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$$\begin{aligned} 1) \quad v &= \langle 4t - 3t^2 \rangle \text{ m/s} \\ s &= \int v dt \\ &= \int \langle 4t - 3t^2 \rangle dt \\ &= 2t^2 - t^3 \end{aligned}$$

$$\begin{aligned} \text{When } t &= 4 \text{ sec} \\ s &= 2\langle 4 \rangle^2 - \langle 4 \rangle^3 \\ &= 32 - 64 \end{aligned}$$

$$\therefore s = -32 \text{ m}$$

$$2 \quad v = \langle 0.5t^3 - 8t \rangle \text{ m/s}$$

$$A = dv/dt$$

$$\begin{aligned} dv/dt &= 3\langle 0.5 \rangle t^2 - 8 \\ &= 1.5t^2 - 8 \end{aligned}$$

$$\begin{aligned} \Rightarrow A &= \frac{dv}{dt} \Big|_{t=2} \\ &= 1.5(2)^2 - 8 \\ &= 6 - 8 \\ &= -2 \text{ m/s} \end{aligned}$$

$$3 \quad A = \langle 4t^2 - 2 \rangle \text{ m/s}^2$$

$$v = \int A dt$$

$$= \int (4t^2 - 2)$$

$$= \frac{4t^3}{3} - 2t + C$$

$$s = \int v dt$$

$$= \int \left(\frac{4t^3}{3} - 2t + C \right) dt$$

$$= \frac{4t^4}{12} - \frac{2t^2}{2} + Ct$$

$$P = \frac{1}{3}t^4 - t^2 + Ct + K$$

$$\text{when } t=0, P=2$$

$$-2 = \frac{1}{3}(0)^4 - (0)^2 + C(0) + K$$

$$\therefore K = -2$$

$$\text{when } t=2, P=20, K=-2$$

$$-20 = \frac{1}{3}(2)^4 - 2^2 + C(2) - 2$$

$$-20 = -0.7 + 2C$$

$$C = -9.7$$

$$P = \frac{1}{3}t^4 - t^2 - 9.7t - 2$$

when $t=4$

$$P = \sqrt[3]{(4)^4 - 4^2 - (9.7 \times 4) - 2}$$

$$P = 28.7 \text{ m/s}$$

4 $v = (20 - 0.55s) \text{ m/s}$

$$\frac{dt}{ds} = \frac{1}{v} \quad \& \quad \frac{dt}{dt} = \frac{dv}{a}$$

$$a = \frac{dv}{dt} \quad , \quad \frac{dv}{dt} = \frac{dv}{ds} \times \frac{ds}{dt}$$

$$\frac{dv}{ds} = -0.55 \quad , \quad \frac{ds}{dt} = (20 - 0.55s^2)$$

$$A = (-0.55)(20 - 0.55s^2)$$

where $s = 15$

$$A = (-0.55 \times 15)(20 - 0.55(15)^2)$$

$$A = -13.125 \text{ m/s}^2 //$$