

① a)  $V = s^3$     b)  $\frac{dV}{ds} = 3s^2$     c)  $s=1, \frac{dV}{ds} = 3 \text{ in}^3/\text{in}$   
 $s=5, \frac{dV}{ds} = 3 \cdot 5^2 = 75 \text{ in}^3/\text{in}$   
 d)  $\text{in}^3/\text{in}$

⑬ a)  $v(t) = 24 - 1.6t \text{ m/sec}$     b)  $s' = 0$      $24 - 1.6t = 0$  or  
 $a(t) = -1.6 \text{ m/sec}^2$      $24 = 1.6t$  find  
 $\boxed{15 \text{ sec} = t}$  vertex

c)  $s(15) = 360 - 180 = 180 \text{ meters}$

d)  $24t - .8t^2 = \frac{1}{2}(180)$      $t \approx 4.393 \text{ sec}$

e)  $24t - .8t^2 = 0$      $t(24 - .8t) = 0$      $\boxed{30 \text{ seconds}}$   
 $t = 0, 30$

⑮  $s' = 0$      $24 - 9.8t = 0$      $s(2.449) = 58.776 - 29.388$   
 $t \approx 2.449$      $= \boxed{29.388 \text{ meters}}$

⑰

$s(t) = t^2 - 3t + 2$

a)  $s(5) - s(0) = 12 - 2 = 10 \text{ m}$

b) AV velocity =  $\frac{\Delta s}{\Delta t} = \frac{s(5) - s(0)}{5 - 0} = \frac{10}{5} = 2 \text{ m/s}$

c)  $s' = v(t) = 2t - 3$      $v(4) = 5 \text{ m/sec}$

d)  $a = v' = 2 \text{ m/s}^2$

e)  $2t - 3 = 0$      $\overleftarrow{-1.5} \rightarrow$      $\boxed{t = 1.5 \text{ sec}}$   
 $t = 1.5$

f)  $s(1.5) = -\frac{1}{4} \text{ m}$

⑲

$s(t) = t^3 - 6t^2 + 9t + 2$

a)  $v(t) = s' = 3t^2 - 12t + 9$

b)  $a(t) = 6t - 12$

c) set  $v(t) = 0$  = solve on G.C.

$3t^2 - 12t + 9 = 0$

$t \approx .845, 3.155$

d) The particle starts at  $s = 2$  and moves right until it stops when  $t \approx .845$  then it moves left until  $t = 3.155$  where it stops again & moves right from there on

⑳

$s = t^3 - 6t^2 + 9t$

$v = s' = 3t^2 - 12t + 9$

$3t^2 - 12t + 9 = 0$

$t^2 - 4t + 3 = 0$

$(t-3)(t-1) = 0$

$t = 1, 3$

$a = v' = 6t - 12$

$a(1) = -6$      $a(3) = 6$