F12-3

$V = (4t - 3t^2)$.

$\dfrac{dv}{dt} = 4 - 6t$.

when $t = 4$

$\dfrac{dv}{dt} = 4 - 6(4)$.

$\dfrac{dv}{dt} = 4 - 24$

$\dfrac{dv}{dt} = -20 \ m/s^2$.

i.e $\dfrac{dv}{dt}$ is deceleration.

$a = 20 \ m/s^2$.

To get distance at time, 4 secs

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

To get velocity.

$a = \dfrac{V - u}{t}$

$20 = \dfrac{v - 0}{4}$

$80 = v$

$v = 80 \ m/s$.

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

$(80)^2 = (0)^2 + 2(20) s$

$6400 = 40 s$

$s = \dfrac{6400}{40}$

$s = 160 m$.

F12-4

$V = (0.5t^3 - 8t)$.

when $t = 2s$.

$a = \dfrac{dv}{dt}$.

$V = (0.5t^3 - 8t)$.

$\dfrac{dv}{dt} = 1.5t^2 - 8$

where $t = 2\,secs$

$\dfrac{dv}{dt} = 1.5(2) - 8$

$\dfrac{dv}{dt} = 6 - 8$

$\dfrac{dv}{dt} = -2\,m/s^2$.

F12-7

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

$\dfrac{dv}{dt} = 8t.$

$dv = 8t\,dt.$

$\int dv = \int 8t\,dt.$

$v = \dfrac{8t^2}{2} + c.$

$v = 4t^2 + c.$

  when $t = 0$, $c = 2.$

$v = 4(0)^2 + 2.$

$v = 2 m/s.$

when $t = 2s$, $c = 20m.$

$v = 4(2)^2 + 20$

$v = 36 m/s$ at $20m.$

$a = \dfrac{v - 4}{t} = \dfrac{36 - 2}{4}$

$a = \dfrac{34}{4} = 8.5 m/s^2.$

from $v^2 = u^2 + 2as.$

$(36)^2 = (2)^2 + 2(8.5)s.$

$1,296 = 4 + 17s.$

$1296 = 21s.$

$S = \dfrac{1296}{21}$

$S = \underline{61.714m}.$

F12-8

$v = (20 - 0.05s^2)$.

$v = \dfrac{ds}{dt}$

$\dfrac{1}{2} = \dfrac{\frac{dv}{dt}}{\frac{ds}{dt}}$ ——————— ①.

$\dfrac{dv}{ds} = 0 - (0.1)s$.

where $s = 15m$.

$\dfrac{dv}{ds} = -0.1(15)$.

$\dfrac{dv}{ds} = -1.5$ ——————— ②.

from eqn ①.

$\dfrac{1}{v} = \dfrac{dv}{ds}$

$\dfrac{1}{v} = -1.5$.

$v = \dfrac{1}{-1.5}$

$v = 0.67 m/s$.

Getting acceleration,
Using, $v^2 = u^2 + 2as$.

$(0.67)^2 = (0)^2 + 2a(15)$.

$0.4489 = 30a$.

$a = \dfrac{0.4489}{30}$

$a = 0.015 m/s^2$.