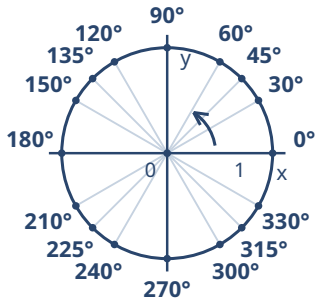
Unit Circle Chart

16 angles around the circle



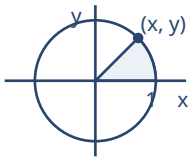
READ THE PLOT

Radius = 1
Start at +x.
Turn counterclockwise for positive angles.

Read the unit circle

Position at angle t	**(cos t, sin t)**
Circle equation	**$x^2 + y^2 = 1$**
Degrees to radians	**degrees × π/180**

Positive angles turn counterclockwise.



Values on the axes

0° or 360°	**0 or 2π: (1, 0), tan = 0**
90°	**π/2: (0, 1), tan undefined**
180°	**π: (−1, 0), tan = 0**
270°	**3π/2: (0, −1), tan undefined**

Cotangent is undefined on the horizontal axis.

Quadrant I values

30°	**π/6: (√(3)/2, 1/2), tan = √(3)/3**
45°	**π/4: (√(2)/2, √(2)/2), tan = 1**
60°	**π/3: (1/2, √(3)/2), tan = √(3)**

Read radians, then (cos t, sin t), then tan t.

Quadrant II values

120°	**2π/3: (−1/2, √(3)/2), tan = −√(3)**
135°	**3π/4: (−√(2)/2, √(2)/2), tan = −1**
150°	**5π/6: (−√(3)/2, 1/2), tan = −√(3)/3**

Cosine is negative and sine is positive.

Quadrant III values

210°	**7π/6: (−√(3)/2, −1/2), tan = √(3)/3**
225°	**5π/4: (−√(2)/2, −√(2)/2), tan = 1**
240°	**4π/3: (−1/2, −√(3)/2), tan = √(3)**

Cosine and sine are both negative.

Quadrant IV values

300°	**5π/3: (1/2, −√(3)/2), tan = −√(3)**
315°	**7π/4: (√(2)/2, −√(2)/2), tan = −1**
330°	**11π/6: (√(3)/2, −1/2), tan = −√(3)/3**

Cosine is positive and sine is negative.

Reference angles and reciprocals

Reduce to one full turn	**$0 \le t < 2\pi$**
Quadrant II reference	**π − t**
Quadrant III reference	**t − π**
Quadrant IV reference	**2π − t**

Reflect the first-quadrant values and choose signs by coordinates.
Where defined, tan = sin/cos, csc = 1/sin, sec = 1/cos and cot = cos/sin.