Simple transformations and periodicity

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. State amplitude and range of $y = 5 + 3\sin x$. [3 marks]

Use midline 5 and vertical distance 3.

Answer: Amplitude 3; range $[2, 8]$.

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

$\frac{2\pi}{\frac{1}{2}} = 4\pi$.

Answer: 4π

3. Describe the shift in $y = \sin(x - \frac{\pi}{3})$. [3 marks]

The argument becomes 0 at $x = \frac{\pi}{3}$.

Answer: $\frac{\pi}{3}$ to the right.

4. For $y = \tan(2x)$, find its period and closest asymptotes to 0. [3 marks]

The period is $\frac{\pi}{2}$; solve $2x = \pm\frac{\pi}{2}$ for the boundaries.

Answer: Period $\frac{\pi}{2}$; asymptotes $x = \pm\frac{\pi}{4}$.

5. A cosine model has maximum 7, minimum -1, period 6 and starts at its maximum. Give a rule. [3 marks]

Midline 3 and amplitude 4.

$B = \frac{2\pi}{6} = \frac{\pi}{3}$.

Answer: $y = 3 + 4\cos(\frac{\pi x}{3})$

6. Find the first maximum for $x \geq 0$ of $y = 2\sin(x - \frac{\pi}{4})$. [3 marks]

The argument is $\frac{\pi}{2}$ at a maximum: $x - \frac{\pi}{4} = \frac{\pi}{2}$.

Answer: $x = \frac{3\pi}{4}$, value 2.