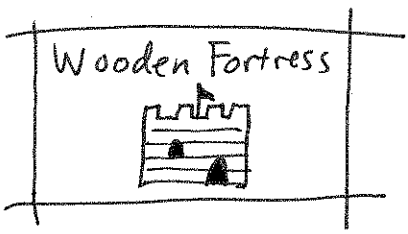
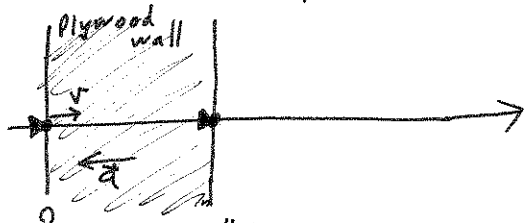


Draw & Axis the problem:



The problem has 2 parts. Let's start with part 1.

Bullet hits	Bullet stops
$x_0 = 0$	$x = ?$
$t_0 = 0$	$t = ?$
$v_0 = +400\ m/s$	$v = 0\ m/s$
$a_0 = -2\times10^6\ m/s^2$	$a = -2\times10^6\ m/s^2$

These are the conditions when the bullet first hits the wood

These are the conditions when the bullet stops.

KNOWNS: Already written explicitly above on diagram.

$$\boxed{v,\ v_0,\ a}$$

UNKNOWNS: The problem is asking for wood thickness. Sounds like a displacement: the difference between impact location (x_0) and point where the bullet stops (x).

$$\boxed{\Delta x} = x - x_0 = X.$$

LET'S LOOK AT MOTION EQUATIONS...

$$v^2 = v_0^2 + 2a\Delta x$$

$$v = v_0 + at$$

$$\Delta x = v_0 t + \frac{1}{2}at^2$$

We're looking with an equation with only one unknown... particularly the unknown we need, Δx.

The first equation above would be perfect!

$v^2 = v_0^2 + 2a\Delta x$ I'm going to not write units during computation because everything (all #'s here) are in meters and seconds.

$0 = (400)^2 + 2\cdot(-2\times10^6)\Delta x$

$0 = 1.6\times10^5 + (-4\times10^6)\Delta x$

$-1.6\times10^5 = -4\times10^6\,\Delta x$

$\Delta x = \frac{-1.6\times10^5}{-4\times10^6} = \frac{1.6}{40} = \boxed{0.04 \text{ meters}}$

Note, this is about 1.57 inches. Not much wood to stop the bullet!

Part 2... All that's changed is the initial velocity. Now, $v_0 = 800\ m/s$. Let's jump straight to solving the motion equation since the other values are the same!

$$v^2 = v_0^2 + 2a\Delta x$$

$$0 = (800)^2 + 2\cdot(-2\times10^6)\Delta x$$

$$0 = 6.4\times10^5 - 4\times10^6\,\Delta x$$

$$-6.4\times10^5 = -4\times10^6\,\Delta x$$

$$\Delta x = \frac{-6.4\times10^5}{-4\times10^6}$$ ~ factors of 10 cancel to be $\frac{1}{10}$

$$\Delta x = \frac{6.4}{40}$$

$$\boxed{\Delta x = 0.16 \text{ meters}}$$

Note, this is about 6.3 inches. We doubled the bullet speed but have to quadruple the plywood thickness to stop this faster bullet!