Unit-circle meaning

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Give the exact unit-circle coordinates at 60°. [2 marks]

Coordinates are $(\cos 60^\circ, \sin 60^\circ)$.

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

2. Find $\sin 210^\circ$ exactly. [2 marks]

210° is in quadrant III with reference angle 30°.

Sine is negative, so $\sin 210^\circ = -\frac{1}{2}$.

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

3. Find $\cos 240^\circ$ exactly. [2 marks]

The reference angle is 60° in quadrant III.

$\cos 240^\circ = -\cos 60^\circ = -\frac{1}{2}$.

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

4. Find $\tan 135^\circ$ exactly. [2 marks]

$\tan 135^\circ = \frac{\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = -1$.

Answer: -1

5. Do 45° and 765° identify the same unit-circle point? Explain. [2 marks]

$765^\circ - 45^\circ = 720^\circ$, which is two complete turns.

Answer: Yes.

6. For a quadrant-II angle, $\cos\theta = -\frac{3}{5}$. Find $\sin\theta$ and $\tan\theta$ exactly. [3 marks]

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

Sine is positive in quadrant II.

$\tan\theta = \frac{\frac{4}{5}}{-\frac{3}{5}} = -\frac{4}{3}$.

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