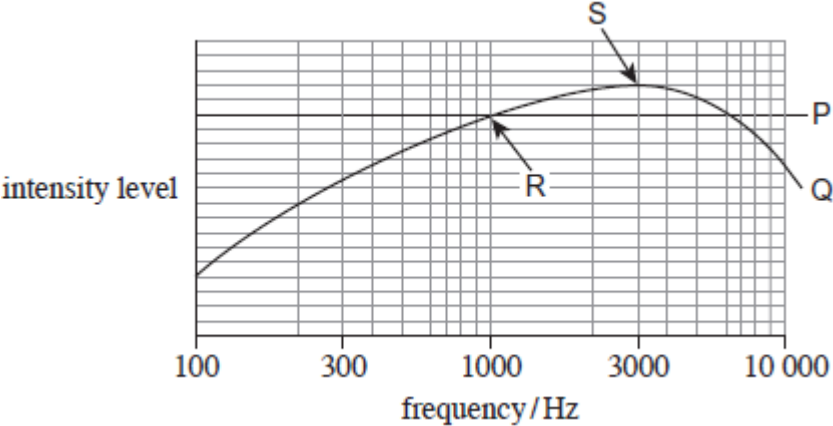


Q1.(a) A variable-frequency sound source produces sound of equal intensity at all frequencies. Two sound meters are placed at equal distances from the source. The two meters are set on different scales. Lines P and Q on the graph show how the intensity level indicated by each meter varies with frequency.



(i) State and explain which sound meter scale is used for line P.

.....

(2)

(ii) State and explain which sound meter scale is used for line Q.

.....

(2)

(b) (i) Explain the significance of the point R.

.....

(1)

(ii) Explain the significance of the point S.

.....

.....

(1)

- (c) A sound of intensity level 95 dB is incident on a human ear. Calculate the intensity incident on the ear drum.

$$I_0 = 1.0 \times 10^{-12} \text{ W m}^{-2}$$

intensity = W m⁻²

(2)

(Total 8 marks)

- Q2.(a)** Sound waves are incident on a human ear.

Describe how the frequency and amplitude of the vibrations change as the wave is transmitted through the ear to the fluid in the inner ear.

.....

(2)

- (b) Explain how the components of the ear act to amplify the pressure changes due to the sound wave.

.....

.....

(3)

- (c) A sound intensity meter, set to the dB scale, is placed near to a source of sound. The intensity level reading on the sound meter is 82 dB.

Calculate in, W m^{-2} , the intensity of the sound at the meter.

intensity = _____ W m^{-2}

(3)

- (d) The sound intensity meter is 2.0 m from the source which is emitting sound equally in all directions.

Calculate the power emitted by the source.

power = _____ W

(2)

(Total 10 marks)

- Q3.(a)** Define the threshold of hearing, I_0 .

.....
.....
.....
.....

(2)

(b) Sound intensity levels are usually measured in decibels which is based on a logarithmic scale. State **two** reasons why this logarithmic scale is used.

reason 1

.....

reason 2

.....

(2)

(c) Hearing loss might be due to ageing or exposure to excessive noise. For each cause, state how the hearing loss varies with frequency over the audible range.

(i) Loss due to ageing.

.....

.....

(1)

(ii) Loss due to excessive noise.

.....

.....

(2)

(Total 7 marks)