3. A particle P is moving in a straight line with simple harmonic motion about the fixed point O as centre.

When P is a distance 0.02 m from O, the speed of P is $0.3\,\text{m s}^{-1}$ and the magnitude of the acceleration of P is $0.5\,\text{m s}^{-2}$

(a) Find the period of the motion.

(4)

The amplitude of the motion is a metres.

Find

(b) the value of a,

(3)

(c) the total length of time during each complete oscillation for which P is within $\frac{1}{2}a$ metres of O.

(4)

(Total for Question 3 is 11 marks)