

Sound, echoes, ultrasound and hearing

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

Answer all questions. Show your working, and give units. Use 330 m/s for the speed of sound in air unless the question states another value. A calculator is allowed. The test is out of 20 marks.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** IGCSE 3.4

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Hearing range (2 marks)

- State the approximate range of frequencies that a healthy young person can hear. (1 mark)
- State what is meant by ultrasound. (1 mark)

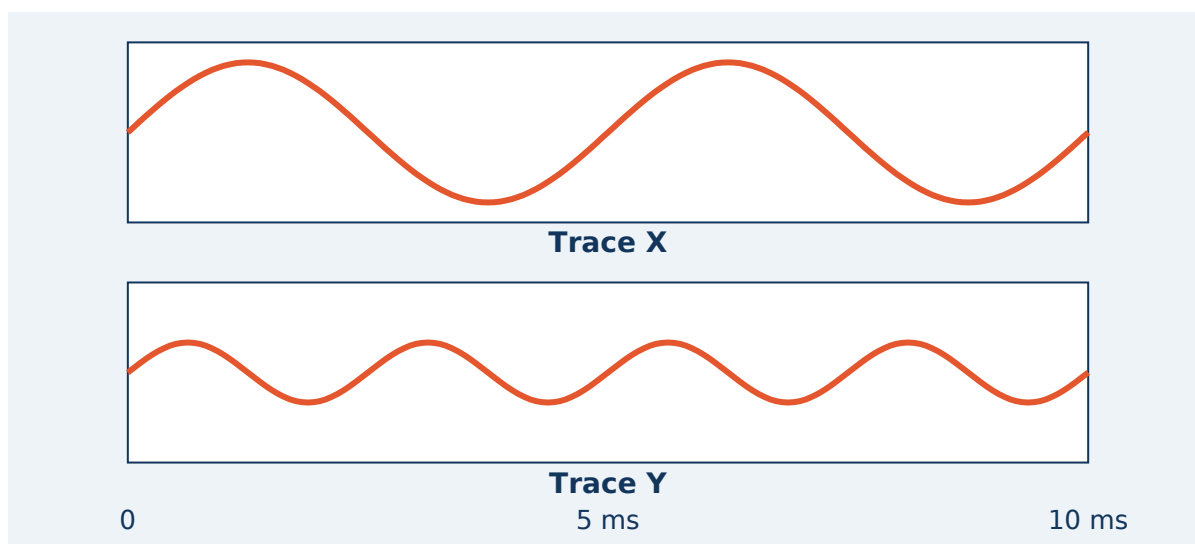
Question 2 Thunder (3 marks)

Kofi hears thunder 6.0 s after seeing lightning. The speed of sound in air is 330 m/s. Calculate the distance to the lightning. (3 marks)

Question 3 Sonar (3 marks)

A ship sends a pulse of ultrasound to the seabed and receives the echo after 0.160 s. The speed of sound in sea water is 1500 m/s. Calculate the depth of the water. (3 marks)

Question 4 Two sounds (4 marks)



Traces of two sounds drawn to the same time scale (10 ms across).

- State which trace shows the sound with the higher pitch. (1 mark)
- State which trace shows the louder sound. (1 mark)
- Calculate the frequency of the sound in trace X. (1 mark)
- Calculate the wavelength of X in air, using 330 m/s. (1 mark)

Question 5 Sound in air (3 marks)

Describe how a sound wave travels through air from a loudspeaker to a listener. (3 marks)

Question 6 Sound and vacuum (2 marks)

Explain why sound cannot travel through a vacuum. (2 marks)

Question 7 Medical ultrasound (2 marks)

Explain how an ultrasound scan produces an image of an organ. (2 marks)

Question 8 Speed in air (1 mark)

State the speed of sound in air used in this course. (1 mark)