GSE PreCalculus: Graphing Trig Functions
Test 4 Review

Name_____
Date_____ Period_____

Graph each

1. $y = -3\cos(\frac{x}{2} - 30°) - 1$

360/b

Period 720

|a| Amplitude 3

VS: -1

(bx+c) HS: 60

Start: 60

End: 780

Increments

Period/4 720/4 = 180

360/½ = 360 · 2/1 = 720

60 + 720 = 780

½x − 30 = 0

(2/1) ½x = 30(2/1)

x = 60

X	Y	
60	-4	
240	-1	SA
420	2	
600	-1	SA
780	-4	

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

Period $2\pi/4 = \pi/2$

Amplitude 2

VS: 4

HS: $\frac{\pi}{2} + (-\frac{\pi}{4})$

Start: $-\frac{\pi}{4}$

End: $\frac{\pi}{2} + (-\frac{\pi}{4})$

Increments $\frac{\pi/2}{4} = \frac{\pi}{8}$

$4x + \pi = 0$

$\frac{4x}{4} = \frac{-\pi}{4}$

$x = -\frac{\pi}{4}$

$\frac{\pi}{2} + (-\frac{\pi}{4})$

$\frac{2\pi}{4} + (-\frac{\pi}{4})$

$-\frac{\pi}{4} + \frac{\pi}{8}$

$-\frac{2\pi}{8} + \frac{\pi}{8}$

X	Y
$-\frac{\pi}{4}$	4
$-\frac{\pi}{8}$	2
0	4
$\frac{\pi}{8}$	6
$\frac{\pi}{4}$	4

*3. $y = -\tan(4x)$ Period 180

180/b b=4 45

VS: 0

HS:

Start: -22.5

End: 22.5

Increments 45/4 = 11.25

$4x = -90$

$x = -22.5$

$4x = 90$

$x = 22.5$

Period = 180/b

so, 180/b = 4/1

180/b = 4b/b

b = 45

X	Y	
-22.5	VA	
-11.25	1	
0	0	
-11.25	-1	
22.5	VA	

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

b=1

VS: 0

HS:

Start: $-\pi/4$

End: $3\pi/4$

Increments $\pi/4$

$x + \pi/4 = 0$

$x = -\pi/4$

$x + \pi/4 = 180$

$x = \frac{4\pi}{4} - \frac{\pi}{4}$

$= 3\pi/4$

Period = π

$\frac{\pi}{b} = 1$

$b = \pi$

$-\pi/4 + \pi/4$

$*-\pi/4$

X	Y	
$-\pi/4$	VA	
0	4	
$\pi/4$	0	
$2\pi/4$ $\pi/2$	-4	
$3\pi/4$	VA	

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

cos

VS: 1

HS: $\pi/4$

Start: $\pi/4$

End: $5\pi/4$

Increment $\pi/4$

Period: $2\pi/2 = \pi$

HS: $\pi/4$

End: $\pi/4 + \frac{4\pi}{4} = 5\pi/4$

$x - \pi/4 = 0$

$x = \pi/4$

X	Y	
$\pi/4$	3	
$2\pi/4$ $\pi/2$	1	VA
$3\pi/4$	-1	
$4\pi/4$ π	1	VA
$5\pi/4$	3	

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

sin

VS: 0

HS: -22.5

Start: -22.5

End: -22.5 + 180 = 157.50

Increments 180/4 = 45

Period: 360/2 = 180

$2x + 45 = 0$

$2x = -45$

$x = -22.5$

X	Y	
-22.5	0	VA
22.5	3	
67.5	0	VA
112.5	-3	
157.50	0	VA

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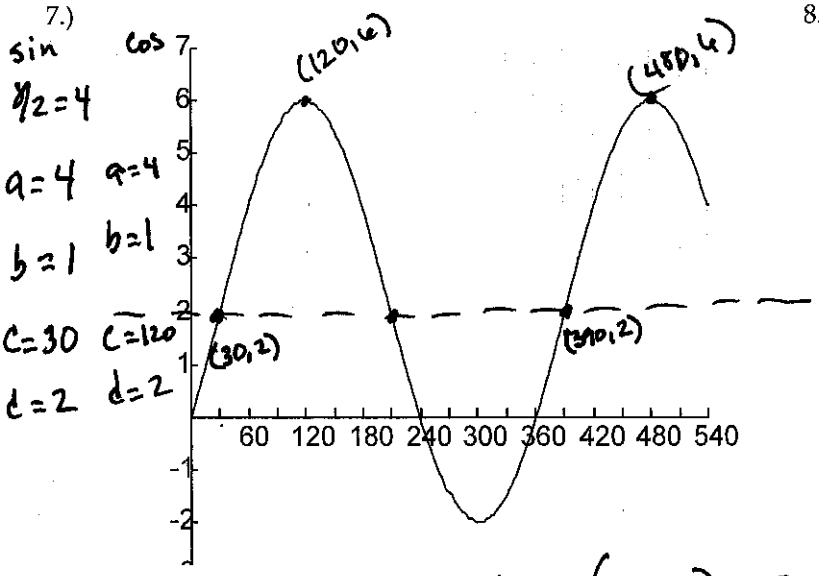
Determine the equation of the following graphs.

7.)

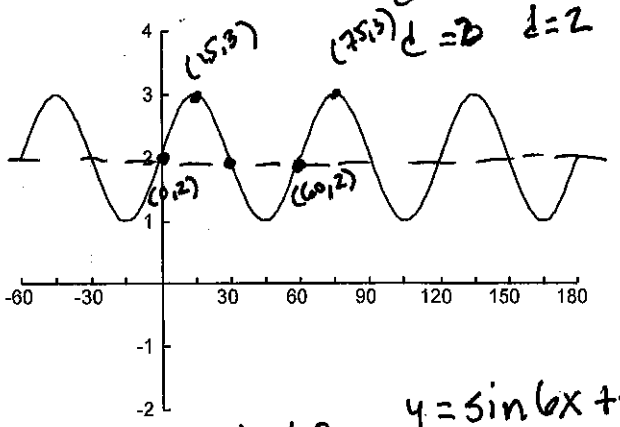


$a=4$ $a=4$
$b=1$ $b=1$
$c=30$ $c=120$
$d=2$ $d=2$

Period = 360
$360 = \frac{360}{b}$
$\frac{360b}{360} = \frac{360}{360}$
$b = 1$

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

8.)



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

Period = 60
$60 = \frac{360}{b}$
$\frac{60b}{60} = \frac{360}{60}$
$b = 6$

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

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

10.) arcsin 1 $90°$

11.) arcsin $(-\frac{\sqrt{2}}{2})$ $-45°$

12.) arcsin $(\frac{\sqrt{3}}{2})$ $60°$

13.) $\cos^{-1}(\frac{\sqrt{2}}{2})$ $45°$

14.) arccos $(-\frac{\sqrt{3}}{2})$ $150°$

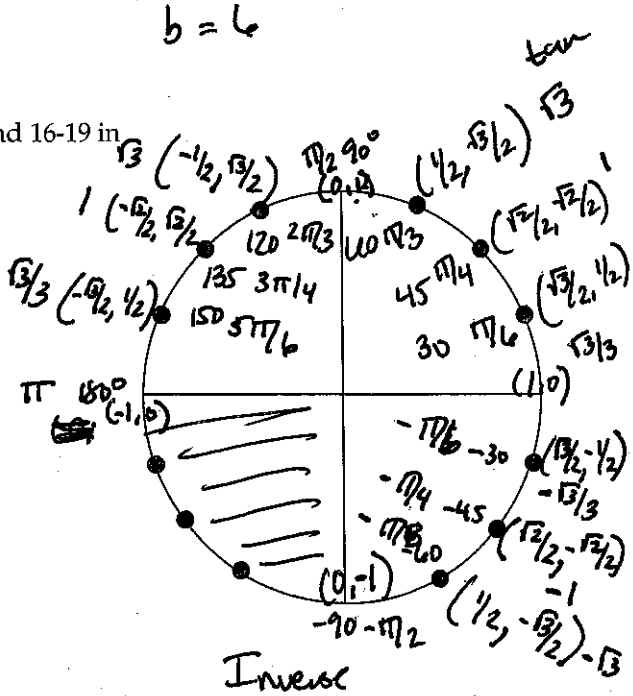
15.) $\tan^{-1}(-\sqrt{3})$ $-60°$

16.) arctan (-1) $-\pi/4$

17.) arctan $(-\frac{\sqrt{3}}{3})$ $-\pi/6$

18.) $\sin^{-1}(-1)$ $-\pi/2$

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



GSE PreCalculus: Graphing Trig Functions Name_____

Test 4 Review Make sure calculator is in Radians! Date_____Period_____

20. **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.

a. Sketch a graph of this sinusoid.

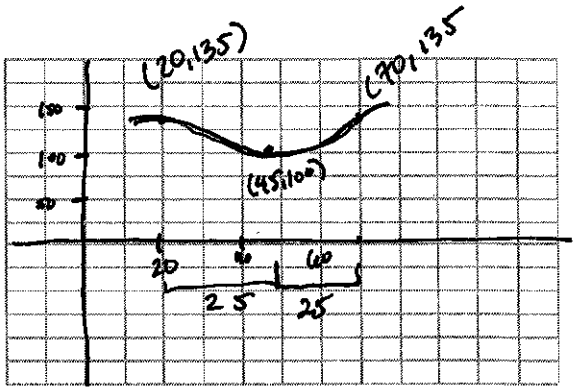
b. Write an equation expressing temperature in terms of minutes since they started timing.

35/2 $a = 17.5$

$b = \pi/25$

$f(x) = 17.5 \cos \pi/25(x-20) + 117.5$ Starting point $c = 20$

$135 - 17.5$ $d = 117.5$



c. What was its temperature when they first started timing?

$f(x) = 17.5 \cos(\pi/25 x - 4\pi/5) + 117.5$ $\frac{2\pi}{50} = \pi/25$

$f(0) = 103.34$

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 river bank. 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 $y = 20$.

a. Sketch a graph of this sinusoid.

b. Write an equation expressing Tarzan's distance from the riverbank in terms of *t*.

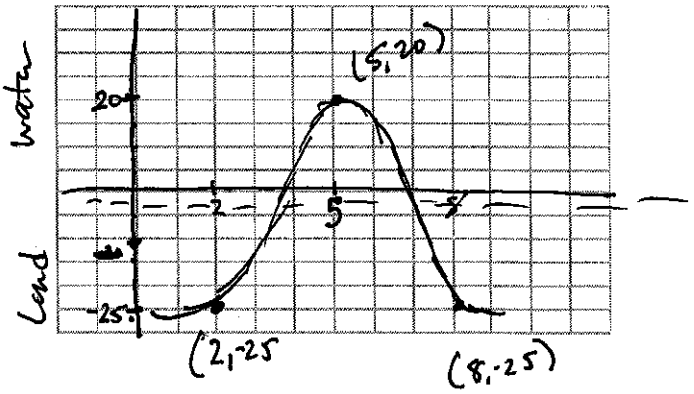
c. Predict y when
   i. $-13.75t = 3$
   ii. 16.99 $t = 4.5$
   iii. $-13.75t = 15$

45/2 $a = 22.5$

$b = \pi/3$

Starts $c = 2$

$20 - 22.5 = -2.5$ $d = -2.5$



$\frac{2\pi}{6} = \pi/3$

Reflected $f(x) = -22.5 \cos \pi/3(x-2) - 2.5$

$-22.5 \cos(\pi/3 x - 2\pi/3) - 2.5$

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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: $\begin{bmatrix} a & -2 \\ z & 3 \end{bmatrix}\cdot\begin{bmatrix} 2 & 4 \\ -1 & 7 \end{bmatrix}$ $\begin{bmatrix} 2a+2 & 4a+7a \\ 2z-3 & 4z+7z \end{bmatrix}$

4. Solve the linear system: $\begin{matrix} 2x+4y=-2 \\ 5x+2y=7 \end{matrix}$ $\begin{bmatrix} 2 & 4 \\ 5 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} -2 \\ 7 \end{bmatrix}=\begin{bmatrix} 2 \\ -1.5 \end{bmatrix}$ $x=2$ $y=-1.5$

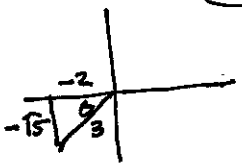
5. Find a positive co-terminal angle for: a. $\theta=-\frac{3\pi}{7}$ b. $\theta=\frac{2\pi}{5}$

$-3\pi/7+\frac{2\pi}{1}\cdot\frac{7}{7}$ $-3\pi/7+14/7=\boxed{11\pi/7}$

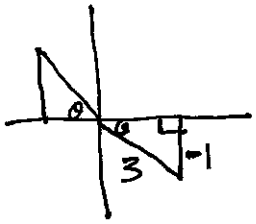
$2\pi/5+\frac{2\pi}{1}$ $2\pi/5+10\pi/5=\boxed{12\pi/5}$

6. Given $\cos\theta=-\frac{2}{3}$ and θ is in quadrant 3, find $\tan\theta$ $\sqrt{5}/2$

7. Given $\sin\theta=-\frac{1}{3}$ and θ is in quadrant 4, find $\cos\theta$



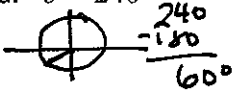
$a^2+(-2)^2=3^2$
$a^2+4=9$
$a^2=5$
$\sqrt{5}$



$(-1)^2+b^2=3^2$

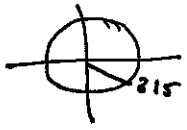
8. Find the reference angle for: a. $\theta=240°$ b. $\theta=315°$

"Closest way back to the x-axis"



$240-180=60°$

$360-315=45°$



9. Find the exact value of the following functions:

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

$-\frac{5\pi}{6}+\frac{2\pi}{1}$ $-5\pi/6+12\pi/6=7\pi/6$

b. $\sin 240°$ $\boxed{-\sqrt{3}/2}$

c. $\sec\frac{7\pi}{3}$ $7\pi/3-2\pi/1=7\pi/3-6\pi/3=\pi/3=\boxed{2}$

d. $\tan 480°$ $480-360=120$

e. $\csc(-330°)$ $-330+360=30°=\boxed{2}$

f. $\cot 150°$ $\frac{-\sqrt{3}/2}{1/2}$ $-\sqrt{3}/2\cdot 2/1=\boxed{-\sqrt{3}}$

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

$\frac{\sqrt{3}/2}{-1/2}$ $\frac{\sqrt{3}}{2}\cdot\frac{-2}{1}=\boxed{-\sqrt{3}}$