

ASSIGNMENT 4  
 $s = \frac{1}{3}t^3 - t^2 + Ct + C_1$   
 $t = 0, s = -2$   
 $-2 = \frac{1}{3}(0)^3 - (0)^2 + C(0) + C_1$   
 $C_1 = -2$   
 when  $t = 2, s = -20$   
 $-20 = \frac{1}{3}(2)^3 - (2)^2 + C(2) - 2$   
 $-20 = \frac{8}{3} - 4 + 2C - 2$   
 $-20 = \frac{8}{3} - \frac{12}{3} + 6C - \frac{6}{3}$   
 $-60 = -2 + 6C$   
 $-60 + 2 = 6C$   
 $-58 = 6C$   
 $C = -9.7$   
 $s = \frac{1}{3}t^3 - t^2 - (9.7)t - 2$   
 $= 28.7 \text{ m/s}$

12 =  
 $v = (4t - 3t^2) \text{ ms}^{-1}$   
 $s = \int (4t - 3t^2) dt$   
 $= \frac{4t^2}{2} - \frac{3t^3}{3} + C$   
 $= 2t^2 - t^3 + C$   
 when  $t = 1, s = 10$   
 $10 = 2(1)^2 - (1)^3 + C$   
 $10 = 2 - 1 + C$   
 $10 = 1 + C$   
 $C = 9$   
 $s = 2t^2 - t^3 + 9$   
 when  $t = 2, s = 2$   
 $2 = 2(2)^2 - (2)^3 + 9$   
 $2 = 8 - 8 + 9$   
 $2 = 9$  (contradiction)

Fig 12.4(2)  
 $a = \frac{dv}{dt} = 2 \text{ ms}^{-2}$   
 $v = \int a dt = \int 2 dt = 2t + C$   
 position (s):  
 $s = \int v dt = \int (2t + C) dt = t^2 + Ct + C_1$

③  
 $v = A - 5t^2 = 8 \text{ ms}^{-2}$   
 $A = \frac{dv}{dt} = -10t$   
 when  $t = 2, a = -8$   
 $-8 = -10(2)$   
 $-8 = -20$  (contradiction)

C. 2  
 ④  
 $v = 20 - 0.05s^2 \text{ ms}^{-1}$   
 $v = 0$   
 $A = \frac{dv}{ds} = -0.1s$   
 $A = \frac{dv}{ds} = \frac{dv}{ds} \cdot \frac{ds}{dt} = -0.1s \cdot (20 - 0.05s^2)$   
 $\frac{dv}{ds} = -0.1s, ds = 20 - 0.05s^2$   
 $\frac{dv}{dt} = -0.1s \cdot (20 - 0.05s^2)$   
 Recall  $s = 15$   
 $= -0.1(15) \cdot (20 - 0.05(15)^2)$   
 $= -1.5(20 - 0.05(225))$   
 $= -13.125 \text{ ms}^{-2}$