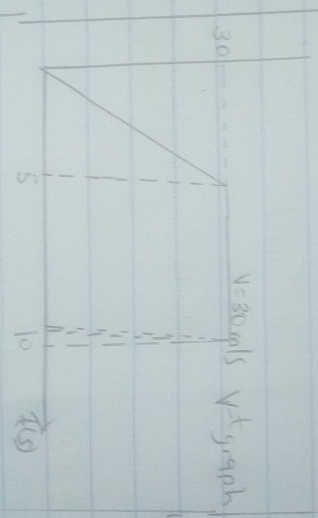
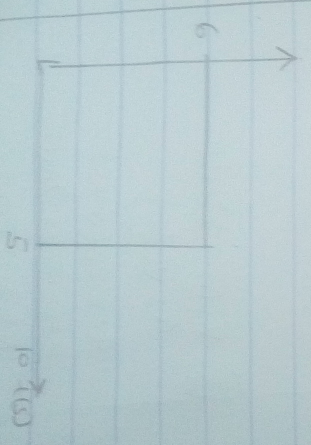


4. $S = 3t^2$
 $V = 6t$
 At $t = 5$
 $V = 6 \times 5$
 $V = 30 \text{ m/s}$

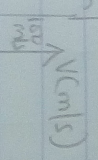


$V = (6t) \text{ m/s}$
 $a = 6 \text{ m/s}^2$

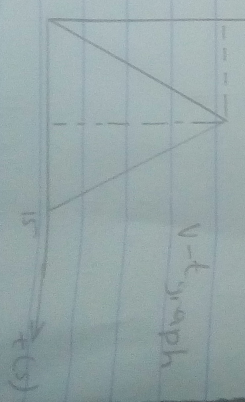


$V = 30 \text{ m/s}$
 $a = 0 \text{ m/s}^2$

5. $a = 20 \text{ m/s}^2$ $a = 10 \text{ m/s}^2$
 $\int dv = \int a \cdot dt$
 $\int_0^v dv = \int_0^t 20 \cdot dt$
 $v = 20t$
 At $t = 5$
 $v = 100 \text{ m/s}$
 $\int_{100}^v dv = \int_5^t -10 \cdot dt$
 $v - 100 = -10(t - 5)$
 $v - 100 = -10t + 50$
 $v = (-10t + 150) \text{ m/s}$
 At $v = 0$
 $0 = -10t + 150$
 $-150 = -10t$
 $t = 15 \text{ sec}$ (time for the car to come to rest)



$v = 20t$
 $\int_0^v dv = \int_0^t 20 \cdot dt$
 $v = 15t$
 At $t = 5$
 $v = 75 \text{ m/s}$



6. $v = 30t$
 $\int ds = \int v \cdot dt$
 $\int_0^s ds = \int_0^t (30t) \cdot dt$
 $s = 15t^2$
 At $t = 5$
 $s = 15(5)^2$
 $s = 375 \text{ m}$

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 18/ENG02/070
 MECHANICS
 COMPUTER ENGINEERING

(1) Given that.

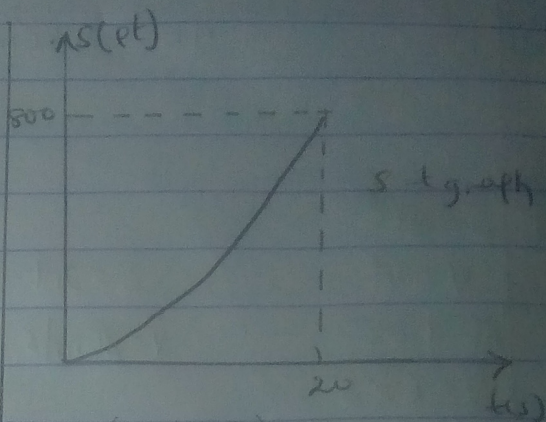
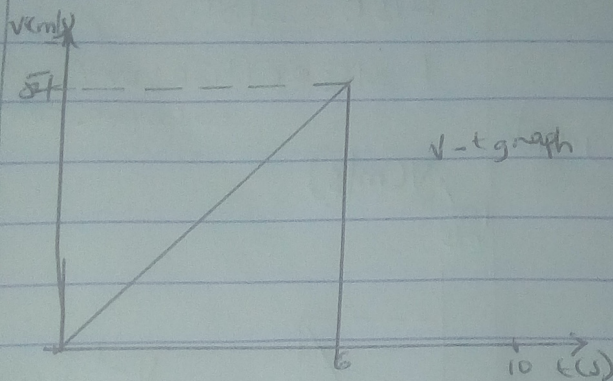
$$s = 0.5t^3 \text{ m.}$$

$$v \frac{ds}{dt}, v_1 = 1.5t^2$$

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

$$s_2 = 108 \text{ m}$$

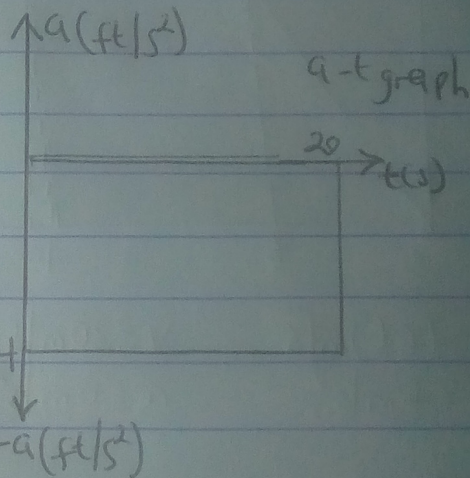
$$v \frac{ds}{dt} = 0, v = 0 \text{ m/s}$$



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

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

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



(2) Given that

$$v = 4t + 80$$

$$s = \int v dt.$$

$$s = \int_0^{20} (4t + 80) dt.$$

$$s = \left[2t^2 + 80t \right] \Big|_0^{20}$$

\therefore at $t = 20$

$$s = \left[2(20)^2 + 80(20) \right]$$

$$s = -800 + 1600$$

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

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

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

$$a = 0.25s(0.25)$$

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

$$\text{At } s = 40 \text{ m}$$

$$a = (0.0625 \times 40)$$

$$a = 2.5 \text{ m/s}^2$$