4 A particle P is moving along a straight line through the fixed point O.
The displacement, s metres, of P from O at time t seconds is given by

$$s = t^3 - 27t + 55 \qquad t \geqslant 0$$

(a) Write down the distance, in metres, of P from O when $t = 0$

(1)

(b) Find an expression, in terms of t, for the velocity, v m/s, of P at time t seconds.

(2)

(c) Find the value of t when P is closest to O.

(2)

(d) Find the distance, in metres, of P from O when P is closest to O.

(1)

(e) Find the distance, in metres, travelled by P in the interval $0 \leqslant t \leqslant 5$

(3)

Question 4 continued

(Total for Question 4 is 9 marks)