

Hearing and Ultrasound

KS3 Physics · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Can a person hear a sound of 30 000 Hz?

Step 1 · Human range

About 20 Hz to 20 000 Hz.

Step 2 · Compare

30 000 Hz is above 20 000 Hz.

Answer: No — it is ultrasound

Check: A dog (up to about 45 000 Hz) could hear it.

2. Now try one with the steps

Describe the path of sound through the ear.

Step 1 · Outer ear

Step 2 · Middle ear

Step 3 · Inner ear

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is the approximate hearing range of a young human? [1]

2. What is ultrasound? [1]

3. What is infrasound? [1]

4. Which part of the ear vibrates first when sound arrives? [1]

5. Can a human hear a sound of 25 000 Hz? [1]
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6. Write 20 kHz in hertz. [1]
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7. Put these in order travels through the ear: cochlea, eardrum, ear canal, ear bones. [2]
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8. A dog can hear up to 45 000 Hz and a young person up to 20 000 Hz. How much higher is the dog's limit, in Hz? [1]
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9. Explain why a dog responds to a dog whistle but its owner hears nothing. [2]
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10. Why can many older people not hear very high-pitched sounds? [2]
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11. A teenager can hear up to 18 000 Hz and her grandfather up to 14 000 Hz. How many Hz higher can she hear, in Hz? [1]
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12. Give two uses of ultrasound. [2]
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13. Why should workers using loud machinery wear ear defenders? [2]
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14. Elephants communicate using sounds of about 15 Hz. Explain why people standing nearby may not hear them. [1]
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4. Before you hand it in

"Ultrasound is very loud sound."

Ultrasound has a frequency above 20 000 Hz; it can be quiet or intense.

"Everyone can hear from 20 Hz to 20 000 Hz."

The upper limit varies and falls with age and noise damage.

Mixing up kHz and Hz.

1 kHz = 1000 Hz. Convert before comparing.