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# Check Your Understanding: Answers

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1. Explain why the sine law holds true for obtuse angle triangles as well as acute angle triangles.

For an angle in standard position, the sine of this angle is defined as  $\frac{y}{r}$ . Whether the angle is obtuse or acute, the values of  $y$  and  $r$  are positive and therefore have no effect on the sine law. (See section 6.1, Part 2.)

2. What dimensions of a triangle do you need to know to use the cosine law? the sine law?

To use the cosine law, you need to know SSS or SAS. To use the sine law, you need to know AAS, ASA, or SSA (be careful about the ambiguous case). (See the *Key Ideas* in section 6.1.)

3. If you are given a side, an angle, and the side opposite this angle, how many triangles could you create? What additional information about the triangle do you need to determine to help you decide which case you are dealing with?

Depending on the length of the sides, you can create one or two triangles or you cannot create any triangles. Suppose you know sides  $a$  and  $b$  and  $\angle A$ ; you need to compare side  $a$  with the value of  $b \sin A$ . (See section 6.1, *Key Ideas*, case 4.)

4. You are asked to determine the exact value of  $\sin \frac{\pi}{4}$ .

- (a) Explain why you cannot use a calculator in this case.

A calculator generates an irrational number or an approximation, but not an exact value.

- (b) What must you use to accomplish this?

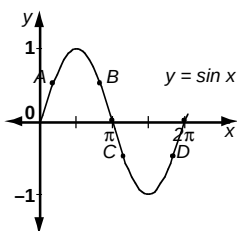
To obtain an exact answer, you must use a special isosceles right triangle.

- (c) To obtain an approximate value from the calculator, what mode would you use?

Set the calculator to radian (not degree) mode, since the angle is expressed in radians.

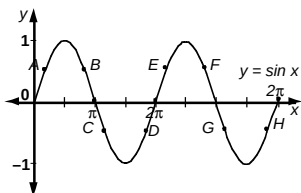
5. Determine, over the domain  $0 \leq \theta \leq 2\pi$ , the maximum number of solutions possible for a trigonometric equation based on

- (a) the sine function with a period of  $2\pi$



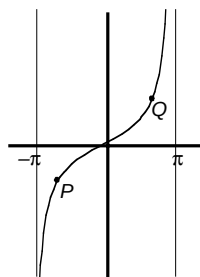
The maximum number of solutions is two, because a horizontal line will intersect the graph at no more than two points for this period. For example, points  $A$  and  $B$  are possible solutions for a positive value of sine, while  $C$  and  $D$  are solutions for a negative value of sine.

- (b) the sine function with a period of  $4\pi$



The maximum number of solutions is four, because a horizontal line will intersect the graph at no more than four points for this period. For example, points  $A$ ,  $B$ ,  $E$ , and  $F$  are possible solutions for a positive value of sine, while  $C$ ,  $D$ ,  $G$ , and  $H$  are possible solutions for a negative value of sine.

(c) the tangent function with a period of  $\pi$



There is only one solution, because a horizontal line will intersect the graph at no more than one point for this period. For example,  $P$  is a possible solution for a negative value of tangent, while  $Q$  is a possible solution for a positive value of tangent.

6. How many solutions does a trigonometric equation have if the domain is not specified? Explain why.

Without a specific domain, there are an infinite number of solutions for a trigonometric equation, as the curve repeats itself to infinity.

7. If an equation is also an identity, how many solutions can it have? Explain.

An identity can have an infinite number of solutions, because the identity is true for every value in the domain.

8. Explain how you could prove that a given equation is an identity using

(a) a graph

Graph each side of the equation. The equation is an identity if the graphs are the same.

(b) algebra

Show that both sides of the equation represent the same expression to prove that the original equation is an identity. One side can equal the other, or both sides can equal the same expression.

9. Write an example of

(a) a linear trigonometric equation

Example:  $3 \tan \beta = -2$

(b) a quadratic trigonometric equation

Example:  $\sin^2 \alpha - 5 \sin \alpha + 6 = 0$

10. Can all quadratic trigonometric equations be solved by factoring? Explain.

Some simple quadratic trigonometric equations can be solved by factoring. For other types of this equation, it might be necessary to first to express the equation in standard form, use the Pythagorean identity, or rearrange the equation before factoring.

11. Approximate solutions to linear and quadratic trigonometric equations can be found using graphing technology. What must be done to the equation so that the zeros of the corresponding trigonometric function can be used to solve the original equation?

The equation must be written in standard form.