

Name \_\_\_\_\_ 2<sup>nd</sup> Quarter Exam Review Enriched Trig 2018

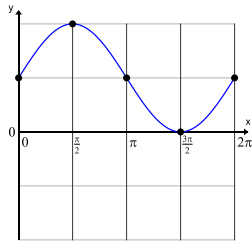
Objective 1: Reading a sine and cosine graph and writing its equation

ASSUME RADIAN MEASURE UNLESS TOLD OTHERWISE

1. How do you determine the “d” value of a graph of sine or cosine given its graph?
2. How do you determine the “a” value of a graph of sine or cosine given its graph?
3. Explain the difference between period length and a period of a trigonometric function?
4. How do you determine period length of a graph of sine or cosine given its graph?
5. How do you determine the “b” value of a graph of sine or cosine given its graph?
6. What is the “formula” related to determining the value of “b” for all trigonometric functions except tangent and cotangent?
7. What is the “formula” related to determining the value of “b” tangent and cotangent?
8. Explain the difference between “c” and phase shift
9. How do you determine phase shift of sine and cosine from its graph?
10. How do you determine the “c” value of a graph of sine or cosine given its graph?

Directions: Determine the equations of each of the graphs below

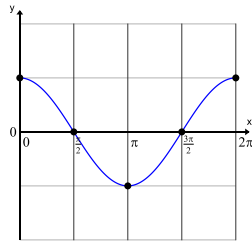
Graph 1



Equation of this graph

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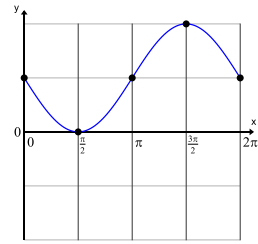
Graph 2



Equation of this graph

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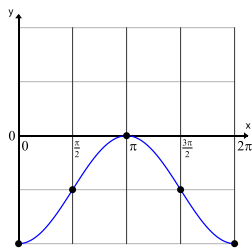
Graph 3



Equation of this graph

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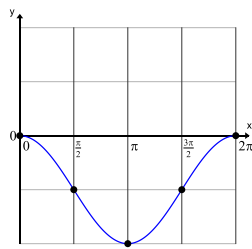
Graph 4



Equation of this graph

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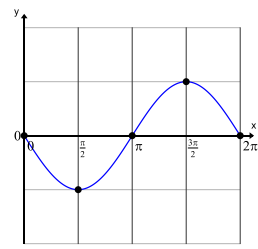
Graph 5



Equation of this graph

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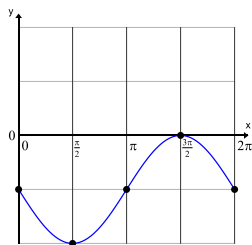
Graph 6



Equation of this graph

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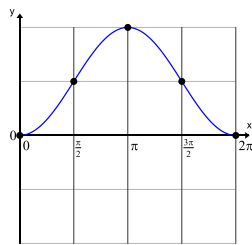
Graph 7



Equation of this graph

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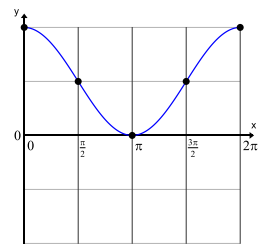
Graph 8



Equation of this graph

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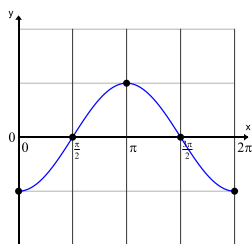
Graph 9



Equation of this graph

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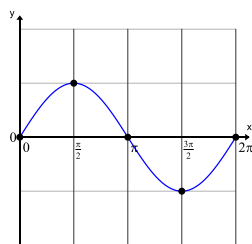
Graph 10



Equation of this graph

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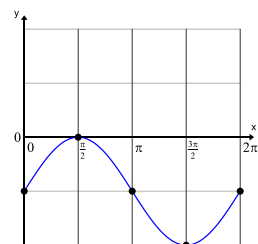
Graph 11



Equation of this graph

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Graph 12

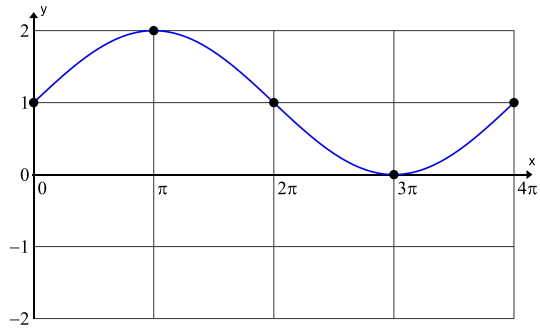


Equation of this graph

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Directions: Determine the equations of the functions below

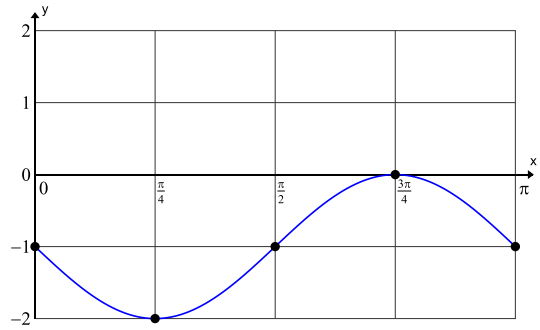
Graph 13



Equation of this Graph

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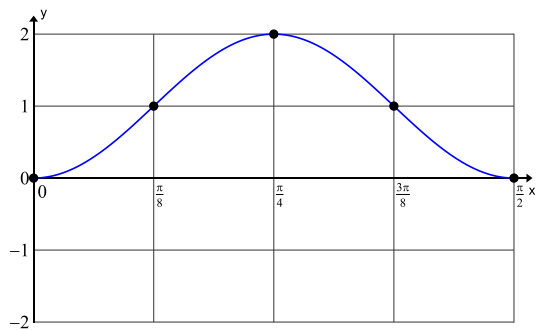
Graph 14



Equation of this Graph

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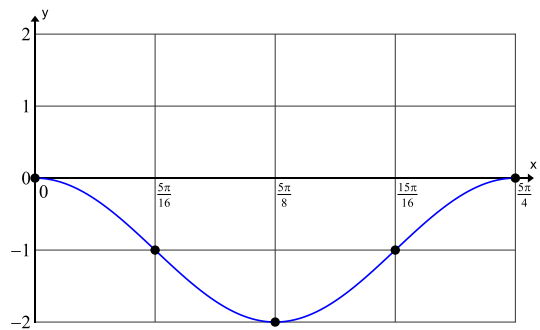
Graph 15



Equation of this Graph

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Graph 16

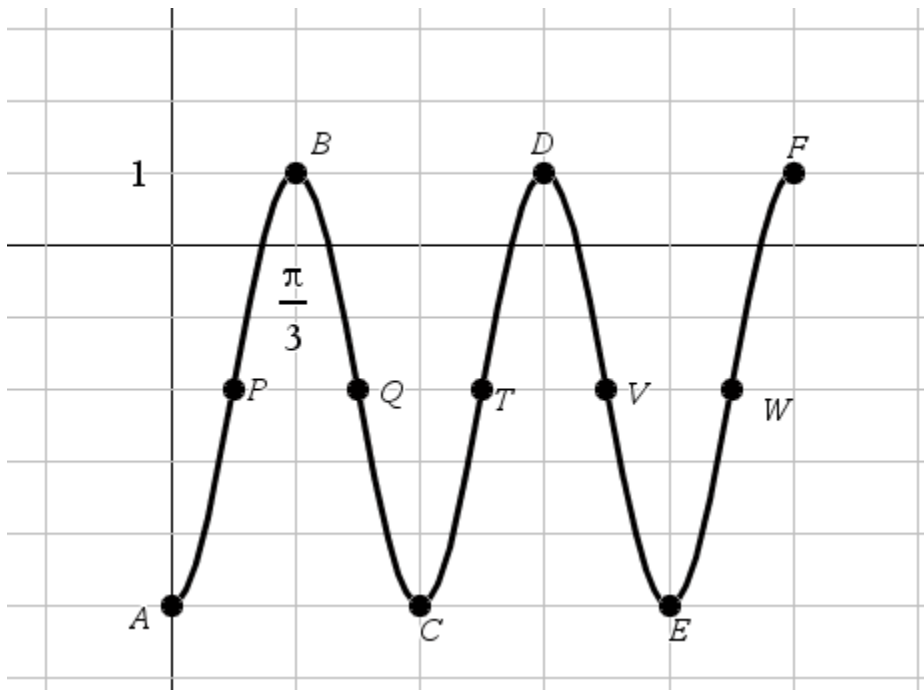


Equation of this Graph

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11. What do all of these graphs have in common?
- a. One of the things should discuss phase shift
  
  
  
  
  
  
  
  
  
  
  - b. Another of the things should talk about vertical shift

Directions: Determine the equation of the graphs below BASED ON THE SPECIFIC PERIOD MENTIONED



12. Write the equation of the function that has period [A, C)

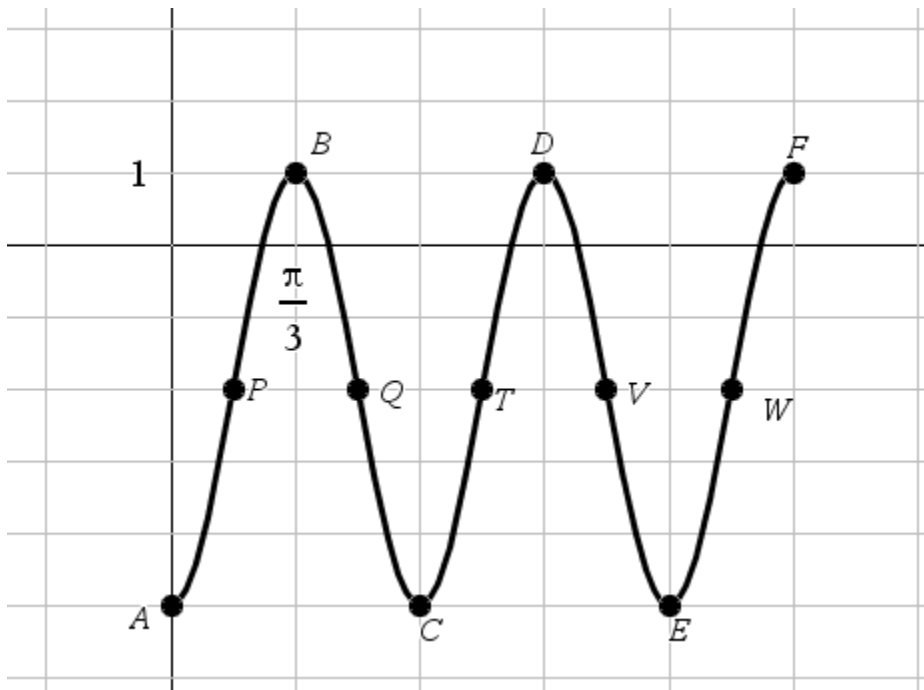
13. Write the equation of the function that has period [B, D)

14. Write the equation of the function that has period [C, E)

15. Write the equation of the function that has period [D, F)

16. Based on the periods selected, what do these functions have in common?

Directions: Determine the equation of the graphs below BASED ON THE SPECIFIC PERIOD MENTIONED



17. Write the equation of the function that has period  $[P, T]$

18. Write the equation of the function that has period  $[Q, V]$

19. Write the equation of the function that has period  $[T, W]$

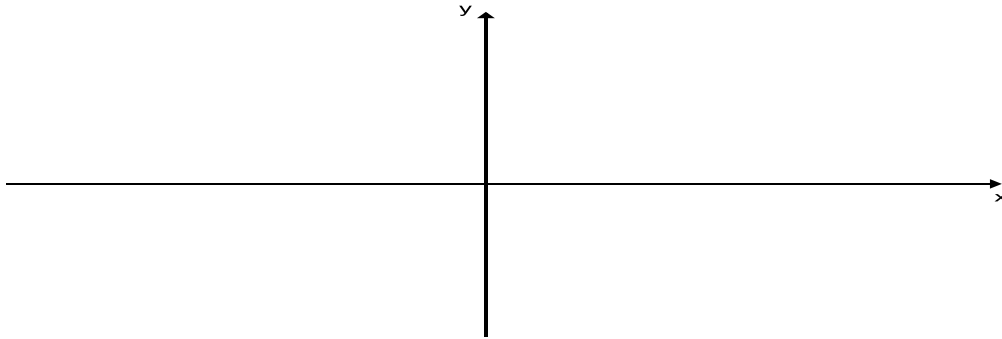
20. Based on the periods selected, what do these functions have in common?

Objective 2: Reading a sine and cosine function, describing its graph, and graphing the function

ASSUME RADIAN MEASURE

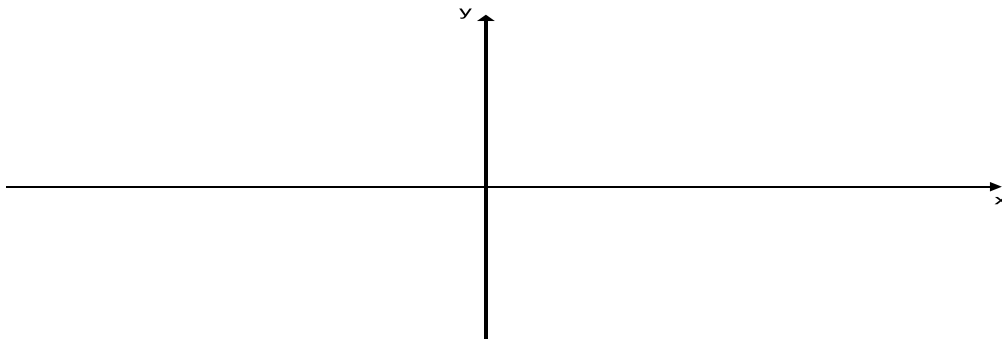
21.  $y = \frac{1}{2} - 2\sin\left(\frac{1}{3}x - \frac{\pi}{4}\right)$

amplitude = \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_ Vertical Shift \_\_\_\_\_



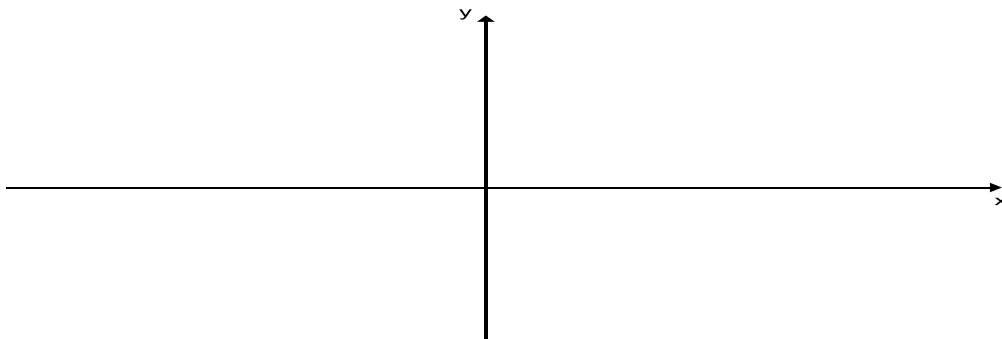
22.  $y = -2 + \frac{6}{5}\cos\left(\frac{12}{5}x + \pi\right)$

amplitude = \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_ Vertical Shift \_\_\_\_\_



23.  $y = 10 - 0.6\sin(1.6x + 19.2)$

amplitude = \_\_\_\_\_ Period \_\_\_\_\_ Phase Shift \_\_\_\_\_ Vertical Shift \_\_\_\_\_



Objective 3: Use sum and difference formulas to determine trigonometric ratios

You are responsible for the six trigonometric ratios related to multiples of  $15^\circ$  or  $\frac{\pi}{12}$  that do not reside on the unit circle

24. Find all six trigonometric ratios related to  $285^\circ$  SIMPLIFY ALL EXPRESSIONS COMPLETELY

a.  $\sin(285^\circ)$

b.  $\cos(285^\circ)$

c.  $\tan(285^\circ)$

d.  $\csc(285^\circ)$

e.  $\sec(285^\circ)$

f.  $\cot(285^\circ)$

25. Find all six trigonometric ratios related to **SIMPLIFY ALL EXPRESSIONS COMPLETELY**

Hint: nobody said you had to keep radians or negative angles

a.  $\sin\left(\frac{-17\pi}{12}\right)$

b.  $\cos\left(\frac{-17\pi}{12}\right)$

c.  $\tan\left(\frac{-17\pi}{12}\right)$

d.  $\csc\left(\frac{-17\pi}{12}\right)$

e.  $\sec\left(\frac{-17\pi}{12}\right)$

f.  $\cot\left(\frac{-17\pi}{12}\right)$



26. Rewrite the following as a trigonometric function of a single angle and evaluate

a.  $\frac{\tan 11 + \tan 19}{1 - \tan 11 \tan 19}$

b.  $\frac{\tan 147 - \tan 27}{1 + \tan 147 \tan 27}$

c.  $\sin 23 \cos 307 + \cos 23 \sin 307$

d.  $\cos 405 \cos 105 + \sin 405 \sin 105$

e.  $\sin 111 \cos 21 - \cos 111 \sin 21$

f.  $\cos 735 \cos 15 - \sin 735 \sin 15$

27. Determine two values of  $x$  that will satisfy the given equation USE DEGREE MEASURE

a. 
$$\frac{\tan 18 + \tan x}{1 - \tan 18 \tan x} = -\sqrt{3}$$

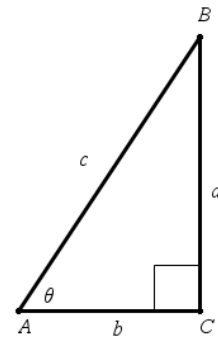
b. 
$$\sin 34 \cos x + \cos 34 \sin x = \frac{-\sqrt{3}}{2}$$

c. 
$$\cos 78 \cos x + \sin 78 \sin x = \frac{-1}{2}$$

Objective 4: Use and verify Trigonometric Identities

28. Use right triangles to verify each of the Pythagorean Identities

a.  $\sin^2 \theta + \cos^2 \theta = 1$



b.  $1 + \cot^2 \theta = \csc^2 \theta$

c.  $\tan^2 \theta + 1 = \sec^2 \theta$

29. Verify that  $\csc^2 \theta - 1 = \frac{\csc^2 \theta}{\sec^2 \theta}$  using trigonometric identities

30. Verify that  $\sec^2 \theta = \sin \theta \tan \theta \sec \theta + \csc^2 \theta \sin^2 \theta$  using trigonometric identities

Objective 5: Apply Right Triangle Trigonometry USE DEGREE MEASURE

Four of the mathematics teachers are outside in a variety of scenarios. Mr. Statler is 1000 feet from the base of the tower that Mr. Hickman is standing on top of, and Mr. Urbanc is flying in an airplane that is DIRECTLY ABOVE Mr. Hickman. Mr. Hickman knows that Mr. Urbanc is 5000 feet above him, but he does not know how tall the tower he is standing on is. Mrs. Robinson is in a hot air balloon DIRECTLY ABOVE Mr. Statler. Mr. Statler knows that the angle of elevation from a point on the ground at his feet to Mr. Hickman is  $42^\circ$ , and Mr. Urbanc knows that his angle of depression to Mrs. Robinson is  $38^\circ$ . Mr. Hickman does know that Mrs. Robinson's balloon is higher than his tower, but lower than Mr. Urbanc's airplane.

HINT: DRAW A DETAILED FIGURE

31. How tall is Mr. Hickman's tower?

32. At what altitude is Mrs. Robinson flying?

33. What is the angle of depression from Mrs. Robinson to Mr. Hickman?

34. What is the angle of elevation from the point at Mr. Statler's feet to Mr. Urbanc's airplane.

Objective 6: Solving trigonometric equations using a variety of methods

35. Find all of the solutions to the following equations GIVE ANSWERS IN BOTH RADIANS AND DEGREES

a.  $\sqrt{3} \sin x + 2 = 0$

b.  $\sqrt{5} \cos x + 3 = 0$

c.  $\sqrt{2} \tan x - 7 = 0$

d.  $\sqrt{3} \cot x + 1 = 0$

e.  $\sqrt{7} \sec x - 1 = 0$

36. Find all of the solutions to the following equations over  $[0, 360^\circ)$

a.  $6\sin x - 6 = \cos^2 x$

b.  $2\cos^2 x + 2\cos x - 3 = 0$

c.  $9\tan^2 x - 1 = 0$

## Math for math's sake

Baltazar and Penelope are two very bright students in a Precalculus class and they are very competitive, so they asked their teacher for a challenge problem to settle who is smarter. So their Precalculus teacher grinned and gave them a choice between two solving two trigonometric equations and asked them to solve the one that proved that they were smarter and explain how that decision was the best choice to show once in for all why they were smarter.

The teacher wrote the following equations on the board SOLVE OVER  $[0,360^\circ)$

Equation A:  $\sin^2 x + \sin x = \frac{-1}{2}$  and Equation B:  $\cos^2 x - \cos x = \frac{5}{4}$

After about 5 minutes, Baltazar got up and handed the teacher his answer to the problem he selected on a half sheet of paper, the teacher confirmed the answer to the problem that Baltazar provided.

Twenty minutes later, Penelope got up and handed the teacher her answer on two pieces on paper to the question she picked. The teacher confirmed her answer, but explained that Baltazar won the contest.

Which problem do you think Baltazar picked? Support your rationale with mathematics