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The initial velocity of a projectile

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The aim with this experiment is to learn how to calculate the initial velocity of a projectile, or in this case a ball that is rolled out from a table (0.92m above the floor). The first thing we did was to try to derive a general formula, so:

First we must state that the ball's horizontal velocity (v_x) is constant throughout the flight.

So initially: $v_x = v_o$, $v_y = 0$

Then after a while: $v_x t = x \rightarrow t = x/v_x$

$$v_y = y_o + v_y t + \tfrac{1}{2}gt^2 = \tfrac{1}{2}gt^2$$

and if we use t from the first equation in the second we get:

$$v_y = \tfrac{1}{2}\, g\, (x/v_x)^2 = gx^2 / 2v_x^2$$

$$v_o = \sqrt{(gx^2 / 2y)} = \boxed{\sqrt{(g / 2y) * x}}$$

So, when we now rolled the ball from the table we just had to measure the distance from the table to the place the ball landed, and put it into the formula.

We rolled the ball, and the distance x was:

$x_1 = 0.58$ m
$x_1 = 0.44$ m
$x_1 = 0.63$ m

So the initial velocity of the ball was in each case:

(1) $\sqrt{(9.81 / 1.84)} * 0.58 = 1.34$ m/s
(2) $\sqrt{(9.81 / 1.84)} * 0.44 = 1.02$ m/s
(3) $\sqrt{(9.81 / 1.84)} * 0.63 = 1.46$ m/s