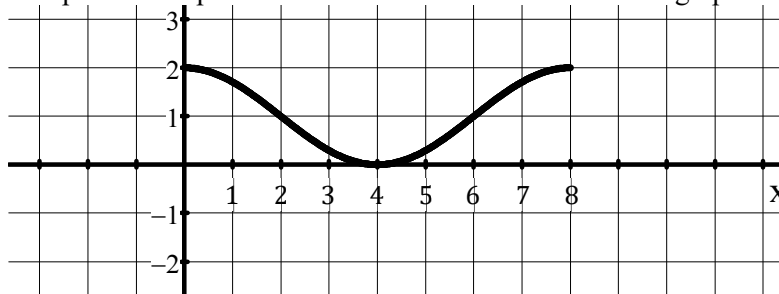


Name: _____ Date: _____ Period: _____

Unit 3A Review – Trigonometric and Polar Functions

Reviews do NOT cover all material from the lessons but will hopefully remind you of key points. To be prepared, you must study all packets for lessons 3.1 – 3.2.

1. The graph below shows one period of a periodic function. Sketch the rest of the graph on the given axes.



a. Is the function above increasing, decreasing or both on the interval $20 < x < 24$.

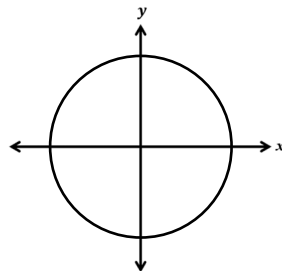
The measurement of an angle in standard position is listed. In which quadrant is the terminal ray?

2. 6.6π

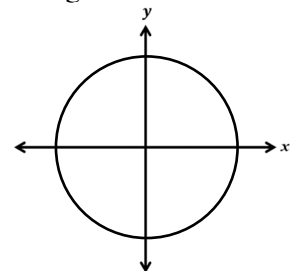
3. -2.3π

Below are various measurements of a circle's radius, an angle within the circle, or the arc subtended by the angle. SKETCH the approximate angle on the axes and find the missing value.

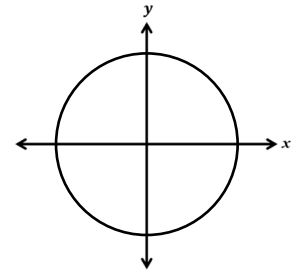
4. Radius is 8.2 and the length of an arc subtended by an angle is 37.63. Find the measure of the angle.



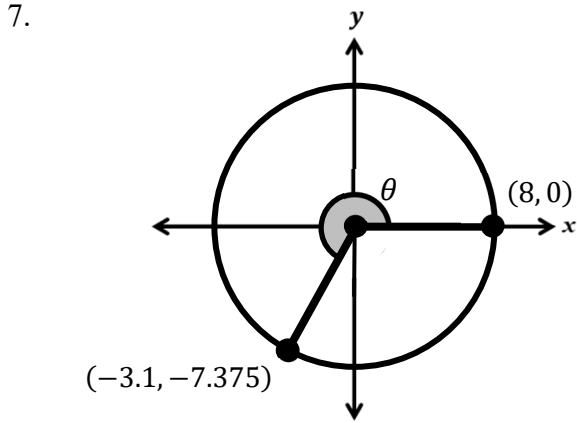
5. Radius is 5.27 and an angle is 0.56π radians. Find the length of the arc subtended by the angle.



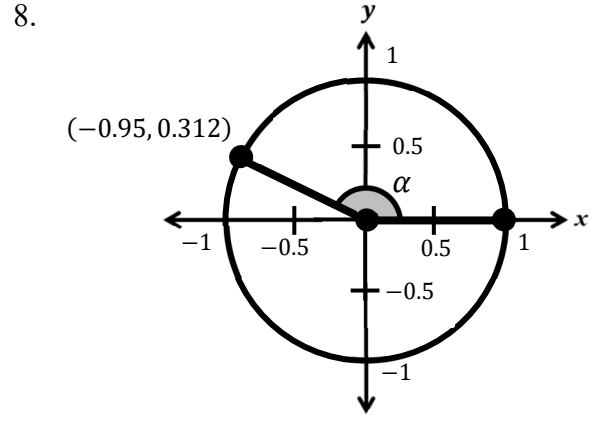
6. An angle is 3.56 radians and the length of an arc subtended by the angle is 5.2. What is the radius of the circle?



Each figure below gives a circle in the xy -plane with center at the origin, and an angle θ in standard position. Find the value of each expression.



- a. $\sin \theta =$
- b. $\cos \theta =$
- c. $\tan \theta =$



- a. $\sin \alpha =$
- b. $\cos \alpha =$
- c. $\tan \alpha =$

Find the value of each expression. Do not look back at the Unit Circle for help!

9. $\cos \pi$	10. $\sin \frac{\pi}{4}$	11. $\cos \frac{2\pi}{3}$	12. $\cos \frac{7\pi}{6}$	13. $\sin \left(-\frac{\pi}{6}\right)$	14. $\cos \left(-\frac{5\pi}{4}\right)$
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For each problem, an angle in standard position in the xy -plane is given in radians. A circle is centered at the origin with the given radius. What are the coordinates of the point of intersection of the terminal ray of the angle and the circle?

15. $\theta = \frac{3\pi}{2}, r = 6$

16. $\theta = \frac{5\pi}{3}, r = 10$

In the xy -plane, the terminal ray of angle θ in standard position intersects a circle of radius r at the given point. What are the values of θ and r , with $0 \leq \theta \leq 2\pi$?

17. $(\sqrt{3}, -1)$

18. $(-6, 6\sqrt{3})$

The function f is given by $f(\theta) = \cos \theta$. Describe the concavity of f on the interval, and if f is increasing or decreasing on the interval.

19. $\frac{\pi}{2} < \theta < \pi$

20. $\frac{3\pi}{2} < \theta < 2\pi$

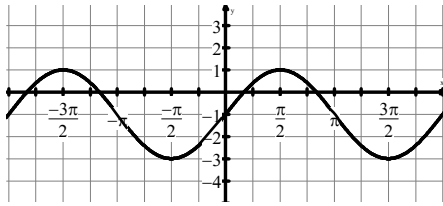
The function f is given by $f(\theta) = \sin \theta$. Describe the concavity of f on the interval, and if f is increasing or decreasing on the interval.

21. $0 < \theta < \frac{\pi}{2}$

22. $\pi < \theta < \frac{3\pi}{2}$

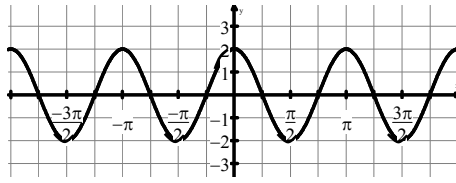
Write the given function for each graph. Use a positive coefficient for all equations.

23. Write a **sine** function.



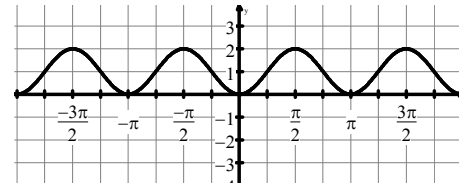
$y =$ _____

24. Write a **cosine** function.



$y =$ _____

25. Write a **sine** function.



$y =$ _____

State the amplitude, period, phase shift, and vertical shift.

26. $y = 3 \cos(5x - \pi)$

Amp: _____ Period: _____

Midline: _____ Freq: _____

Max value: _____ Min value: _____

Phase shift: _____

27. $y = \frac{1}{2} \sin(4x) - 2$

Amp: _____ Period: _____

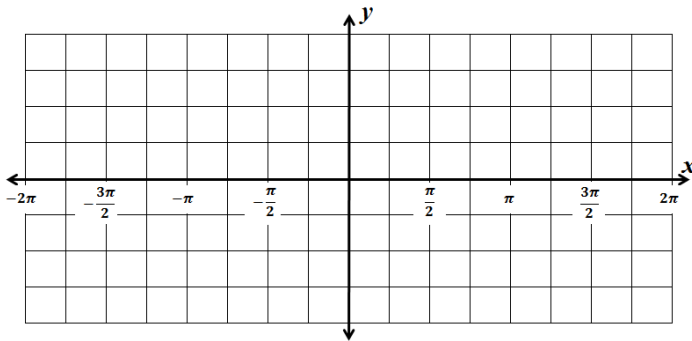
Midline: _____ Freq: _____

Max value: _____ Min value: _____

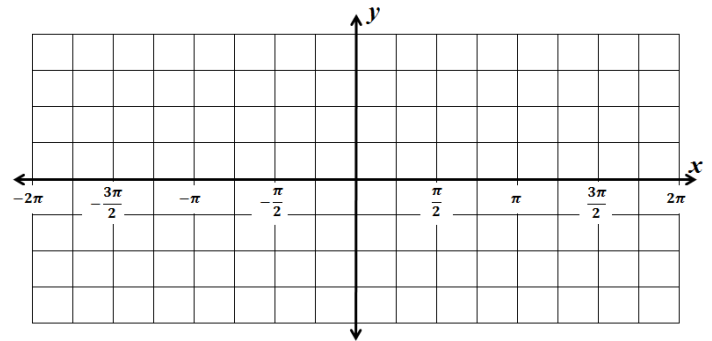
Phase shift: _____

Graph each function on the given set of axes.

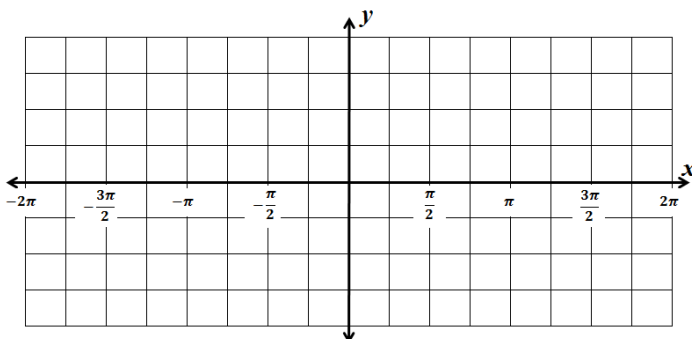
28. $y = 2 \cos x$



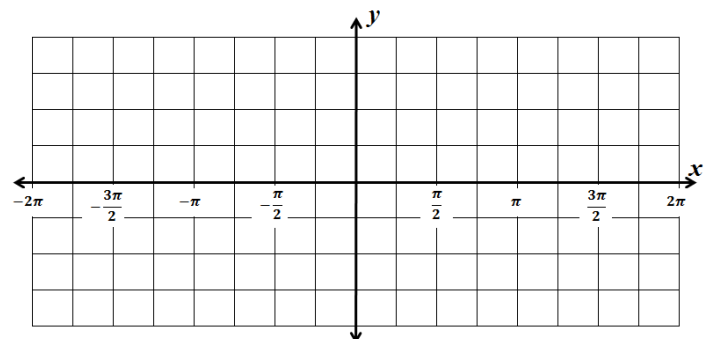
29. $y = 3 \sin 2x - 1$



30. $y = -3 \sin\left(\frac{x}{2} + \pi\right)$



31. $y = 2 \cos(2x - \pi) - 1$



32. Suppose you are riding a Ferris wheel. After everyone is loaded, the wheel starts to turn, and the ride lasts for 105 seconds. Your height h (in feet) above the ground at any time t (in seconds) can be modeled by the equation $h(t) = 50 \sin \left[\frac{\pi}{10} (t - 4) \right] + 65$. You do not need a calculator for any question except the last two.
- What is the period?
 - What does the period represent?
 - What is the frequency?
 - What does the frequency represent?
 - What is your maximum height?
 - What is your minimum height?
 - How many circles will the Ferris Wheel make during the ride?
 - Calculator active.** How high are you when the ride begins?
 - Calculator active.** What is your height when the ride stops?

33. The following data set can be modeled by a sinusoidal function. Use the data to answer each problem below.

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	16	2	-10	-1	18	21	40	52	37	29

x	10	11	12	13	14	15	16	17	18	19
$f(x)$	12	-2	-11	4	17	22	38	49	39	26

- | | | |
|---------------------------------------|---|----------------------------|
| a. Estimate the period and frequency. | b. Estimate the vertical shift (midline). | c. Estimate the amplitude. |
|---------------------------------------|---|----------------------------|

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- d. Using the above information, create a sinusoidal function model.

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- e. Using a calculator, find a sinusoidal model from the given data set. Your answer should look similar to your estimate in part d.