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Course: ENG 234

$s = ut + \frac{1}{2}at^2$ $\frac{4t^3}{3} - 2t$ 0 $-2 = 0 + \frac{1}{2}a0$

Distance = speed x time

v

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1) $v = (4t - 3t^2)\ m/s$

$v = ds/dt$

$ds = v\,dt$

$\int_0^s ds = \int_0^t (4t - 3t^2)\,dt$

$s\Big|_0^s = \frac{4t^2}{2} - \frac{3t^3}{3}\Big|_0^t$

$s = 2t^2 - t^3$

when $t = 4s$

$s = 2(4)^2 - (4)^3$

$s = 32 - 64$

$s = -32m$

$\Rightarrow$ 32m to the left of the origin

2) $a = (4t^2 - 2)\ m/s^2$

~~about~~ when $t = 0s$, $s = -20m$ - 2m

" $t = 2s$, $s = -20m$

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

$\int_0^v dv = \int_0^t (4t^2 - 2)\,dt$

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

$v = ds/dt$

$\int_0^s ds = \int_0^t v\,dt$

$s = \int_0^t (\frac{4t^3}{3} - 2t + c)\,dt$

$s = \frac{t^4}{3} - t^2 + ct + c$

at $t = 2$, $s = -20$

$-20 = \frac{2^4}{3} - 2^2 + 2c + c$

$c = \frac{-20 - 1.3}{3} = -7.1$

$\therefore$ at $t = 4s$

$s = \frac{4^4}{3} - 4^2 + (4 \times -7.1) - 7.1$

$s = \frac{256}{3} - 16 - 28.4 - 7.1$

$s = 33.8m$

~~3) $v = (20 - 0.05s^2)\,m/s$~~

3) $v = (0.5t^3 - 8t)\,m/s$

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

$\therefore a = 1.5t^2 - 8$

when $t = 2s$

$a = 1.5(2)^2 - 8$

$a = 6 - 8 = -2\,m/s^2$

4) $v = (20 - 0.05s^2)\,m/s$

at $s = 15$

$v = 20 - 0.05(15)^2$

$v = 20 - (0.05 \times 225)$

$v = 20 - 11.25$

$v = 8.75\,m/s$

using $v^2 = u^2 + 2as$

$8.75^2 = 0^2 + (2a \times 15)$

$30a = 76.5625$

$a = \frac{76.5625}{30}$

$a = 2.55\,m/s^2$