

Introduction to Trigonometry

Trigonometry Worksheet · Grade 9–11

Name: _____

Date: _____

Learning Objectives

- Identify and define angles in standard position, including initial and terminal sides
- Distinguish between positive and negative angles based on direction of rotation
- Convert between degree measure and radian measure

Problems

1. Trigonometry is defined as the branch of mathematics that studies the relationship between the sides and angles of a triangle. Which type of triangle did geometry focus on when using the Pythagorean theorem?

2. An angle is in standard position when its initial side lies on the positive x-axis. Where is the terminal side located for an angle of exactly 90 degrees in standard position?

90 °

3. State whether a 230-degree angle is positive or negative, and explain what direction the terminal side rotates to form this angle.

230 °

4. A terminal side rotates clockwise 150 degrees from the positive x-axis. Write the measure of this angle using the correct sign, and identify it as positive or negative.

5. Two angles have their terminal sides at the same position on the XY plane. One angle measures 230 degrees and the other measures negative 130 degrees. Are these two angles the same? Explain why they can have different measures but share the same terminal side.

230 ° and – 130 °

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6. A full rotation of the terminal side around the XY plane equals 360 degrees. How many degrees does the terminal side sweep through when it makes exactly one and a half full counterclockwise rotations?

$$1.5 \times 360^\circ$$

7. Convert the angle from degrees to radians. Remember that 180 degrees equals pi radians.

$$270^\circ = \frac{? \pi}{?}$$

8. Convert the following radian measure to degrees. Remember that pi radians equals 180 degrees.

$$\frac{5\pi}{6}$$

9. The table below shows angle measures in degrees. Complete the table by filling in the equivalent radian measures for each angle.

Degrees	Radians
0°	0
90°	
180°	
270°	
360°	

10. An angle in standard position has its terminal side at negative 390 degrees. First, find a positive coterminal angle between 0 and 360 degrees. Then convert that coterminal angle to radians and identify which quadrant the terminal side lies in.

$$-390^\circ$$

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Introduction to Trigonometry — Answer Key

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Answer Key

1. Answer: Right triangle

- Recall that in geometry, the Pythagorean theorem ($a^2 + b^2 = c^2$) is used to find side lengths.
 - The Pythagorean theorem applies only to right triangles, which have one 90° angle.
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2. Answer: On the positive y-axis

- An angle in standard position starts with the initial side on the positive x-axis.
 - Rotating the terminal side counterclockwise by 90° places it on the positive y-axis.
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3. Answer: Positive; terminal side rotates counterclockwise

- A positive angle is formed when the terminal side rotates counterclockwise from the positive x-axis.
 - Since 230° is given as a positive value, the terminal side rotates counterclockwise, landing between 180° and 270° (in the third quadrant).
-

4. Answer: -150° ; negative angle

- Clockwise rotation produces a negative angle.
 - A clockwise rotation of 150° is written as -150° .
-

5. Answer: No, they are not the same angle; they are coterminal angles — same terminal side position but different rotation directions and magnitudes.

- Coterminal angles share the same terminal side but differ in the direction and amount of rotation.
 - 230° (counterclockwise) and -130° (clockwise) land in the same position: $230 + (-130) = 100\dots$ Actually verify: 230° counterclockwise = $180^\circ + 50^\circ$; -130° clockwise = $-130^\circ \rightarrow 360^\circ - 130^\circ = 230^\circ$. Both land at the same terminal side position.
 - They are called coterminal angles.
-

6. Answer: 540°

- One full counterclockwise rotation = 360° .
 - One and a half rotations = $1.5 \times 360^\circ = 540^\circ$.
-

7. Answer: $3\pi/2$ radians

- Use the conversion factor: multiply degrees by $\pi/180$.
 - $270^\circ \times (\pi/180) = 270\pi/180 = 3\pi/2$.
 - So $270^\circ = 3\pi/2$ radians.
-

8. Answer: 150°

- Use the conversion factor: multiply radians by $180/\pi$.
 - $(5\pi/6) \times (180/\pi) = (5 \times 180)/6 = 900/6 = 150$.
 - So $5\pi/6$ radians = 150° .
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9. Answer: See completed table

Degrees	Radians
0°	0
90°	$\pi/2$
180°	π
270°	$3\pi/2$
360°	2π

- Use the formula: Radians = Degrees $\times (\pi/180)$.
- $90^\circ \rightarrow 90 \times \pi/180 = \pi/2$
- $180^\circ \rightarrow 180 \times \pi/180 = \pi$
- $270^\circ \rightarrow 270 \times \pi/180 = 3\pi/2$
- $360^\circ \rightarrow 360 \times \pi/180 = 2\pi$

10. Answer: Coterminal angle = $-390 + 360 + 360 = 330^\circ$; in radians = $11\pi/6$; terminal side is in Quadrant IV

- Add 360° repeatedly until the angle is between 0° and 360° : $-390^\circ + 360^\circ = -30^\circ$; $-30^\circ + 360^\circ = 330^\circ$.
- 330° lies between 270° and 360° , so the terminal side is in Quadrant IV.
- Convert 330° to radians: $330 \times (\pi/180) = 330\pi/180 = 11\pi/6$.
- Final answer: coterminal angle = $330^\circ = 11\pi/6$ radians, Quadrant IV.

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