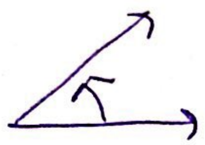
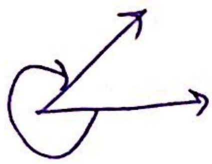
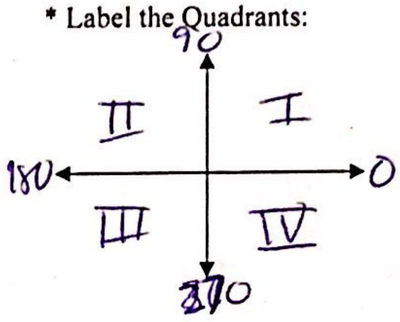
Angles and Their Measure

Vocabulary

- Ray part of a line w/ one endpt ⟶
- Angle formed by 2 rays w/ a common endpt
- Initial Side Starting side of your angle; doesn't move
- Terminal Side Ending side of your angle
- Vertex common endpt of an angle

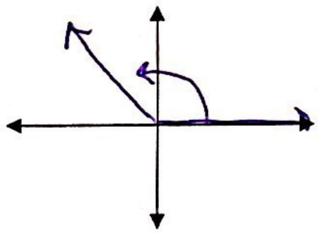
- Positive Angle:
  Rotates CCW
  

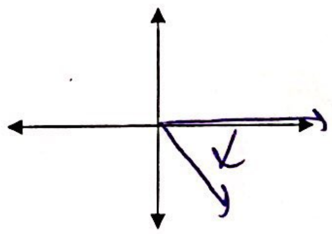
* Negative Angle:
Rotates CW


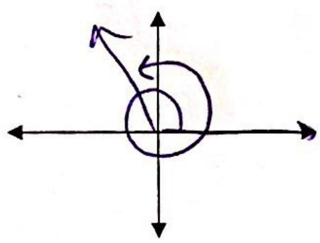
* Label the Quadrants:


- Standard Position: when an angle has its vertex at the origin and its initial side along the positive x-axis.

Sketch the following angles in standard position:

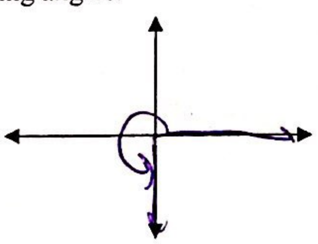
a. $\theta = 125°$


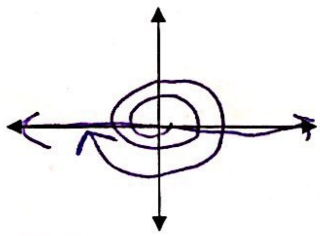
b. $\theta = -60°$


c. $\theta = 480°$


Quadrantal Angle: when the terminal side of an angle in standard position coincides with one of the axes.

Sketch the following angles:

a. $\theta = 270°$


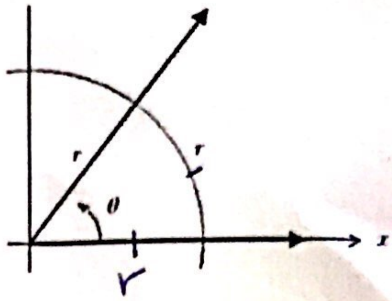
b. $\theta = -900°$


900
-360
540
-360
180

c. List 5 different measures of quadrantal angles(degrees): -90, 0, 90, 180, 270

Units for measuring angles:

Degrees: A circle is divided into $360°$ equal degrees.



Radian: a central ∠ of a circle has ∠ measure 1 radian if it intercepts an arc w/ the same length as the radius

There are 2π **radians in one circle.**

$360 = 2\pi$

$\boxed{180 = \pi}$

To change from degrees to radians: Multiply by $\boxed{\frac{\pi}{180}}$

To change from Radians to degrees: Multiply by $\boxed{\frac{180}{\pi}}$

Example: Change to radians. a) 45° b) 120° c) -30° d) 130°

Exact Answer only

a) $45°\left(\frac{\pi}{180°}\right) = \frac{\pi}{4}$

b) $120\left(\frac{\pi}{180}\right) = \frac{2\pi}{3}$

c) $-30\left(\frac{\pi}{180}\right) = \frac{-\pi}{6}$

d) $130°\left(\frac{\pi}{180}\right) = \frac{13\pi}{18}$

Example: Change to degrees. a) $\frac{7\pi}{8}$ b) $\frac{2\pi}{5}$ c) $-\frac{9\pi}{4}$ d) 5 radians

a) $\frac{7\pi}{8}\left(\frac{180}{\pi}\right) = \frac{315}{2}$ or $157.5°$

b) $\frac{2\pi}{5}\left(\frac{180}{\pi}\right) = 72°$

c) $-\frac{9\pi}{4}\left(\frac{180}{\pi}\right) = -405°$

d) $\left(\frac{180}{\pi}\right) = \boxed{\frac{900}{\pi}}$

Co-terminal Angles: Same initial and terminal ray; **can be found by +/- 360° (or 2π if in radians)**

Example: Find one positive angle and one negative angle that are co-terminal with each given angle .

a) 395° ± 360

$755°, 35°, -325°$

b) -45°

$-405°, 315°$

c) $\frac{2\pi}{3}$ $\pm 2\pi$ or $\frac{6\pi}{3}$

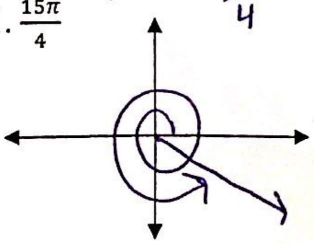
$\frac{8\pi}{3}, \frac{-4\pi}{3}$

d) $\frac{11\pi}{4}$ $\pm 2\pi$ or $\frac{8\pi}{4}$

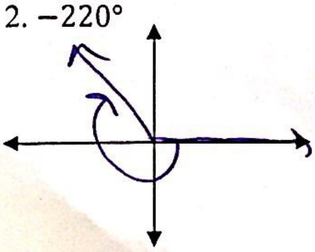
$\frac{19\pi}{4}, 3\pi/4, \frac{-5\pi}{4}$

Sketch each angle in standard position and determine the quadrant in which its terminal side lies.

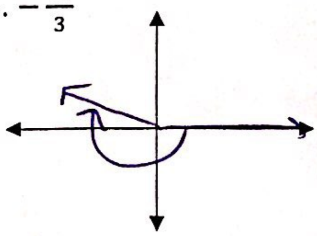
1. $\frac{15\pi}{4}$ $-2\pi = \frac{7\pi}{4}$



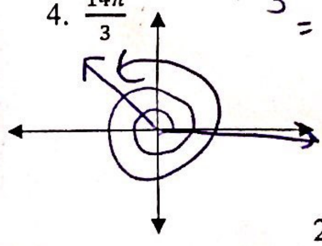
2. $-220°$



3. $-\frac{4\pi}{3}$



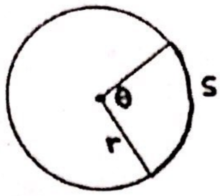
4. $\frac{14\pi}{3}$ $-2\pi = \frac{8\pi}{3} - 2\pi = \frac{2\pi}{3}$



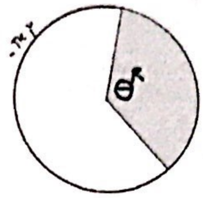
Day 2 Notes - Central Angles and Arcs

1. There are 360 degree in a circle. This is equivalent to 2π radians in one full circle.

2. An arc is a portion of the circle's circumference.



A sector is a portion of the circle's area.



Recall the formulas: Circumference of a circle $2\pi r$ Area of a circle πr^2

3.

	Circumference · portion of circle Length (measure) of Arc, s	Area · portion of circle Area of Sector, A
Degrees	$2\pi r\left(\frac{\theta}{360°}\right)$	$\pi r^2\left(\frac{\theta}{360}\right)$
Radians	$2\pi r\left(\frac{\theta}{2\pi}\right) = r\theta$	$\pi r^2\left(\frac{\theta}{2\pi}\right) = r^2\left(\frac{\theta}{2}\right)$

Examples:

Leave answers in terms of pi (π) unless otherwise noted.

$r=10$

1. Given the radian measure of a central angle, find the measure of its intercepted arc in terms of π in a circle of radius 10 cm.

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

$\frac{\pi}{4}(10) = \frac{10\pi}{4} = \frac{5\pi}{2}$

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

$\frac{2\pi}{3}(10) = \frac{20\pi}{3}$

c. $\frac{5\pi}{6}$

$\frac{5\pi}{6}(10) = \frac{50\pi}{6} = \frac{25\pi}{3}$

d. $\frac{2\pi}{5}$

$\frac{2\pi}{5}(10) = \frac{20\pi}{5} = 4\pi$

2. Given the degree measure of a central angle, find the measure of its intercepted arc in a circle of diameter 30 in. Leave in terms of π. $r=15$

a. 30°

$2\pi(15)\left(\frac{30}{360}\right) = \frac{5\pi}{2}$

b. 5°

$2\pi(15)\left(\frac{5}{360}\right) = \frac{5\pi}{12}$

c. 77°

$2\pi(15)\left(\frac{77}{360}\right) = \frac{77\pi}{12}$

d. 57°

$2\pi(15)\left(\frac{57}{360}\right) = \frac{19\pi}{4}$

3. Given the measure of an arc, find the degree measure to the nearest tenth of the central angle it subtends in a circle of radius 8 cm. **Note: The values below are in RADIANS.**

a. 5

$5 = 8\theta$

$\frac{5}{8} = \theta$

$\frac{5}{8}\left(\frac{180}{\pi}\right) = 35.8^\circ$

b. 14

$14 = 8(\theta)$

$7/2 = \theta$

$\frac{7}{2}\left(\frac{180}{\pi}\right) = 200.5^\circ$

c. 24

$24 = 8\theta$

$3 = \theta$

$3\left(\frac{180}{\pi}\right)$

$= 171.89^\circ$

d. 12.5

$12.5 = 8(\theta)$

$\frac{25}{16} = \theta$

$\frac{25}{16}\left(\frac{180}{\pi}\right) = 89.5^\circ$

4. Find the area of each sector **to the nearest tenth,** given its central angle and the radius of the circle.

a. $\theta = \frac{5\pi}{12}, r = 10\, ft$

$\frac{5\pi}{12} \cdot \frac{1}{2\pi} = \frac{5}{24}$

$A = \pi(10)^2\left(\frac{\frac{5\pi}{12}}{2\pi}\right)$

$= 100\pi\left(\frac{5}{24}\right) = 65.45\, ft^2$

b. $\theta = 54°, r = 6\, in.$

$A = \pi(6)^2\left(\frac{54}{360}\right)$

$= 16.96\, in^2$

c. $\theta = \frac{2\pi}{3}, r = 1.36\, m$

$\frac{2\pi}{3} \cdot \frac{1}{2\pi} = \frac{1}{3}$

$A = \pi(1.36)^2\left(\frac{\frac{2\pi}{3}}{2\pi}\right)$

$= \pi(1.36)^2\left(\frac{1}{3}\right) = 1.94\, m^2$

d. $\theta = 82°, r = 7.3\, km$

$A = \pi(7.3)^2\left(\frac{82}{360}\right)$

$=$

$38.13\, km^2$

For Exercises 5-6, round answers to the **nearest tenth**.

5. An arc is 6.5 cm long and it subtends a central angle of 45°. Find the radius of the circle.

$6.5 = 2\pi r\left(\frac{45}{360}\right)$

$(360)6.5 = \frac{90\pi r}{\cancel{360}} \cancel{\cdot 360}$

$\frac{2340}{90\pi} = \frac{90\pi r}{90\pi}$

$r = 8.28$

6. A sector has area of 15 in^2 and central angle of 0.2 radians. Find the radius of the circle and arc length of the sector.

$15 = \cancel{\pi} r^2\left(\frac{.2}{2\cancel{\pi}}\right)$

$2 \cdot 15 = \frac{.2r^2}{\cancel{2}} \cancel{\cdot 2}$

$\frac{30}{.2} = \frac{.2r^2}{.2}$

$\sqrt{150} = \sqrt{r^2}$

$r = 12.25\, in$

$S = 2\pi(12.25)\left(\frac{.2}{2\pi}\right)$

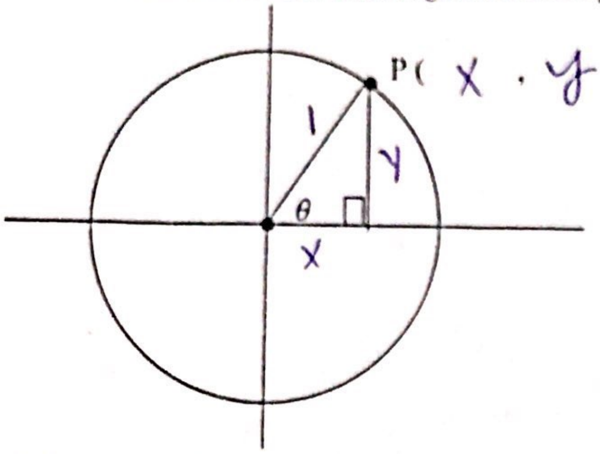
$\boxed{S = 2.45}$

Day 3 - Circular Functions & the Unit Circle

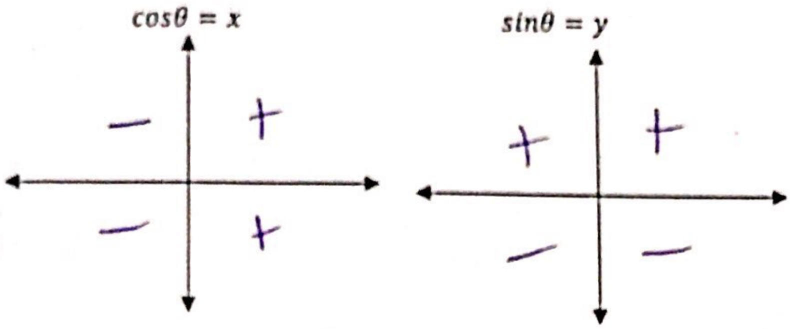
S | A
T | C

Sine and Cosine:

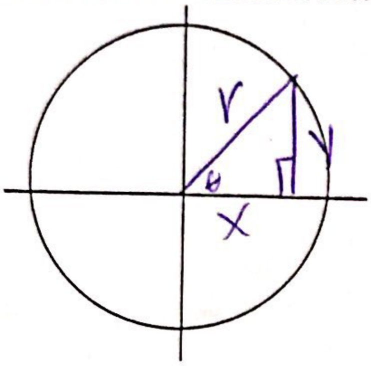
If the terminal side of an angle in standard position intersects the unit circle P(x,y), then cos θ = x and sin θ = y



SIGNS FOR EACH QUADRANT



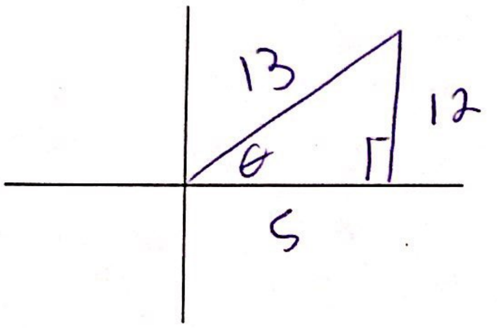
1. Sine and Cosine Functions of an Angle in Standard Position for any circle whose radius is **r.** SohCahToa



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

$cos\theta = \frac{x}{r}$

2. Find the values of the sine, cosine, & tangent functions of an angle in standard position with measure θ if the point with coordinates (5, 12) lies on its terminal side. Sketch the reference triangle.

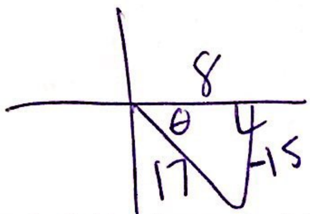


sinθ = 12/13

cosθ = 5/13

$\tan\theta = \frac{12}{5}$

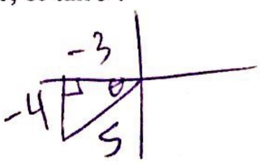
3. Find the sin θ when cos $\theta = \dfrac{8}{17}$ and the terminal side of θ is in the fourth quadrant.



$\sin\theta = \frac{-15}{17}$

(-3, -2)

4. The terminal side of an angle θ in standard position contains the point with coordinates (-3, -4). Find sinθ, cosθ, & tan θ.



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

$\cos\theta = \frac{-3}{5}$

$\tan\theta = \frac{4}{3}$

5. The terminal side of an angle θ in standard position contains the point with coordinates (0, -4). Find $\sin\theta$, $\cos\theta$, & $\tan\theta$.

$0^2+(-4)^2=r^2$

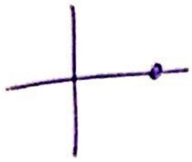
$r=4$

$\sin\theta = -1$ $\tan\theta =$ undef $\left(\frac{-1}{0}\right)$

$\cos\theta = 0$

6. The terminal side of an angle θ in standard position contains the point with coordinates (7, 0). Find $\sin\theta$, $\cos\theta$, & $\tan\theta$.

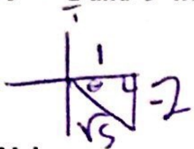
$r=7$



$\sin\theta = 0$ $\tan\theta = 0$ $\left(\frac{0}{1}\right)$

$\cos\theta = 1$

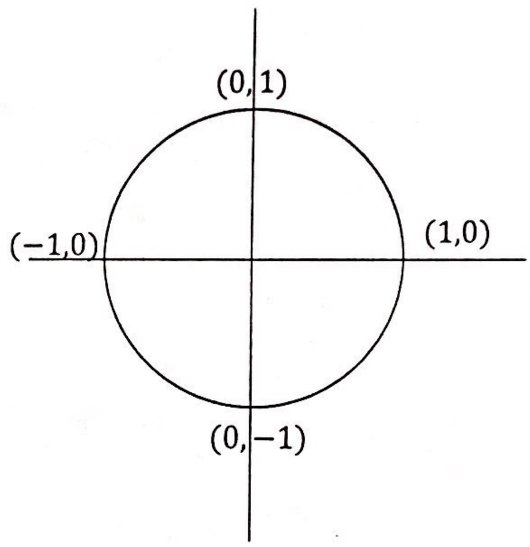
7. If $\tan\theta = \frac{-2}{1}$ and θ lies in Quadrant IV, find $\sin\theta$ and $\cos\theta$.



$\sin\theta = \frac{-2}{\sqrt{5}} = \frac{-2\sqrt{5}}{5}$ $\cos\theta = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$

8. Exact Values:

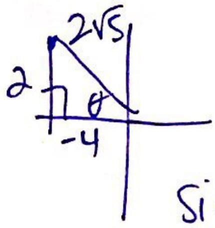
	0°	90°	180°	270°	360°
sinθ	0	1	0	-1	0
cosθ	1	0	-1	0	1
tanθ	0	undef	0	undef	0



Practice:

Find the value for sine, cosine, and tangent of an angle in standard position given the following.

1. Lies on the point (-4, 2)



$4^2+2^2=r^2$

$r=\sqrt{20}$

$r=2\sqrt{5}$

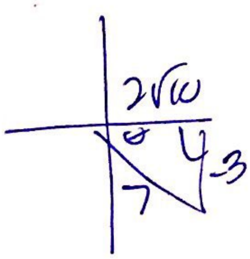
$\sin\theta = \frac{2}{2\sqrt{5}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$

$\cos\theta = \frac{-4}{2\sqrt{5}} = \frac{-2}{\sqrt{5}} = \frac{-2\sqrt{5}}{5}$

$\tan\theta = -\frac{1}{2}$

2. $\sin\theta = -\frac{3}{7}$ and θ lies in Quadrant IV.

$\sqrt{40} = 2\sqrt{10}$



$\cos\theta = \frac{2\sqrt{10}}{7}$

$\tan\theta = \frac{-3}{2\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{-3\sqrt{10}}{20}$

Day 6 - Graphing Sine & Cosine Functions

Vocabulary

- Period: how long it takes to repeat
- Amplitude: ½ height of wave
- Phase Shift: shifts left | right

Sinusoidal Functions

$$y = a\sin(b(x-c)) + d \text{ or } y = a\cos(b(x-c)) + d$$

V. stretch/comp

a = amp b = H comp/stretch c = L/R d = ↑/↓

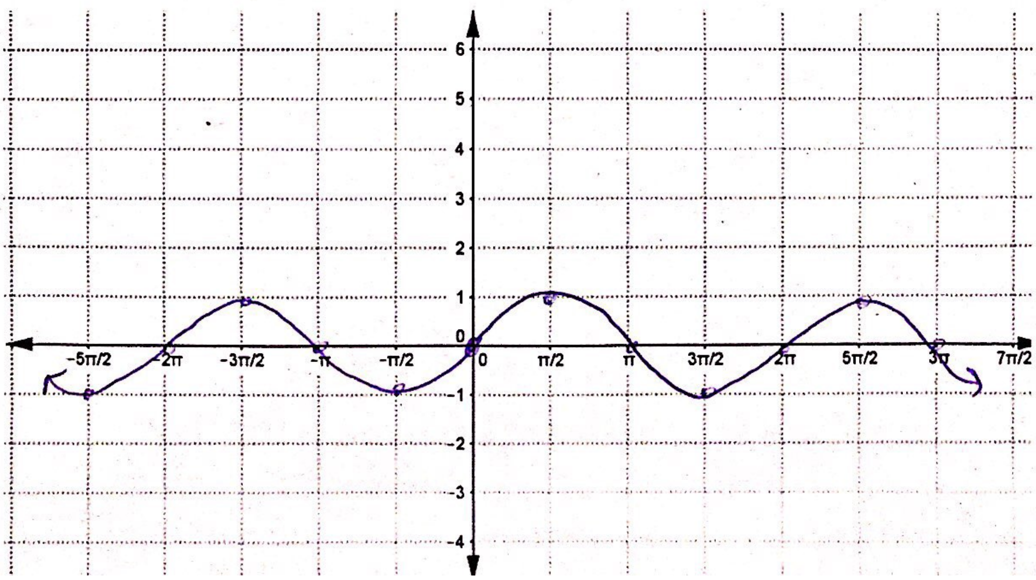
↑ midline

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

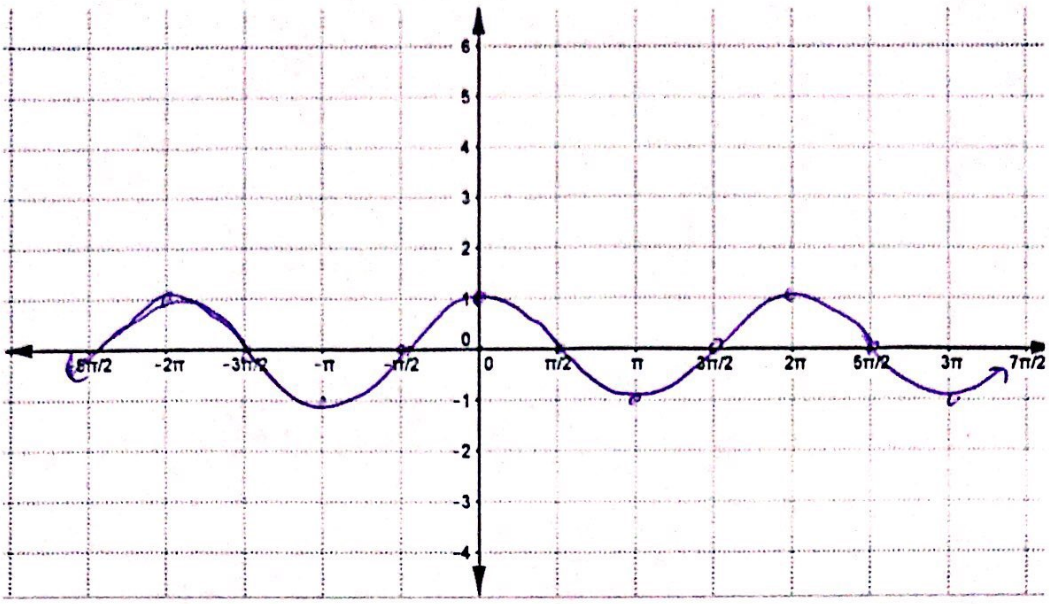
I. Determine the amplitude, b value, and period for each function.

	Amplitude	b – value	period
1. $y = 3\sin x$	3	1	2π
2. $y = \frac{1}{2}\cos 2x$	$\frac{1}{2}$	2	$\frac{2\pi}{2} = \pi$
3. $y = -5\sin \pi x$	5	π	$\frac{2\pi}{\pi} = 2$
4. $y = -8\cos\frac{5\pi}{4}x$	8	$5\pi/4$	$\frac{2\pi}{1} \cdot \frac{4}{5\pi} = \frac{8}{5}$
5. $y = 2.5\cos\frac{1}{2}x$	2.5	$\frac{1}{2}$	$\frac{2\pi}{1} \cdot 2 = 4\pi$
6. $y = -\sin 3x$	1	3	$2\pi/3$

7. Graph $y = \sin x$ a = 1 b = 1 p = 2π

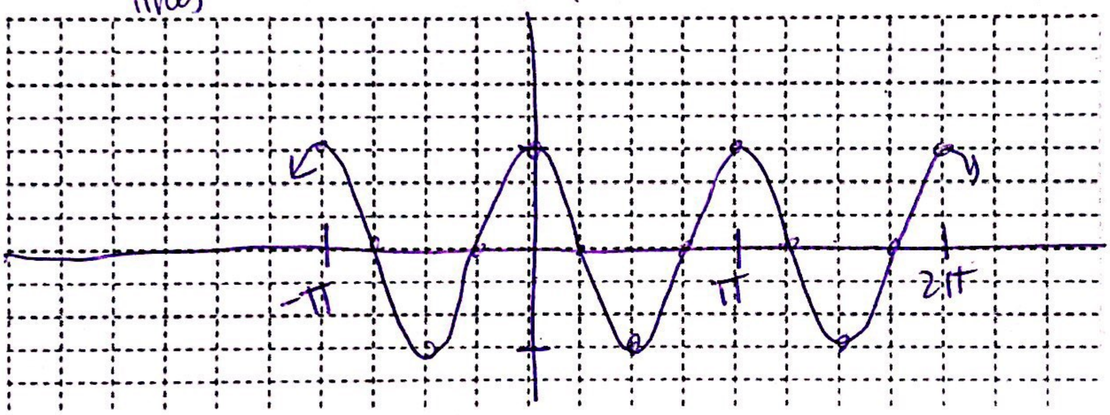


8. Graph $y = \cos x$ $a =$ 1 $b =$ 1 $p =$ 2π

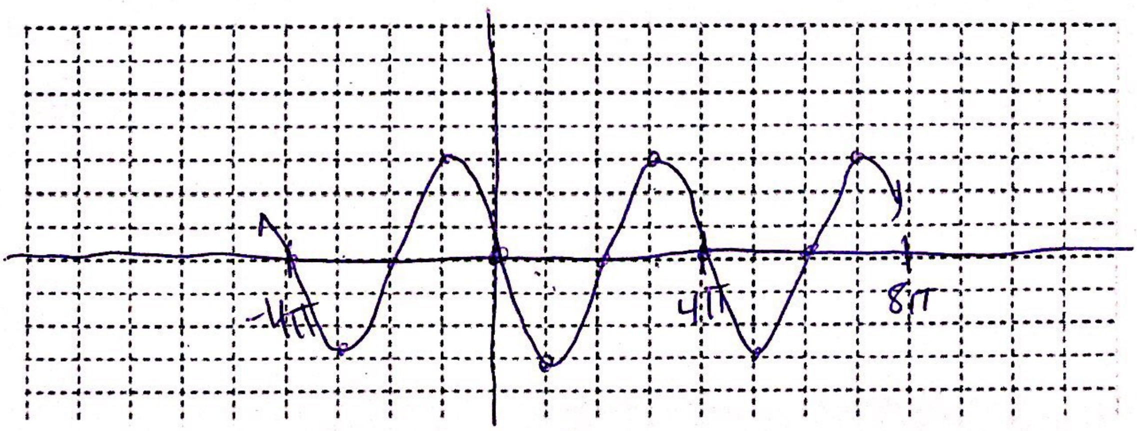


9. $y = 3\cos 2x$ $a =$ 3 $b =$ 2 $p =$ π

every 4 lines = period



10. $y = -3\sin\frac{1}{2}x$ $a =$ 3 $b =$ $\frac{1}{2}$ $p =$ 4π

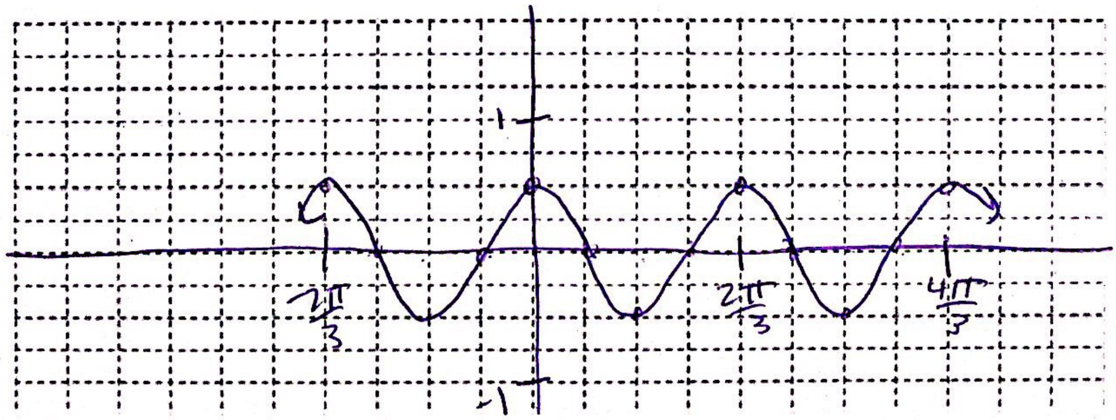


11. $y = -2cosx + 3$ a = 2 b = 1 p = 2π

up 3

12. $y = sin4x - 3$ a = 1 b = 4 p = $\frac{2\pi}{4} = \frac{\pi}{2}$ ↓3

13. $y = 1/2cos3x$ a = $\frac{1}{2}$ b = 3 p = $2\pi/3$



AFM HW Graphing Sine & Cosine

I. Determine the amplitude, b value, and period for each function.

1. $y = -\frac{1}{2}\cos x$
2. $y = 2\cos 6x$
3. $y = -4\sin\frac{\pi}{4}x$
4. $y = 3\sin\frac{3}{2}x$
5. $y = -5\cos\frac{5\pi}{3}x$
6. $y = \cos 2x$

Amplitude	b – value	period
$\frac{1}{2}$	1	2π
2	6	$\pi/3$
4	$\pi/4$	8
3	$3/2$	$4\pi/3$
5	$5\pi/3$	$6/5$
1	2	π

II. Find the following and then graph at least 2 cycles of each function on graph paper. **Number** your problems and **label** your axes!

7. $y = 3\sin x$
8. $y = 5\cos x$
9. $y = 4\cos 2x$
10. $y = -2\sin\frac{1}{2}x$
11. $y = -\cos 3x$
12. $y = 2\sin\frac{1}{3}x$

a	b	period
3	1	2π
5	1	2π
4	2	π
2	$1/2$	4π
1	3	$2\pi/3$
2	$1/3$	6π

III. Determine the amplitude, b value, period, phase shift and vertical shift for each function.

$\frac{6\pi}{3}$

13. $y = \cos 2x - 5$
14. $y = \sin(x - \pi)$ $3(x + 2\pi)$
15. $y = -2\sin(3x + 6\pi) + 4$
16. $y = 4\cos\left(3x - \frac{\pi}{3}\right) - 7$
17. $y = -\frac{1}{3}\cos(4x - 2\pi) - 6$
18. $y = 3\sin 6x - 3$ $(4(x - \frac{\pi}{2}))$

a	b	p	PS L/R	VS ↑/↓
1	2	π	—	↓5
1	1	2π	R π	none
2	3	$2\pi/3$	L 2π	↑4
4	3	$2\pi/3$	R $\pi/9$	↓7
$1/3$	4	$\pi/2$	R $\pi/2$	↓6
3	6	$\pi/3$	—	↓3

$\frac{2\pi}{4} = \frac{\pi}{2}$

$\frac{2\pi}{6}$

Graphing Sine & Cosine Day 2

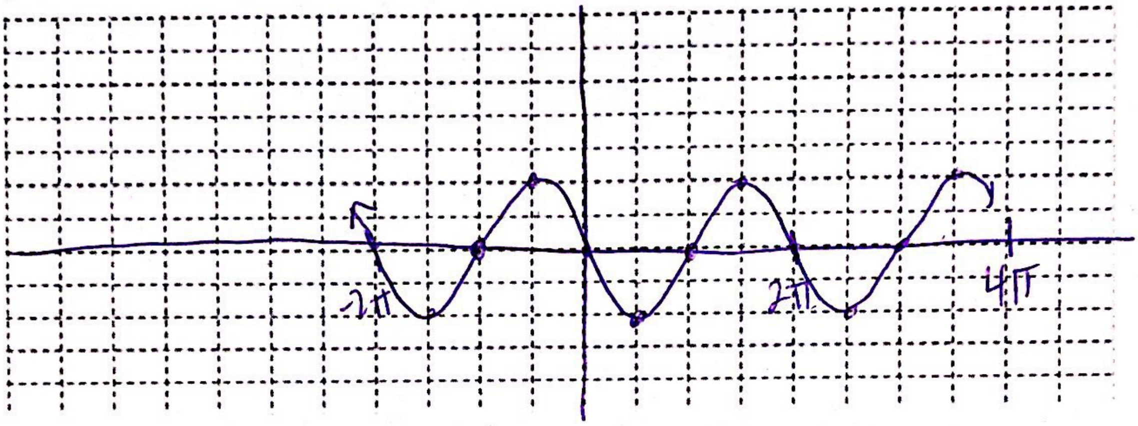
Find the following and then graph #'s 2 & 3 on graph paper.

1. $y = cos2x - 1$
2. $y = 2sin(x + \pi)$
3. $y = 3cos\frac{1}{2}\left(x - \frac{\pi}{2}\right) + 4$
4. $y = -4sin(3x - 6\pi) - 2$

$(3(x-2\pi))$

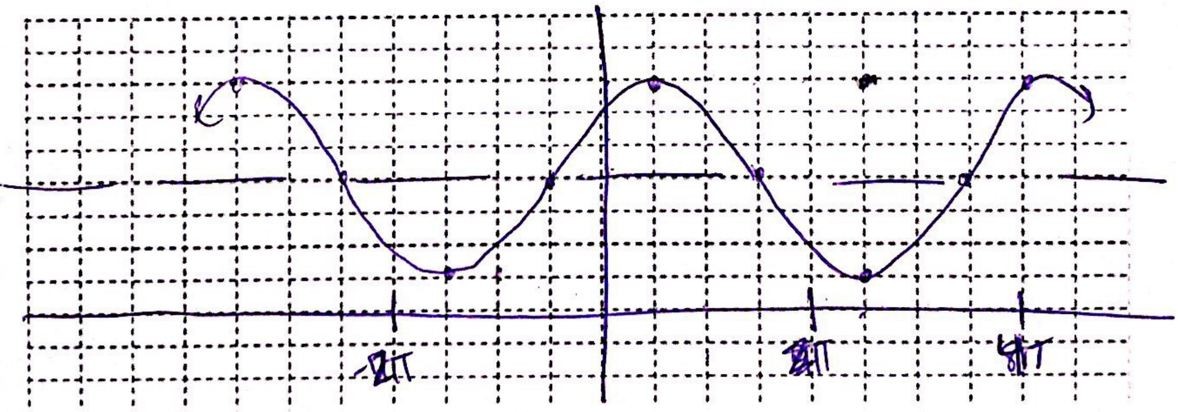
a	b	p	PS	VS
1	2	π	none	$\downarrow 1$
2	1	2π	L π	none
3	$\frac{1}{2}$	4π	R $\pi/2$	$\uparrow 4$
4	3	$2\pi/3$	R 2π	$\downarrow 2$

#2



#3

midline



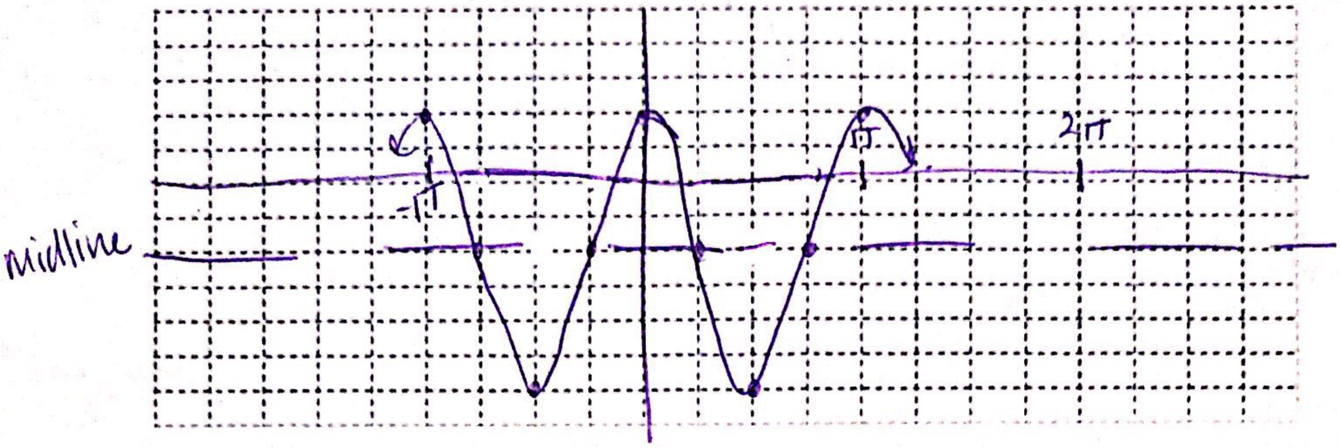
5. $y = \sin(x - \pi)$
6. $y = 3sin6x - 3$
7. $y = 2\cos(3x + 3\pi)$ $3(x+\pi)$
8. $y = -cos\frac{1}{2}x + 4$
9. $y = -2\cos\left(3x - \frac{4\pi}{3}\right) - 3$

$3(x - \frac{4\pi}{9})$

a	b	p	PS	VS
1	1	2π	R π	none
3	6	$\pi/3$	none	$\downarrow 3$
2	3	$2\pi/3$	L π	none
1	$1/2$	4π	none	$\uparrow 4$
2	3	$2\pi/3$	R $4\pi/9$	$\downarrow 3$

$4\cos(2(x+\pi))-2$ $\quad a=4 \quad b=2 \quad \downarrow 2$

10. $y = 4\cos(2x + 2\pi) - 2$ $\quad p=\pi \quad PS = L\pi$



11. $y = cos3x + 3$ $\quad a=1 \quad b=3$

$p=2\pi/3 \quad \pi\ 3$

12. $Y = -3\sin(2x + \pi) - 2$ $\quad a=3 \quad b=2 \quad \downarrow 2$

$-3\sin(2(x+\pi/2))-2$ $\quad p=\pi \quad PS=L\pi/2$

Writing Equations of Graphs using Sine & Cosine

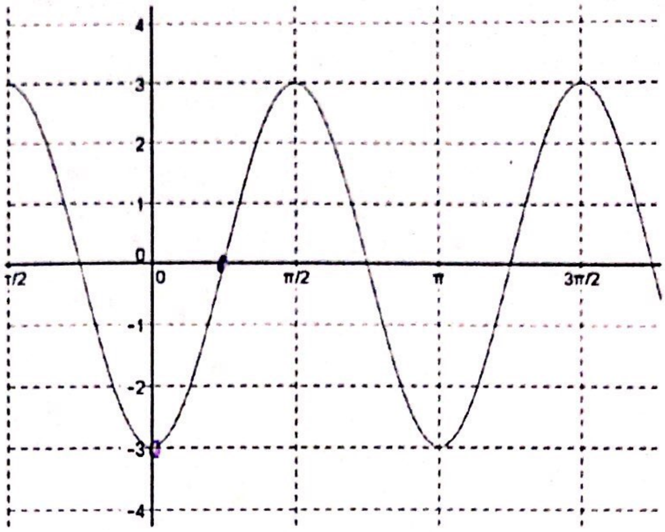
Name________________

What to look for:

- amplitude
- period
- vertical shift
- phase shift
- sine/cosine
- Reflections

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

so $\frac{2\pi}{p} = b$



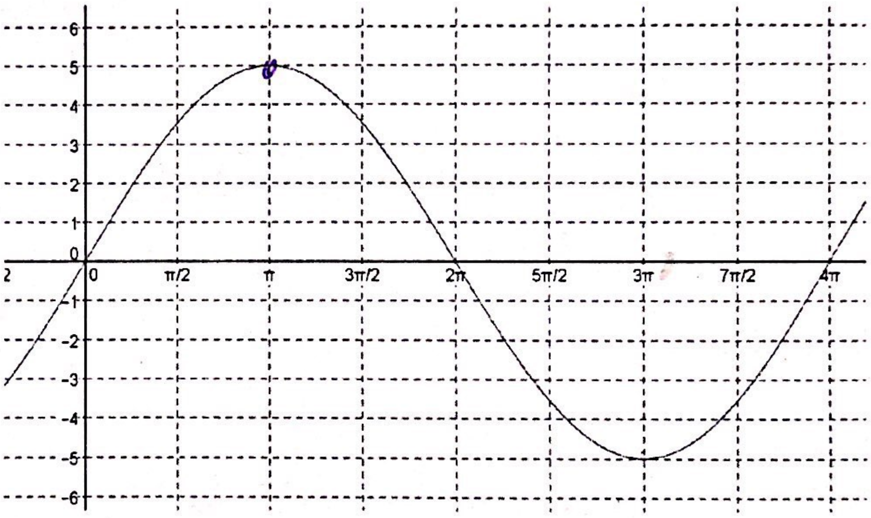
1. Amplitude: 3

   Period: π so $b=2$

   Vertical Shift: none

   Phase Shift: R $\pi/4$ for sine

   Equation: $y = 3\cos 2x$ OR $y = -3\sin(2(x-\pi/4))$



2. Amplitude: 5

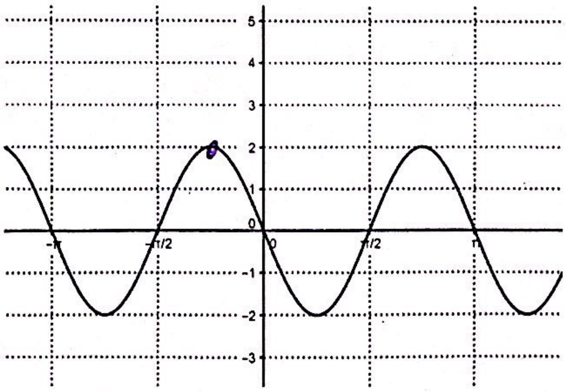
   Period: 6π so $b=\frac{1}{3}$

   Vertical Shift: none

   Phase Shift: R π for cosine

   Equation: $y=5\sin\frac{1}{3}x$

   OR $y=5\cos(\frac{1}{3}(x-\pi))$



3. Amplitude: 2

   Period: π so $b=2$

   Vertical Shift: none

   Phase Shift:______

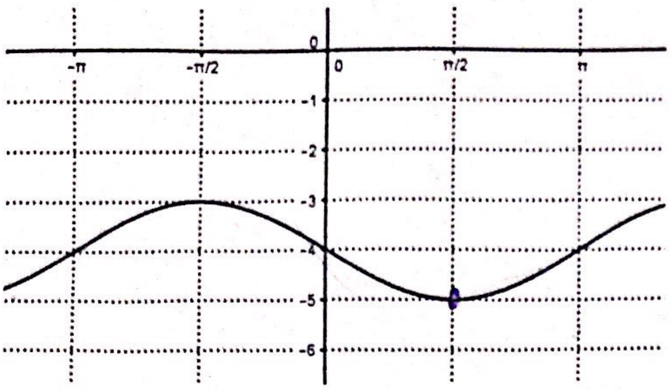
   Equation: $y=-2\sin 2x$ OR

   $y=2\cos(2(x+\pi/4))$

   or

   $y=-2\cos(2(x-\pi/4))$

4.



Amplitude: 1

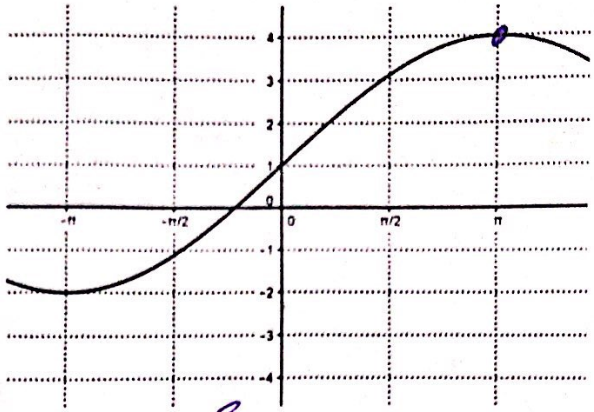
Period: 2π so $b=1$

Vertical Shift: $\downarrow 4$

Phase Shift:

Equation: $y=-\sin x-4$ OR $y=-\cos(x-\pi/2)-4$

5.



Amplitude: 3

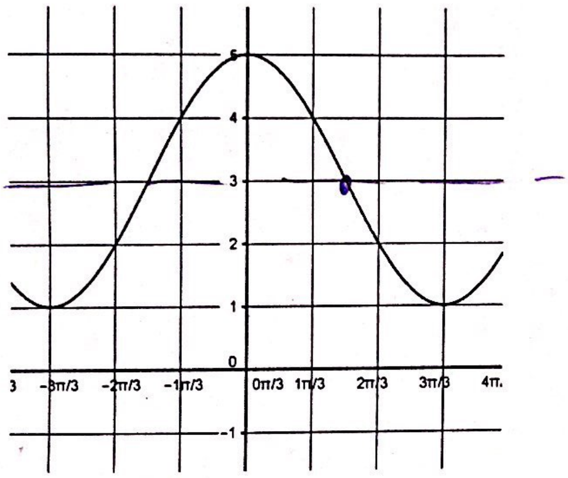
Period: 4π so $b=\frac{1}{2}$

Vertical Shift: $\uparrow 1$

Phase Shift:

Equation: $y=3\sin\frac{1}{2}x+1$ OR $y=3\cos(\frac{1}{2}(x-\pi))+1$

6.



Amplitude: 2

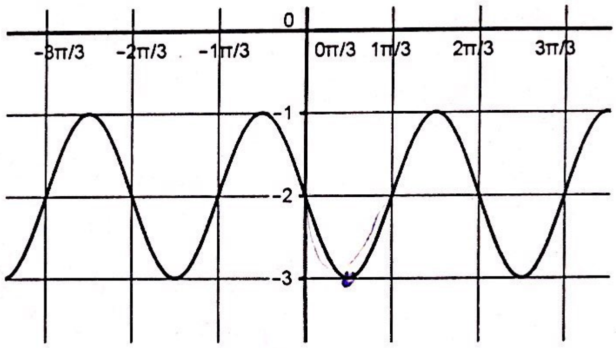
Period: 2π so $b=1$

Vertical Shift: $\uparrow 3$

Phase Shift:

Equation: $y=2\cos x+3$ OR $y=-2\sin(x-\frac{\pi}{2})+3$

7.



Amplitude: 1

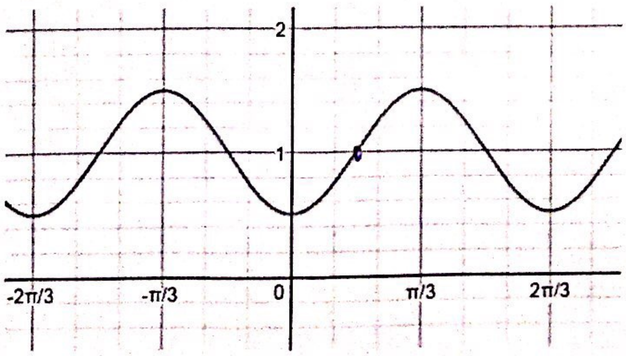
Period: $2\pi/3$ so $b=3$

Vertical Shift: $\downarrow 2$

Phase Shift:

Equation: $y=-\sin(3x)-2$ OR $y=-\cos(3(x-\pi/6))-2$

8.



Amplitude: $1/2$

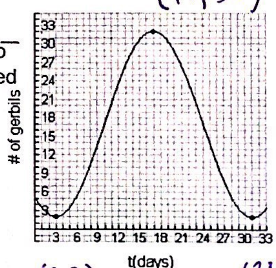
Period: $2\pi/3$ so $b=3$

Vertical Shift: $\uparrow 1$

Phase Shift:

Equation: $y=-\frac{1}{2}\cos 3x+1$ OR $y=\frac{1}{2}\sin(3(x-\pi/6))+1$

A pet store clerk noticed that the population in the gerbil habitat varied sinusoidally with respect to time in days. He carefully collected data and graphed his resulting equation.



$\frac{32-3}{2} = a$

a. Amplitude 15

b. Period 28 days

c. Vertical shift ↑

d. Phase shift R 3

$b = \frac{2\pi}{28} = \frac{\pi}{14}$

e. Equation

$y = -15\cos\left(\frac{\pi}{14}(x-3)\right) + 17$

↳ Amp + min

Ken is riding a ferris wheel. H(t) models his height (in ~~mm~~ ft) above the ground, t seconds after the ride starts. Here, t is entered in radians.

$$H(t) = -10\cos\left(\frac{2\pi}{150}t\right) + 10$$

1. What is the period? 150 seconds
2. When does Ken first reach a height of 16 mm?
3. What is the maximum height the ferris wheel reaches? 20 ft
4. What is the minimum height? 0 ft

The temperature in an office is controlled by an electronic thermostat. The temperatures vary according to the sinusoidal function:

$$y = 19 + 6\sin\left(\frac{\pi}{12}(t - 11)\right)$$

where y is the temperature (°C) and x is the time in hours past midnight.

1. What is the temperature of the office at 9 am? at 2 pm?

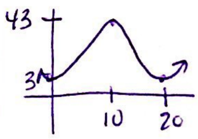
16°C 23.24°C

2. What are the maximum and minimum temperatures of the office?

max = 25°C Amp + VS

min = 13°C VS − Amp

As a Ferris wheel turns, the distance a rider is above the ground varies sinusoidally with time. The highest point on the wheel is 43 feet above the ground. The wheel makes a full circle every 20 seconds and has a diameter of 40 feet. Write a function to model the rider's height versus time.



$a = \frac{1}{2}(43-3) = 20$

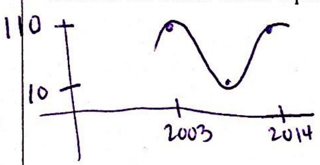
$p = 20$ sec $\frac{2\pi}{20} = \frac{\pi}{10}$

up 23

$y = -20\cos\left(\frac{\pi}{10}x\right) + 23$

24

Astronomers have noticed that the number of visible sunspots varies from a minimum of about 10 to a maximum of about 110 per year. Further, this variation is sinusoidal, repeating over an 11 year period. If the last maximum occurred in 2003, write a cosine function which models this phenomenon in terms of the time t which represents the year.



$a = \frac{1}{2}(110-10) = 50$

$p = 11$ so $b = \frac{2\pi}{11}$

↑60 R2003

$y = 50\cos\left(\frac{2\pi}{11}(x-2003)\right) + 60$

The tides in a particular bay can be modeled with an equation of the form d = Acos(Bt) + C, where t represents the number of hours since high-tide and d represents the depth of water in the bay. The maximum depth of water is 36 feet, the minimum depth is 22 feet and high-tide occurs every 12 hours.

a. Sketch a graph to model the tides

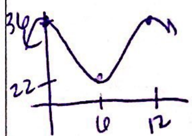
b. Write an equation

c. What is the depth of the water when t = 4?

$a = 7$

$p = 12$ so $b = \pi/6$

↑29



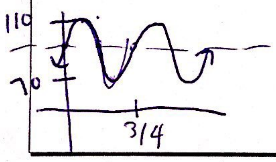
$y = 7\cos\left(\frac{\pi}{6}x\right) + 29$

An athlete was having her blood pressure monitored during a workout. Doctors found that her maximum blood pressure, known as systolic, was 110 and her minimum blood pressure, known as diastolic, was 70. If each heartbeat cycles takes 0.75 seconds, then determine a sinusoidal model in the form y = Asin(Bt) + C, for her blood pressure as a function of time t in seconds.

Using your equation, what is the athletes blood pressure after 25 seconds?

$a = 20$ $p = 3/4$ $b = 8\pi/3$

up 90



$y = 20\sin\left(\frac{8\pi}{3}x\right) + 90$

You go to the carnival and decide to ride the Ferris Wheel. The wheel is 3ft off of the ground and the diameter of it is 38ft. The wheel makes a revolution every 10 seconds.

a. Draw a graph

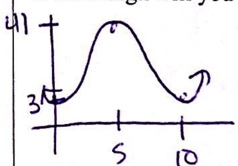
b. Write a function

c. How high will you be after 8 seconds?

$a = 19$

$p = 10$ $b = \pi/5$

↑22



$y = -19\cos\left(\frac{\pi}{5}x\right) + 22$