

NAME: ARIKPO DEBORAH KEDZAYEI

MATRIC NO: 18/ENGG06/012

DEPARTMENT: MECHANICAL ENGINEERING

COURSE: ENGG 284 (MECHANICS)

① $s = 0.5t^3$

at $0 < t < 6$ seconds

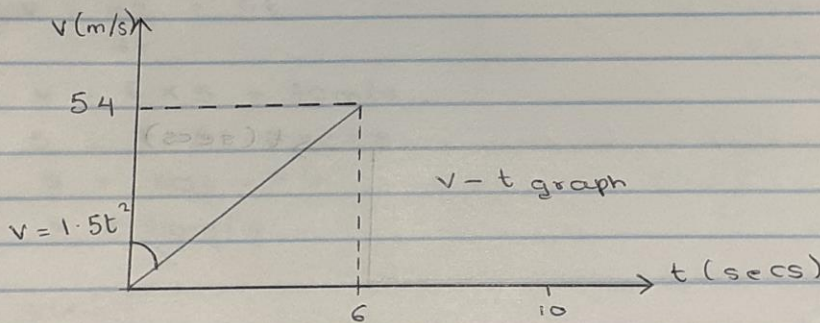
$$v = \frac{ds}{dt} = 1.5t^2 \text{ m/s}$$

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

6 < t < 10 seconds

$$s = 108$$

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



② $v = -4t + 80$

$$s = \int_0^5 ds = \int_0^1 dt$$

$$s = \int_0^4 (-4t + 80)$$

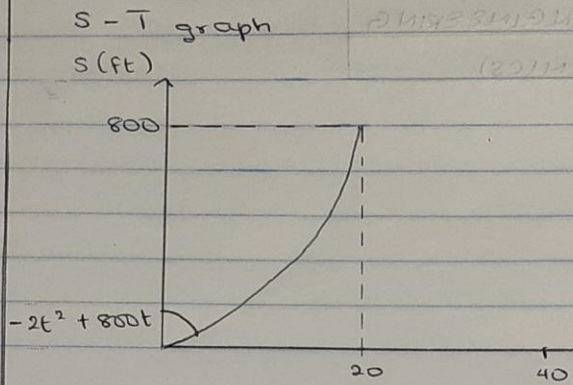
$$s = \left[-2t^2 + 80t \right]_0^{20}$$

0 < t < 20 secs

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

$$s = -800 + 1600$$

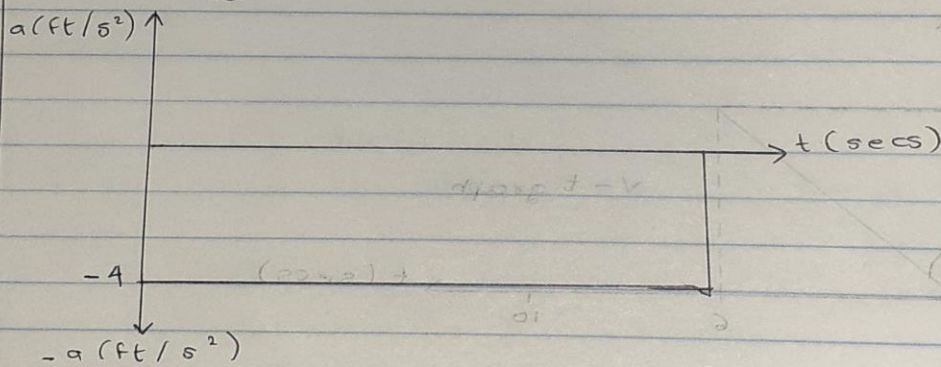
$$S = 800 \text{ ft}$$



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

$$0 < t < 20 \text{ s}$$

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



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

$$a ds = v dv$$

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

$$\frac{dv}{ds} = 0.25$$

$$ds$$

$$a = (0.25s)(0.25)$$

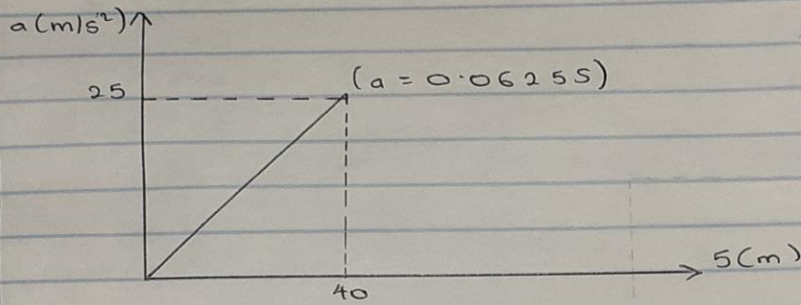
$$a = 0.0625s \text{ m/s}^2$$

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

$$a = 0.0625 \times 40$$

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

$a = S$ graph



④

$$s = 3t^2$$

$$0 < t < 5 \text{ secs}$$

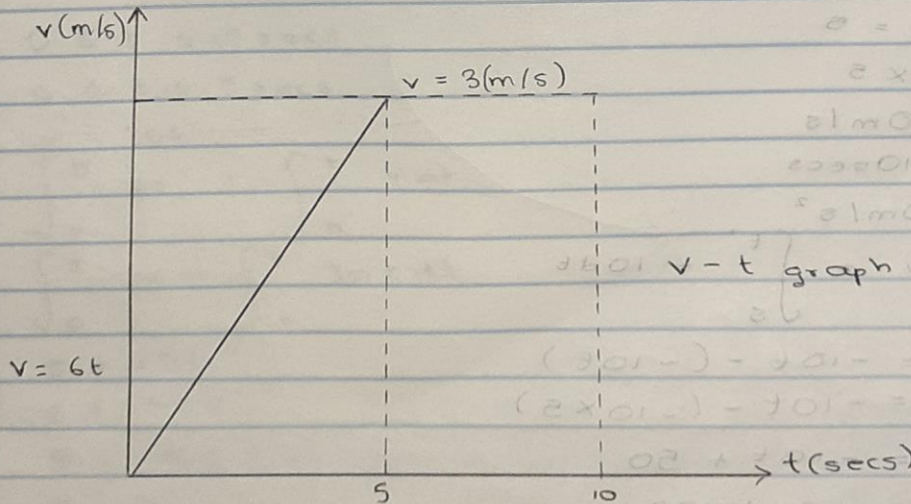
$$v = \frac{ds}{dt} = 6t$$

$$v = 6 \times 5 = 30 \text{ m/s}$$

$$5 \leq t \leq 10 \text{ secs}$$

$$s = 30t - 75$$

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



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

$$0 \leq t \leq 5 \text{ secs}$$

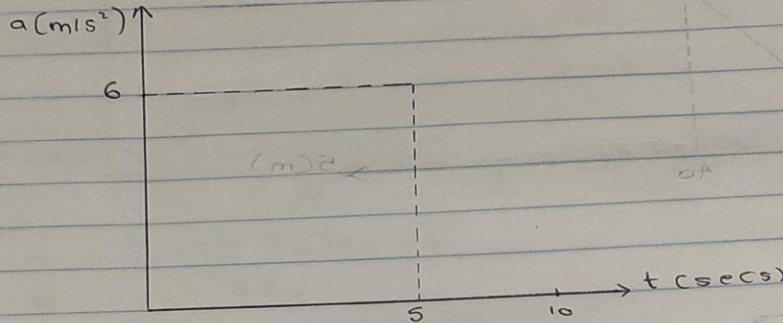
$$a = \frac{dv}{dt} = 6 \text{ m/s}^2$$

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

$$5 \leq t \leq 10 \text{ secs}$$

$$a = \frac{dv}{dt} = 0 \text{ m/s}^2$$

a - t graph



⑤ $0 \leq t \leq 5 \text{ secs}$

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

$$dv = a dt$$

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

$$v = 20t$$

when $t = 5$

$$v = 20 \times 5$$

$$v = 100 \text{ m/s}$$

$$5 \leq t \leq 10 \text{ secs}$$

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

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

$$v - 100 = -10t - (-10 \times 5)$$

$$v - 100 = -10t - (-10 \times 5)$$

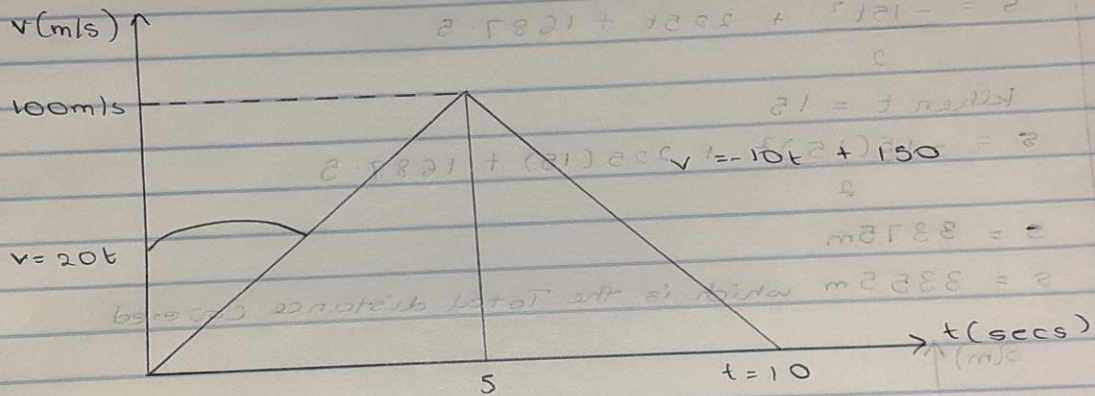
$$v - 100 = -10t + 50$$

$$v = -10t + 50 + 100$$

$$v = -10t + 150$$

when $v = 0$
 $0 = -10t + 150$
 $10t = 150$
 $t = \frac{150}{10}$

$t = 15 \text{ secs}$
 $0 \leq t \leq t'$
 $t' = 15 \text{ secs}$
 $v = -10 \times 15 + 150$
 $v = 0$



⑥ $0 \leq t \leq 15 \text{ secs}$

$0 \leq t \leq 5 \text{ secs}$

$v = 30t$

$\int_0^5 ds = \int_0^5 v dt$

$\int_0^5 ds = \int_0^5 30t dt$

$s = 15t^2$

$s = 15(5)^2$

$s = 15 \times 5 \times 5$

$s = 375 \text{ m}$

$s \leq t \leq 15 \text{ secs}$

$$v = -15t + 225$$

$$\int_{15}^5 ds = \int_s^t (-15t + 225) dt$$

$$s - 375 = \left[\frac{-15t^2 + 225t}{2} \right]_s^t$$

$$s - 375 = \left[\frac{-15t^2 + 225t}{2} \right] - \left[\frac{-15(5)^2 + 225(5)}{2} \right]$$

$$s - 375 = \frac{-15t^2 + 225t}{2} + 1312.5$$

$$s = \frac{-15t^2 + 225t}{2} + 1312.5 + 375$$

$$s = \frac{-15t^2 + 225t}{2} + 1687.5$$

When $t = 15$

$$s = \frac{-15(15)^2 + 225(15)}{2} + 1687.5$$

$$s = 3375 \text{ m}$$

$s = 3355 \text{ m}$ which is the Total distance covered

