4. A particle P moves along a straight line such that at time t seconds, $t \geq 0$, its velocity, v m s^{-1}, is given by

$$v = 16 - 3t^2$$

Find

(a) the distance travelled by P in the first second,

(3)

(b) the value of t at the instant when P changes its direction of motion,

(2)

(c) the value of t at the instant when P returns to its starting point.

(3)

(Total 8 marks)