Six Trigonometric Functions

Answer Key

1) Answer: A
Explanation: Cosine of the acute angle θ is the ratio of the adjacent side of θ to the hypotenuse of the right triangle. Mathematically:

$$\cos \theta = \text{adjacent side/hypotenuse}$$

The adjacent side of the given right triangle has a measurement of 24 units. Meanwhile, the right triangle's hypotenuse measures 25 units. Therefore, the value of the cosine of θ is:

$$\cos \theta = \text{adjacent side/hypotenuse}$$
$$\cos \theta = 24/25$$

Thus, the answer is 24/25.

2) Answer: C
Explanation: Among the given options, only the value of the tangent of θ is correct. Let us falsify each option to see why they are not the correct answer:

(a) The value of csc θ is 25/7 and not 7/24.
(b) The value of sec θ is 25/24. Recall that the secant of θ is just the reciprocal of the cosine of θ. In item 1, we found out that the cosine of θ is 24/25. Thus, the sec θ should be the reciprocal of 24/25 (which is 25/24). Hence, sec θ = 25/7 is wrong.
(c) This is the correct answer.
(d) The value of sin θ must be 7/25 and not 24/25 (which is the value of cos θ).

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3) Answer: C
Explanation: Recall that the special angle 45° has a sine and cosine values that are both $\sqrt{2}/2$. Since the trigonometric values of sin 45° and cos 45° are the same, then sin(45°) - cos(45°) = 0.

4) Answer: D
Explanation: Basically, it's asking us what special angle has the sine value of ½ or 0.5. If you take a look at our table of trigonometric values of special angles (which I hope you have memorized or at least become familiar with), you will see that sin 30° is equal to ½ or 0.5.

5) Answer: B
Explanation: Recall that the perimeter of a triangle is just the sum of the measures of its three sides. Thus, the perimeter of a right triangle is just the sum of the lengths of its legs and hypotenuse.

In the given problem, the sin of the acute angle θ of the given right triangle has a value of $\frac{10}{26}$. Recall that the definition of the sin θ is the ratio of the length of the opposite leg to the length of the hypotenuse or:

sin θ = opposite side/hypotenuse

Since sin θ = 10/26, then the opposite side of the right triangle measures 10 units and its hypotenuse measures 26 units.

Now that we're able to reveal the two sides of the right triangle (one leg and the hypotenuse), we need one more side so that we can calculate the perimeter of the right triangle. To find that remaining side, we need to find the value or the measurement of the adjacent side of the acute angle θ.

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Recall that by the Pythagorean theorem:

$(\text{Opposite side})^2 + (\text{adjacent side})^2 = (\text{hypotenuse})^2$

We already have opposite side = 10 and hypotenuse = 26; inputting these values to the equation above:

$(10)^2 + (\text{adjacent side})^2 = (\text{hypotenuse})^2$

For the sake of conciseness, let *x* be the length of the adjacent side:

$(10)^2 + (x)^2 = (26)^2$

Let us now do the math and compute for the value of *x* in the equation above:

$(10)^2 + (x)^2 = (26)^2$

$100 + x^2 = 676$

$x^2 = -100 + 676$ *Transposition method*

$x^2 = 576$

$\sqrt{x^2} = \sqrt{576}$ *Take the square root of both sides of the equation*

$x = \pm 24$

We reject the negative value of *x* since *x* represents the length of the adjacent side. Hence, we will take x = 24 only.

Thus, the length of the adjacent side is 24 units.

We now have three sides:

- Opposite side = 10 units
- Adjacent side = 24 units
- Hypotenuse = 26 units.

We add the measurements of these sides to obtain the perimeter of the right triangle:

P = 10 + 24 + 26 = 60 cm

Thus, the perimeter of the right triangle is 60 cm.