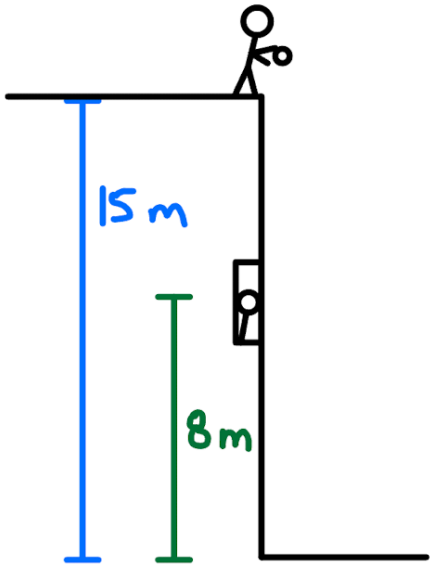
You drop a rock from the top of a 15 m high building. Your friend is looking out a window 8 m above the ground.

a) How long will it be before your friends see the rock pass him?

b) At what speed does the rock pass your friend?

c) At what speed does the rock impact the ground?



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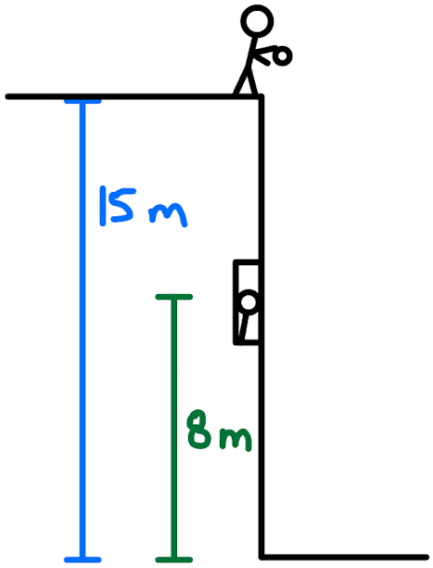

$d = +7\text{ m}$

$a = +9.8\ \text{m/s}^2$

$v_i = 0$

$t = ?$

$d = v_i t + \frac{1}{2} a t^2$

$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(7)}{9.8}}$

$= \boxed{1.20\text{ s}}$

b) At what speed does the rock pass your friend?

$d = +7\text{ m}$

$a = +9.8\ \text{m/s}^2$

$v_i = 0$

$t = 1.20\text{ s}$

$v_f = ?$

$v_f^2 = v_i^2 + 2ad$

$v_f = \sqrt{2ad}$

$= \sqrt{2(9.8)(7)} = \boxed{11.7\ \frac{\text{m}}{\text{s}}}$

c) At what speed does the rock impact the ground?

$d = +15\text{ m}$

$a = +9.8\ \text{m/s}^2$

$v_i = 0$

$v_f = ?$

$v_f^2 = v_i^2 + 2ad$

$v_f = \sqrt{2ad}$

$= \sqrt{2(9.8)(15)} = \boxed{17.1\ \frac{\text{m}}{\text{s}}}$