

## Suggested Answers for SJPO 2012 Special Round

1.  $\frac{41}{9}L$

2. (a) 150 Hz  
(b) 271 Hz

3. 500K

4. (a)  $g - \frac{8g}{m_1\left(\frac{1}{m_2} + \frac{1}{m_3}\right) + 4}$

(b)  $T_1 = \frac{8g}{\frac{1}{m_2} + \frac{1}{m_3} + \frac{4}{m_1}}; T_2 = \frac{1}{2}T_1$

5. (a) 75s  
(b) (i) 126m  
(ii)  $a = -0.23 \text{ m/s}^2$

6.  $160 \text{ m}^2$

7. (b) 1.5W

8. (a)  $\frac{v_o^2}{2g} \frac{V}{d}$

- (b) (ii)  $6.0 \times 10^3 \text{ V}$   
(iii) 29 times

9.  $\sqrt{\frac{q_2 m_1}{q_1 m_2}} \alpha$

10. (a) (i)  $r_o = 1.4 \times 10^{-17} \text{ m}$

(ii)  $1.8 \times 10^{-24} \text{ s}$ ; No

(b)  $3.3 \times 10^{-17} \text{ kg m s}^{-1}$