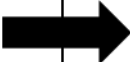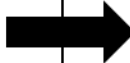# Application to Mechanics

Out of displacement, speed, acceleration, force, mass and time, all but mass and time are vectors. Clearly these can act in 3D space.

	Vector		Scalar
Force	$\begin{pmatrix} 3 \\ 4 \\ -1 \end{pmatrix} N$	➡	
Acceleration	$\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} ms^{-2}$	➡	
Displacement	$\begin{pmatrix} 12 \\ 3 \\ 4 \end{pmatrix} m$	➡	
Velocity	$\begin{pmatrix} 0 \\ 4 \\ 3 \end{pmatrix} ms^{-1}$	➡	

Example

[Textbook] **A particle of mass 0.5 kg is acted on by three forces.**

$$F_1 = (2i - j + 2k)\ N \quad F_2 = (-i + 3j - 3k)\ N \quad F_3 = (4i - 3j - 2k)\ N$$

a. **Find the resultant force R acting on the particle.**

b. **Find the acceleration of the particle, giving your answer in the form $(pi + qj + rk)$ ms^{-2}.**

c. **Find the magnitude of the acceleration.**

Given that the particle starts at rest,

d. **Find the distance travelled by the particle in the first 6 seconds of its motion.**