3

A string, tied to a sinusoidal oscillator at P and running over a support at Q, is stretched by a block of mass *m* as shown in Fig. 3.1. The amplitude of the motion at P is small enough for that point to be considered a node. A node also exists at Q.

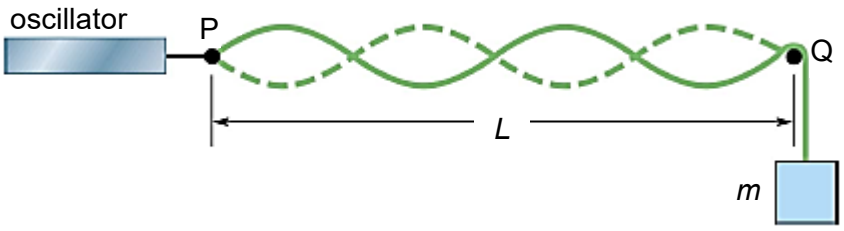

Fig. 3.1

(a)

Explain how a

.....

.....

..... [2]

(b)

Explain why the incident wave must undergo a phase change of 180° at point Q.

.....

..... [1]

(c)

The frequency of the oscillator is set at 120 Hz. A stationary wave is formed when the length *L* is 1.20 m. The length is slowly increased and the stationary wave disappears. The stationary wave is again formed when *L* is increased by 0.30 m.

(i)

Calculate the velocity of the wave in the string.

wave velocity = ... m s^{-1}

[2]

(ii)

Given that the amplitude of the antinodes is 0.80 cm, calculate the maximum *vertical* velocity for a point on the string.

maximum vertical velocity = ... m s^{-1}

[2]

[Total: 7]