

Solutions

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

2.1

- $|F| = kx = 20 \times 0.15 = 3 \text{ N}$

2.2

- The force opposes the displacement (points back to equilibrium)

2.3

- $|a| = \omega^2 x = 25 \times 0.2 = 5 \text{ m s}^{-2}$

2.4

- At the extremes (largest x)

3.1 B

- proportional to displacement and opposite in direction

3.2 B

- at equilibrium, $x = 0$ so $a = 0$

3.3

(a)

- $F = -kx = -8 \times 0.1 = -0.8 \text{ N}$ (magnitude 0.8 N)

(b)

- $\omega^2 = k/m = 16$; $a = -\omega^2 x = -1.6 \text{ m s}^{-2}$

3.4

(a)

- Yes (approximately)

(b)

- Small angles (roughly under 15°)