

# Unit vector

A *unit vector* is a vector whose magnitude is 1.

The unit vector in the same direction as vector  $\mathbf{r}$  is  $\frac{\mathbf{r}}{|\mathbf{r}|}$ . It is sometimes written as  $\hat{\mathbf{r}}$ .

By convention, we often define three unit vectors,  $\mathbf{i}$ ,  $\mathbf{j}$  and  $\mathbf{k}$  to be parallel to the  $x$ ,  $y$  and  $z$  coordinate axes.

So in column notation,  $\mathbf{i} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$ ,  $\mathbf{j} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$  and  $\mathbf{k} = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$ .