

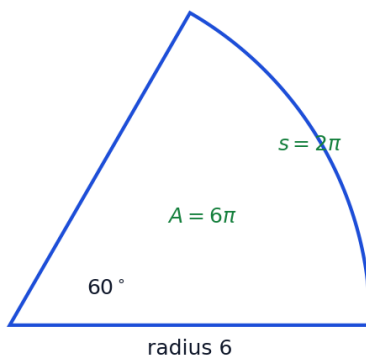
Solutions

5.1 Radians and Arc Length

5.1.1. A radius-6 circle has a 60° central angle. Find arc length and sector area.

Solution. Convert to $\pi/3$. Then $s = 6(\pi/3) = 2\pi$, and $A = (1/2)(36)(\pi/3) = 6\pi$.

A 60-degree sector



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Arc length is 2π , and sector area is 6π .

5.1.2. Convert $7\pi/4$ radians to degrees.

Solution. $7\pi \cdot 180/(4\pi) = 315^\circ$.

5.1.3. An arc has length 15 on a radius-5 circle. Find its central angle in radians.

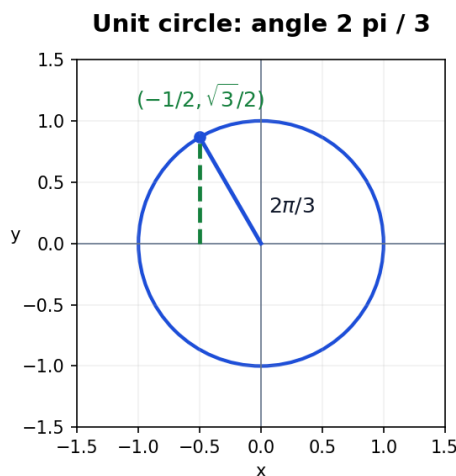
Solution. $\theta = s/r = 15/5 = 3$ radians.

Solutions

5.2 Unit Circle Coordinates

5.2.1. Find the unit-circle coordinates at $2\pi/3$.

Solution. The reference angle is $\pi/3$; quadrant II gives $(-1/2, \sqrt{3}/2)$.



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The terminal point is $(-1/2, \sqrt{3}/2)$; tangent is $-\sqrt{3}$.

5.2.2. Find $\sin(7\pi/6)$ and $\cos(7\pi/6)$.

Solution. Quadrant III makes both negative: $\sin = -1/2$ and $\cos = -\sqrt{3}/2$.

5.2.3. Give a positive coterminal angle for $-\pi/4$ in $[0, 2\pi)$.

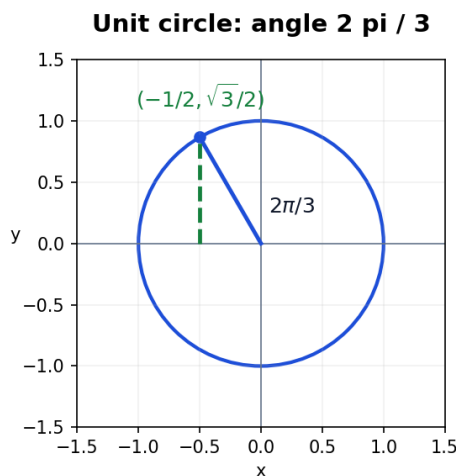
Solution. Add 2π to get $7\pi/4$.

Solutions

5.3 The Six Functions

5.3.1. At $2\pi/3$, find sine, cosine, and tangent exactly.

Solution. $\sin = \sqrt{3}/2$, $\cos = -1/2$, and $\tan = -\sqrt{3}$.



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The terminal point is $(-1/2, \sqrt{3}/2)$; tangent is $-\sqrt{3}$.

5.3.2. If $\sin \theta = 5/13$ and θ is acute, find secant.

Solution. The adjacent side is 12 by Pythagoras, so $\sec \theta = 13/12$.

5.3.3. Find $\csc(3\pi/2)$ and state whether cotangent exists there.

Solution. Sine is -1 , so cosecant is -1 . Cotangent is $0/(-1) = 0$, which exists.