5-3

Practice

Trigonometric Functions on the Unit Circle

Use the unit circle to find each value.

1. $\csc 90°$

2. $\tan 270°$

3. $\sin(-90°)$

Use the unit circle to find the values of the six trigonometric functions for each angle.

4. $45°$

5. $120°$

Find the values of the six trigonometric functions for angle θ in standard position if a point with the given coordinates lies on its terminal side.

6. $(-1, 5)$

7. $(7, 0)$

8. $(-3, -4)$

NAME _____ DATE _____ PERIOD _____

5-3

Practice

Trigonometric Functions on the Unit Circle

Use the unit circle to find each value.

1. csc 90°
1

2. tan 270°
undefined

3. sin (−90°)
−1

Use the unit circle to find the values of the six trigonometric functions for each angle.

4. 45°

$\sin 45° = \frac{\sqrt{2}}{2}$ $\csc 45° = \sqrt{2}$

$\cos 45° = \frac{\sqrt{2}}{2}$ $\sec 45° = \sqrt{2}$

$\tan 45° = 1$ $\cot 45° = 1$

5. 120°

$\sin 120° = \frac{\sqrt{3}}{2}$ $\csc 120° = \frac{2\sqrt{3}}{3}$

$\cos 120° = -\frac{1}{2}$ $\sec 120° = -2$

$\tan 120° = -\sqrt{3}$ $\cot 120° = -\frac{\sqrt{3}}{3}$

Find the values of the six trigonometric functions for angle θ in standard position if a point with the given coordinates lies on its terminal side.

6. (−1, 5)

$\sin \theta = \frac{5\sqrt{26}}{26}$

$\cos \theta = -\frac{\sqrt{26}}{26}$

$\tan \theta = -5$

$\csc \theta = \frac{\sqrt{26}}{5}$

$\sec \theta = -\sqrt{26}$

$\cot \theta = -\frac{1}{5}$

7. (7, 0)

$\sin \theta = 0$

$\cos \theta = 1$

$\tan \theta = 0$

$\csc \theta =$ undefined

$\sec \theta = 1$

$\cot \theta =$ undefined

8. (−3, −4)

$\sin \theta = -\frac{4}{5}$

$\cos \theta = -\frac{3}{5}$

$\tan \theta = \frac{4}{3}$

$\csc \theta = -\frac{5}{4}$

$\sec \theta = -\frac{5}{3}$

$\cot \theta = \frac{3}{4}$

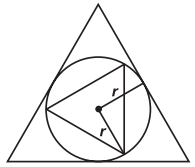
NAME _____ DATE _____ PERIOD _____

5-3

Enrichment

Areas of Polygons and Circles

A regular polygon has sides of equal length and angles of equal measure. A regular polygon can be inscribed in or circumscribed about a circle. For n-sided regular polygons, the following area formulas can be used.



Area of circle $A_C = \pi r^2$

Area of inscribed polygon $A_I = \frac{nr^2}{2} \times \sin \frac{360°}{n}$

Area of circumscribed polygon $A_C = nr^2 \times \tan \frac{180°}{n}$

Use a calculator to complete the chart below for a unit circle (a circle of radius 1).

	Number of Sides	Area of Inscribed Polygon	Area of Circle less Area of Polygon	Area of Circumscribed Polygon	Area of Polygon less Area of Circle
	3	1.2990381	1.8425545	5.1961524	2.0545598
1.	4	2	1.1415927	4	0.8584073
2.	8	2.8284271	0.3131655	3.3137085	0.1721158
3.	12	3	0.1415927	3.2153903	0.0737977
4.	20	3.0901699	0.0514227	3.1676888	0.0260962
5.	24	3.1058285	0.0357641	3.1596599	0.0180673
6.	28	3.1152931	0.0262996	3.1548423	0.0132497
7.	32	3.1214452	0.0201475	3.1517249	0.0101323
8.	1000	3.1415720	0.0000207	3.1416030	0.0000103

9. What number do the areas of the circumscribed and inscribed polygons seem to be approaching as the number of sides of the polygon increases?
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