

Geometry & Trigonometry: SOH CAH TOA & Right Triangles



Use the matching sheet ID when checking answers.

Part A: Trigonometric Calculations. Apply SOH CAH TOA to determine exact ratios and side lengths.

1. In right triangle ABC with right angle at C, leg AC (adjacent to angle A) = 15 cm and hypotenuse AB = 17 cm. What is the value of $\cos(A)$?

Answer: B. $15 / 17$

By definition of cosine (CAH): $\cos(A) = \text{Adjacent} / \text{Hypotenuse} = AC / AB = 15 / 17$.

2. A surveyor stands 100 meters away from the base of a telecommunications tower on level ground. The angle of elevation from the ground to the top of the tower is 30° . Given that $\tan(30^\circ) \approx 0.577$, what is the approximate height of the tower?

Answer: A. 57.7 meters

$\tan(\theta) = \text{Opposite} / \text{Adjacent} \Rightarrow \tan(30^\circ) = \text{Height} / 100 \Rightarrow \text{Height} = 100 \times \tan(30^\circ) = 100 \times 0.577 = 57.7$ meters.

3. In any right triangle where angle A and angle B are complementary acute angles ($A + B = 90^\circ$), which trigonometric co-function identity is always true?

Answer: B. $\sin(A) = \cos(B)$

The side opposite to angle A is the side adjacent to angle B; hence, $\sin(A) = \text{Opposite}_A / \text{Hypotenuse} = \text{Adjacent}_B / \text{Hypotenuse} = \cos(B)$.

Part B: Special Right Triangle Exact Values. Fill in the exact simplified fraction or integer for each trigonometric ratio.

1. In a 30° - 60° - 90° special right triangle, the exact ratio of the shortest side to the hypotenuse yields $\sin(30^\circ) = 0.5$ (or $1/2$).

2. In a 45° - 45° - 90° isosceles right triangle, both legs are of equal length, which means $\tan(45^\circ) = \text{Opposite} / \text{Adjacent} = 1$ exactly.

3. According to the fundamental Pythagorean trigonometric identity, for any angle θ , $\sin^2(\theta) + \cos^2(\theta) = 1$.

4. In a right triangle where $\sin(\theta) = \cos(\theta)$, the acute angle θ must be 45° , so $\tan(\theta) = 1$.