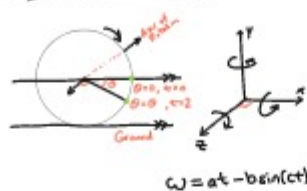
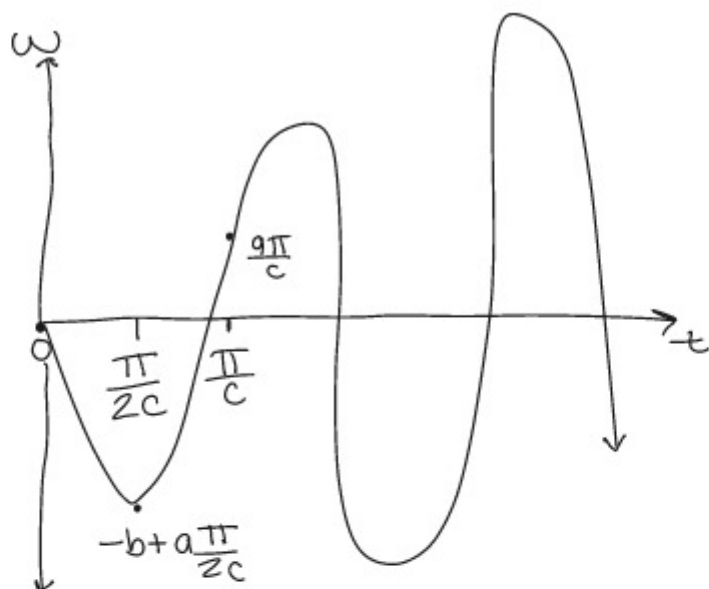


Q1 Part A



$$\theta = \omega_0 t + \frac{1}{2} \alpha t^2$$



$$\Theta = \int_0^2 \omega(t) dt = \int_0^2 (at - b \sin(ct)) dt$$

$$= a \left[\frac{1}{2} t^2 \right]_0^2 + \frac{b}{c} \cos(ct) \Big|_0^2$$

$$= \frac{a}{2} [4 - 0] + \frac{b}{c} \cos(ct) \Big|_0^2$$

$$= \frac{4s^2}{2} a + \frac{b}{c} [\cos(2c) - \cos(0)]$$

$$= 2a + \frac{b}{c} [\cos(2c) - 1]$$

$$\begin{aligned} a &= 0.500 \frac{\text{rad}}{\text{s}^2} \\ b &= 0.250 \text{ rad} \\ c &= 2.00 \frac{\text{rad}}{\text{s}} \end{aligned}$$

$$\Theta = 2s^2(0.500 \frac{\text{rad}}{\text{s}^2}) + \frac{0.250 \text{ rad}}{2.00 \frac{\text{rad}}{\text{s}}} [\cos(2 \cdot 2.00 \frac{\text{rad}}{\text{s}}) - 1]$$

$$= 1.00 \text{ rad} + 0.125 (\cos(4 \text{ rad}) - 1)$$

$$= 0.793 \text{ rad}$$

Part B

$$2\pi = 360$$

$$0.793 \text{ rad} \times \frac{180^\circ}{\pi \text{ rad}} = 45.2^\circ$$

Part C

$$\begin{aligned} d &= OR \\ &= 39.7 \text{ cm} \end{aligned}$$



Part D

$$\begin{aligned} \alpha &= \frac{d\omega}{dt} = a - bc \cos(ct) \\ &= 0.500 \frac{\text{rad}}{\text{s}^2} - 0.250 \frac{\text{rad}}{\text{s}} \cdot 2.00 \frac{\text{rad}}{\text{s}} \cos(2.00 \frac{\text{rad}}{\text{s}} \cdot 2\text{s}) \end{aligned}$$

$$\begin{aligned} \omega &= at + b \sin(ct) \\ &= 0.500 \frac{\text{rad}}{\text{s}^2} (2\text{s}) + \dots \end{aligned}$$