

1. Write each of the Pythagorean identities in at least 3 different equivalent equations.

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<p>2. Which of the following expressions is NOT equivalent to the other three?</p>	<p>a) $\frac{\cos x}{\sin x}$</p> <p>b) $\cot x$</p> <p>c) $\frac{1}{\tan x}$</p> <p>d) $1 + \cot^2 x$</p>
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3. Simplify the following trig expressions:

<p>a) $\frac{\sec^2 x - 1}{\sec x + 1}$</p>	<p>b) $\frac{\cos^2 x - 1}{\cos^2 x}$</p>	<p>c) $\csc^2 x - \cot^2 x + \sec^2 x - 1$</p>
<p>d) $\frac{\cos^2 x - 1}{\sin^2 x - 1}$</p>	<p>e) $\frac{1 + \cot^2 x}{\sec^2 x}$</p>	<p>f) $\cos x (\sec x + \tan x)$</p>

4. Verify the following trig identities:

a) $\frac{\tan x + \cot x}{\cot x} = \sec^2 x$	b) $\frac{1}{\sec x - \tan x} - \frac{1}{\sec x + \tan x} = 2 \tan x$	c) $\cos\left(\frac{3\pi}{2} + x\right) = \sin x$
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5. Verify the following:

a) $\cos(x + 30) + \sin(x - 60) = 0$	b) $\cos(x + y) + \cos(x - y) = 2 \cos x \cos y$
c) $\cos^2 5x - \sin^2 5x = \cos 10x$	d) $\sin 4x = 4 \cos x \sin x \cos 2x$
e) $\sin 6x = 2 \sin 3x \cos 3x$	f) $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

8. Find the exact value of the following:

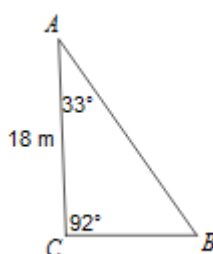
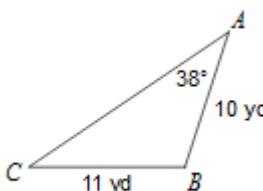
a) $\cos 112.5^\circ$	b) $\sin \frac{11\pi}{12}$	c) $\tan \frac{3\pi}{8}$
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9. Complete each statement:

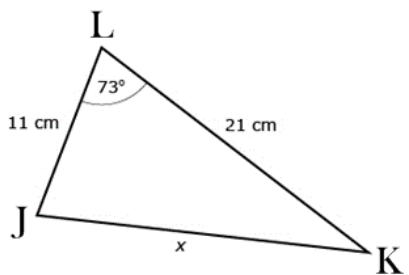
a) If $\cos x = k$, then $\cos(-x) =$	b) If $\tan x = a$, then $\tan(2\pi - x) =$
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10. Given that $\sin x = \frac{3}{5}$, and x is in Q1, what is the value of the expression $\cos\left(\frac{\pi}{2} - x\right)$?

11. Solve for all missing pieces of the following triangles:

a) 	b) 
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12. Solve each of the following using Law of Sines or Law of Cosines.

<p>a) For $\triangle ABC$ (draw it), $\angle C = 65^\circ$, $b = 12$, $c = 5$. Find $\angle B$.</p>	<p>b) For $\triangle ABC$ (draw it), $\angle A = 35^\circ$, $a = 9$, $\angle B = 65^\circ$. Find b.</p>	<p>c) For the $\triangle JKL$, find side length x.</p>  <p>The diagram shows a triangle with vertices J, K, and L. Vertex L is at the top, J is at the bottom left, and K is at the bottom right. Side LJ is labeled 11 cm. Side LK is labeled 21 cm. The angle at vertex L is labeled 73 degrees. The side JK is labeled x.</p>
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13. State the number of possible triangles given the following information, then solve the triangle(s).

<p>a) $m\angle B = 89^\circ$, $b = 24$, $a = 12$</p>	<p>b) $m\angle A = 86^\circ$, $c = 7$, $a = 4$</p>
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14. Joanna is interested in determining the height of a tree. She is at point A, 80 feet from the base of the tree, and she notices that the angle of elevation to the top of the tree is 52° . The tree is leaning towards her and is growing at an angle of 85° with respect to the ground. What is the height of the tree?

15. You are sailing a boat and need to get to an island that is 50 miles to the West of your current location. But there are rough seas along the direct route. To avoid this, you take a path at a bearing of 245° for 30 miles. How far away are you from the island and at what bearing must you now sail to get to the island?

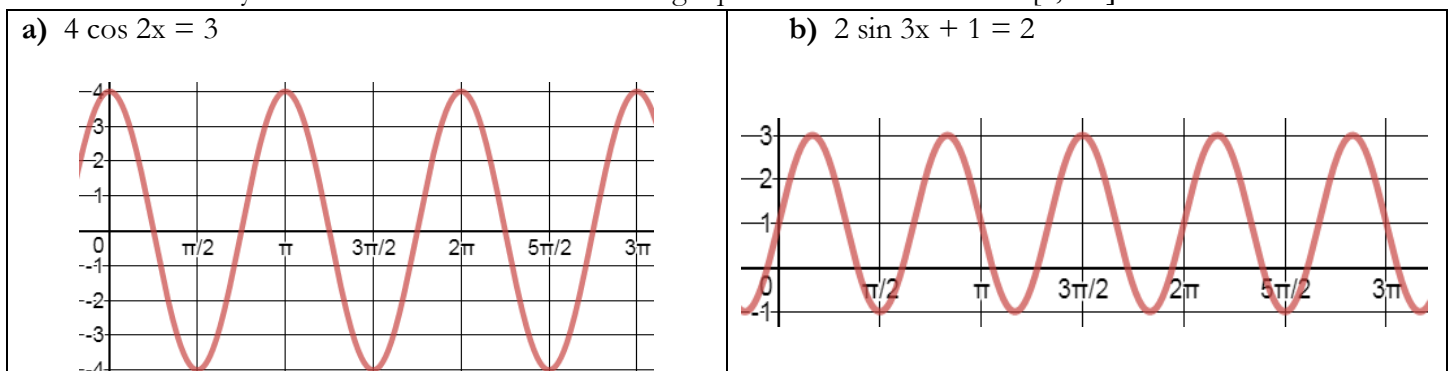
16. Which of the following statements is NOT true?

- a) You can use the law of sines if you know any two angles and any one side of the triangle.
- b) You can use the law of sines if you know the three sides of a triangle.
- c) You can use the law of cosines if you know any two sides and any one angle of a triangle
- d) You can use the law of cosines if you know the three sides of a triangle.

17. You CANNOT use the law of cosines if you know:

- a) the three sides of a triangle
- b) two sides and the included angle
- c) two angles and the included side
- d) two sides and the non-included angle

18. How many solutions are there to the following equations over the interval $[0, 2\pi]$



18. The frequency of the musical note A_3 is 220 Hz.

- What is the equation for a sine wave that represents A_3 played at a volume of 75 dB?
- A note one octave higher vibrates twice as fast. What would the equation for the sine wave be if the note described above was played one octave higher?
- What would the equation be if the note were played one octave lower?

19) The number of daylight hours for San Diego can be modeled by the equation

$$h(d) = 2.4 \sin \left[\frac{2\pi}{365.25} (d - 80) \right] + 12, \text{ for } d = \text{day of year.}$$

- Graph the function.
- On what dates does San Diego have 10 hours of daylight?
- On what dates does San Diego have more than 15 hours of daylight?
- Rounded to the nearest hour, what are the maximum and minimum numbers of hours of daylight in San Diego?

20) For $\triangle ABC$, $b = 7.5$, $c = 9.8$, and $A = 50.5^\circ$. Which equation can be used to calculate the value of side a ?

A) $a = \sqrt{(7.5)^2 + (9.8)^2 + (2)(7.5)(9.8) \cos 50.5^\circ}$

B) $a = \sqrt{(7.5)^2 + (9.8)^2 - (2)(7.5)(9.8) \cos 50.5^\circ}$

C) $a = \sqrt{(7.5)^2 + (9.8)^2 + (7.5)(9.8) \cos 50.5^\circ}$

D) $a = \sqrt{(7.5)^2 + (9.8)^2 - (7.5)(9.8) \cos 50.5^\circ}$