

Particle A leaves $4\mathbf{i} + 2\mathbf{j}$ and travels with velocity $-\mathbf{i} + 2\mathbf{j}$ and particle B leaves $-5\mathbf{i} + 2\mathbf{j}$ and travels with velocity $\mathbf{i} + \mathbf{j}$.

Then use solve to find the times at which each particle is at the point of intersection of the paths.

Determine where the paths of the particles intersect.

Since the times are different, they don't collide - A arrived first after 3 seconds and B arrived after 6 seconds.

Set up position vectors as shown.

You can choose to put the whole equation on a single line.

Also works with 3D vectors, etc.

TI-84 Plus calculator interface showing the setup of position vectors:

$$\begin{bmatrix} 4 \\ 2 \end{bmatrix} + s \times \begin{bmatrix} -1 \\ 2 \end{bmatrix} \Rightarrow \mathbf{a}$$

$$\begin{bmatrix} -s+4 \\ 2 \cdot s+2 \end{bmatrix}$$

$$\begin{bmatrix} -5 \\ 2 \end{bmatrix} + t \times \begin{bmatrix} 1 \\ 1 \end{bmatrix} \Rightarrow \mathbf{b}$$

$$\begin{bmatrix} t-5 \\ t+2 \end{bmatrix}$$

Mode: Alg Standard Real Rad

TI-84 Plus calculator interface showing the solve function:

$$\text{solve}(\mathbf{a}=\mathbf{b}, \{s, t\})$$

$$\{s=3, t=6\}$$

$$\begin{bmatrix} t-5 \\ t+2 \end{bmatrix} | t=6$$

$$\begin{bmatrix} 1 \\ 8 \end{bmatrix}$$

Mode: Alg Decimal Real Rad

TI-84 Plus calculator interface showing the entire equation in the solve function:

$$\text{solve}\left(\begin{bmatrix} 4 \\ 2 \end{bmatrix} + s \times \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} -5 \\ 2 \end{bmatrix} + t \times \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \{s, t\}\right)$$

$$\{s=3, t=6\}$$

Mode: Alg Standard Real Rad