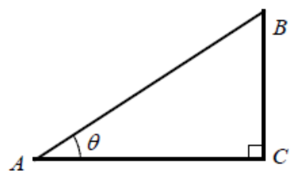
Practice Test

Trigonometry

1



Note: Figure not drawn to scale.

In the right triangle shown above, if $\tan\theta = \frac{3}{4}$, what is $\sin\theta$?

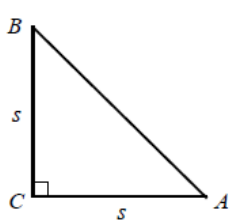
A) $\frac{1}{3}$

B) $\frac{1}{2}$

C) $\frac{4}{5}$

D) $\frac{3}{5}$

2



In the isosceles right triangle shown above, what is $\tan\angle A$?

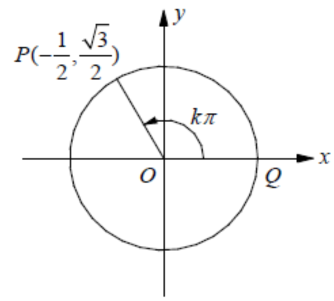
A) s

B) $\frac{1}{s}$

C) 1

D) $\frac{s}{\sqrt{2}}$

Questions 1 and 2 refer to the following information.



In the xy- plane above, O is the center of the circle, and the measure of $\angle POQ$ is $k\pi$ radians.

3

What is the value of k ?

A) $\frac{1}{3}$

B) $\frac{1}{2}$

C) $\frac{2}{3}$

D) $\frac{3}{4}$

4

What is $\cos(k+1)\pi$?

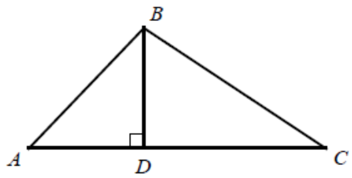
A) $\frac{1}{\sqrt{3}}$

B) $\frac{1}{2}$

C) $\frac{\sqrt{3}}{2}$

D) $\sqrt{3}$

5



In triangle ABC above, $\overline{AC} \perp \overline{BD}$. Which of the following does not represent the area of triangle ABC?

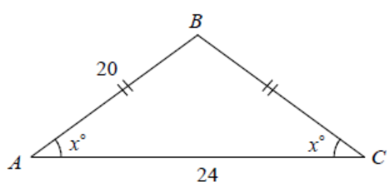
A) $\frac{1}{2}(AB\cos\angle A + BC\cos\angle C)(AB\cos\angle ABD)$

B) $\frac{1}{2}(AB\cos\angle A + BC\cos\angle C)(BC\sin\angle C)$

C) $\frac{1}{2}(AB\sin\angle ABD + BC\sin\angle CBD)(AB\sin\angle A)$

D) $\frac{1}{2}(AB\sin\angle ABD + BC\sin\angle CBD)(BC\cos\angle C)$

6



In the isosceles triangle above, what is the value of $\sin x^\circ$?

A) $\frac{1}{2}$

B) $\frac{3}{5}$

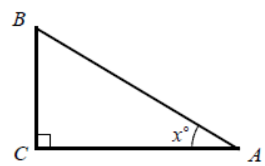
C) $\frac{2}{3}$

D) $\frac{4}{5}$

7

In triangle ABC, the measure of $\angle C$ is 90°, $AC = 24$, and $BC = 10$. What is the value of $\sin A$?

8



In the right triangle ABC above, the cosine of x° is $\frac{3}{5}$. If $BC = 12$, what is the length of AC?

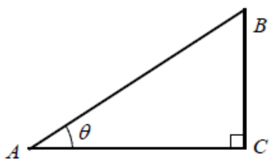
9

If $\sin(5x - 10)^\circ = \cos(3x + 16)^\circ$, what is the value of x?

Answers

Trigonometry

1. D



Note: Figure not drawn to scale.

In ΔABC, $\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{BC}{AC}$.

If $\tan\theta = \frac{3}{4}$, then $BC = 3$ and $AC = 4$.

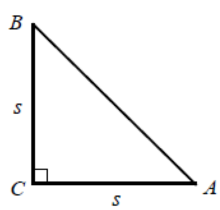
By the Pythagorean theorem,

$AB^2 = AC^2 + BC^2 = 4^2 + 3^2 = 25$, thus

$AB = \sqrt{25} = 5$.

$\sin\theta = \frac{BC}{AB} = \frac{3}{5}$

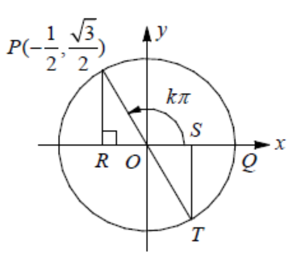
2. C



$\tan\angle A = \frac{\text{opposite side of } \angle A}{\text{adjacent side of } \angle A} = \frac{s}{s} = 1$

$= \frac{s}{s} = 1$

3. C



Draw segment PR, which is perpendicular to the x-axis. In right triangle POR, $x = -\frac{1}{2}$ and $y = \frac{\sqrt{3}}{2}$. To find the length of OP, use the Pythagorean theorem.

$OP^2 = PR^2 + OR^2 = (\frac{\sqrt{3}}{2})^2 + (\frac{-1}{2})^2 = \frac{3}{4} + \frac{1}{4} = 1$

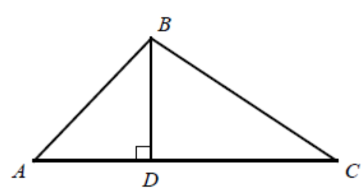
Which gives $OP = 1$. Thus, triangle OPR is $30°$-$60°$-$90°$ triangle and the measure of $\angle POR$ is $60°$, which is $\frac{\pi}{3}$ radian. Therefore, the measure of $\angle POQ$ is $\pi - \frac{\pi}{3}$, or $\frac{2\pi}{3}$ radian. If $\angle POQ$ is $k\pi$ radians then k is equal to $\frac{2}{3}$.

4. B

Since the terminal side of $(k+1)\pi$ is OT, the value of $\cos(k+1)\pi$ is equal to $\frac{OS}{OT}$.

$\frac{OS}{OT} = \frac{1}{2}$

5. D



Area of triangle $ABC = \frac{1}{2}(AC)(BD)$

Check each answer choice.

A) $\frac{1}{2}(AB\cos\angle A + BC\cos\angle C)(AB\cos\angle ABD)$

$= \frac{1}{2}(AB \cdot \frac{AD}{AB} + BC \cdot \frac{CD}{BC})(AB \cdot \frac{BD}{AB})$

$= \frac{1}{2}(AD + CD)(BD) = \frac{1}{2}(AC)(BD)$

B) $\frac{1}{2}(AB\cos\angle A + BC\cos\angle C)(BC\sin\angle C)$

$= \frac{1}{2}(AB \cdot \frac{AD}{AB} + BC \cdot \frac{CD}{BC})(BC \cdot \frac{BD}{BC})$

$= \frac{1}{2}(AD + CD)(BD) = \frac{1}{2}(AC)(BD)$

Answers
Trigonometry

C) $\frac{1}{2}(AB \sin \angle ABD + BC \sin \angle CBD)(AB \sin \angle A)$

$= \frac{1}{2}(AB \cdot \frac{AD}{AB} + BC \cdot \frac{CD}{BC})(AB \cdot \frac{BD}{AB})$

$= \frac{1}{2}(AD + CD)(BD) = \frac{1}{2}(AC)(BD)$

D) $\frac{1}{2}(AB \sin \angle ABD + BC \sin \angle CBD)(BC \cos \angle C)$

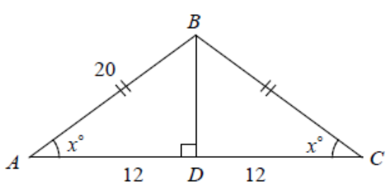
$= \frac{1}{2}(AB \cdot \frac{AD}{AB} + BC \frac{CD}{BC})(BC \cdot \frac{CD}{BC})$

$= \frac{1}{2}(AD + CD)(CD) = \frac{1}{2}(AC)(CD)$

Which does not represent the area of triangle ABC.

Choice D is correct.

6. D



Draw segment BD, which is perpendicular to side AC. Because the triangle is isosceles, a perpendicular segment from the vertex to the opposite side bisects the base and creates two congruent right triangles.

Therefore, $AD = \frac{1}{2}AC = \frac{1}{2}(24) = 12$.

By the Pythagorean theorem, $AB^2 = BD^2 + AD^2$

Thus, $20^2 = BD^2 + 12^2$.

$BD^2 = 20^2 - 12^2 = 256$

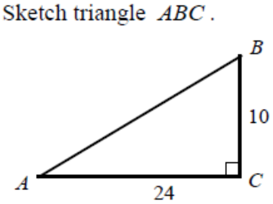
$BD = \sqrt{256} = 16$

In right ΔABD,

$\sin x^\circ = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{BD}{AB} = \frac{16}{20} = \frac{4}{5}$.

7. $\frac{5}{13}$

Sketch triangle ABC.



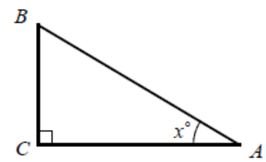
$AB^2 = BC^2 + AC^2$

$AB^2 = 10^2 + 24^2 = 676$

$AB = \sqrt{676} = 26$

$\sin A = \frac{10}{26} = \frac{5}{13}$

8. 9



$\cos x^\circ = \frac{AC}{AB} = \frac{3}{5}$

Let $AC = 3x$ and $AB = 5x$.

$AB^2 = BC^2 + AC^2$ Pythagorean Theorem

$(5x)^2 = 12^2 + (3x)^2$ $BC = 12$

$25x^2 = 144 + 9x^2$

$16x^2 = 144$

$x^2 = 9$

$x = \sqrt{9} = 3$

Therefore, $AC = 3x = 3(3) = 9$

9. 10.5

According to the complementary angle theorem, $\sin\theta = \cos(90 - \theta)$.

If $\sin(5x - 10)^\circ = \cos(3x + 16)^\circ$,

$3x + 16 = 90 - (5x - 10)$.

$3x + 16 = 90 - 5x + 10$

$3x + 16 = 100 - 5x$

$8x = 84$

$x = 10.5$