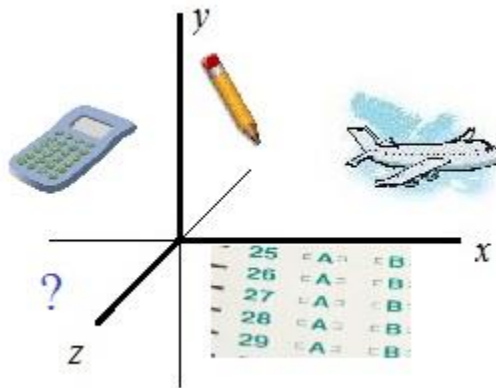


ACT Trigonometry Practice Questions

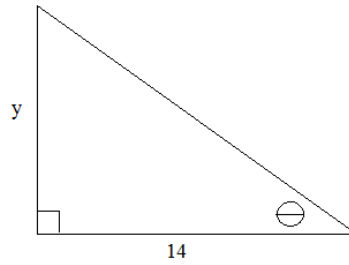
(And, Detailed Solutions)



Topics include Soh Cah Toa, Unit Circle, Law of Sines/Cosines, Periodic Function Graphs, Word Problems, Angle of Depression, Linear Speed, Radians, and more!

1) What is the expression in terms of θ ?

- a) $\frac{\sin \theta}{14}$
- b) $14 \sin \theta$
- c) $14 \sec \theta$
- d) $14 \tan \theta$
- e) $\frac{14}{\tan \theta}$



2) If $\sin B = 3/5$ and $\tan B < 0$, then $\cos B =$

- a) $\frac{4}{5}$
- b) $-\frac{4}{5}$
- c) $\frac{5}{\sqrt{34}}$
- d) $-\frac{5}{\sqrt{34}}$
- e) $\frac{3}{\sqrt{34}}$

3) $\sec(x) \cdot \cot(x) =$

- a) 1
- b) 0
- c) $\csc(x)$
- d) $\sin(x)$
- e) $\tan(x)$

4) Standing in a lighthouse, 150 feet above the shore, I spot a boat at an angle of depression of 11 degrees. How far away is the boat from shore?

- a) 29 feet
- b) 147 feet
- c) 153 feet
- d) 772 feet
- e) 786 feet

5) The subtraction property states that $\sin(A - B) = \sin A \cos B - \cos A \sin B$

Since $\frac{\pi}{4} - \frac{\pi}{6} = \frac{\pi}{12}$, what is $\sin(\frac{\pi}{12})$?

- a) $\frac{1}{4}$
- b) $\frac{\sqrt{6} + \sqrt{2}}{2}$
- c) $\frac{\sqrt{6} - \sqrt{2}}{2}$
- d) $\frac{\sqrt{2} - 1}{2}$
- e) $\frac{\sqrt{6} - \sqrt{2}}{4}$

6) Which equation best describes the periodic trig function?

- a) $4\sin(2x) + 3$
- b) $3\sin(2x) + 4$
- c) $4\sin(\frac{1}{2}x) + 3$
- d) $3\sin(\frac{1}{2}x) + 4$
- e) $7\sin(x)$



7) If placed on the unit circle, which angle measure differs from the others?

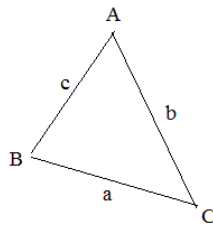
- a) 210 degrees
- b) -510 degrees
- c) $-\frac{5\pi}{6}$
- d) 390 degrees
- e) $\frac{19\pi}{6}$

8) According to the Law of Cosines, $c^2 = a^2 + b^2 - 2ab\cos C$

where a, b, and c are sides of a triangle, and C is the angle opposite to side c...

If $\overline{AB} = 4$, $\overline{BC} = 5$, and $\overline{AC} = 7$, what is the measure of angle C?

- a) 34
- b) 44
- c) 56
- d) 82
- e) 102



- 9) An angle B is in standard position in the xy-coordinate plane. The initial side is on the x-axis, and the terminal side passes through (-3, 7).

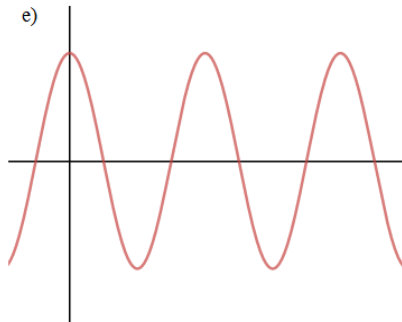
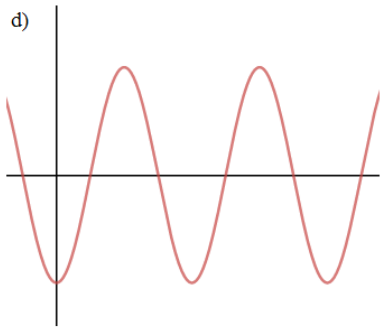
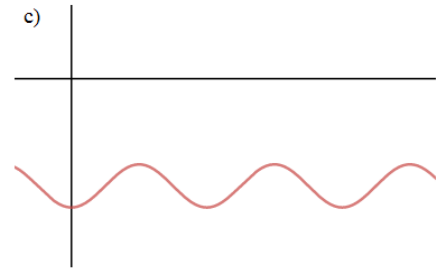
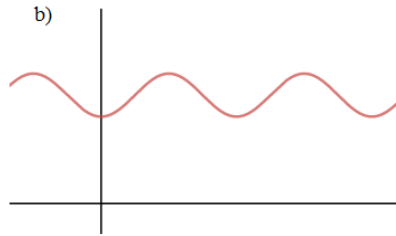
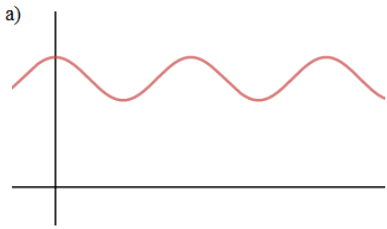
Cot(B) =

- a) -3/7
- b) -7/3
- c) 3/7
- d) 7/3
- e) none of the above

- 10) If $\tan(x) = 1$, and x is between $\frac{\pi}{2}$ and $\frac{3\pi}{2}$, then what is the value of $\frac{x}{3}$?

- a) $\frac{\pi}{3}$
- b) $\frac{5\pi}{12}$
- c) 0
- d) π
- e) $\frac{5\pi}{4}$

- 11) Which graph best represents $-\cos(x) + 5$?



- 12) In the system, $y = 3$
 $y = 4\sin(x)$, the graph would have how many intersections?

- a) none
- b) 1
- c) 2
- d) 3
- e) more than 3

13) $\cos(450^\circ) =$

- a) -1
- b) 0
- c) 1/2
- d) 1
- e) undefined

14) The period of the function $y = 5\sin(4\theta + 60^\circ)$ is

- a) 4
- b) 5
- c) 60°
- d) 90°
- e) 720°

15) The incline of a loading dock ramp (from the ground) must be 20 degrees. If the ramp must reach a height of 8 feet, what is the minimum length of the ramp?

- a) 8
- b) 21
- c) 24
- d) 30
- e) 33

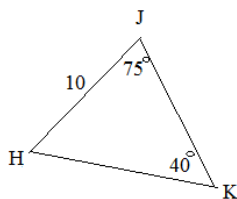
16) Simplify $(1 + \sin R)(1 - \sin R)$

- a) 2
- b) $\cos R$
- c) $\cos^2 R$
- d) $2 - \sin R$
- e) $1 - \sin R$

17) What is the length of JK?

(Hint: the law of sines -- $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$)

- a) 8.9
- b) 12.3
- c) 14.1
- d) 15
- e) 15.8



18) On the unit circle, the coordinate $(x, 3/5)$ lies in quadrant II...

$x =$

- a) $-4/5$
- b) $-3/5$
- c) $3/5$
- d) 1
- e) -4

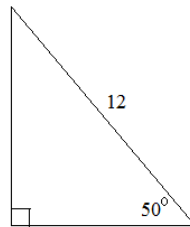
19) A bicycle wheel makes 10 rotations per minute.

If a piece of gum is stuck on the wheel, how many radians does the gum travel per minute?

- a) 10
- b) 20
- c) 31
- d) 63
- e) 78

20) What is the area of triangle ABC?

- a) 35.4
- b) 46.2
- c) 55.2
- d) 70.8
- e) 92.4



21) An angle in standard position has a measure equivalent to $\frac{17\pi}{4}$ radians...

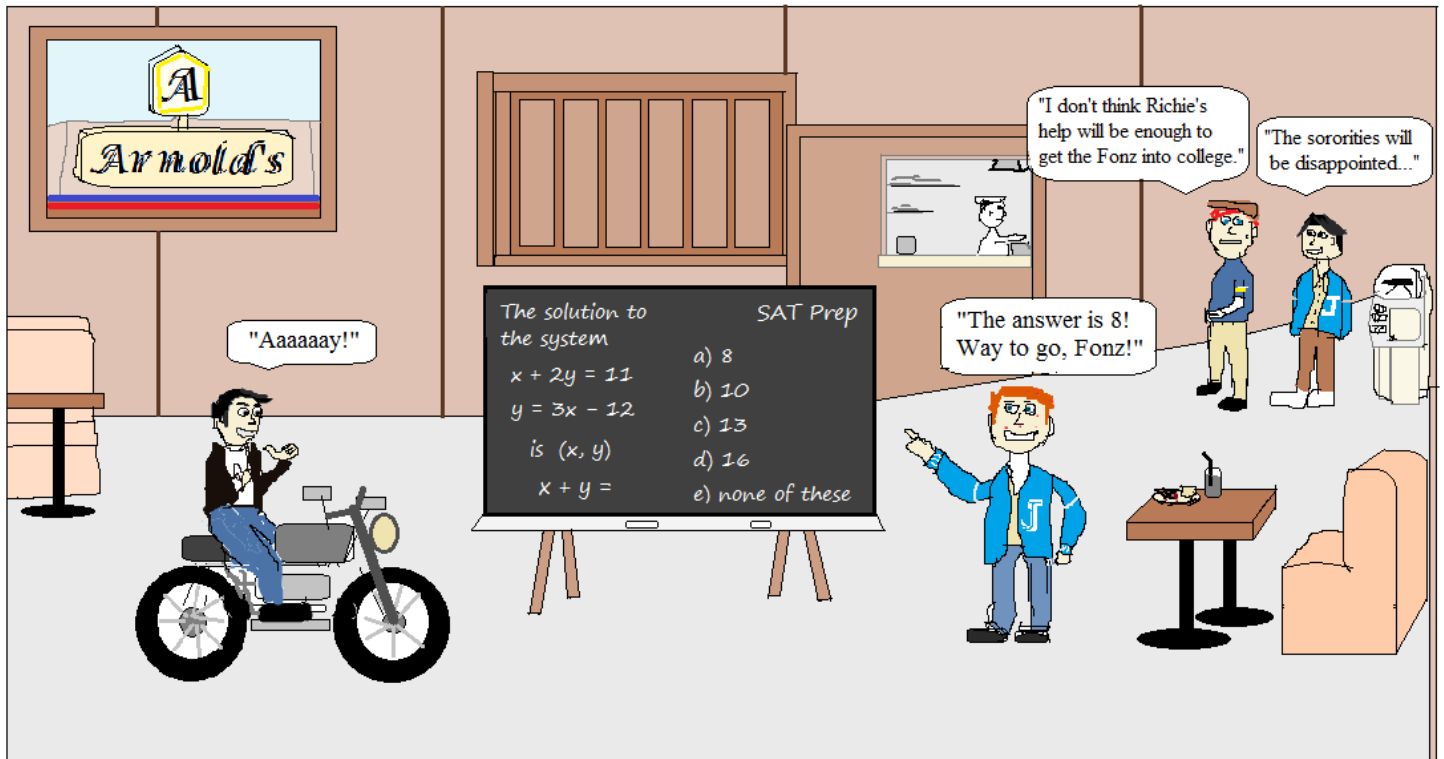
If drawn on the coordinate plane, the terminal side lands in which quadrant?

- a) I
- b) II
- c) III
- d) IV
- e) none (it lands on an axis)

22) In the equation $2\sin^2 x + 3\sin x + 1 = 0$ where $0^\circ < x < 360^\circ$

there are 3 solutions.... The sum of those solutions is

- a) 480 degrees
- b) 570 degrees
- c) 690 degrees
- d) 740 degrees
- e) 810 degrees



LanceAF #284 (6-21-17)
mathplane.com

Unfortunately, Fonzie's guessing only worked about 1/5 of the time!

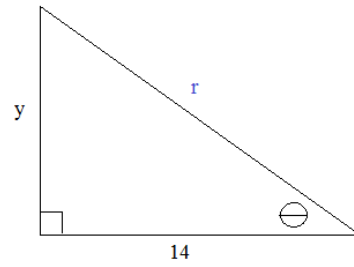
Happy Days
(Lost Episode)

SOLUTIONS-→

SOLUTIONS

1) What is the expression in terms of y ?

- a) $\frac{\sin \ominus}{14}$
- b) $14\sin \ominus$
- c) $14\sec \ominus$
- d) $14\tan \ominus$**
- e) $\frac{14}{\tan \ominus}$



$$\sin \ominus = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{y}{r} \quad y = r\sin \ominus$$

eliminates a) and b)

$$\sec \ominus = \frac{\text{hypotenuse}}{\text{adjacent}} = \frac{r}{14}$$

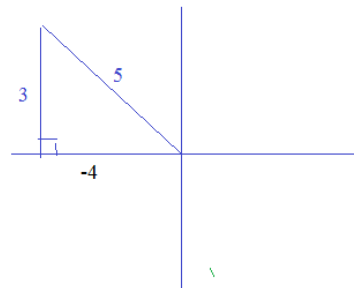
eliminate c)

$$\tan \ominus = \frac{\text{opposite}}{\text{adjacent}} = \frac{y}{14} \quad \boxed{y = 14\tan \ominus}$$

2) If $\sin B = 3/5$ and $\tan B < 0$, then $\cos B =$

- a) $\frac{4}{5}$
- b) $-\frac{4}{5}$**
- c) $\frac{5}{\sqrt{34}}$
- d) $\frac{-5}{\sqrt{34}}$
- e) $\frac{3}{\sqrt{34}}$

since sine is positive, quadrant I or II
 AND
 since tangent is negative, quadrant II or IV
 therefore, angle B is in quadrant II



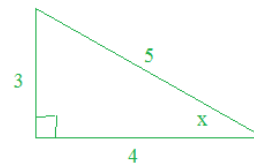
$$\cos B = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{-4}{5}$$

3) $\sec(x) \cdot \cot(x) =$

- a) 1
- b) 0
- c) $\csc(x)$**
- d) $\sin(x)$
- e) $\tan(x)$

$$\frac{1}{\cos(x)} \cdot \frac{\cos(x)}{\sin(x)} = \frac{1}{\sin(x)} = \csc(x)$$

Not sure of identities? Try creating a triangle:

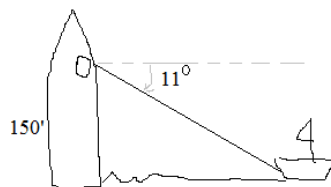


$$\begin{aligned} \sec(x) &= 5/4 \\ \cot(x) &= 4/3 \\ \sec(x) \cot(x) &= 5/4 \cdot 4/3 = 5/3 \\ 5/3 &= \csc(x) \end{aligned}$$

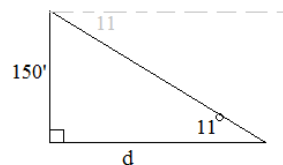
4) Standing in a lighthouse, 150 feet above the shore, I spot a boat at an angle of depression of 11 degrees. How far away is the boat from shore?

- a) 29 feet
- b) 147 feet
- c) 153 feet
- d) 772 feet**
- e) 786 feet

Step 1: Draw a diagram



Step 2: Extract the right triangle



Step 3: Solve

$$\tan(11^\circ) = \frac{150'}{d}$$

$$d = \frac{150'}{1.943} \approx \boxed{772 \text{ feet}}$$

check for reasonableness:
 772 feet is opposite the 79 degree angle and, 150 feet is opposite the 11 degree angle.

SOLUTIONS

5) The subtraction property states that $\sin(A - B) = \sin A \cos B - \cos A \sin B$

Since $\frac{\pi}{4} - \frac{\pi}{6} = \frac{\pi}{12}$, what is $\sin(\frac{\pi}{12})$?

a) $\frac{1}{4}$

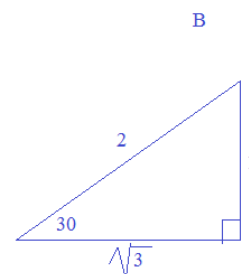
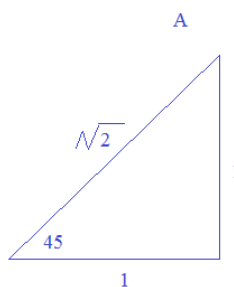
b) $\frac{\sqrt{6} + \sqrt{2}}{2}$

c) $\frac{\sqrt{6} - \sqrt{2}}{2}$

d) $\frac{\sqrt{2} - 1}{2}$

e) $\frac{\sqrt{6} - \sqrt{2}}{4}$

$$\begin{aligned} \sin A \cdot \cos B - \cos A \cdot \sin B \\ \sin(45) \cdot \cos(30) - \cos(45) \cdot \sin(30) \\ \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} \end{aligned}$$



6) Which equation best describes the periodic trig function?

a) $4\sin(2x) + 3$

b) $3\sin(2x) + 4$

c) $4\sin(\frac{1}{2}x) + 3$

d) $3\sin(\frac{1}{2}x) + 4$

e) $7\sin(x)$

$y = a\sin b(x - c) + d$

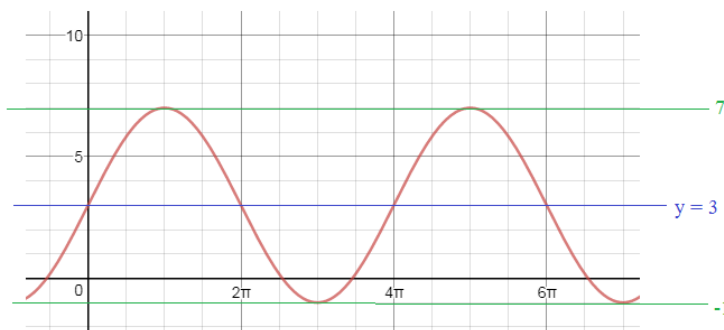
amplitude a: 4

vertical shift d: axis of wave is +3

period: one cycle is 4π

$b = \frac{1}{2}$

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



7) If placed on the unit circle, which angle measure differs from the others?

a) 210 degrees

b) -510 degrees

c) $\frac{-5\pi}{6}$

d) 390 degrees

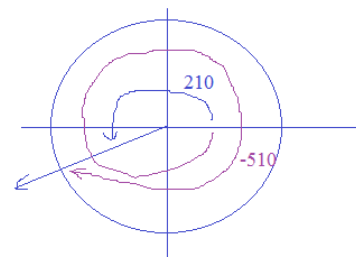
e) $\frac{19\pi}{6}$

in other words, which angles are coterminal?

210 degrees $(-360 - 360) = -510$ so, a) and b) are coterminal

$\frac{19\pi}{6}$ has the same terminal side $\frac{-5\pi}{6}$

390 degrees ends in quadrant I...



8) According to the Law of Cosines, $c^2 = a^2 + b^2 - 2ab\cos C$

where a, b, and c are sides of a triangle, and C is the angle opposite to side c...

If $\overline{AB} = 4$, $\overline{BC} = 5$, and $\overline{AC} = 7$, what is the measure of angle C?

a) 34

b) 44

c) 56

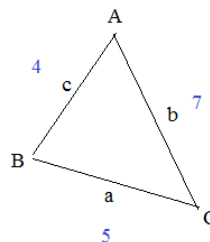
d) 82

e) 102

$(4)^2 = (5)^2 + (7)^2 - 2(5)(7)\cos(C)$

$16 = 25 + 49 - 70\cos(C)$

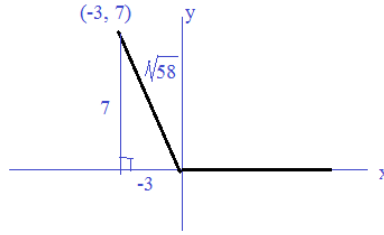
$\frac{-58}{-70} = \cos(C)$ C = 34 degrees



- 9) An angle B is in standard position in the xy-coordinate plane. The initial side is on the x-axis, and the terminal side passes through (-3, 7). Cot(B) =

SOLUTIONS

- a) -3/7
- b) -7/3
- c) 3/7
- d) 7/3
- e) none of the above

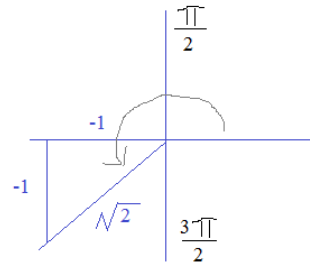
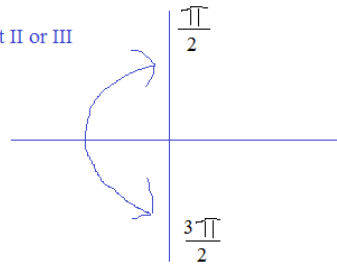


$$\text{cotangent} = \frac{\text{adjacent}}{\text{opposite}} = \frac{-3}{7}$$

- 10) If $\tan(x) = 1$, and x is between $\frac{\pi}{2}$ and $\frac{3\pi}{2}$, then what is the value of $\frac{x}{3}$?

- a) $\frac{\pi}{3}$
- b) $\frac{5\pi}{12}$
- c) 0
- d) π
- e) $\frac{5\pi}{4}$

x is in quadrant II or III

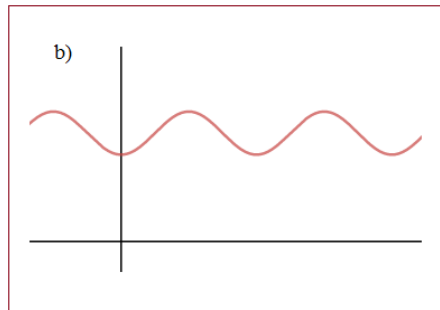
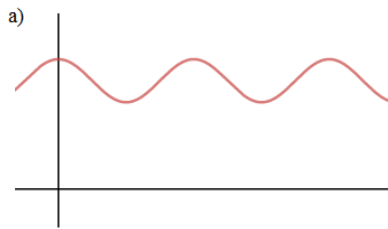


$\tan(x) = 1$
in quad III,

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

$$\text{therefore, } \frac{x}{3} = \frac{5\pi}{12}$$

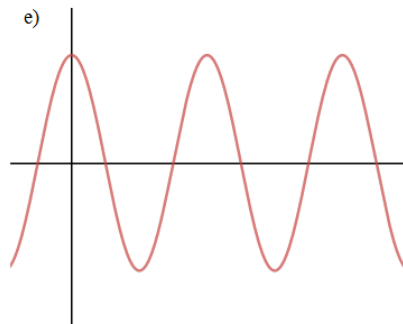
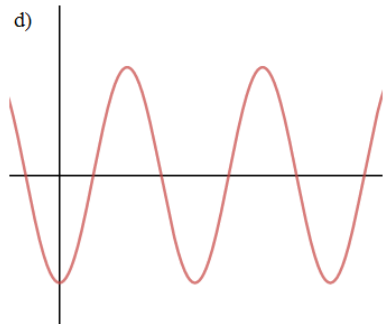
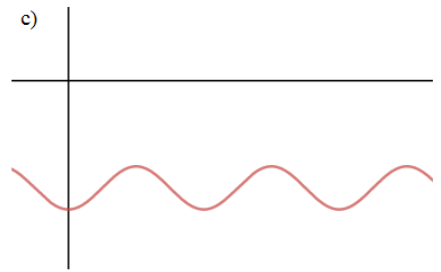
- 11) Which graph best represents $-\cos(x) + 5$?



$$y = a \cos b(x - c) + d$$

since the vertical shift is +5,
there are 2 possibilities: a) and b)

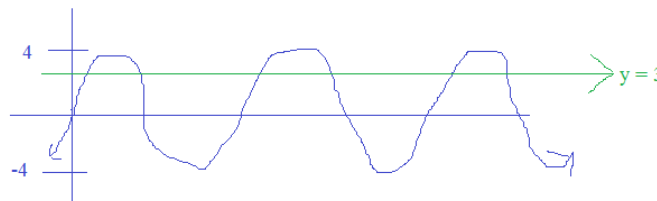
since there is a vertical reflection, the answer is b)



- 12) In the system, $y = 3$
 $y = 4\sin(x)$, the graph would have how many intersections?

- a) none
- b) 1
- c) 2
- d) 3
- e) more than 3

infinite intersections (solutions)

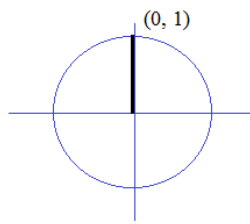


SOLUTIONS

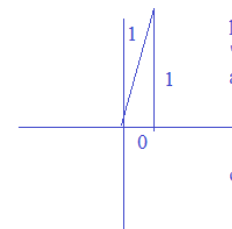
13) $\cos(450^\circ) =$

- a) -1
- b) 0**
- c) 1/2
- d) 1
- e) undefined

$\cos(450) = \cos(90)$ coterminal angles..



on unit circle,
 $\cos = x$
therefore, at (0, 1)
 $\cos(90) = 0$



hypothetical "triangle" at 90 degrees...

$\cos(90) = \frac{0}{1} = 0$

14) The period of the function $y = 5\sin(4\theta + 60^\circ)$ is

- a) 4
- b) 5
- c) 60°
- d) 90°**
- e) 720°

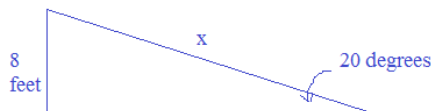
period = $\frac{360^\circ}{B} = \frac{360^\circ}{4}$

since $B = 4$, the period is 90 degrees...

15) The incline of a loading dock ramp (from the ground) must be 20 degrees. If the ramp must reach a height of 8 feet, what is the minimum length of the ramp?

- a) 8
- b) 21
- c) 24**
- d) 30
- e) 33

$\sin(20^\circ) = \frac{8}{x}$ $x = 23.39$ (approx.)



16) Simplify $(1 + \sin R)(1 - \sin R)$

- a) 2
- b) $\cos R$
- c) $\cos^2 R$**
- d) $2 - \sin R$
- e) $1 - \sin R$

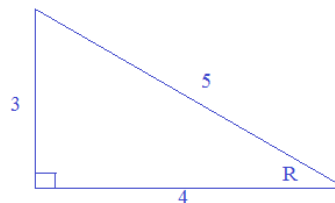
Using trig identities...

$(1 + \sin R)(1 - \sin R) = 1 - \sin^2 R$
 $= \cos^2 R$

since $\sin^2 x + \cos^2 x = 1$
(Pythagorean identity)

Using an example...

suppose you don't know the identities.... try using an example



$1 + \sin R = \frac{8}{5}$

$1 - \sin R = \frac{2}{5}$

$(1 + \sin R)(1 - \sin R) = \frac{16}{25}$ ✓

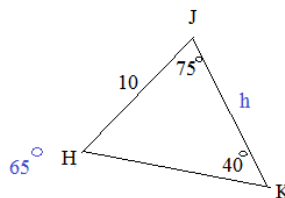
$\cos^2 R = \frac{16}{25}$ ✓

17) What is the length of JK?

(Hint: the law of sines -- $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$)

- a) 8.9
- b) 12.3
- c) 14.1**
- d) 15
- e) 15.8

cannot be 8.9..
(MUST be > 10)



$\frac{h}{\sin H} = \frac{k}{\sin K}$

$\frac{h}{\sin(65)} = \frac{10}{\sin(40)}$

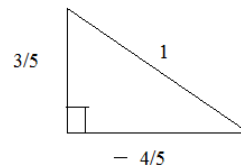
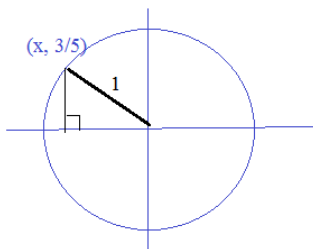
$h = 14.1$

18) On the unit circle, the coordinate $(x, 3/5)$ lies in quadrant II...

SOLUTIONS

$x =$

- a) -4/5
- b) -3/5
- c) 3/5
- d) 1
- e) -4



19) A bicycle wheel makes 10 rotations per minute. If a piece of gum is stuck on the wheel, how many radians does the gum travel per minute?

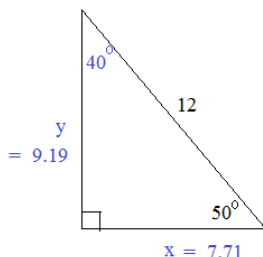
- a) 10
- b) 20
- c) 31
- d) 63
- e) 78

$$10 \text{ rotations} \cdot \frac{2\pi \text{ radians}}{1 \text{ rotation}} = 62.8 \text{ (approx.)}$$

(360 degrees)

20) What is the area of triangle ABC?

- a) 35.4
- b) 46.2
- c) 55.2
- d) 70.8
- e) 92.4



Using trig values: $\sin(50) = \frac{y}{12}$ $y = 9.19$

$\cos(50) = \frac{x}{12}$ $x = 7.71$

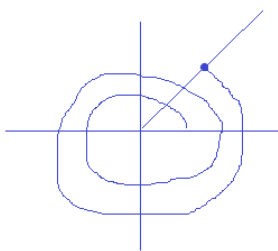
(Use Pythagorean Theorem to check work)

Then, area of triangle = $(1/2)(\text{base})(\text{height}) = (1/2)(7.71)(9.19) = 35.4$

21) An angle in standard position has a measure equivalent to $\frac{17\pi}{4}$ radians...

If drawn on the coordinate plane, the terminal side lands in which quadrant?

- a) I
- b) II
- c) III
- d) IV
- e) none (it lands on an axis)



$$\frac{17\pi}{4} - \frac{8\pi}{4} = \frac{9\pi}{4}$$

$$\frac{9\pi}{4} - \frac{8\pi}{4} = \frac{\pi}{4}$$

coterminal angle that is equivalent to 45°

22) In the equation $2\sin^2 x + 3\sin x + 1 = 0$ where $0^\circ < x < 360^\circ$

there are 3 solutions.... The sum of those solutions is

- a) 480 degrees
- b) 570 degrees
- c) 690 degrees
- d) 740 degrees
- e) 810 degrees

$$(2\sin x + 1)(\sin x + 1) = 0$$

$$\sin x + 1 = 0$$

$$\sin x = -1$$

$$x = 270 \text{ degrees}$$

$$2\sin x + 1 = 0$$

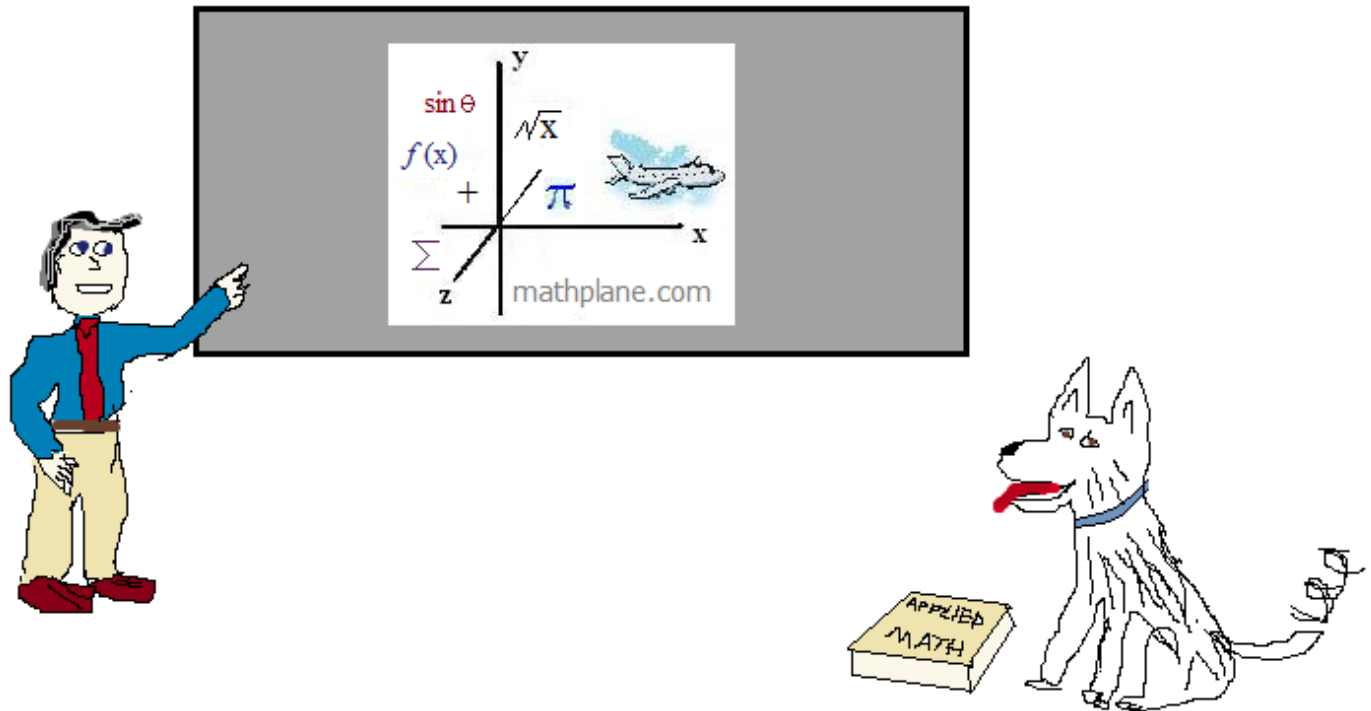
$$\sin x = -1/2$$

$$x = 210 \text{ degrees or } 330 \text{ degrees}$$

Thanks for visiting. (Hope it helped!)

If you have questions, suggestions, or requests, let us know.

Cheers...



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1) In a geometric sequence, the 2nd term is 12 and the 4th term is 3.
The seventh term is

- a) $-13/2$
- b) -6
- c) $3/8$
- d) $1/2$
- e) $3/4$

2) A car gets 30 miles per gallon.
How much will it cost to drive 1000 miles?

- a) \$177
- b) \$269
- c) \$299
- d) \$508
- e) \$538

3) How many different 4-person committees can be selected from a 10-member club?

- a) 40

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