

UNIT CIRCLE ACTIVITY

Angles • Reference Angles • $\sin \theta$ • $\cos \theta$ • $\tan \theta$

Name: _____ Date: _____

Part 1. Understanding the Unit Circle

Key relationship: A point on the unit circle is $(\cos \theta, \sin \theta)$

R=1

1. The x-coordinate represents _____.
2. The y-coordinate represents _____.
3. $\tan \theta = \frac{\quad}{\quad} = \frac{\quad}{\quad}$.

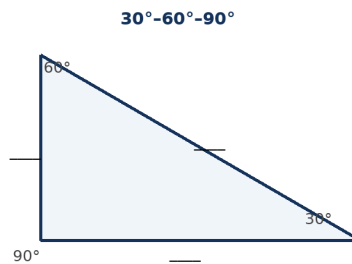
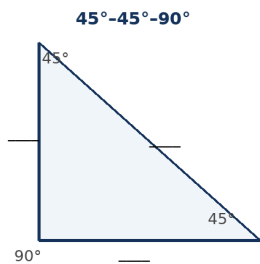
Part 2. Signs in the Four Quadrants

Quadrant	$\sin \theta$	$\cos \theta$	$\tan \theta$
I	+	+	+
II	_____	_____	_____
III	_____	_____	_____
IV	_____	_____	_____

Quadrant rule: QI: _____ QII: _____ QIII: _____ QIV: _____ are positive.

Part 3. Special-Angle Triangles

Complete the side lengths in each triangle. Then use the ratios to complete the exact-value table.

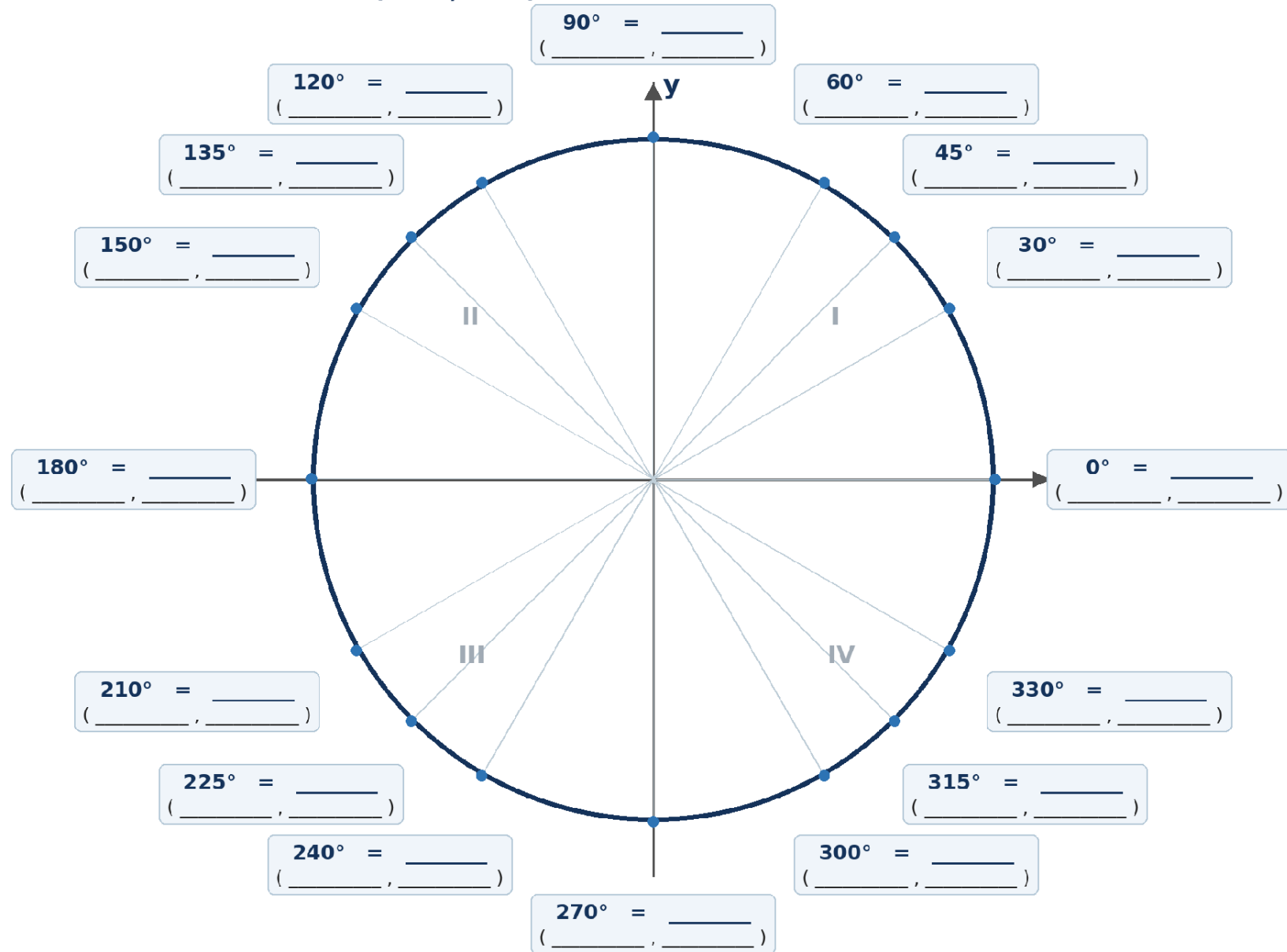


θ	$\cos \theta$	$\sin \theta$	$\tan \theta$
30°	_____	_____	_____
45°	_____	_____	_____
60°	_____	_____	_____

Part 4. Build the Unit Circle

At each marked angle, write the radian measure and the point $(\cos \theta, \sin \theta)$. Use symmetry across the four quadrants.

Degrees = Radians • Point = $(\cos \theta, \sin \theta)$



Part 5. Reference Angles and Exact Values

For each expression, identify the quadrant and reference angle, determine the sign, and find the exact value.

Expression	Quadrant	Reference angle	Sign	Exact value
$\sin 150^\circ$	_____	_____	_____	_____
$\cos 120^\circ$	_____	_____	_____	_____
$\tan 135^\circ$	_____	_____	_____	_____
$\sin 225^\circ$	_____	_____	_____	_____
$\cos 240^\circ$	_____	_____	_____	_____
$\tan 300^\circ$	_____	_____	_____	_____
$\sin 315^\circ$	_____	_____	_____	_____
$\cos 330^\circ$	_____	_____	_____	_____

Part 6. Axis Angles

θ	Point ($\cos \theta$, $\sin \theta$)	$\tan \theta$
0°	(_____ , _____)	_____
90°	(_____ , _____)	_____
180°	(_____ , _____)	_____
270°	(_____ , _____)	_____
360°	(_____ , _____)	_____

Explain why $\tan 90^\circ$ is undefined:

Part 7. Find the Angle

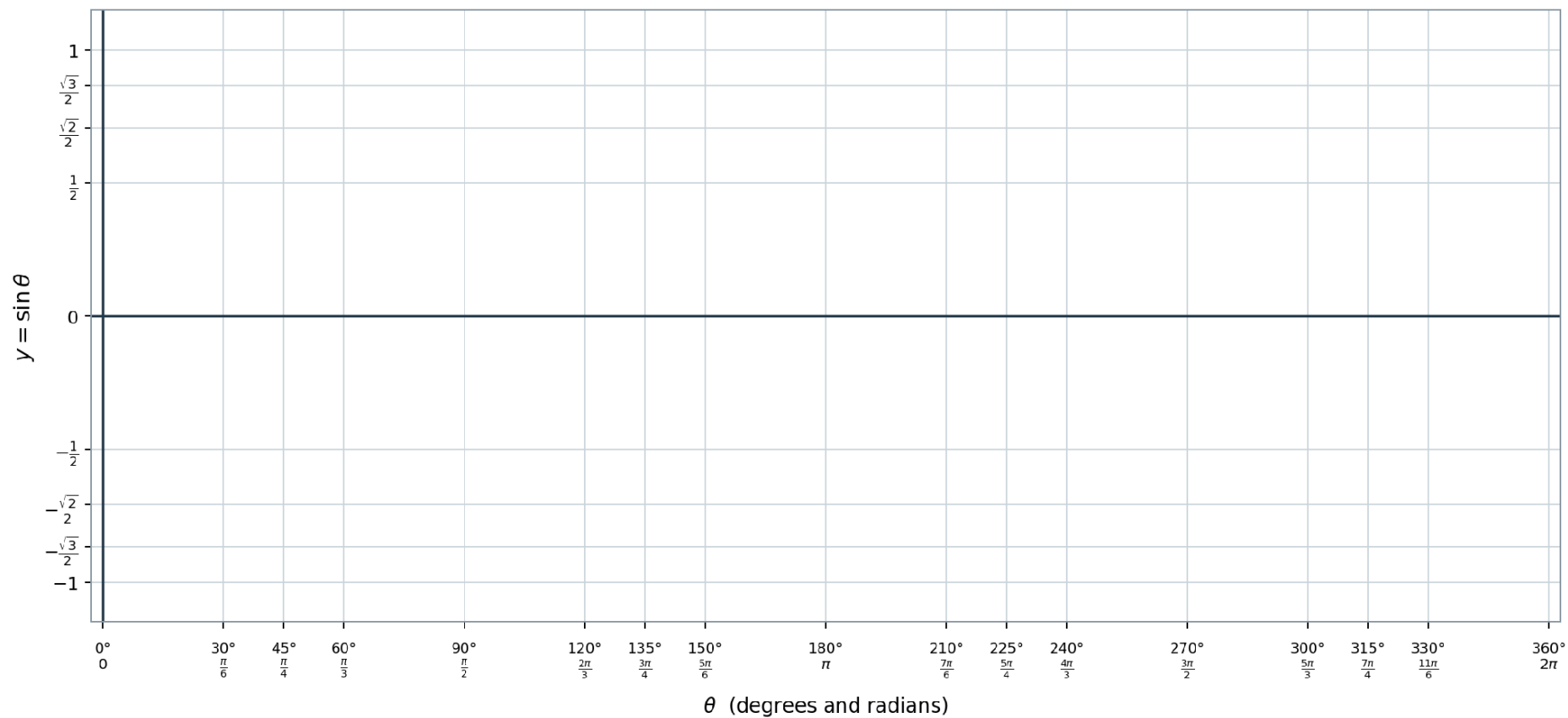
1. $\sin \theta = 1/2$ $\theta =$ _____, _____

2. $\cos \theta = -\sqrt{2}/2$ $\theta =$ _____, _____

3. $\tan \theta = -\sqrt{3}$ $\theta =$ _____, _____

Part 6. Graphing the Sine Function

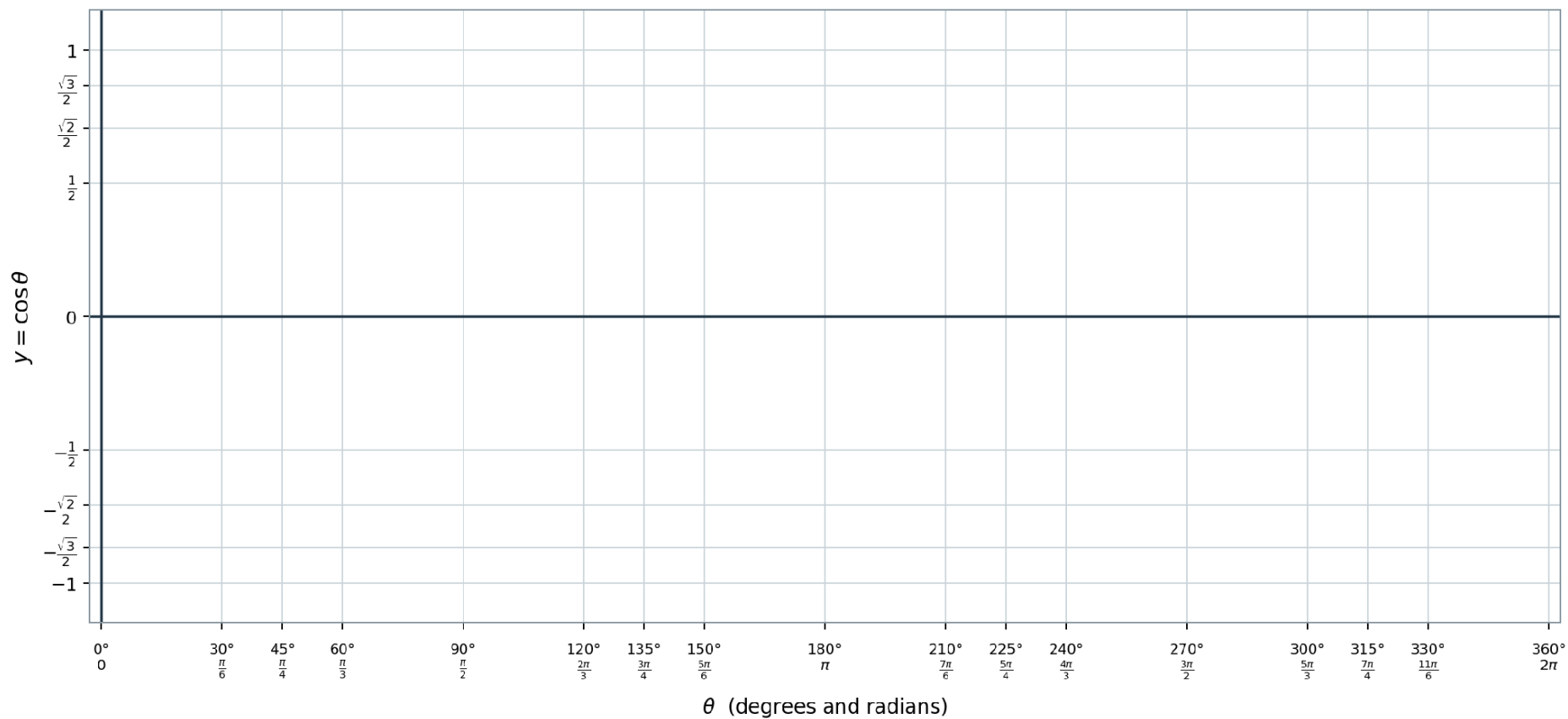
Plot the values from the unit circle, then connect them with a smooth curve. Label key points.



Use the same degree–radian locations and exact values you placed on the unit circle.

Part 7. Graphing the Cosine Function

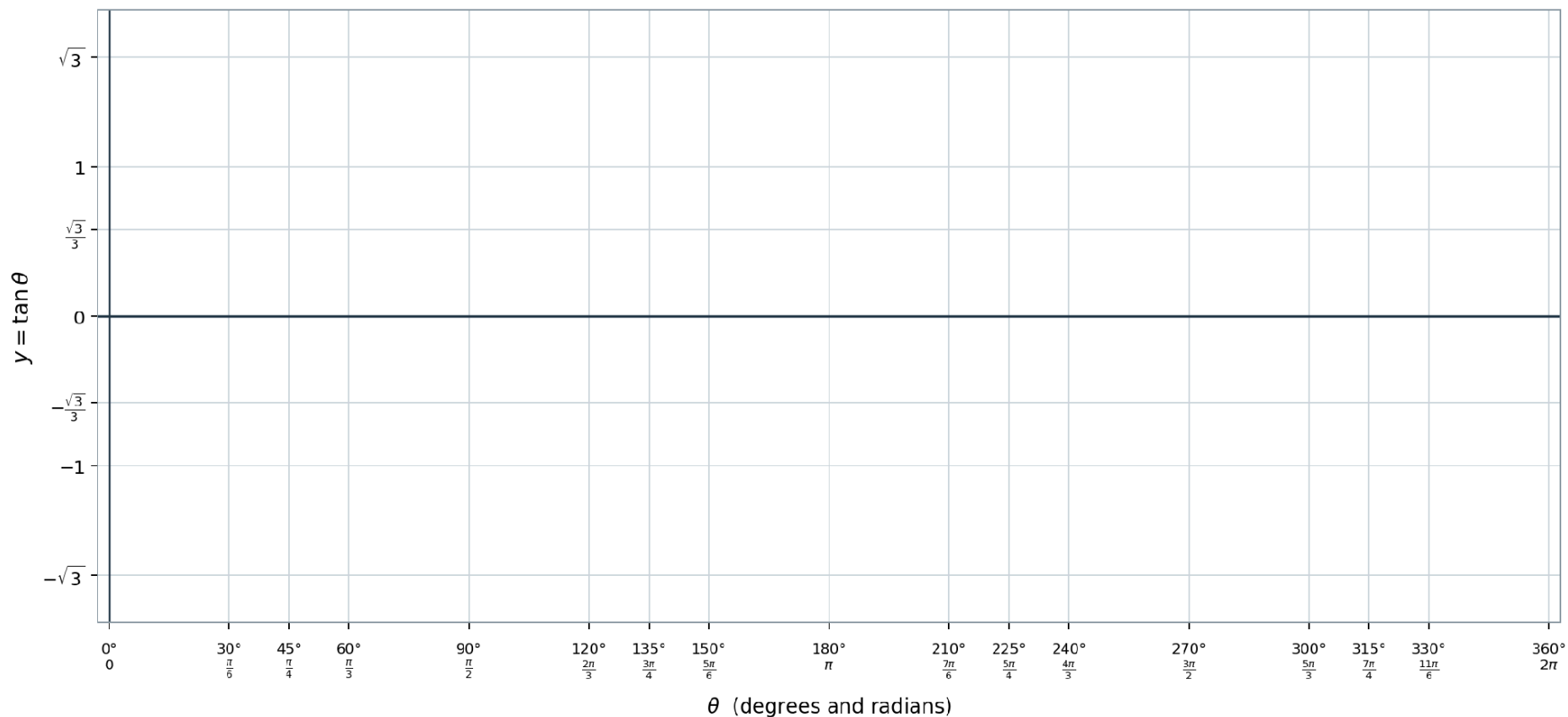
Plot the values from the unit circle, then connect them with a smooth curve. Label key points.



Use the same degree–radian locations and exact values you placed on the unit circle.

Part 8. Graphing the Tangent Function

Plot the values from the unit circle, then connect them with a smooth curve. Label key points.



Remember: $\tan \theta = \sin \theta / \cos \theta$. Mark vertical asymptotes where $\cos \theta = 0$.