4 (a) Waves from a point source pass through an area that is 1.6 cm wide, as shown in Fig. 4.1.

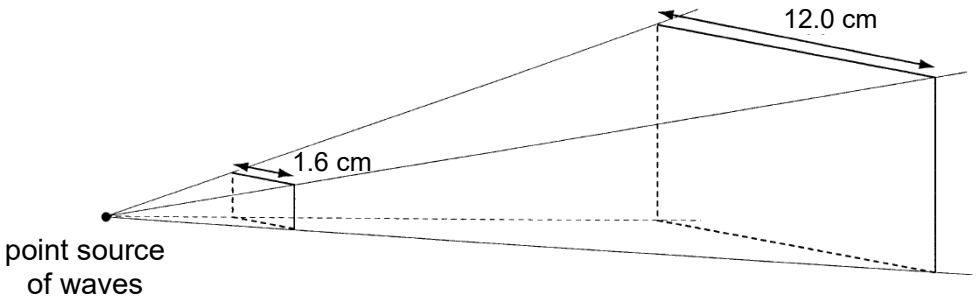

Fig. 4.1

Within this area, the intensity of the waves is I_0 and their amplitude is A_0. The waves reach a second area of width 12.0 cm.

Determine the amplitude of the waves when they reach the second area in terms of A_0.

Show your working clearly.

amplitude = ... [2]

(b) A stationary wave is formed on a stretched string between two fixed points A and B.

The variation of the displacement y of particles of the string with distance x along the string for the wave at time $t = 0$ is shown on Fig. 4.2.

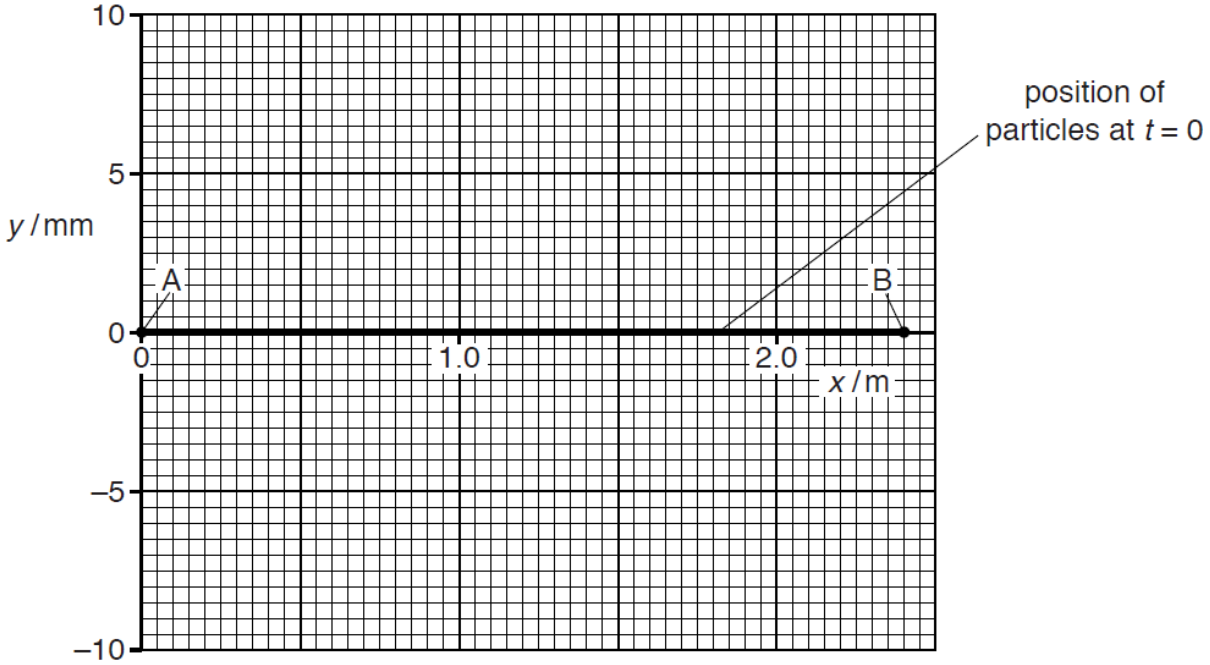

Fig. 4.2

The wave has a period of 20 ms and a wavelength of 1.2 m. The maximum amplitude of the particles of the string is 5.0 mm.

(i) On Fig. 4.2, sketch the variation with position of the displacement of the string at

1. $t = 12.5$ ms (label this Y) [2]

2. $t = 5.0$ ms (label this Z) [2]

(ii) State the phase difference between the particles of the string at $x = 0.40$ m and at $x = 0.80$ m.

phase difference = ... [1]

[Total: 7 marks]