Sound and Ultrasound

Waves · 4 questions · step-by-step answers at the end

Name: Date: Score: / 4

USEFUL EQUATIONS

$v = f\lambda$ distance = $v \times t$ / 2

Questions

Show your working in the space under each question.

1. Sound travels at 340 m/s in air. What is the wavelength of the highest note a person can hear (20 kHz)?

2. An ultrasound pulse is sent into the body at 1500 m/s. An echo from an organ returns 40 µs later. How deep is the organ?

3. Why can't astronauts on a spacewalk talk to each other without radios?

4. A sound gets louder and higher. How does its oscilloscope trace change?

Step-by-step answers

Sound and Ultrasound

1. $\lambda = v/f = 340/20\,000 =$ **0.017 m** (1.7 cm).

2. 1. Distance there and back = $vt = 1500 \times 40 \times 10^{-6} = 0.060$ m.
2. Depth = 0.060/2 = **0.030 m** (3.0 cm).

Answer: 3.0 cm

3. Sound needs a **medium**, and space is a vacuum. Radio waves do not need one.

4. The waves get **taller** (bigger amplitude) and **closer together** (higher frequency).