SJPO 2015 Special Round Suggested Answers

1. $\frac{11}{19}$
2. $\sqrt{(2+\sqrt{3})gl}$
3. (b)$\Delta x = (\frac{m}{M+m})\frac{2v_o^2 sin\theta}{gcos^2\theta}$
4. (b) $\frac{8TA^2}{\lambda}$
   (c) $\pi^2 : 8$
5. (a) $5.6 \times 10^{14}\text{m}^3$
   (b) 1.09m
   (d) 14.6%
6. (a) 218m/s
   (b) 10^{12}collisions
   (c) 10^{-9}m
7. Curvature of other end is convex of curvature radius 5cm
8. 2r
9. (a) $\frac{\rho r}{3\varepsilon_o}$
   (b) (i) $k = \frac{q\rho}{3m\varepsilon_o}$
   (ii) 650s
10. (a) a circle of maximum radius R center at O'
    (b) ring with radius $R = \sqrt{\frac{4(h\frac{c}{\lambda}-\varphi)y^2}{Vq}}$

11. (a) -2×10^{-7}s
    (b) 2.83×10^{-7}s
    (c) 2×10^{-7}s