

- 3 A mass damper can be used to stabilise a building during earthquakes. A mass-spring system shown in **Fig. 3.1** can be used to model a mass damper.

A 600 g mass is placed on a smooth surface and is attached horizontally to two unstretched identical springs X and Y each with a spring constant of 20 N m^{-1} .

When the mass is displaced by 5.0 cm from its equilibrium position and released from rest as shown in **Fig. 3.2**, it undergoes simple harmonic motion.

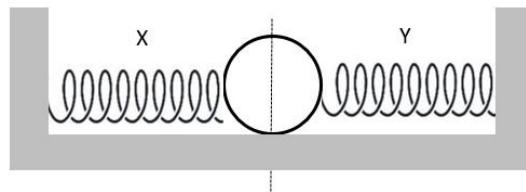


Fig. 3.1

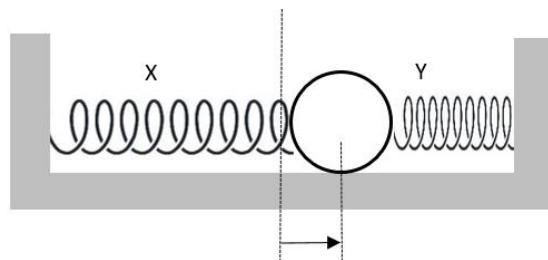


Fig. 3.2

- (a) (i) Using energy consideration, calculate the maximum speed of the mass.

Maximum speed = m s⁻¹ [2]

- (ii) Hence, determine the period of the oscillating spring-mass system.

Period = s [2]

- (iii) Sketch for one complete oscillation, on **Fig. 3.3**, a labelled graph to show the variation with time t from the point of release of the mass

- 1 of the kinetic energy of the mass. Label this graph M.
- 2 of the elastic potential energy of spring Y. Label this graph S.



Fig. 3.3