Unit-circle definitions and exact values

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. Find $\sin(\frac{7\pi}{6})$ exactly. [3 marks]

Reference angle $\frac{\pi}{6}$; quadrant III has negative sine.

Answer: $-\frac{1}{2}$

2. Find $\cos(\frac{3\pi}{4})$ exactly. [3 marks]

Reference angle $\frac{\pi}{4}$; the horizontal coordinate is negative.

Answer: $-\frac{\sqrt{2}}{2}$

3. Find $\tan(\frac{5\pi}{3})$ exactly. [3 marks]

Reference angle $\frac{\pi}{3}$ in quadrant IV; divide negative sine by positive cosine.

Answer: $-\sqrt{3}$

4. Find $\sin(\frac{11\pi}{6})$ and $\cos(\frac{11\pi}{6})$. [3 marks]

Reference angle $\frac{\pi}{6}$ in quadrant IV.

Answer: $-\frac{1}{2},\ \frac{\sqrt{3}}{2}$

5. If $\cos\theta = -\frac{3}{5}$ in quadrant III, find sine and tangent. [3 marks]

$\sin^2\theta = 1 - \frac{9}{25} = \frac{16}{25}$.

Select the negative sine; divide to obtain tangent.

Answer: $\sin\theta = -\frac{4}{5},\ \tan\theta = \frac{4}{3}$

6. Explain why $\tan(\frac{\pi}{2})$ is undefined. [3 marks]

$\cos(\frac{\pi}{2}) = 0$; tangent is sine divided by cosine.

Answer: It would require division by zero.