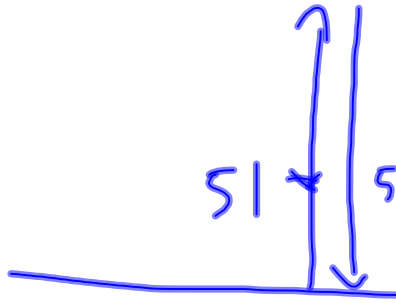
9) $\vec{v}_0 = 142\ m/s$ $\vec{d} = 51\ m$

$t = ?$



$$v_f^2 = v_0^2 + 2\vec{a}\vec{d}$$

$$v_f^2 = (142)^2 + 2(-9.81)(51)$$

$$v_f^2 = 20164 - 1001$$

$$v_f^2 = 19164$$

$$v_f = \sqrt{19164} = \pm 138\ m/s$$

$$a = \frac{v_f - v_0}{t}$$

$$-9.81 = \frac{138 - 142}{t}$$

$$-9.81t = -4$$

$$t = +0.37$$

$$-9.81 = \frac{-138 - 142}{t}$$

$$-9.81t = -280$$

$$t = 28.5\ s$$

A ball is thrown straight up from the top of a 150 m building. Calculate its velocity when the ball is 50 m above the ground. $v_0 = 18\ m/s$ $a = -9.81\ m/s^2$

$$v_f^2 = v_0^2 + 2\vec{a}\vec{d}$$

$$v_f^2 = v_0^2 + 2\vec{a}(\vec{d}_f - \vec{d}_0)$$

$$v_f^2 = (18)^2 + 2(-9.81)(50 - 150)$$

$$v_f^2 = 324 + 2(-9.81)(-100)$$

$$v_f^2 = 324 + 1962$$

$$v_f^2 = 2286$$

$$v_f = \sqrt{2286} = \pm 48\ m/s$$

$\sqrt{\ }$ have + and − answers. Choose the one that fits the problem.