

GCSE Physics Questions on the Smart Speaker

1. A smart speaker is playing music in a kitchen. Describe the main useful energy transfer taking place.
2. The smart speaker feels warm after playing music for an hour. Explain why some of the input energy is wasted as thermal energy.
3. A smart speaker is connected to a 12 V adapter. Explain why a potential difference is needed for current to flow through the speaker.
4. The speaker uses a current of 1.8 A from a 12 V supply. Calculate the power transferred by the speaker.
5. The speaker has a power rating of 24 W and is used for 15 minutes. Calculate the energy transferred.
6. The smart speaker transfers 18 000 J of energy in 10 minutes. Calculate its power.
7. The outer case of the smart speaker is made from plastic. Explain why plastic is used instead of metal for the outside case.
8. Copper tracks are used on the circuit board inside the speaker. Explain why copper is suitable for this job.
9. The speaker cone vibrates backwards and forwards to produce sound. Explain how these vibrations produce a sound wave in air.
10. Sound from the speaker travels as a longitudinal wave. Describe what is meant by a longitudinal wave.
11. A bass note from the speaker has a frequency of 80 Hz. Explain why this note has a lower pitch than a note of frequency 800 Hz.
12. The volume of the smart speaker is increased. Describe what happens to the amplitude of the sound wave and the energy transferred by the wave.
13. A sound wave from the speaker has a frequency of 400 Hz and a wavelength of 0.85 m. Calculate the speed of the sound wave.
14. A person stands 6.8 m away from the smart speaker. Sound travels at 340 m/s. Calculate the time taken for the sound to reach the person.
15. Explain why the sound from the smart speaker would not travel through a vacuum.

16. The microphone in the smart speaker detects someone saying “play music”. Describe the energy transfer in the microphone.
17. The loudspeaker contains a coil of wire placed near a permanent magnet. Explain how the motor effect causes the coil to move.
18. The current in the speaker coil changes direction many times each second. Explain why this makes the speaker cone vibrate backwards and forwards.
19. A wire in the speaker coil carries a current of 2.5 A. The magnetic field strength is 0.32 T and the length of wire in the magnetic field is 0.18 m. Calculate the force on the wire using $F = BIL$.
20. A smart speaker uses Wi-Fi to receive music. Explain two differences between the sound waves from the speaker and the electromagnetic waves used for Wi-Fi.