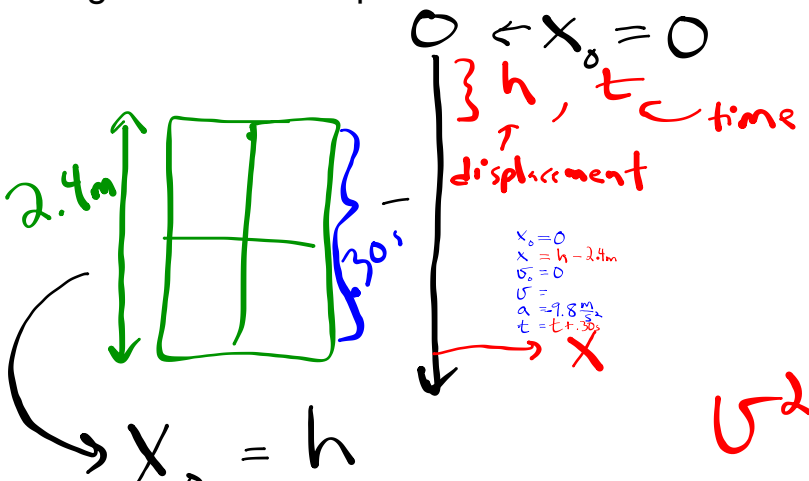
A falling stone takes 0.30 s to pass a window 2.4 m high. In other words, as the stone is falling, 0.30 seconds pass AS the stone falls past the window. From what height above the top of the window did the stone fall?



$X_0 = 0$
$X = h$
$v_0 = 0$
$v = -6.53\ m/s$
$a = -9.8\ m/s^2$
$t = t$

$v^2 = v_0^2 + 2a(x - x_0)$

$X_0 = h$
$X = h - 2.4$
$v_0 = -6.53\ m/s$
$v =$
$a = -9.8\ m/s^2$
$t = 0.30\ s$

$X = X_0 + v_0 t + \frac{1}{2} a t^2$

$-2.4 = h + v_0(.3) + \frac{1}{2}(-9.8)(.3)^2$

$-2.4 = .30 v_0 + -.441$

$-1.96 = .30 v_0$

$v_0 = -6.53\ m/s$

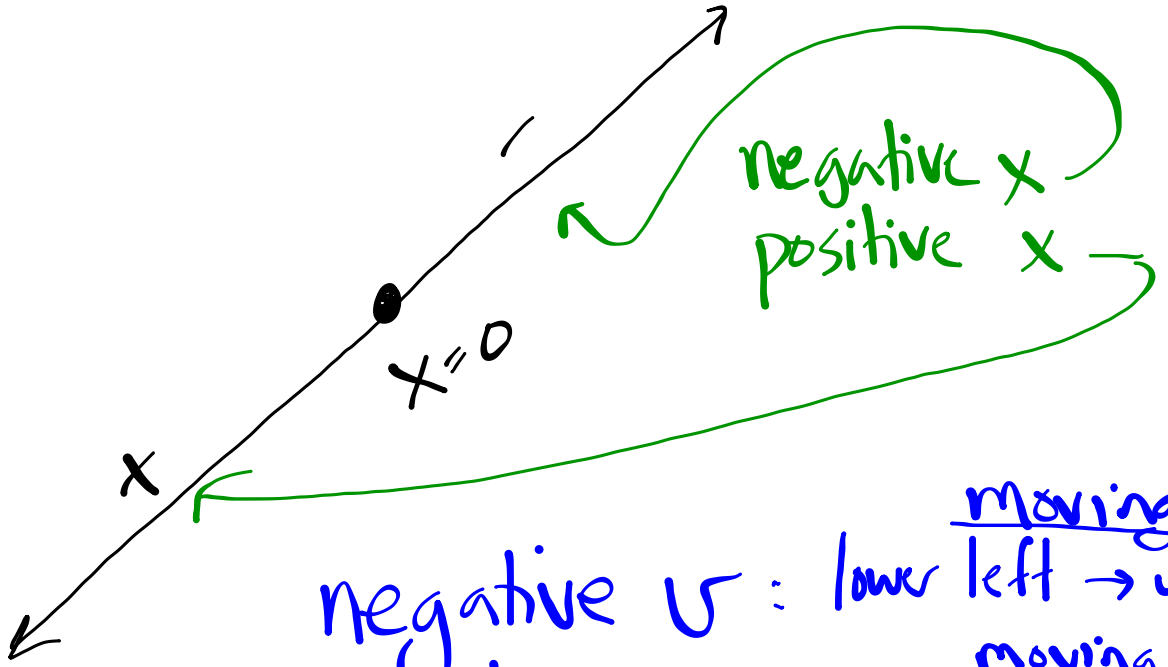
$x_0 = 0$
$x = h$
$v_0 = 0$
$v = -6.53\ m/s$
$a = -9.8\ m/s^2$
$t = t$

$v^2 = v_0^2 + 2a(x - x_0)$

$(-6.53)^2 = 2(-9.8)(h)$

$42.64 = -19.6\ h$

$h = -2.18\ m$

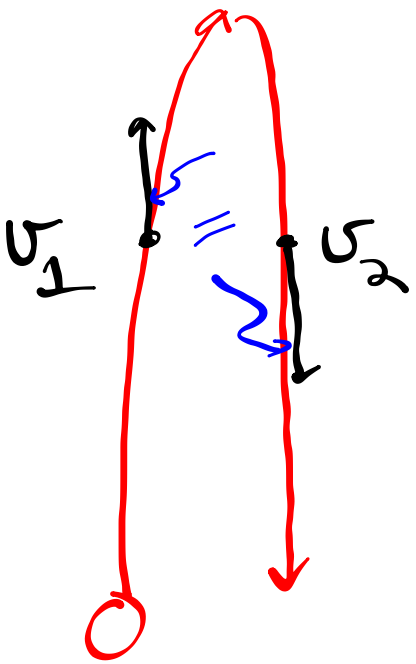


negative v : moving lower left → upper right

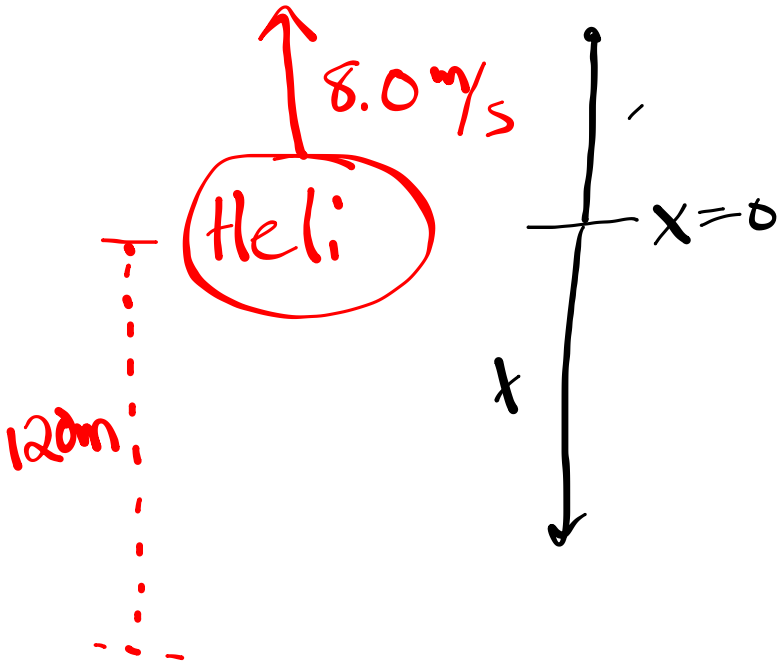
positive v : moving upper right → lower left

negative a: v is getting less + / more −

positive a: v is getting more + / less −


v_1
v_2

A helicopter is ascending vertically with a speed of 8.00 m/s; at a height of 120 m above the earth, a package is dropped from a window. How much time does it take for the package to reach the ground?



$x_0 = 0$

$x = 120$

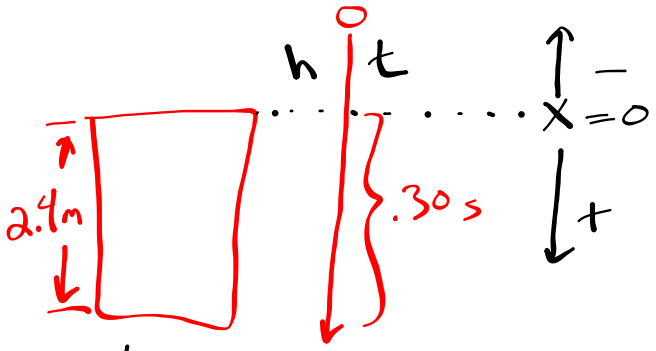
$v_0 = -8.0 \frac{m}{s}$

$v =$

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

$t =$

A falling stone takes 0.30 s to pass a window 2.4 m high. In other words, as the stone is falling, 0.30 seconds pass AS the stone falls past the window. From what height above the top of the window did the stone fall?



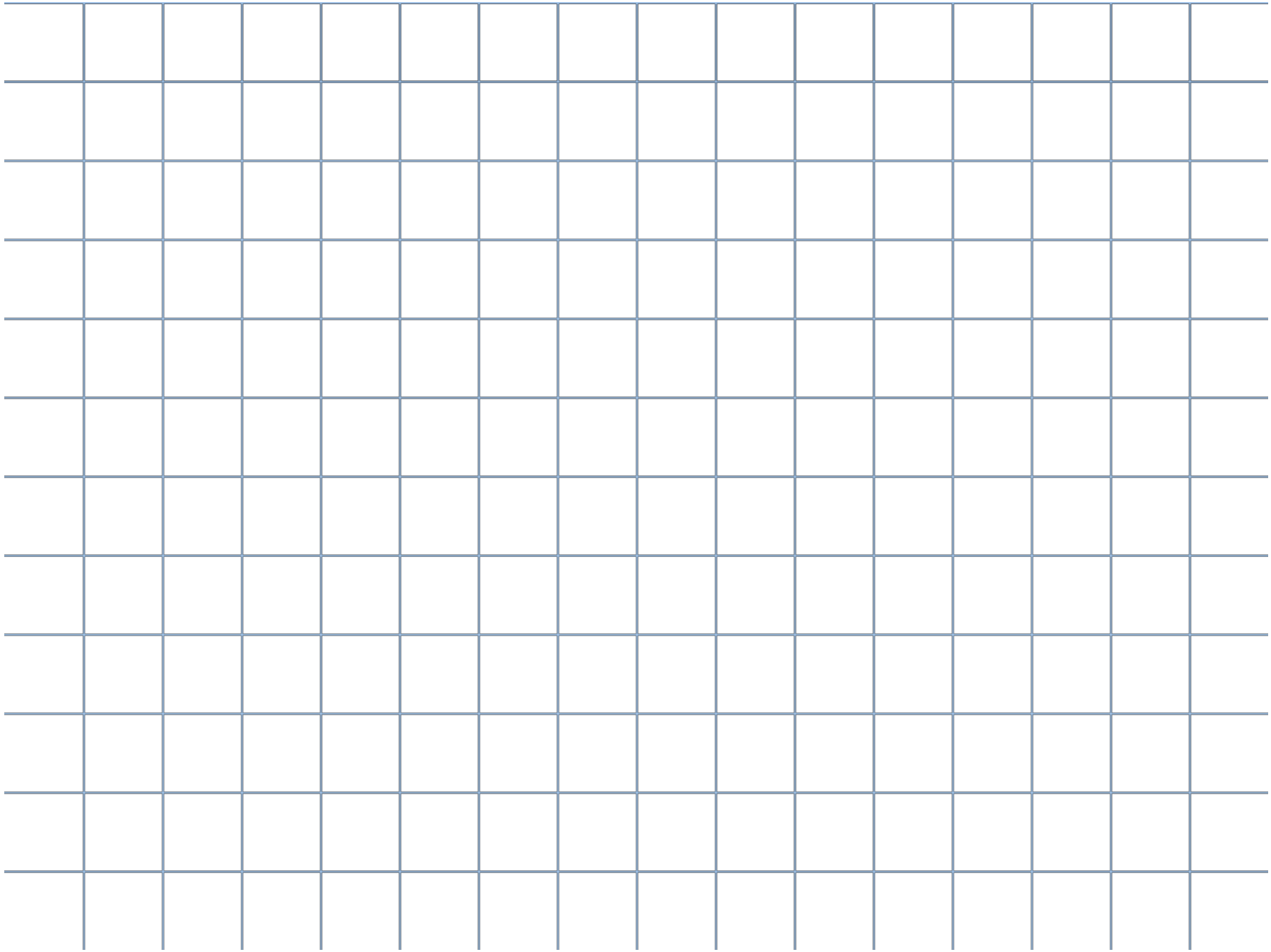
$x_0 = 0$
$x = 2.4$
$v_0 =$
$v =$
$a = 9.8\ m/s^2$
$t = 0.30\ s$

$x_0 = h$
$x = 0$
$v_0 = 0$
$v = 6.53\ m/s$
$a = 9.8\ m/s^2$
$t = t$

$$x = x_0 + v_0 t + \frac{1}{2}at^2$$
$$2.4 = 0.30v_0 + \frac{1}{2}(9.8)(0.30)^2$$
$$v_0 = 6.53\ m/s$$

$$v^2 = v_0^2 + 2a(x - x_0)$$
$$(6.53)^2 = 2(9.8)(-h)$$
$$42.64 = -19.6h$$
$$h = -2.18\ m$$

EXAMPLE 1: A bionic bunny bounces along a trail and travels 56 meters 18^{o} west of due north. It spies a hawk, gets scared, and bolts in a direction that is 39^{o} west of due south. Unfortunately, after going 35 meters he encounters a burly bear. For the bionic bouncing bunny to avoid the burly bear, the bouncing bunny darts away in a direction of 27^{o} north of due east and runs for 98 meters. Where does the bunny end up relative to its starting point?



EXAMPLE 2: A micro meteor experiences the simultaneous accelerations of three different stars as shown. What is the meteor's net acceleration?