KINEMATICS

the kinematics variables

$\Delta x, v_{ix}, v_{fx}, a_x, t$	$t, \Delta y, v_{iy}, v_{fy}, a_y$

the constant-acceleration kinematics equations

***x* equations**	**missing variables**	***y* equations**	**missing variables**
$v_{fx} = v_{ix} + a_x t$	Δx	$v_{fy} = v_{iy} + a_y t$	Δy
$\Delta x = \frac{v_{ix} + v_{fx}}{2} t$	a_x	$\Delta y = \frac{v_{iy} + v_{fy}}{2} t$	a_y
$v_{fx}^2 = v_{ix}^2 + 2a_x \Delta x$	t	$v_{fy}^2 = v_{iy}^2 + 2a_y \Delta y$	t
$\Delta x = v_{ix} t + \frac{1}{2} a_x t^2$	v_{fx}	$\Delta y = v_{iy} t + \frac{1}{2} a_y t^2$	v_{fy}
$\Delta x = v_{fx} t - \frac{1}{2} a_x t^2$	v_{ix}	$\Delta y = v_{fy} t - \frac{1}{2} a_y t^2$	v_{iy}

the systematic, five-step method for solving constant-acceleration kinematics problems

1. Draw the object's path. Label the initial and final positions. Draw velocity and acceleration vectors.
2. If you haven't done so already, write down axes and positive directions.
3. Break displacement, velocity, and acceleration into components. (Not necessary for one-dimensional motion.)
4. Write down all of the kinematics variables. Underneath the variables, write down the given values, including signs, and indicate the question with a "?".
5. When you know values for three of the kinematics variables, you can choose an equation. Identify the one variable you don't care about, and pick the equation that is missing that variable. Plug in and solve. Write your final answer with a sign and units.