AP Precalc

Write your questions and thoughts here!

3.2B Sine, Cosine, and Tangent

3.2B Notes

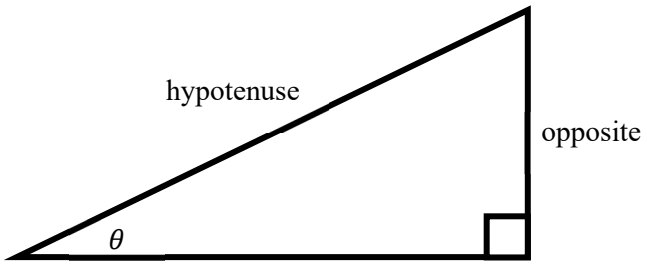
How do you pronounce the following names?

Mr. Jones Mrs. Smith

An abbreviation does not mean we pronounce things differently. It just helps us write it faster. That is the same for sine, cosine, and tangent. How do you pronounce the following?

$\sin\theta$ **$\cos\theta$** **$\tan\theta$**

Recall: SOH – CAH – TOA

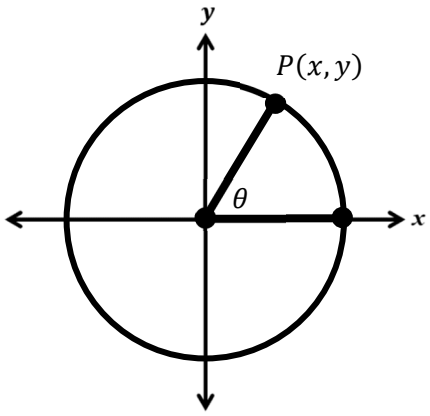


$\sin\theta =$ ———

$\cos\theta =$ ———

$\tan\theta =$ ———

Given an angle in standard position and a circle centered at the origin, there is a point, P, where the terminal ray intersects the circle (see figure to the right).



Using SOH – CAH – TOA, we can find the value of sine, cosine, and tangent of the angle.

$\sin\theta$

The *sine* of the angle is the ratio of the vertical displacement of P from the x-axis to the distance between the origin and point P.

$$\sin\theta = \frac{\text{the vertical displacement of } P \text{ from the } x \text{ axis}}{\text{the distance between the origin and point } P}$$

$$\sin\theta =$$

$\cos\theta$

The *cosine* of the angle is the ratio of the horizontal displacement of P from the y-axis to the distance between the origin and point P.

$$\cos\theta = \frac{\text{the horizontal displacement of } P \text{ from the } y \text{ axis}}{\text{the distance between the origin and point } P}$$

$$\cos\theta =$$

$\tan\theta$

The *tangent* of the angle is the slope, if it exists, of the terminal ray.

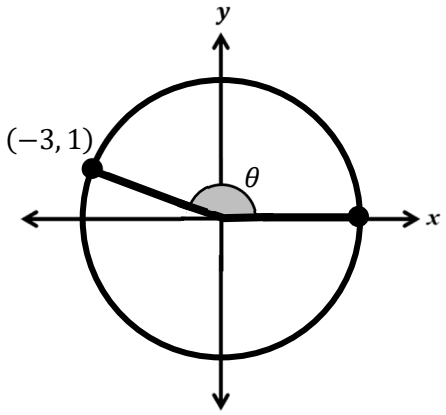
$$\tan\theta = \frac{\text{the vertical displacement of } P \text{ from the } x \text{ axis}}{\text{the horizontal displacement of } P \text{ from the } y \text{ axis}}$$

$$\tan\theta = \quad =$$

Write your questions and thoughts here!

Each figure below gives a circle in the xy-plane with center at the origin, and an angle θ in standard position. Find the value of each expression.

1. Find $\sin\theta$.
2. Find $\cos\theta$.
3. Find $\tan\theta$.



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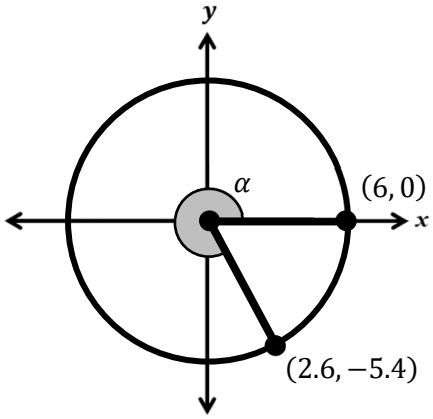
4. Find $\sin\alpha$.
5. Find $\cos\alpha$.
6. Find $\tan\alpha$.

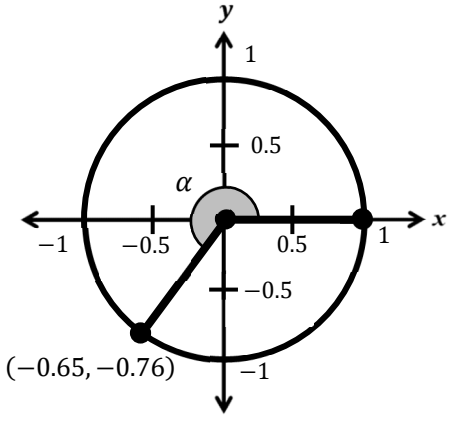


When the circle is a **UNIT CIRCLE** ($r = 1$), the trig values can be simplified.

$\boldsymbol{\sin\theta =}$ $\boldsymbol{\cos\theta =}$ $\boldsymbol{\tan\theta =}$

Each figure below gives a circle in the xy-plane with center at the origin, and an angle θ in standard position. Find the value of each expression.

7. Find $\sin\alpha$.
8. Find $\cos\alpha$.
9. Find $\tan\alpha$.



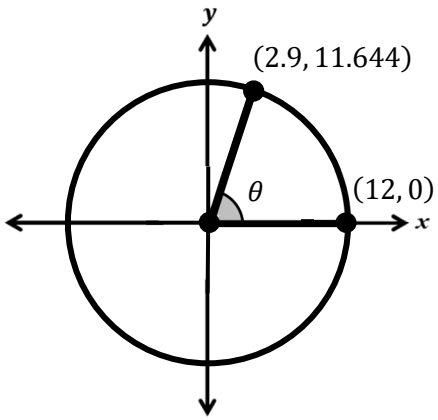
3.2B Sine, Cosine, and Tangent

AP Precalculus

3.2B Practice

Each figure below gives a circle in the xy-plane with center at the origin, and an angle θ in standard position. Find the value of each expression.

1.

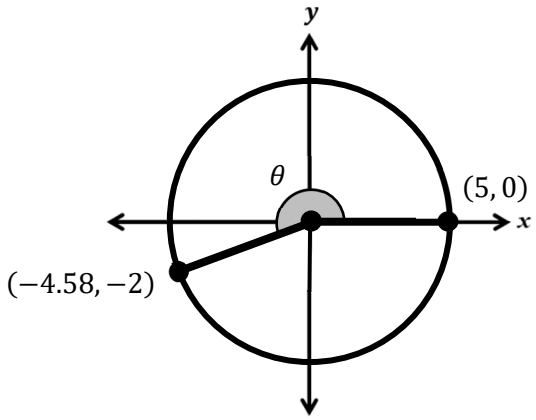


a. $\sin\theta =$

b. $\cos\theta =$

c. $\tan\theta =$

2.

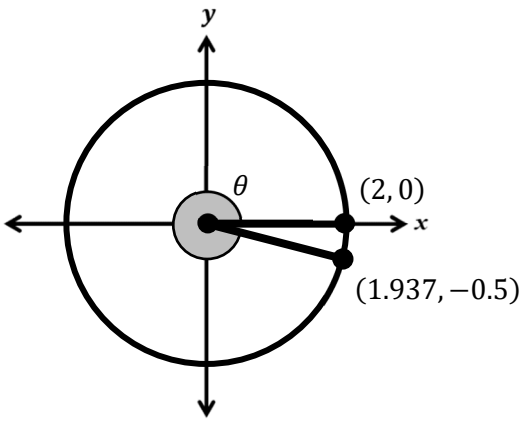


a. $\sin\theta =$

b. $\cos\theta =$

c. $\tan\theta =$

3.

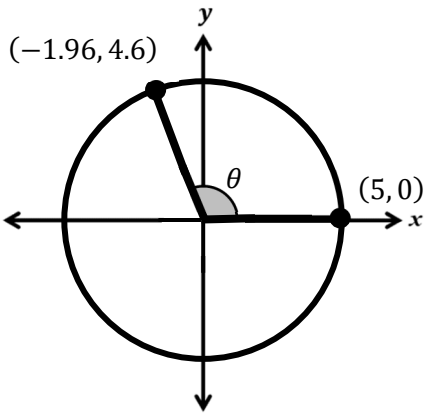


a. $\sin\theta =$

b. $\cos\theta =$

c. $\tan\theta =$

4.

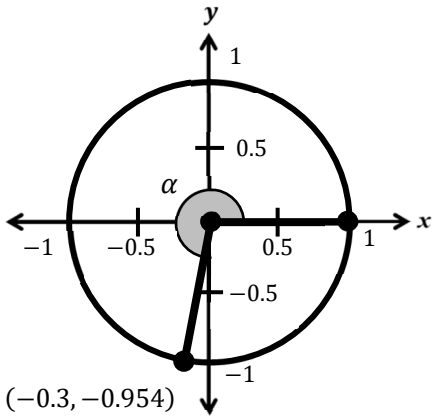


a. $\sin\theta =$

b. $\cos\theta =$

c. $\tan\theta =$

5.

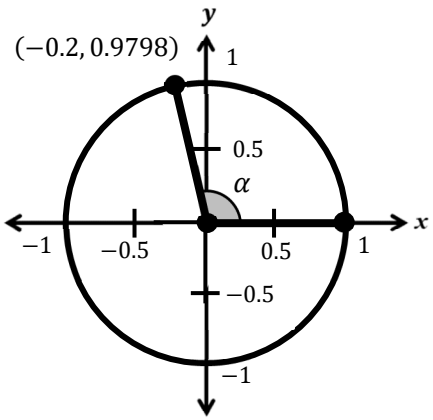


a. $\sin\alpha =$

b. $\cos\alpha =$

c. $\tan\alpha =$

6.



a. $\sin\alpha =$

b. $\cos\alpha =$

c. $\tan\alpha =$

3.2B Sine, Cosine, and Tangent

3.2B Test Prep

7. In the xy-plane, angle ABC is an angle in standard position with terminal ray BC, which intersects the unit circle at the point with coordinates $(0.6, -0.8)$. Which of the following descriptions is correct?

   (A) The sine of angle ABC is $-\frac{4}{3}$.

   (B) The sine of angle ABC is $-\frac{3}{4}$.

   (C) The sine of angle ABC is 0.6.

   (D) The sine of angle ABC is -0.8.

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8. An angle θ is in standard position in the xy-plane. On the interval $0 \le \theta \le 2\pi$ (one full circle), in which quadrant(s) would the terminal ray of the angle be located for each statement?

   a. $\sin\theta < 0$

   b. $\cos\theta > 0$

   c. $\tan\theta > 0$

9. An angle θ is in standard position in the xy-plane. Which of the following is true about θ on the interval $0 \leq \theta \leq 2\pi$ if $\cos\theta < 0$?

(A) There is no value of θ on $0 \leq \theta \leq 2\pi$ for which $\cos\theta < 0$.

(B) There are values of θ on $0 \leq \theta \leq 2\pi$ for which $\cos\theta < 0$ in all four Quadrants.

(C) There is a value of θ on $0 \leq \theta \leq 2\pi$ for which $\cos\theta < 0$ in Quadrant II only.

(D) There are values of θ on $0 \leq \theta \leq 2\pi$ for which $\cos\theta < 0$ in Quadrants II and III only.

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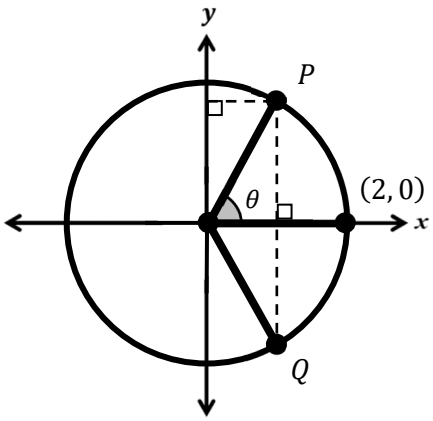
10. The figure shows a circle centered at the origin with an angle of measure θ radians in standard position. The terminal ray of the angle intersects the circle at point P, and point Q also lies on the circle. The coordinates of P are (x, y) and the coordinates of Q are $(x, -y)$. Which of the following is true about the cosine of θ?



(A) $\cos\theta = \frac{x}{2}$, because it is the ratio of the horizontal displacement of P from the y-axis to the distance between the origin and P.

(B) $\cos\theta = \frac{-y}{2}$, because it is the ratio of the vertical displacement of Q from the x-axis to the distance between the origin and Q.

(C) $\cos\theta = \frac{y}{2}$, because it is the ratio of the vertical displacement of P from the x-axis to the distance between the origin and P.

(D) $\cos\theta = \frac{y}{2}$, because it is the ratio of the vertical displacement of Q from the x-axis to the distance between the origin and Q.