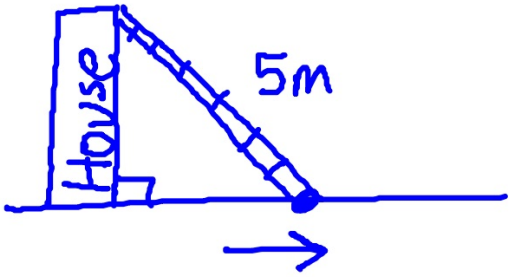
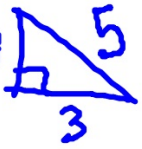
#5 A 5 meter long ladder is leaning against the side of a house. The foot of the ladder is pulled away from the house at the rate of 0.4 m/sec. How fast is the top of the ladder descending when the foot of the ladder is 3 m from the house?



$\frac{dx}{dt} = 0.4 \text{ m/sec}$

$\frac{dy}{dt} = ?$ when $x = 3\text{m}$



$x^2 + y^2 = h^2$

$\frac{d}{dt}\left(x^2 + y^2 = 5^2\right)$

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

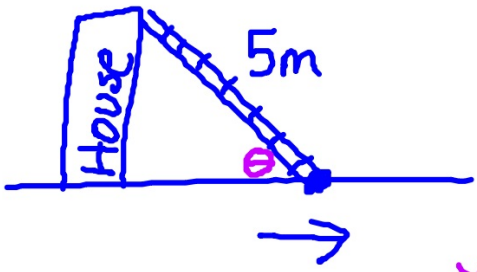
$x\frac{dx}{dt} + y\frac{dy}{dt} = 0$

$(3)(.4) + 4\frac{dy}{dt} = 0$

$\frac{dy}{dt} = \frac{-3(.4)}{4}$

$\frac{dy}{dt} = \frac{-3}{10}$ m/sec

#6 A 5 meter long ladder is leaning against the side of a house. The foot of the ladder is pulled away from the house at the rate of 0.4 m/sec. Find the rate at which the angle between the ladder and the ground is changing when the base of the ladder is 4 meters from the wall.



$\frac{dx}{dt} = 0.4 \text{ m/sec}$ $\frac{d\theta}{dt} = ?$ when $x = 4$

$\cos\theta = \frac{x}{h}$

$\cos\theta = \frac{x}{5}$

$\frac{d}{dt}\left(\cos\theta = \frac{1}{5}x\right)$

$-\sin\theta \frac{d\theta}{dt} = \frac{1}{5}\frac{dx}{dt}$

$-\frac{3}{5}\frac{d\theta}{dt} = \frac{1}{5}(.4)$

$\frac{d\theta}{dt} = \frac{1}{5} \cdot \frac{4}{10_5}\left(-\frac{5}{3}\right)$

$\frac{d\theta}{dt} = \frac{-2}{15}$ rad/sec

Related rates: 1-11

Implicit: 5-15 odd

3, 4, 5
6, 8, 10
5, 12, 13
8, 15, 17
7, 24, 25