Flipping Physics Lecture Notes:
Introduction to Projectile Motion

Any object flying through the vacuum you can breathe in both the x and y directions is in projectile motion. When solving a projectile motion problem you need to separate the x and y direction variables.

x direction	y direction
$a_x = 0$	Free-Fall
Constant Velocity	$a_y = -g = -9.81\frac{m}{s^2}$
$v_x = \frac{\Delta x}{\Delta t}$ (need to know 2 variables)	Uniformly Accelerated Motion (need to know 3 variables)
Δt is the same in both directions because it is a *scalar* and has magnitude only (no direction).	

List what you know in both the x and y directions and solve for Δt in one direction and then use it in the other direction.

The only equation in the x direction is $v_x = \frac{\Delta x}{\Delta t}$, therefore there are 3 variables in the x direction: v_x, Δx & Δt. Therefore, you need to know 2 variables in the x direction to find the other 1.

In the y direction we have Uniformly Accelerated Motion, the equations for which are:

There are 5 variables in the UAM equations: $v_f, v_i, a, \Delta t, \& \Delta x$

There are 4 equations.
If you know 3 of the variables
you can find the other 2.
Which leaves you with 1 …

$$v_f = v_i + a\Delta t$$
$$v_f^{\,2} = v_i^{\,2} + 2a\Delta x$$
$$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$$
$$\Delta x = \frac{1}{2}\left(v_f + v_i\right)\Delta t$$