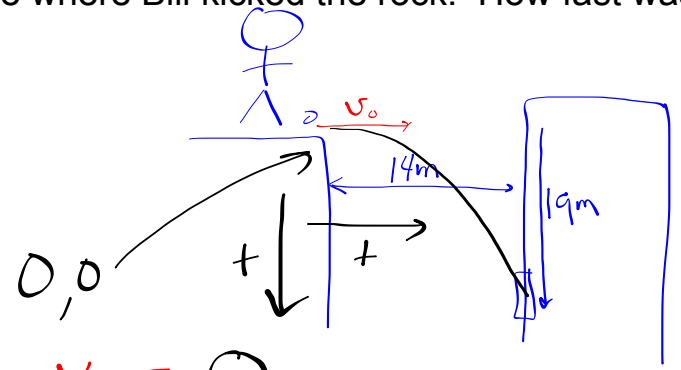
Bill Melater kicks a rock off the top of his apartment building with a horizontal velocity. It strikes the window of another building 14.0 meters away. The window is 19 meters below the place where Bill kicked the rock. How fast was it moving when it left Bill's foot?



$x_0 = 0$
$x = 14$
$v_{0x} = v_0 = 7.1\frac{m}{s}$
$v_x = v_0$
$a_x = 0$
$t_x = 1.97s$

$y_0 = 0$
$y = 19$
$v_{y0} = 0$
$v_y = 9.8t$
$a_y = 9.8$
$t_y = 1.97s$

$v = v_0 + at$
$v = 9.8t$

$x = \cancel{x_0} + \cancel{v_0 t} + \frac{1}{2}at^2$
$19 = \frac{1}{2}(9.8)t^2$
$19 = 4.9t^2$
$t = 1.97s$

$x = \cancel{x_0} + v_0 t + \cancel{\frac{1}{2}at^2}$
$14 = 1.97v_0$
$v_0 = 7.1 m/s$

A player kicks a football at an angle of 37^{o} with the horizontal and with an initial speed of 48 ft/sec. A second player standing at a distance of 100 ft from the first in the direction of the kick starts running to meet the ball at the instant it is kicked. How fast must he run in order to catch the ball before it hits the ground?