIZONTAL POSITION ("h")	$y = \sin(x - \pi/2)$ 	$y = \cos(x - \pi/2)$ 
PERIOD CHANGE ("b")	$y = \sin(2x)$ 	$y = \cos(2x)$ 

8. Graph each equation.

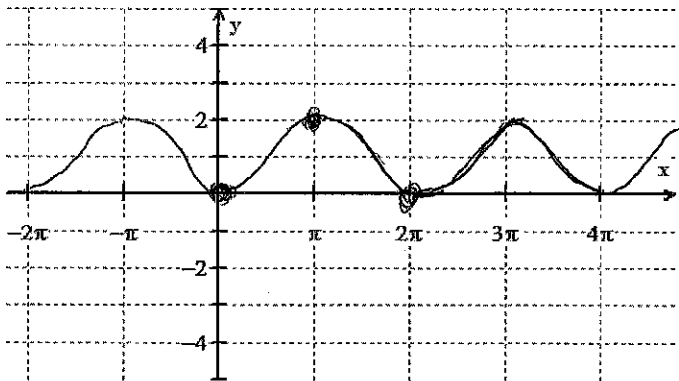
a)  $y = -2\sin(x + \frac{\pi}{2}) + 3$



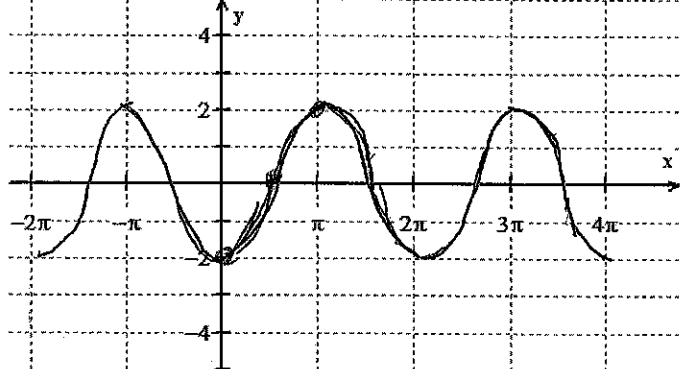
b)  $y = 3\sin(x) - 1$



c)  $y = \cos(x - \pi) + 1$

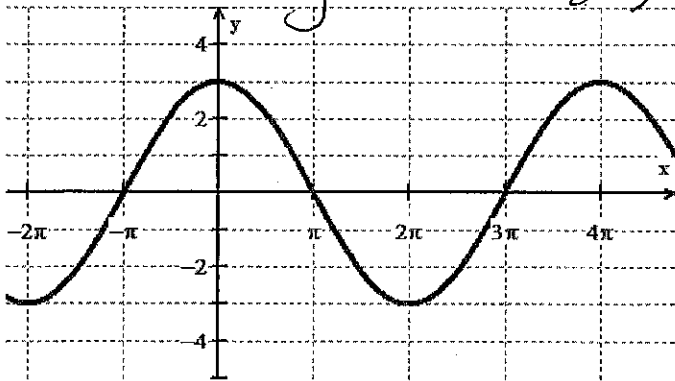


d)  $y = 2\sin(x - \frac{\pi}{2})$

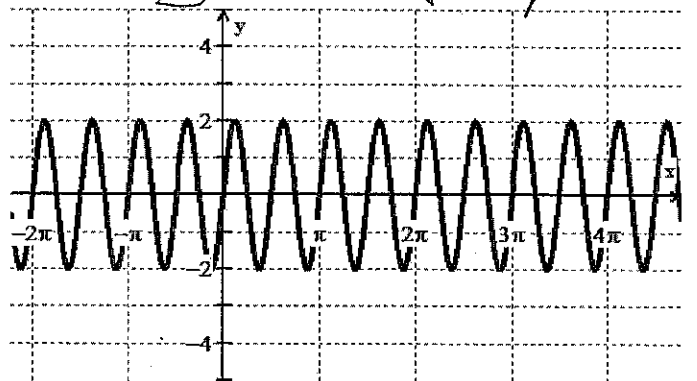


9. Write an equation for each of these graphs.

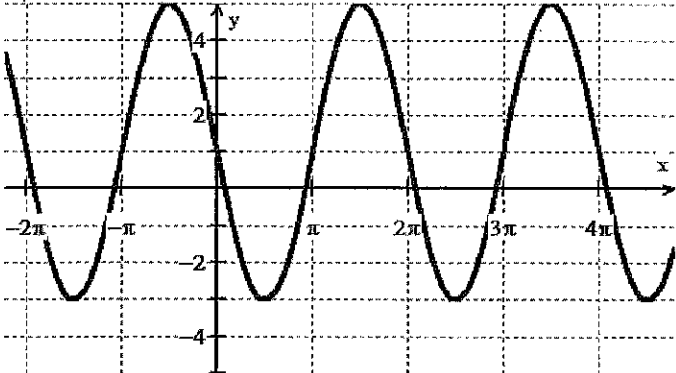
a)  $y = 3\cos(\frac{1}{2}x)$



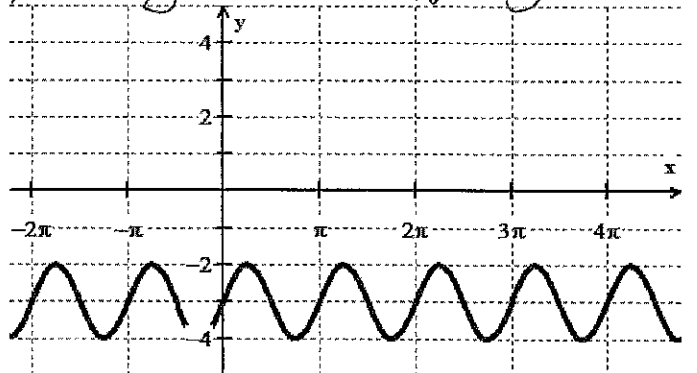
b)  $y = 2\sin(4x)$



c)  $y = -4\sin(x) + 1$



d)  $y = \sin(2x) - 3$



6. A unit circle has angle  $\theta$  in standard position. Point  $P$  is on the circle and the coordinates of  $P$  are shown.

a. What is  $\cos \theta$ ? Explain what it means in terms of the sun.

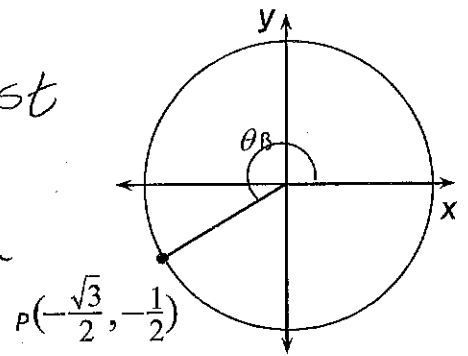
$\cos \theta = -\frac{\sqrt{3}}{2}$  Sun is west

b. What is  $\sin \theta$ ? Explain what it means in terms of the sun.

$\sin \theta = -\frac{1}{2}$  Sun is south

c. What is the measure of angle  $\theta$ ? Give your answer in radians and degrees.

$\theta = 210^\circ$  OR  $\theta = \frac{7\pi}{6}$



Solve for  $\theta$  using simplification and your unit circle.

7.  $2 \sin \theta = 1$

$\sin \theta = \frac{1}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$

8.  $\cos \theta - 1 = -0.50$

$\cos \theta = 0.5$

$\theta = \frac{\pi}{3}, \frac{5\pi}{3}$

9.  $4 \tan \theta = 4$

$\tan \theta = 1$

$\theta = \frac{\pi}{4}, \frac{5\pi}{4}$

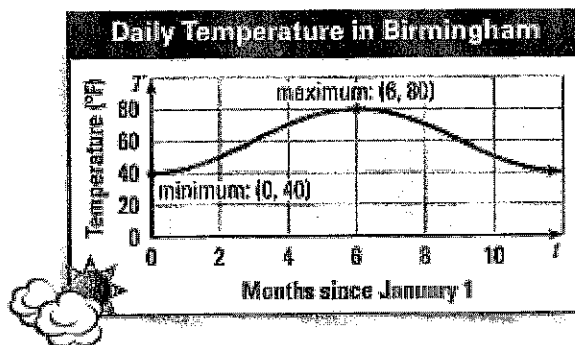
10. If angle  $\theta$  is in the third quadrant and  $\tan \theta = \frac{1}{2}$ , what is sine of that angle?

$\theta \approx 26.57^\circ$  using calculator. But  $\theta$  in 3<sup>rd</sup> Q implies  $\theta = 180 + 26.57 = 206.57^\circ$ .  $\tan 206.57 = \frac{1}{2}$

$\sin 206.57 = -\frac{4}{5}$

11.

Write a trigonometric model for the average daily temperature in Birmingham, Alabama. Source: National Climatic Data Center



$y = -20 \cos\left(\frac{2\pi}{12}x\right) + 60$