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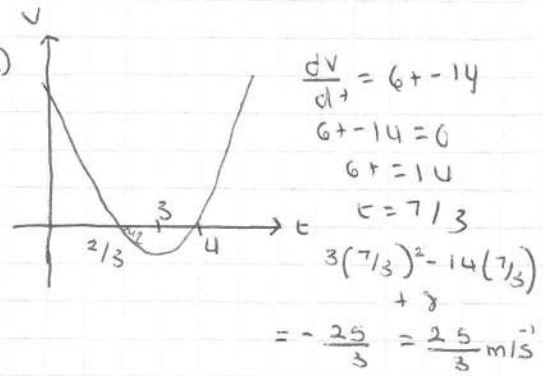
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Solution Bank-11.1

① a)  $3(2)^3 - 2(2)^3 = 16$   
 b)  $3t^3 - 2t + 2 = 0$   
 $t^2(3t - 2) = 0$   
 $t = 0$   
 $t = 2/3$  seconds

② a)  $v = 3(0)^2 - 14(0) + 8$   
 $v = 8 \text{ ms}^{-1}$   
 b)  $v = 0 \rightarrow 3t^2 - 14t + 8 = 0$   
 $t = 4$      $t = 2/3$   
 c)  $v = 13$   
 $13 = 3t^2 - 14t + 8$   
 $3t^2 - 14t - 5 = 0$   
 $t = 5$      $t = -1/3 = 5$

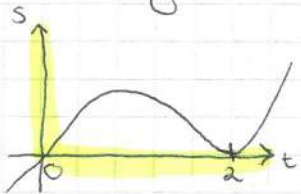
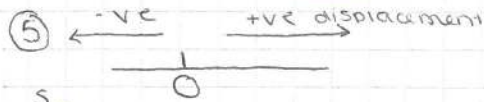


③ a)  $6(3)^2 - (3)^3 = 27$   
 $25 - 27 = -2 \text{ m}$   
 b)  $6(4)^2 - (4)^3 = 32$   
 $32 - 27 = 5 \text{ m}$

④ a)  $\frac{5}{4}t - \frac{1}{4}t^2$   
 $\frac{dv}{dt} = \frac{5}{4} - \frac{1}{2}t$   
 $\frac{5}{4} - \frac{1}{2}t = 0$   
 $\frac{5}{4} = \frac{1}{2}t$   
 $t = 5/2$

b)  $1/4(5t - t^2) = 0$   
 $5t - t^2 = 0$   
 $t(5 - t) = 0$   
 $t = 0$   
 $t = 5$   
 $= 5$

c)  $25/16 + 25/16$   
 $= 50/16 = 25/8 \text{ m}$   
 d)  $t = 0$      $t = 5$   
 $1/4(5t - t^2) = 0$   
 $0 \leq t \leq 5$



displacement is always greater or equal to 0 when  $t \geq 0$   
 $\therefore$  it never moves along the negative x-axis  
 $s = 3t(t-2)^2 \geq 0$  for all  $t \geq 0$

$1/4(5(5/2) - (5/2)^2)$   
 $= 25/16 \text{ m}$

⑥ a)  $2t^2 - 13t + 15 = 0$   
 $t = 5$      $t = 3/2$   
 $t = 1.5$  and  $t = 5$  seconds

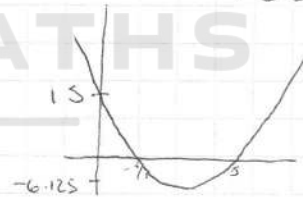
b) a)  $2t^2 - 13t + 15$   
 $2t^2 - 13t + 6 = 0$   
 $t = 6$      $t = 1/2$   
 $t = 0.5$  and  $t = 6$  seconds

⑦ a)  $5 = 5(3)^2 - (3)^3$   
 $= 18$   
 $5 = 5(2)^3 - (2)^3$   
 $= 12$   
 $18 - 12 = 6 \text{ m}$

c)  $4t + 13 = 0$   
 $t = 13/4$   
 $2(13/4)^2 - 13(13/4) + 15$   
 $= -6.125$   
 $15 > -6.125$

b)  $5t^2 - t^3 = 0$   
 $t^2(5 - t) = 0 \rightarrow t^2(5 - t) \geq 0$   
 $t = 0$   
 $t = 5$   
 $\therefore t = 5$

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$\therefore 15$  is the greatest speed  
 $= 15 \text{ ms}^{-1}$

⑧ a)  $10t - t^2 = 0$   
 $t(10 - t) = 0$   
 $t = 0$   
 $t = 10$   
 $t = 0$  and  $t = 10$  seconds

b)  $10 - 2t = 0$   
 $10 = 2t$   
 $t = 5$   
 $10(5) - (5)^2 = 25 \text{ ms}^{-1}$