Answer Key: Civil Engineering Licensure Exam – Mock Exam (Day 3: Trigonometry)

February 23, 2025

Answer Key

Section A: Multiple Choice Solutions

1. Identity: $\sin^2 x + \cos^2 x = 1$ **Answer: (b) 1**
2. Solve $\cos x = \frac{1}{2}$:
$$x = 60^\circ, 300^\circ$$
Answer: (b) $60^\circ, 300^\circ$
3. Identity check:
$$\tan x = \frac{\sin x}{\cos x}$$
Answer: (a) $\tan x = \frac{\sin x}{\cos x}$
4. Given $\tan\theta = \frac{3}{4}$, find $\sin\theta$:
$$\sin\theta = \frac{3}{5}$$
Answer: (a) $\frac{3}{5}$
5. Using Law of Sines:
$$\frac{\sin B}{10} = \frac{\sin 40^\circ}{8}$$
$$B = \arcsin\left(\frac{10\sin 40^\circ}{8}\right) = 55.3^\circ$$
Answer: (c) 55.3°

Section B: Problem-Solving Solutions

1. Proof:
$$\frac{1-\cos 2x}{\sin 2x} = \frac{2\sin^2 x}{2\sin x\cos x} = \frac{\sin x}{\cos x} = \tan x$$

2. Solve $2\sin x - 1 = 0$:
$$\sin x = \frac{1}{2}$$
$$x = 30^\circ, 150^\circ$$

3. Given $\cos A = 0.6$:
$$\sin^2 A = 1 - \cos^2 A = 1 - 0.36 = 0.64$$
$$\sin A = 0.8, \quad \sin 2A = 2\sin A\cos A = 2(0.8)(0.6) = 0.96$$

4. Using Law of Cosines:
$$C = \cos^{-1}\left(\frac{7^2 + 9^2 - 12^2}{2(7)(9)}\right)$$

5. Tower height:
$$h = 20\tan 30^\circ = 20 \times \frac{\sqrt{3}}{3} \approx 11.55 \text{ meters}$$