

Homework 10

1)

A particle executes simple harmonic motion about a point O . The magnitude of the maximum acceleration is 1 m s^{-2} and the maximum speed is 4 m s^{-1} .

Calculate the period of the motion.

4

2)

A piston oscillates about the point O with simple harmonic motion of amplitude 0.25 m .

Calculate the distance of the piston from O when its speed is half its maximum speed.

5

3)

A particle performs simple harmonic motion in a straight line between points A and B with period 0.6 seconds. Initially it was projected from C , the midpoint of AB , with speed $\frac{\pi}{5} \text{ m s}^{-1}$ towards B .

Calculate

(a) the length of AB , and

3

(b) the time taken by the particle to move directly from C to D , the midpoint of CB .

2

4)

The maximum speed of a particle executing simple harmonic motion is 13 centimetres per second. When the particle has moved 15 centimetres from its centre of oscillation, its speed is 12 centimetres per second.

Calculate the period and the amplitude of the motion.

5

5)

A particle describes simple harmonic motion. At an instant one eighth of a period after the particle has been in an extreme position its speed is 2 m s^{-1} and its acceleration has magnitude 8 m s^{-2} . Find the period and the amplitude of the motion.

6