Derivatives of sine/cosine/tangent

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Differentiate $5\sin x + 2\cos x$. [2 marks]

Apply the sine and cosine rules term by term.

Answer: $5\cos x - 2\sin x$

2. Differentiate $\tan(3x)$. [2 marks]

Use the tangent rule.

Multiply by 3 from the inner angle.

Answer: $3\sec^2(3x)$

3. Find the gradient of $y = \cos(2x)$ at $x = \frac{\pi}{4}$. [2 marks]

The derivative is $-2\sin(2x)$.

At $\frac{\pi}{4}$, the sine is 1.

Answer: -2

4. Differentiate $x\sin x$. [2 marks]

Use the product rule.

Differentiate one factor at a time.

Answer: $\sin x + x\cos x$

5. Differentiate $\cos^3 x$. [2 marks]

Differentiate the outer cube.

Multiply by $-\sin x$.

Answer: $-3\cos^2 x\sin x$

6. For $h(t) = 5 + 2\cos(\frac{\pi t}{6})$ metres, find and interpret $h'(3)$ in m/s. [3 marks]

Differentiate to get $-(\frac{\pi}{3})\sin(\frac{\pi t}{6})$.

At $t = 3$, the angle is $\frac{\pi}{2}$.

Answer: $-\frac{\pi}{3}$ m/s: the height is decreasing.