Example: How deep is the well? [warm-up version]

You drop a rock into a well and it takes 2.50 seconds for it to hit the bottom. How deep is the well?

Assume $v_0 = 0$

$a = g = 9.8 \text{ m/s}^2$ (Neglect air resistance)

$d = \text{depth} = ?$

we don't care about $v_f$...

1. $x = x_0 + \left( \frac{v_0 + v}{2} \right) t$ Does not contain $a$! (but you know it's constant)

2. $v = v_0 + at$ Does not contain position!

3. $x = x_0 + v_0 t + \frac{1}{2} at^2$ Does not contain $v_f$!

4. $v^2 = v_0^2 + 2a(x - x_0)$ Does not contain $t$!

Set $d = (x - x_0)$, $a = g$

$d = x_0 t + \frac{1}{2} g t^2$

$= 0 + \frac{1}{2} (9.8)(2.5)^2$
\[ d = 30.625 \text{ m} \]
\[ d = 30.6 \text{ m} \]