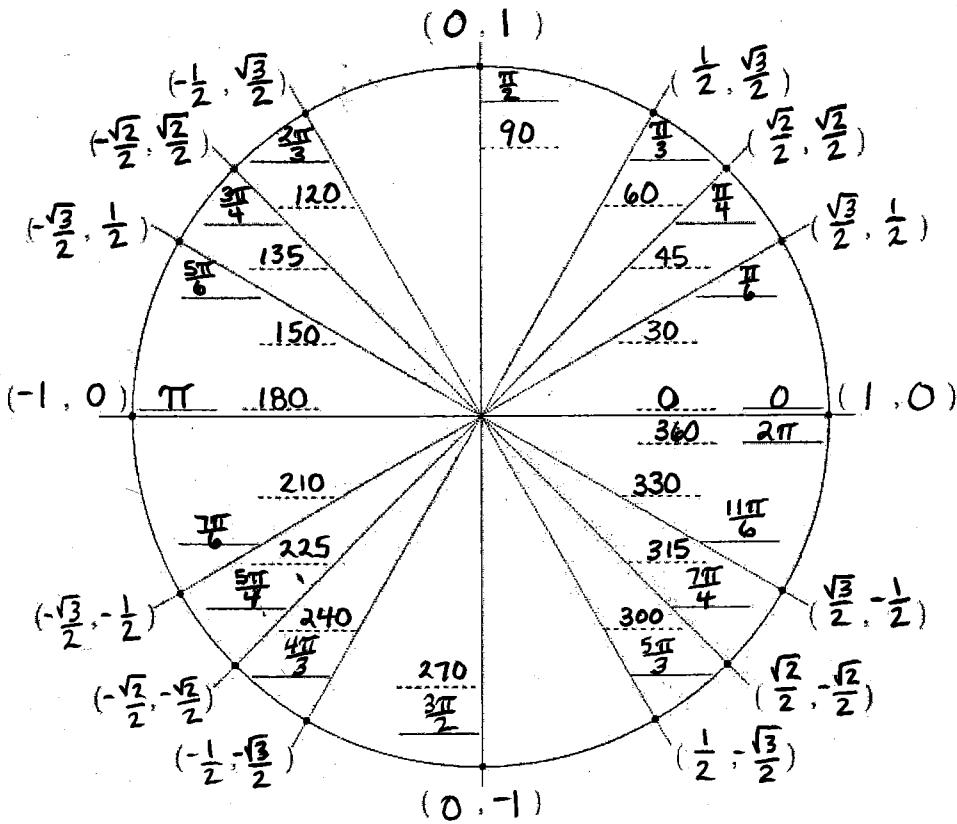


Complete the unit circle with degrees (dashed line), radians (solid line), and coordinates (\cos, \sin) without using a calculator.



- 1) Convert the following angles to radians.

a) $225^\circ \cdot \frac{\pi}{180}$

$\frac{5\pi}{4}$

b) $75^\circ \cdot \frac{\pi}{180}$

$\frac{5\pi}{12}$

c) $-15^\circ \cdot \frac{\pi}{180}$

$-\frac{\pi}{12}$

d) $330^\circ \cdot \frac{\pi}{180}$

$\frac{11\pi}{6}$

- 2) Without a calculator, give the exact value of each expression by drawing special right triangles.

a) $\sin 60^\circ = \frac{\sqrt{3}}{2}$

$\frac{\sqrt{3}}{2}$

b) $\cos 180^\circ = -1$

-1

c) $\tan 225^\circ = 1$

1

d) $\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{2}$

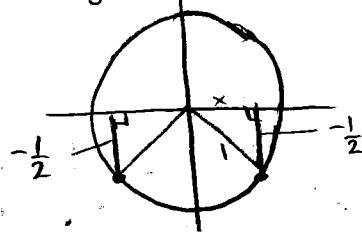
e) $\cos \frac{2\pi}{3} = -\frac{1}{2}$

$-\frac{1}{2}$

f) $\tan \frac{3\pi}{2} = \text{undefined}$

undefined

- 3) If an angle between 0 and 2π radians has a sine of -0.5 , what is its cosine? How do you know?



$$x^2 + (-\frac{1}{2})^2 = 1^2$$

$$x^2 + \frac{1}{4} = 1$$

$$x^2 = \frac{3}{4}$$

$$x^2 = \frac{3}{4}$$

$$|x| = \frac{\sqrt{3}}{2}$$

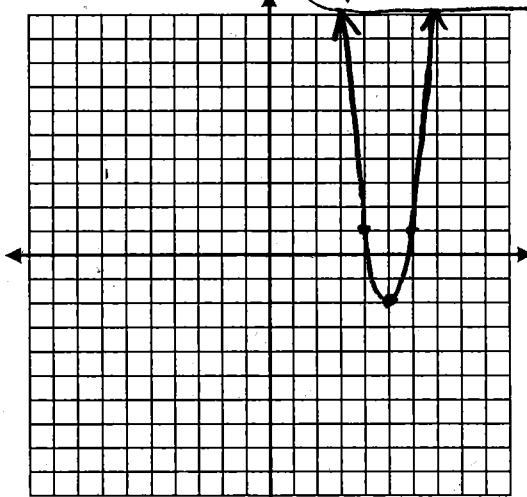
$$x = \pm \frac{\sqrt{3}}{2}$$

- 4) Rewrite each equation below in graphing form and sketch its graph. Then state the domain and range and whether or not it is a function.

$$y - 73 = 3(x^2 - 10x)$$

a) $y = 3x^2 - 30x + 73$ $y - 73 + 75 = 3(x^2 - 10x + 25)$
 $y + 2 = 3(x - 5)^2$

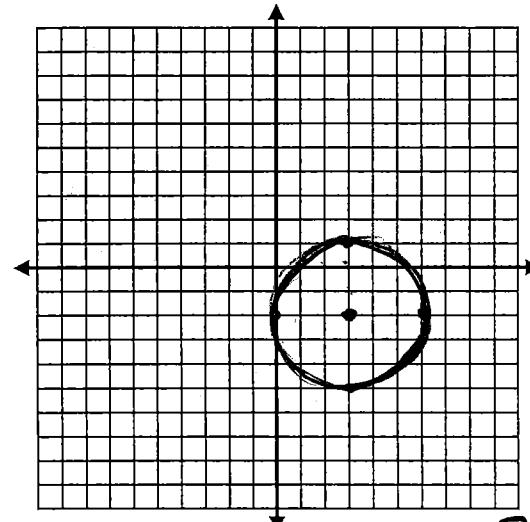
$$y = 3(x - 5)^2 - 2$$



$$D: (-\infty, \infty) \quad R: [-2, \infty)$$

$$(x^2 - 6x + 9) + (y^2 + 4y + 4) = -4$$

$$(x - 3)^2 + (y + 2)^2 = 9$$



$$D: [0, 6] \quad R: [-5, 1]$$

- 5) Solve each equation to the nearest thousandth.

a) $\frac{2(3)^x}{2} = \frac{40.8}{2}$

$$3^x = 20.4$$

$$\log 3^x = \log 20.4$$

$$\frac{x \cdot \log 3}{\log 3} = \frac{\log 20.4}{\log 3}$$

$$x \approx 2.745$$

b) $\frac{3x^4}{3} = \frac{27}{3}$

$$x^4 = 9$$

$$\sqrt[4]{x^4} = \sqrt[4]{9}$$

$$x \approx 1.732$$

c) $\log_5(2x+1) = 3$

$$5^3 = 2x + 1$$

$$125 = 2x + 1$$

$$\frac{124}{2} = \frac{2x}{2}$$

$$62 = x$$

d) $\log(x) + \log(2x) = 5$

$$\log(2x^2) = 5$$

$$10^5 = 2x^2$$

$$\frac{100000}{2} = \frac{2x^2}{2}$$

$$\sqrt{50,000} = \sqrt{x^2}$$

$$223.607 = x$$

e) $2\log_4(x) - \log_4(3) = 2$

$$\log_4(x^2) - \log_4(3) = 2$$

$$\log_4(\frac{x^2}{3}) = 2$$

$$x \approx 6.928$$

$$4^2 = \frac{x^2}{3}$$

$$16 = \frac{x^2}{3}$$

$$48 = x^2$$

f) $\log_7(x+1) + \log_7(x-5) = 1$

$$\log_7(x^2 - 4x - 5) = 1$$

$$7 = x^2 - 4x - 5$$

$$0 = x^2 - 4x - 12$$

$$(x-6)(x+2) = 0$$

$$x=6 \quad x=-2$$

- 6) Find an equation for an exponential function that passes through the points $(1, 22)$, $(3, 20.125)$, and has a horizontal asymptote at $y = 20$.

$$y = ab^x + k$$

$$22 = ab^1 + 20 \quad 20.125 = ab^3 + 20$$

$$2 = ab^1$$

$$\frac{2}{b} = a$$

$$0.125 = \frac{2}{b} \cdot b^3 \quad \frac{2}{b} = a(0.25)$$

$$\frac{0.125}{2} = \frac{2b^2}{2}$$

$$0.625 = b^2$$

$$0.25 = b$$

$$\frac{2}{0.25} = \frac{0.25}{0.25}$$

$$8 = a$$

$$y = 8(0.25)^x + 20$$

- 7) An angle in the unit circle is in the second quadrant and has a $\cos(\theta) = -\frac{2}{7}$. Find the exact values of the following using the Pythagorean Identity. Show your work!

a. $\sin(\theta)$

$$= \frac{3\sqrt{5}}{7}$$

$$(-\frac{2}{7})^2 + y^2 = 1$$

$$\frac{4}{49} + y^2 = \frac{49}{49}$$

$$y^2 = \frac{45}{49}$$

$$y = \sqrt{\frac{45}{49}}$$

$$y = \pm \frac{3\sqrt{5}}{7}$$

$$y^2 =$$

$$y =$$

b. $\sin(\theta + \pi)$

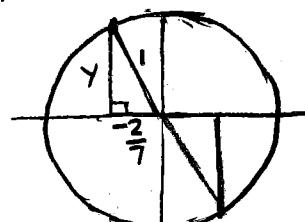
$$= -\frac{3\sqrt{5}}{7}$$

c. $\cos(2\pi - \theta)$

$$-\frac{2}{7}$$

d. $\tan(\theta)$

$$\frac{\frac{3\sqrt{5}}{7}}{-\frac{2}{7}} = \frac{3\sqrt{5}}{7} \cdot -\frac{7}{2}$$



- 8) Convert the following to degrees.

a. $\frac{5\pi}{6} \cdot \frac{180}{\pi}$

$$150^\circ$$

b. $3\pi \cdot \frac{180}{\pi}$

$$540^\circ$$

c. $\frac{11\pi}{4} \cdot \frac{180}{\pi}$

$$495^\circ$$

d. $\frac{-2\pi}{5} \cdot \frac{180}{\pi}$

$$-72^\circ$$

- 9) State the reference angle for each angle given in degrees or radians.

a. 150

$$30^\circ$$

b. 225

$$45^\circ$$

c. 320

$$40^\circ$$

d. $\frac{\pi}{4}$

$$\frac{\pi}{4}$$

e. $\frac{2\pi}{3}$

$$\frac{\pi}{3}$$

f. $\frac{11\pi}{6}$

$$\frac{\pi}{6}$$

- 10) Graph $y = 4\sin(2\theta) - 2$

Amp = 4

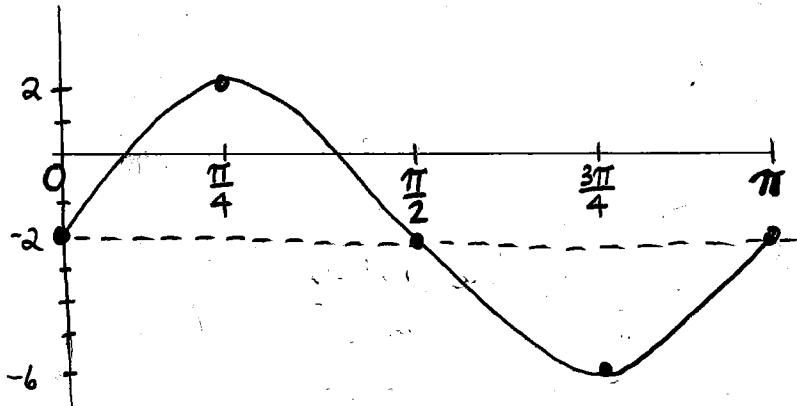
Period = $\frac{2\pi}{2} = \pi$

P.S. = 0

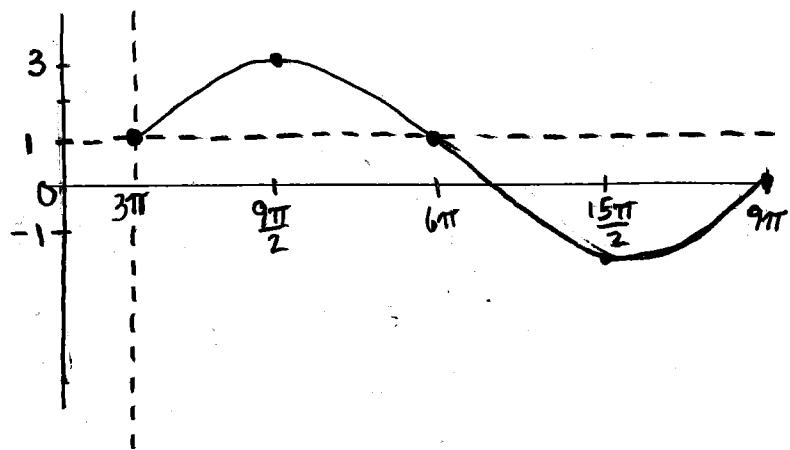
V.S. = -2

$m, n = -6$

Max = 2



11) Graph $y = 2\sin\left(\frac{1}{3}\theta - \pi\right) + 1$



Amp = 2

Period = 6π

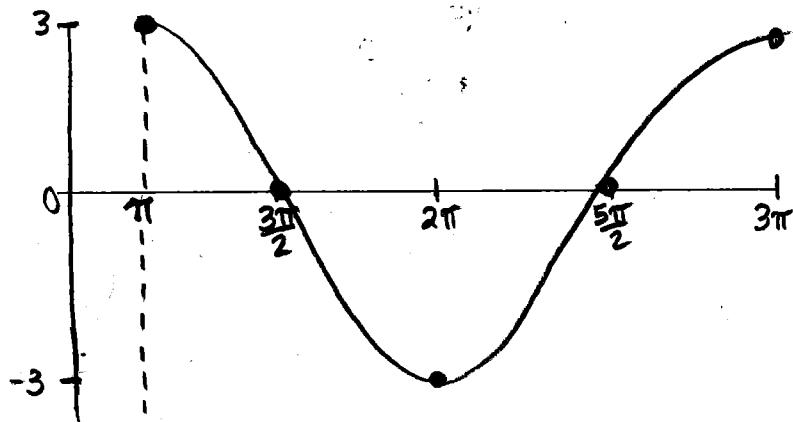
P.S. = 3π

V.S. = 1

MIN = -1

MAX = 3

12) Graph $y = 3\cos(\theta - \pi)$



Amp = 3

Period = 2π

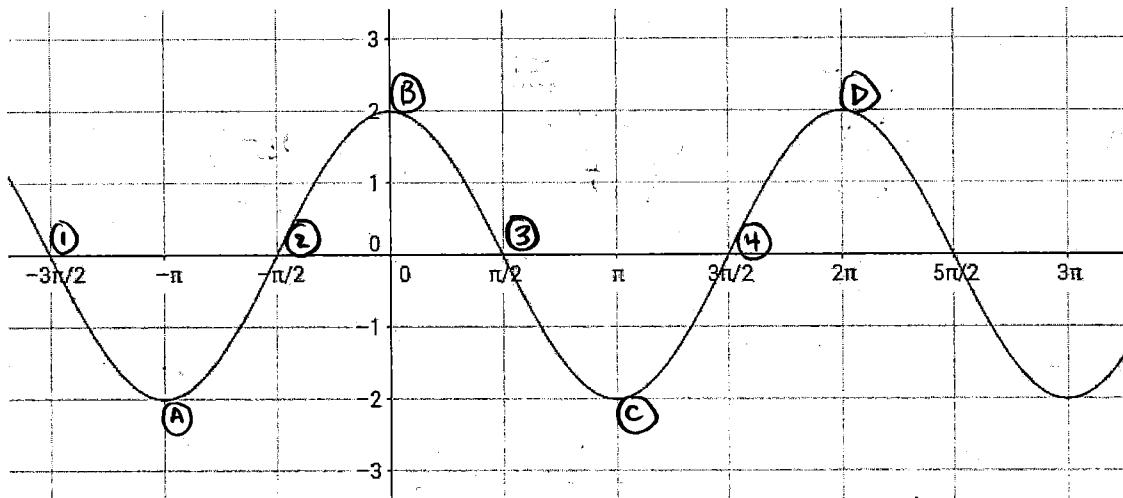
P.S. = π

V.S. = 0

MIN = -3

MAX = 3

13) Write 3 possible equations for the graph below.



sine graphs:

(1) $y = -2\sin(\theta + \frac{3\pi}{2})$

(2) $y = 2\sin(\theta + \frac{\pi}{2})$

(3) $y = -2\sin(\theta - \frac{\pi}{2})$

(4) $y = 2\sin(\theta - \frac{3\pi}{2})$

cosine graphs:

(A) $y = -2\cos(\theta + \pi)$

(B) $y = 2\cos(\theta)$

(C) $y = -2\cos(\theta - \pi)$

(D) $y = 2\cos(\theta - 2\pi)$