Suppose an object is at $P(x_1, y_1)$ at time t_1 and at $Q(x_2, y_2)$ at time t_2 and it moves along a straight line at constant speed v.

The parametric equations of motion of the object are :

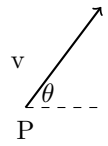
$$x = a + b(t - t_1) \qquad y = c + d(t - t_1)$$

where (a, c) is the position of the object at t_1, that is $a = x_1$ and $c = y_1$
$b = v_x$ the horizontal component of the velocity and d= v_y the vertical component of the velocity. So you can also write

$$x = x_1 + v_x(t - t_1), \qquad y = y_1 + v_y(t - t_1)$$

You can calculate v_x and v_y in different ways, depending on what the problem gives you :

- If you are given $P(x_1, y_1)$, $Q(x_2, y2)$, t_1 and t_2 then
  $v_x = \frac{x_2 - x_1}{t_2 - t_1} \, (\frac{\Delta x}{\Delta t})$
  $v_y = \frac{y_2 - y_1}{t_2 - t_1} \, (\frac{\Delta y}{\Delta t})$
- If you are given $P(x_1, y_1)$, v , θ (see figure) then



$v_x = v\cos(\theta)$
$v_y = v\sin(\theta)$.

Note: in many problems time t_1 is just the initial time so $t_1 = 0$ in which case you have

$$x = x_1 + v_x t, \qquad y = y_1 + v_y t$$