MATH 1A - SOLUTION TO 3.9.13

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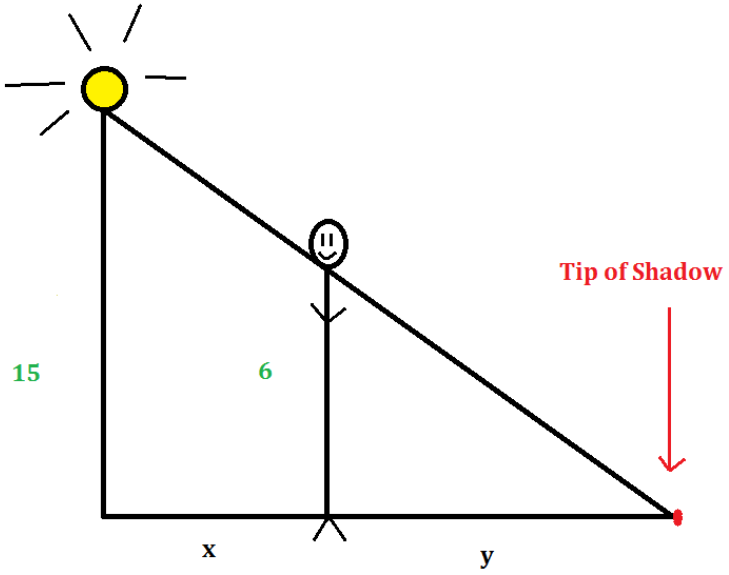
1) First of all, let's draw a picture of the situation, and remember to only label things that are **constant!**

1A/Solutions/Street Light.png



Here, x is the distance between the street light and the man, and y is the distance between the man and the shadow. Also, let $z = x + y$, the total length of the shadow.

2) We want to figure out z' when $x = 40$.
3) Looking at the picture, we can use the law of similar triangles to conclude:

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$$\frac{y}{x+y} = \frac{6}{15}$$

That is:

$$\begin{aligned} y &= \frac{2}{5}(x+y) \\ \frac{3}{5}y &= \frac{2}{5}x \\ y &= \frac{2}{3}x \end{aligned}$$

It follows that:

$$z = x + y = x + \frac{2}{3}x = \frac{5}{3}x$$

4) Hence $z' = \frac{5}{3}x'$
5) However, we know that $x' = 5$ (because the man is walking with a speed of 5 ft/s). Hence we get $z' = \frac{5}{3}(5) = \frac{25}{3}$

So $\boxed{z' = \frac{25}{3}}$.

Note: We did not need the fact that $x = 40$!