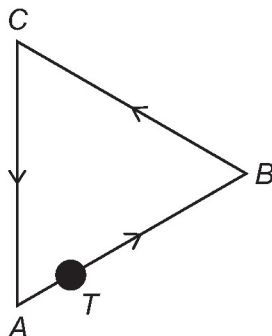18   In this question **i** and **j** are perpendicular unit vectors representing due east and due north respectively.

A particle, T, is moving on a plane at a constant speed.

The path followed by T makes the exact shape of a triangle ABC.

T moves around ABC in an anticlockwise direction as shown in the diagram below.

On its journey from A to B the velocity vector of T is $(3\mathbf{i} + \sqrt{3}\mathbf{j})\,\mathrm{m\,s}^{-1}$

18 (a)   Find the speed of T as it moves from A to B

[1 mark]

18 (b)   On its journey from B to C the velocity vector of T is $(-3\mathbf{i} + \sqrt{3}\mathbf{j})\,\mathrm{m\,s}^{-1}$

Show that the acute angle $ABC = 60°$

[2 marks]

18 (c)   It is given that ABC is an equilateral triangle.

T returns to its initial position after 9 seconds.

Vertex B lies at position vector $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ metres with respect to a fixed origin O

Find the position vector of C

[3 marks]