Kinematics

The **positon vector** for a moving object is the same as the equation of a straight line except that the parameter is time (usually represented by *t*):

2 dimensions	**3 dimensions**
$$r = \begin{pmatrix} -1 \\ 3 \end{pmatrix} + t\begin{pmatrix} 3 \\ -2 \end{pmatrix}$$	$$r = \begin{pmatrix} 2 \\ -2 \\ 5 \end{pmatrix} + t\begin{pmatrix} -2 \\ 3 \\ -5 \end{pmatrix}$$
(-1,3) is the position when t = 0	(2,-2,5) is the position when t = 0
Velocity $= v = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$	Velocity $= v = \begin{pmatrix} -2 \\ 3 \\ -5 \end{pmatrix}$
Speed = $\lvert v \rvert = \sqrt{3^2 + (-2)^2}$	Speed = $\lvert v \rvert = \sqrt{(-2)^2 + 3^2 + (-5)^2}$

Questions often require us to see if two objects have collided. It is NOT enough to check that the lines intersect. To collide, they must occupy the **same place** at the **same time**

There are 2 methods for checking if A and B collide

1. Find the time when the when $x_A = x_B$. Find y_A at this time. Find y_B at this time. Is $y_A = y_B$?
2. Find time, t_1 when $x_A = x_B$. Find time, t_2 when $y_A = y_B$. Is $t_1 = t_2$?