Topic: The unit circle

Question: What is the coordinate point associated with $\theta = 30^\circ$ along the unit circle?

Answer choices:

A $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

B $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

C $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

D $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

Solution: A

Looking at the unit circle shows that the coordinate point associated with $\theta = 30°$ in the first quadrant is

$$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$$

Topic: The unit circle

Question: At which angles are sine and cosine equivalent?

Answer choices:

A $\frac{\pi}{4}$

B $\frac{\pi}{4}, \frac{3\pi}{4}$

C $\frac{\pi}{4}, \frac{5\pi}{4}$

D $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

Solution: C

The sign of cosine and sine is the same in the first and third quadrants, so we need to find the angles in these quadrants. From the unit circle, we see that sine and cosine are the same at $\theta = \pi/4$ and $\theta = 5\pi/4$.

Topic: The unit circle

Question: Use the unit circle to find the value of tangent of the angle $\theta = 5\pi/3$.

Answer choices:

A -1

B $\frac{\sqrt{3}}{3}$

C $\sqrt{3}$

D $-\sqrt{3}$

Solution: D

Looking at the unit circle, we know that sine of $\theta = 5\pi/3$ is the y-value of the coordinate point at that angle, and that cosine of $\theta = 5\pi/3$ is the x-value of the coordinate point at that angle.

$$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$$

$$\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$$

Use the quotient identity for tangent to find the value of tangent.

$$\tan\left(\frac{5\pi}{3}\right) = \frac{\sin\left(\frac{5\pi}{3}\right)}{\cos\left(\frac{5\pi}{3}\right)} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\frac{\sqrt{3}}{2}\left(\frac{2}{1}\right) = -\sqrt{3}$$