

Solutions

Each answer shows the steps, then the **result**.

2.1

- maximum speed in SHM:

$$v_{\max} = A\omega = (0.2 \text{ m})(4 \text{ rad s}^{-1})$$

- $v_{\max} = \mathbf{0.8 \text{ m s}^{-1}}$

2.2

- maximum acceleration in SHM:

$$a_{\max} = A\omega^2 = (0.2 \text{ m})(4 \text{ rad s}^{-1})^2$$

- $a_{\max} = \mathbf{3.2 \text{ m s}^{-2}}$

2.3

- At the equilibrium position

2.4

- The amplitude (the maximum displacement)

3.1 B

- maximum speed is at equilibrium

3.2 B

- $a_{\max} = A\omega^2$

3.3

(a)

- maximum speed in SHM:

$$v_{\max} = A\omega = (0.05 \text{ m})(10 \text{ rad s}^{-1})$$

- $v_{\max} = \mathbf{0.5 \text{ m s}^{-1}}$

(b)

- maximum acceleration in SHM:

$$a_{\max} = A\omega^2 = (0.05 \text{ m})(10 \text{ rad s}^{-1})^2$$

- $a_{\max} = \mathbf{5 \text{ m s}^{-2}}$

3.4

(a)

- Cosine, with $\varphi = 0$

(b)

- At the extremes