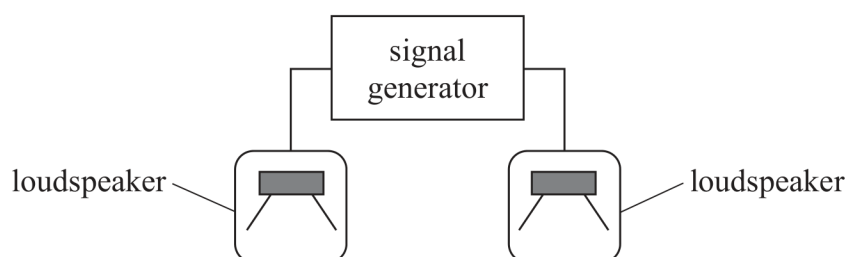


- 2 A student investigated the interference of sound waves. The student used a signal generator with two loudspeakers, as shown.



Plan view
not to scale

- (a) The student adjusted the signal generator output until he heard a loud, continuous sound from the loudspeakers.

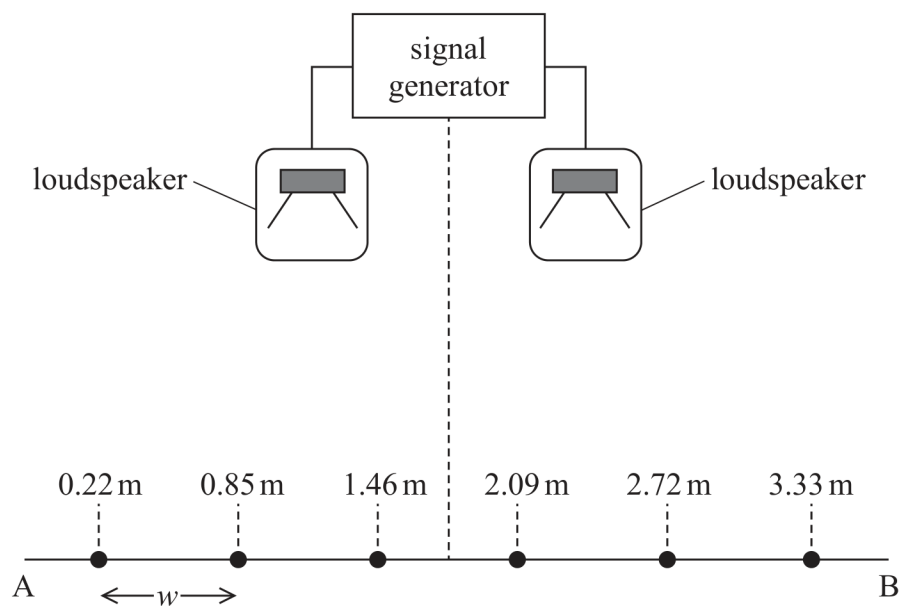
(i) State a reason for connecting both loudspeakers to the same signal generator.

(1)

(ii) Identify a health and safety issue for the student and how it may be dealt with.

(2)

- (b) The student walked along a line between points A and B carrying a sound meter. The sound meter indicated the positions of maximum sound intensity, as shown.



Drawing
not to scale

Key

● position of maximum sound intensity

The student measured the distance of each maximum from point A using a tape measure.

- (i) Determine an accurate value for the separation w of the maxima.

(3)

$w =$



- (ii) The relationship between w and the wavelength λ of the sound waves is given by

$$w = \frac{\lambda D}{s}$$

where D is the perpendicular distance between the loudspeakers and the line AB, and s is the separation of the loudspeakers.

Determine the value of λ .

$$D = 4.0\text{ m}$$

$$s = 110\text{ cm}$$

(2)

$$\lambda = \dots\dots\dots$$

- (iii) The student expected a maximum intensity at the point equidistant from the loudspeakers.

Suggest why there was actually a minimum intensity at this point.

(2)



(c) The student used this investigation to determine the speed of sound in air.

- (i) To determine an accurate value for the speed of sound, the student would need to use other apparatus.

Explain what other apparatus the student would need.

(2)

- (ii) On a humid day, the speed of sound in air increases.

Explain how an increase in the speed of sound would affect the value of w for this investigation.

(2)

(Total for Question 2 = 14 marks)