

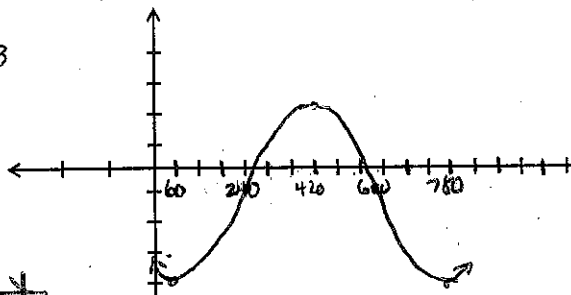
GPS PreCalculus: Graphing Trig Functions  
Test Review

Name KEY  
Date \_\_\_\_\_ Period \_\_\_\_\_

Graph each

1.  $y = -3 \cos\left(\frac{x}{2} - 30^\circ\right) - 1$

Period 720  
Amplitude 3  
VS: -1  
HS: 60  
Start: 60  
End: 780  
Increments 180

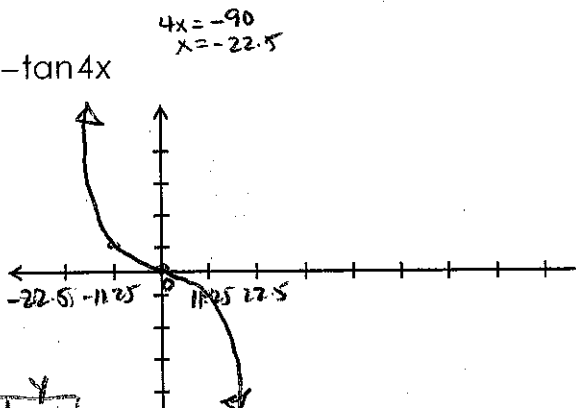


x	y
60	-4
240	-1
420	2
600	-1
780	-4

period = 45

3.  $y = -\tan 4x$

VS: 0  
HS: -22.5  
Start: -22.5  
End: 22.5

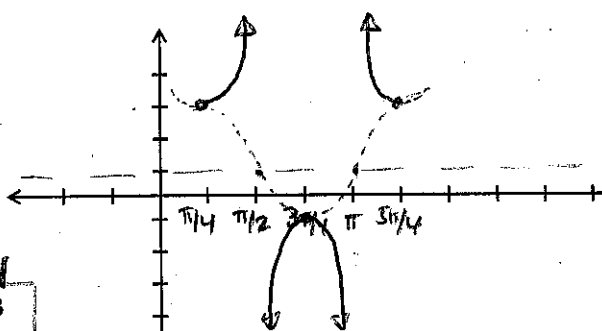


Increments 11.25

x	y
-22.5	VA
-11.25	1
0	0
11.25	-1
22.5	VA

5.  $y = 2 \sec 2\left(x - \frac{\pi}{4}\right) + 1$

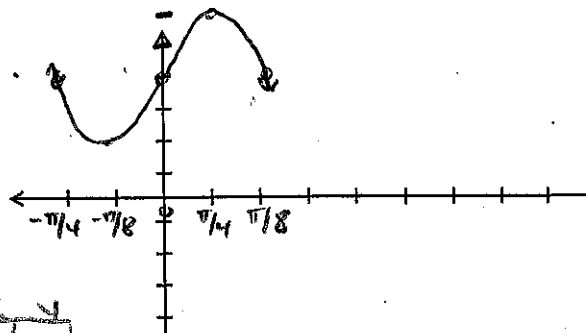
VS: 1  
HS:  $\pi/4$   
Start:  $\pi/4$   
End:  $5\pi/4$   
Increment  $\pi/4$



x	y
$\pi/4$	3
$\pi/2$	1
$3\pi/4$	-1
$\pi$	1
$5\pi/4$	3

2.  $y = -2 \sin(4x + \pi) + 4$

Period  $\pi/2$   
Amplitude 2  
VS: 4  
HS:  $-\pi/4$   
Start:  $-\pi/4$   
End:  $\pi/4$   
Increments  $\pi/8$

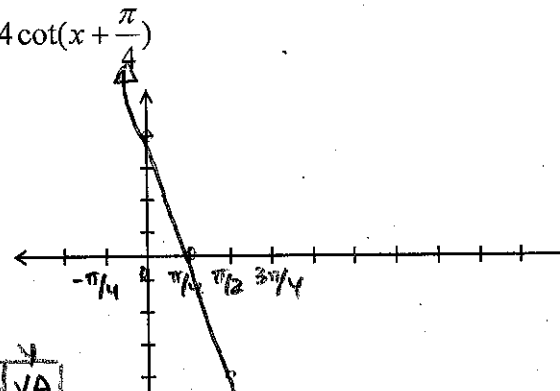


x	y
$-\pi/4$	4
$-\pi/8$	2
0	4
$\pi/8$	6
$\pi/4$	4

period =  $\pi$

4.  $y = 4 \cot\left(x + \frac{\pi}{4}\right)$

VS: 0  
HS:  $-\pi/4$   
Start:  $-\pi/4$   
End:  $3\pi/4$

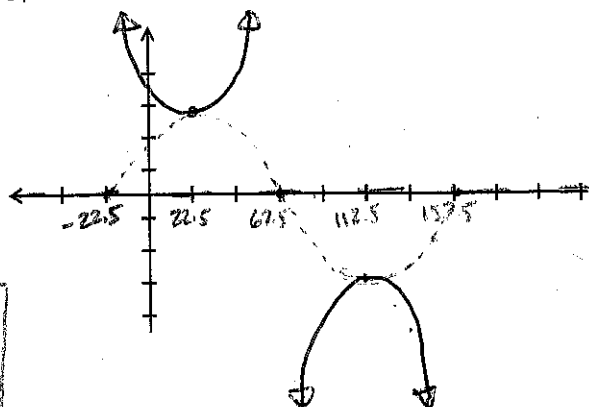


Increments  $\pi/4$

x	y
$-\pi/4$	VA
0	4
$\pi/4$	0
$\pi/2$	-4
$3\pi/4$	VA

6.  $y = 3 \csc(2x + 45)$

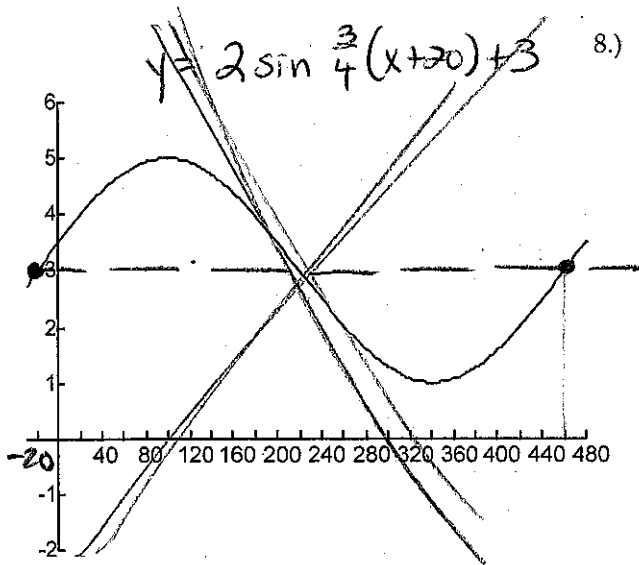
VS: 0  
HS: -22.5  
Start: -22.5  
End: 157.5  
Increments 45



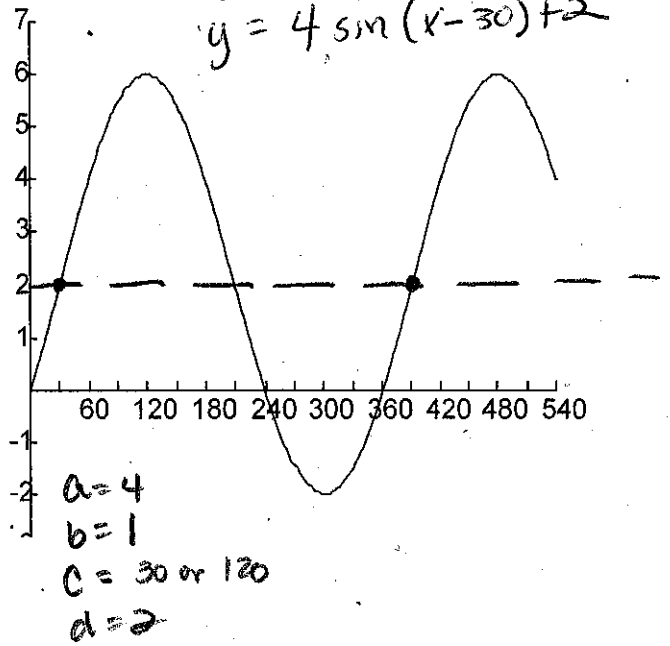
x	y
-22.5	0
22.5	3
67.5	0
112.5	-3
157.5	0

Determine the equation of the following graphs.

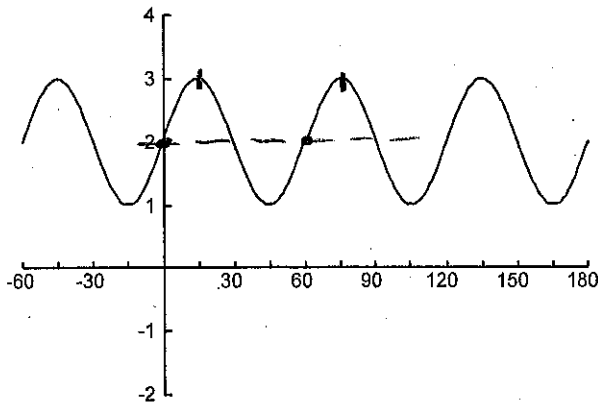
- 7.)  
a=2  
b=3/4  
c=-20  
d=3



$y = 4 \cos(x - 120) + 2$   
 $y = 4 \sin(x - 30) + 2$



9.)



a=1  
b=6  
c=15 or 0  
d=2

$y = \cos 6(x - 15) + 2$   
 $y = \sin 6x + 2$

Evaluate the expression without using a calculator. Answer 10-15 in degrees and 16-19 in radians.

10.)  $\arcsin 1$   $90^\circ$

11.)  $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$   $\frac{7\pi}{4}$

12.)  $\arcsin\left(\frac{\sqrt{3}}{2}\right)$   $60^\circ$

13.)  $\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$   $\frac{\pi}{4}$

14.)  $\arccos\left(-\frac{\sqrt{3}}{2}\right)$   $150^\circ$

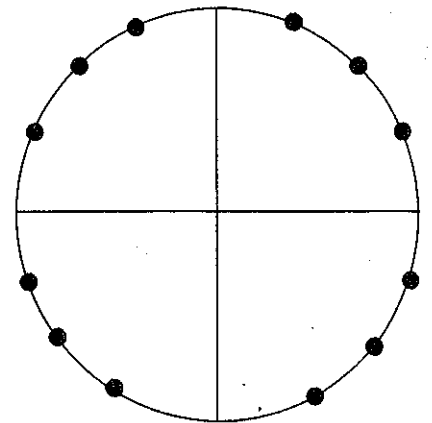
15.)  $\tan^{-1}(-\sqrt{3})$   $\frac{5\pi}{3}$

16.)  $\arctan(-1)$   $315^\circ$

17.)  $\arctan\left(-\frac{\sqrt{3}}{3}\right)$   $\frac{11\pi}{6}$

18.)  $\sin^{-1}(-1)$   $270^\circ$

19.)  $\arccos\left(-\frac{1}{2}\right)$   $\frac{2\pi}{3}$



**Extraterrestrial Being Problem** Researchers find a being from an alien planet. Its body temperature is varying sinusoidally with time. 20 minutes after they start timing, it reaches a high of 135° F. 25 minutes after that it reaches its next low 100° F.

- Sketch a graph of this sinusoid.
- Write an equation expressing temperature in terms of minutes since they started timing.

$$S_0 = \frac{2\pi}{b}$$

$$S_{0b} = \frac{2\pi}{b}$$

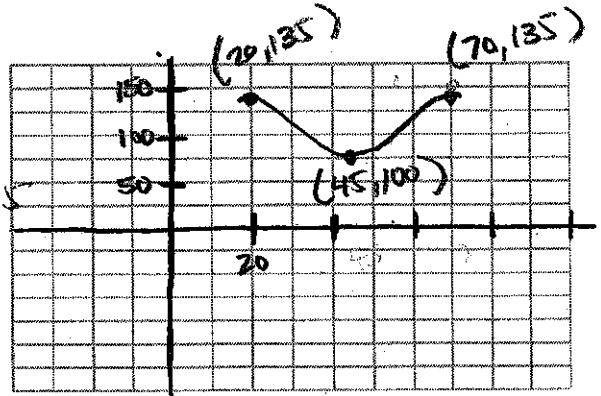
$$a = 17.5$$

$$b = \pi/25$$

$$c = 20$$

$$d = 117.5$$

$$y = 17.5 \cos \left( \frac{\pi}{25}(x-20) \right) + 117.5$$



- What was its temperature when they first started timing?

$$x = 0$$

$$103.34$$

$$17.5 \cos \left( \frac{\pi}{25}(0-20) \right) + 117.5$$

**21. Tarzan Problem** Tarzan is swinging back and forth on his grapevine. As he swings, he goes back and forth across the riverbank, going alternatively over land and water. Jane decides to model mathematically his motion and starts her stopwatch. Let  $t$  be the number of seconds the stopwatch reads and  $y$  be the number of meters Tarzan is from the riverbank. Assume that  $y$  varies sinusoidally with  $t$ , and that  $y$  is positive when Tarzan is over water and negative when he is over land.

Jane finds that when  $t = 2$ , Tarzan is at one end of his swing, where  $y = -25$ . She finds that when  $t = 5$  he reaches the other end of his swing and  $y = 20$ .

- Sketch a graph of this sinusoid.
- Write an equation expressing Tarzan's distance from the riverbank in terms of  $t$ .
- Predict  $y$  when
  - $x = 3$      $-13.75$
  - $x = 4.5$      $16.99$
  - $x = 15$      $-13.75$

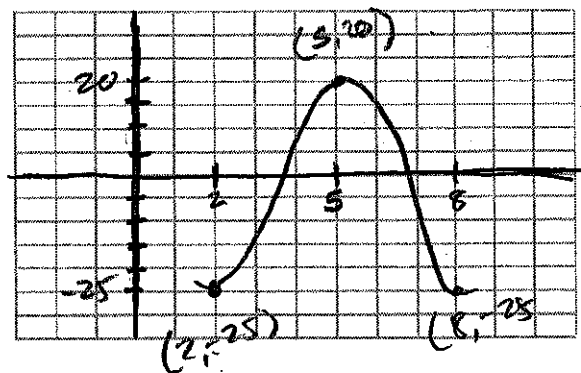
$$y = -22.5 \cos \left( \frac{\pi}{3}(x-2) \right) - 2.5$$

$$a = 22.5$$

$$b = \pi/3$$

$$c = 2$$

$$d = -2.5$$



Review from Test 1-Test 3:

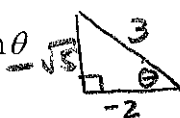
1. Identify the following conic:  $x^2 + (y-1)^2 = 4$  *circle*

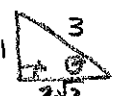
2. Identify the following conic:  $\frac{(x-1)^2}{4} - \frac{(y+2)^2}{25} = 1$  *hyperbola*

3. Multiply the following matrices:  $\begin{bmatrix} a & -2 \\ z & 3 \end{bmatrix} \cdot \begin{bmatrix} 2 & 4 \\ -1 & 7 \end{bmatrix} = \begin{bmatrix} 2a+2 & 4a-14 \\ 2z-3 & 4z+21 \end{bmatrix}$

4. Solve the linear system:  $2x + 4y = -2$   $5x + 2y = 7$   
 $x = 2$   $y = -1.5$

5. Find a positive co-terminal angle for: a.  $\theta = -\frac{3\pi}{7}$   $\frac{11\pi}{7}$  b.  $\theta = \frac{2\pi}{5}$   $\frac{12\pi}{5}$

6. Given  $\cos \theta = -\frac{2}{3}$  and  $\theta$  is in quadrant 3, find  $\tan \theta$   
  $(-2)^2 + b^2 = 3^2$   
 $4 + b^2 = 9$   
 $b^2 = 5$   
 $b = \sqrt{5}$   
 $\tan \theta = \frac{\sqrt{5}}{2}$

7. Given  $\sin \theta = -\frac{1}{3}$  and  $\theta$  is in quadrant 4, find  $\cos \theta$   
  $(-1)^2 + b^2 = 3^2$   
 $1 + b^2 = 9$   
 $b^2 = 8$   
 $b = 2\sqrt{2}$   
 $\cos \theta = \frac{2\sqrt{2}}{3}$

8. Find the reference angle for: a.  $\theta = 240^\circ$   $60^\circ$  b.  $\theta = 315^\circ$   $45^\circ$

9. Find the exact value of the following functions:

a.  $\cos\left(-\frac{5\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

b.  $\sin 240^\circ = -\frac{\sqrt{3}}{2}$

c.  $\sec \frac{7\pi}{3} = 2$

d.  $\tan 480^\circ = \sqrt{3}$

e.  $\csc(-330^\circ) = 2$

f.  $\cot 150^\circ = -\sqrt{3}$

g.  $\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$