7.

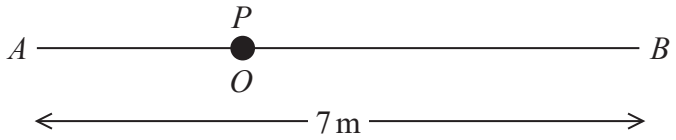


Figure 4

The fixed points A and B are 7 m apart on a smooth horizontal surface.

A light elastic string has natural length 2 m and modulus of elasticity 4 N. One end of the string is attached to a particle P of mass 2 kg and the other end is attached to A

Another light elastic string has natural length 3 m and modulus of elasticity 2 N. One end of this string is attached to P and the other end is attached to B

The particle P rests in equilibrium at the point O, where AOB is a straight line, as shown in Figure 4.

(a) Show that $OA = 2.5$ m.

(4)

The particle P now receives an impulse of magnitude 6 N s in the direction OB

(b) (i) Show that P initially moves with simple harmonic motion with centre O

(ii) Determine the amplitude of this simple harmonic motion.

(8)

The point C lies on OB. As P passes through C the string attached to B becomes slack.

(c) Find the speed of P as it passes through C

(2)

(d) Find the time taken for P to travel directly from O to C

(3)

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TOTAL FOR PAPER IS 75 MARKS

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