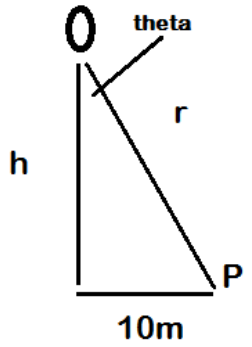
Questions for Section 4.3

Below are the functions that you should set up in order to max/min the problem, along with the answer. (Anything that looks weird let me know, it may be wrong!)

1. $T = \dfrac{x}{6} + \dfrac{\sqrt{(2000-x)^2+600}}{4}$ minimum time 445 seconds.
2. $A = (9-a)\sqrt{a}$ dimensions $6 \times \sqrt{3}$
3. $V = \dfrac{A}{4}x - \dfrac{1}{2}x^3$ maximum volume is $V = \left(\dfrac{a}{6}\right)^{3/2}$
4. $I = \dfrac{kh}{(h^2+10^2)^{3/2}}$. height $\sqrt{50}$. (see picture below for labels) Note, we want the illumination, not the point P... (Also, be aware that if illumination is inversely proportional to A and proportional to B, you can write it as $I = k\dfrac{B}{A}$.)



5. $R(x) = (1600-10x)(90+x)$, Max Rev: 156,250, cost for passenger: 1250, number of passengers: 125
6. $P(x) = (8-0.10x)(50+x)$, Max profit: 422.50, seats: 65
7. $A = 2rP - 2r^2(2+\pi) + \frac{1}{2}\pi r^2$, radius: $\dfrac{2P}{8+3\pi}$.
8. $A = x(1020-2x)$ note x is the side perpendicular to the river. dimensions 255×510
9. $C(r) = 20\pi r^2 + 80r^{-1}$, radius is $\sqrt[3]{\frac{2}{\pi}}$ height is $\frac{5}{4^{1/3}\pi^{2/3}}$. (For the tests they will probably ask round to so many decimals... you can do this!)
10. $E = 500e\left(\dfrac{2-\cos\theta}{\sin\theta}\right) + 2000e$. Optimal angle $\theta = \pi/3$. The answer won't change if e is different, but if the lengths are it will change! (Note, the book gives the above function, this is 'simplified', and I came up with the function $E = 2e\left(\frac{500}{\sin\theta}\right) + e\left(2000 - \frac{500}{\tan\theta}\right)$ (Note, answers that you are given may be equivalent to yours, so don't worry if at first glance things seem different!))