5 **(a)** State the relationship between the intensity and the amplitude of a wave.

.....

.....[1]

(b) Microwaves of the same amplitude and wavelength are emitted in phase from two sources P and Q. The sources are arranged as shown in Fig. 5.1.

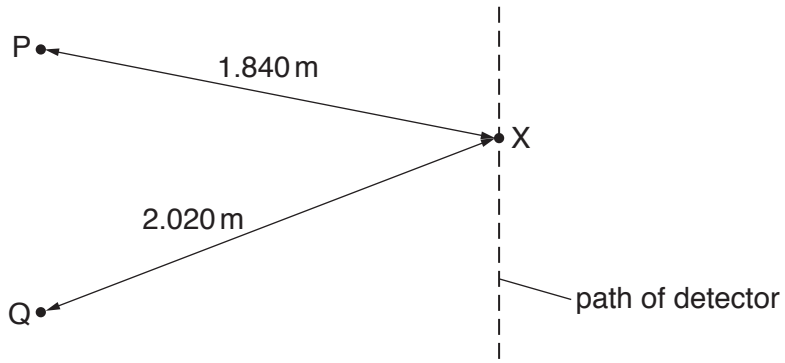

Fig. 5.1

A microwave detector is moved along a path that is parallel to the line joining P and Q. A series of intensity maxima and intensity minima are detected.

When the detector is at a point X, the distance PX is 1.840 m and the distance QX is 2.020 m. The microwaves have a wavelength of 6.0 cm.

(i) Calculate the frequency of the microwaves.

frequency = ... Hz [2]

(ii) Describe and explain the intensity of the microwaves detected at X.

.....

.....

.....

.....

.....[3]

(iii) Describe the effect on the interference pattern along the path of the detector due to each of the following separate changes.

1. The wavelength of the microwaves decreases.

.....

.....

2. The phase difference between the microwaves emitted from the sources changes to 180°.

.....

.....

[2]

[Total: 8]