

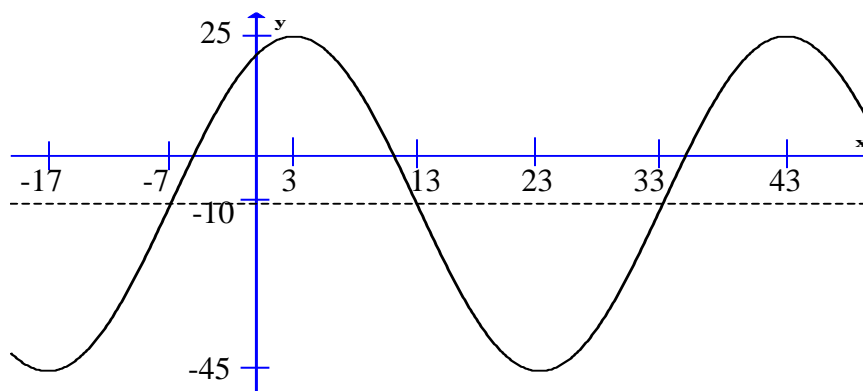
Name: _____ Period: _____

PreCalculus Semester Exam Review 2017

Do all work on a separate sheet of paper. Your exam review is due on the day of your exam.

1. Name the angle whose measure is between 0° and 360° that is coterminal with 489° .
2. Find the reference angle for each of the following:
 - a) 133°
 - b) 254°
 - c) 317°
 - d) 71°
3. Find the six trigonometric functions for an angle whose terminal side passes through the point $(-5, 2)$.
4. Find the six trigonometric functions of θ if θ terminates in Quadrant III and $\sin \theta = -\frac{2}{3}$.
5. Find θ if $\sin \theta = 0.4791$ (in degrees)
6. Suppose you have been assigned the job of measuring the height of the local water tower. Climbing makes you dizzy, so you decide to do the whole job at ground level. From a point 47.3 meters from the base of the tower, you find that you must look up at an angle of 53° to see the top of the tower. How high is the tower?
7. From a window 20 meters high, the angle of depression to the top of a nearby streetlight is 50° . The angle of depression to the base of the streetlight is 58° . How tall is the streetlight?
8. The Rocky Mountain Turnpike has a steady uphill slope of 4.7° . How long must a straight uphill segment of road be in order to allow a vertical rise of 450 feet? What is the horizontal distance of this segment?
9. An observer 5.2 kilometers from the launch pad at Cape Canaveral observes the Discovery space shuttle take off. (Discovery ascends vertically for some time after take-off.)
 - a.) At a particular time, the angle of elevation of Discovery is 32.3° . How high is the space shuttle?
 - b.) How far is Discovery from the observer?
 - c.) What will the angle of elevation be when the space shuttle reaches 28 kilometers?

10. Given: $y = C + A \sin B (\theta - D)$
Explain the effects of A, B, C, and D.
11. Graph $y = -5 + 7 \cos 30 (\theta + 4^\circ)$
12. What is the highest point on the graph of $y = -15 + 22 \cos 4(\theta - 29)$?
13. Write the equation of the graph in radians using ***sin***:



14. Convert to radian measure:

- a) 45°
- b) 120°
- c) 150°
- d) 225°
- e) -90°

15. Convert to degree measure:

- a) $\frac{4\pi}{3}$
- b) $\frac{\pi}{6}$
- c) $\frac{7\pi}{4}$
- d) $\frac{5\pi}{6}$
- e) $-\frac{2\pi}{5}$

16. Using your unit circle, find the exact value of:

- a) $\sin \frac{\pi}{3}$
- b) $\tan \pi$
- c) $\cos \frac{3\pi}{4}$
- d) $\cos -\frac{\pi}{6}$

17. Sketch a graph of each of the following in radians:

- a) $y = \sin x$
- b) $y = \cos x$
- c) $y = \tan x$
- d) $y = \cot x$
- e) $y = \csc x$
- f) $y = \sec x$

18. Find the exact principal value of each in degrees:

- a) $\theta = \sin^{-1} 1$
- b) $\theta = \cos^{-1} -\frac{\sqrt{3}}{2}$
- c) $\theta = \sin^{-1} 2$

19. Find the exact principal value of each in radians:

- a) $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$
- b) $x = \sec^{-1}(\sqrt{2})$
- c) $x = \tan^{-1}(0)$

20. Find the exact value of the expression using radians and radicals if necessary.

- a) $\sin^{-1}\left(\cos\left(\frac{5\pi}{6}\right)\right)$
- b) $\sin\left(\cos^{-1}\left(-\frac{3}{4}\right)\right)$
- c) $\cot\left(\sec^{-1}\left(\frac{2}{3}\right)\right)$

21. Given: $f(x) = 2 + 3 \cos \frac{\pi}{9}(x - 6)$

- a) Find $f(8)$ correct to three decimal places
- b) Find the first three positive values of x for which $f(x) = 1.3$.

22. Given $f(x) = 5 + 4 \sin \frac{\pi}{12}(x + 10)$

- a) Find $f(1)$
- b) Find the first three positive values of x for which $f(x) = 2$.

Use the following information for problems 23-26

You are sitting on the deck of a river steamboat. As the paddlewheel turns, a point on the paddle blade is moved in a way such that its distance, d , from the water's surface is a sinusoidal function of time, t . When your stopwatch reads 7 seconds, the point is at its highest, 20 feet above the water's surface. The wheel's diameter is 24 feet, and it completes a revolution every 16 seconds.

23. Sketch a graph of the sinusoid.
24. Write the equation of the sinusoid.
25. How far above the surface of the water is the point when your stopwatch reads 2 seconds?
26. What is the FIRST positive value of time at which the point is at the water's surface?
27. At that first positive value, Is the point going into the water or coming out of the water?
28. A weight attached to a long spring is being bounced up and down by an electric motor. As it bounces, its distance from the floor varies sinusoidally with time. The following equation represents the spring's distance in centimeters, y , as a function of the time elapsed, x , in seconds.

$$y = 50 + 10 \cos \left(\frac{5\pi}{16} (x - 0.3) \right)$$

What is the maximum height of the spring?

29. Prove: $(1 + \cos x)(1 - \cos x) = \sin^2 x$
30. Prove: $\cot x + \tan x = \csc x \sec x$
31. Prove $\csc \theta \cos^2 \theta + \sin \theta = \csc \theta$

Solve each of the following equations in the domain $x \in [0, 2\pi)$ or $\theta \in [0^\circ, 360^\circ)$

32. $2\sin(\theta + 46^\circ) = -2$

33. $4\cos^2 x = 1$

34. $2\sin^2 \theta + \sin \theta = 0$

35. $\sin^2 x + 5\sin x + 6 = 0$

36. $3\cot x + 1 = 2\cot x$

37. $2\cos^2 x + \cos x - 1 = 0$

Be sure to study your old assessments as well as your notes. Good Luck!

Tuesday, December 13

"0" hour Exam 8:00- 8:52

1st period exam 9:00-11:00

2nd period 11:06-11:44

4th period 11:50- 1:11

A lunch 11:44-12:09

B lunch 12:15-12:40

C lunch 12:46- 1:11

3rd period 1:17- 1:56

5th period 2:02- 2:41

6th period 2:47- 3:26

7th period 3:32- 4:10

Wednesday, December 14

"0" hour Exam 8:00 - 8:52

2nd period 9:00 - 9:42

3rd period exam 9:48- 11:48

4th period 11:54- 1:15

A lunch 11:48- 12:13

B lunch 12:19- 12:44

C lunch 12:50- 1:15

6th period 1:21- 2:04

7th period exam 2:10- 4:10

Thursday, December 15

2nd period exam 9:00 - 10:50

4th period 10:56- 11:04

5th period exam 11:10 - 1:00

(note dismissal time)

Friday, December 16

4th period exam 9:00 -10:57

6th period exam 11:03 - 1:00

(note dismissal time)