

**LAWAL MUHAMMAD ABDLAZEEZ**

**CIVIL ENGINEERING**

**18/ENG03/036**

**ENG 234**

**ENGINEERING MECHANICS (ENG 234)**

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CIVIL ENGINEERING

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1 (Fig 12-9)

Given that

$$s = 0.5t^3 \text{ m}$$

$$v = \frac{ds}{dt}, v = 1.5t^2$$

$$\text{at } t = 6$$

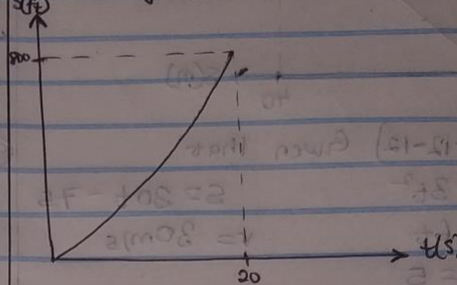
$$v = 1.5(6)^2 = 54 \text{ m/s}$$

$$\therefore s_2 = 0.5(6)^3$$

$$= 108 \text{ m}$$

$$v = \frac{ds}{dt} \stackrel{!}{=} 0, v = 0 \text{ m/s}$$

s-t graph



$$v = (-4t + 80) \text{ ft/s}$$

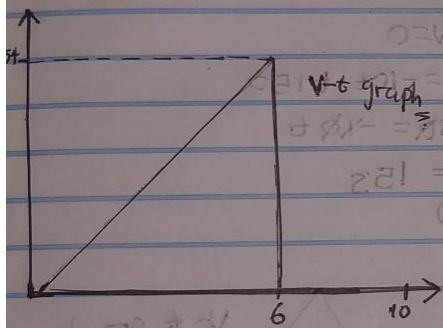
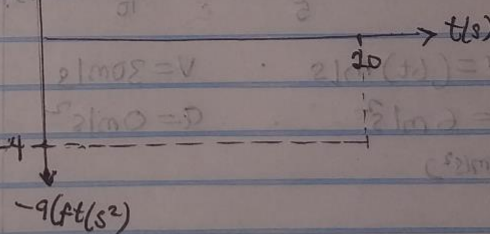
$$a = \frac{dv}{dt}$$

$$a = -4 + 0$$

$$a = -4 \text{ ft/s}^2$$

a-t graph

a-t graph



2. Given that (F12-10)

$$v = -4t + 80$$

$$s = \int v dt$$

$$s = \int_0^{20} -4t + 80 dt$$

$$s = [-2t^2 + 80t]_0^{20}$$

$$s = [-2(20)^2 + 80(20) - 0]$$

$$s = -800 + 1600 = 800$$

$$s = 800 \text{ ft}$$

3) (Fig 12-11)

$$v = (0.25s) \text{ m/s}$$

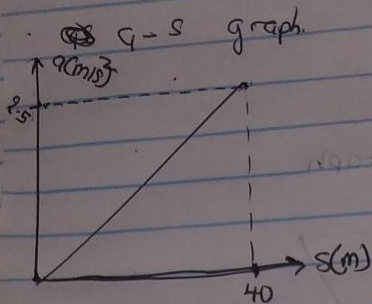
$$a = v \left( \frac{dv}{ds} \right)$$

$$a = 0.25s(0.25)$$

$$a = (0.0625s) \text{ m/s}^2$$

$$a) s = 40 \text{ m}$$

$$a = (0.0625 \times 40) = 2.5 \text{ m/s}^2$$



4) (F12-12) Given that

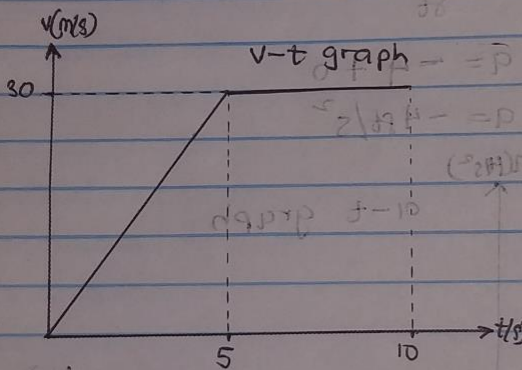
$$s = 3t^2$$

$$v = 6t$$

a)  $t = 5$

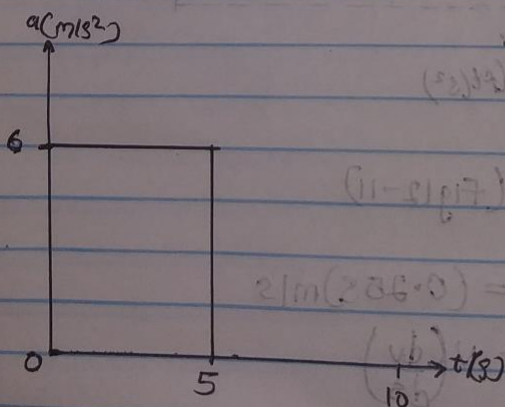
$$v = 6 \times 5$$

$$v = 30 \text{ m/s}$$



$$v = (6t) \text{ m/s}$$

$$a = 6 \text{ m/s}^2$$



5) F12-13 Given that

$$a = 20 \text{ m/s}^2 \quad a = -10 \text{ m/s}^2$$

$$\int dv = \int a \cdot dt$$

$$\int_0^v dv = \int_0^t 20 \cdot dt$$

$$v = 20t$$

a)  $t = 5 \text{ s}$

$$v = 100 \text{ m/s} \quad (20 \times 5)$$

$$\int_{100}^v dv = \int_5^t -10 \cdot dt$$

$$v - 100 = -10[t - 5]$$

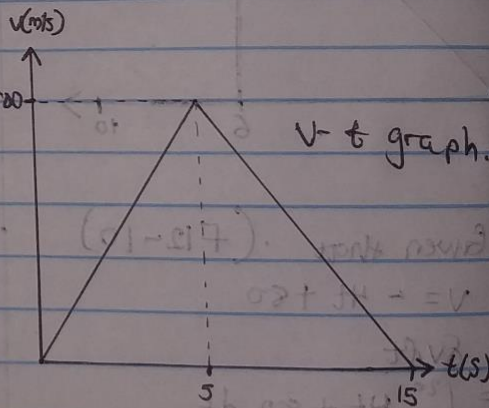
$$v = [-10t + 150] \text{ m/s}$$

a)  $v = 0$

$$0 = -10t + 150$$

$$\Rightarrow 50 = -10t$$

$$t = 15 \text{ s}$$



6.

$$v = 30t$$

$$\int ds = \int v dt$$

$$\int_0^s ds = \int_0^t (30t) dt$$

$$s = 15t^2$$

a)  $t = 5 \text{ s}$

$$s = 15(5)^2$$

$$s = 375$$