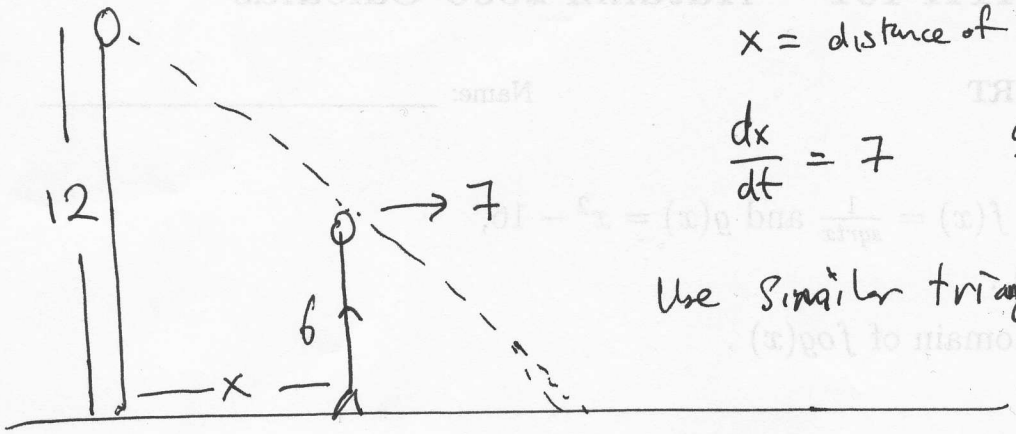
(1)



s = shadow

x = distance of the lady from the pole

$\frac{dx}{dt} = 7$ $\quad \frac{ds}{dt}\Big|_{x=40} = ?$

Use similar triangles: $\frac{6}{12} = \frac{s-x}{s}$

$s = 2s - 2x$

$s = 2x$

$\frac{ds}{dt} = 2\frac{dx}{dt}$ $\Leftarrow$ $\frac{ds}{dt} = 14$ $\Leftarrow$ $\boxed{\frac{ds}{dt}\Big|_{x=40} = 14}$ ///

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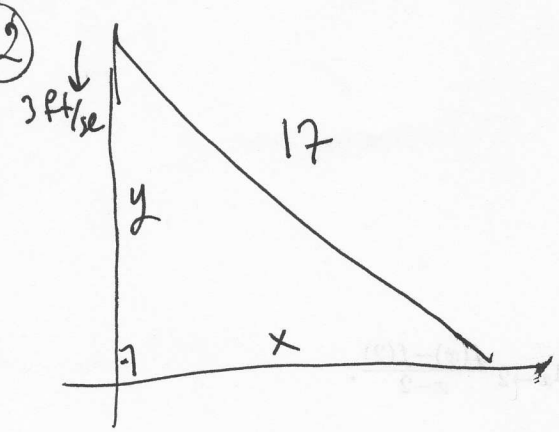
(2)

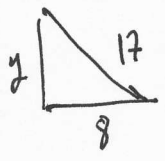


$\frac{dy}{dt} = -3$ $\quad \frac{dx}{dt}\Big|_{x=8} = ?$

$x^2 + y^2 = 17^2 \Rightarrow 2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

$\Rightarrow \frac{dx}{dt} = -\frac{y}{x}\frac{dy}{dt} \Rightarrow \frac{dx}{dt}\Big|_{x=8} = -\frac{15}{8}\cdot(-3)$

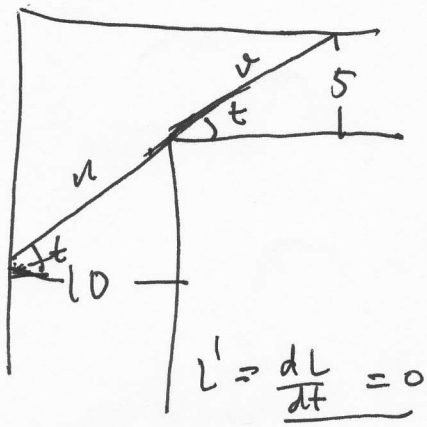
$= \boxed{\frac{45}{8}}$



$\Rightarrow y^2 = \sqrt{17^2 - 8^2}$

$y = 15$

14



$\cos t = \frac{10}{u}$, $\sin t = \frac{5}{v} \Rightarrow L = v + u = \frac{10}{\cos t} + \frac{5}{\sin t}$

$L = v + u \Rightarrow \frac{dL}{dt} = \frac{10\sin t}{\cos^2 t} - \frac{5\cos t}{\sin^2 t}$

$= \frac{10\sin^3 t - 5\cos^3 t}{\cos^2 t \cdot \sin^2 t}$ $\quad 0 < t < \pi/2$

$L' = \frac{dL}{dt} = 0$ if $10\sin^3 t - 5\cos^3 t = 0$

$10\sin^3 t = 5\cos^3 t$

$\tan^3 t = 1/2$ $\Rightarrow$ $\tan t = \frac{1}{\sqrt[3]{2}}$

$\Rightarrow$