Sound – 2021 O Level 5054

1. Nov/2021/Paper_11/No.25

A student stands a distance x in front of a large wall.

He claps his hands at a regular rate so that each clap coincides with the echo from the previous clap.

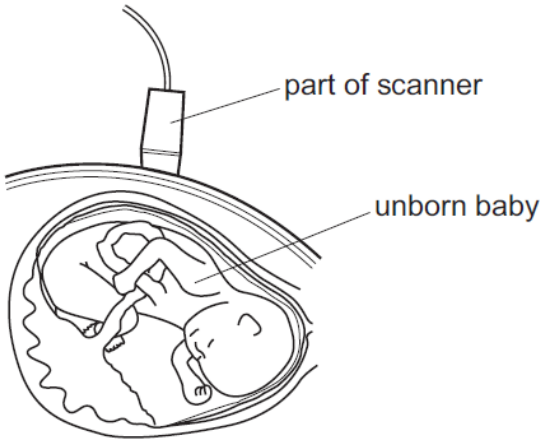
In a time t, he claps his hands N times.

Which expression is used to calculate the speed of sound in air?

A $\frac{x}{Nt}$ **B** $\frac{2x}{Nt}$ **C** $\frac{Nx}{t}$ **D** $\frac{2Nx}{t}$

2. Nov/2021/Paper_11/No.26

An ultrasound scanner produces an image of an unborn baby.



What does the scanner use to form an image of the baby?

A ultrasound absorbed by the baby

B ultrasound emitted by the baby

C ultrasound reflected by the baby

D ultrasound refracted by the baby

3. Nov/2021/Paper_12/No.28

Which of the following is most closely associated with echoes?

A focussing

B reflection

C refraction

D total internal reflection

4. Nov/2021/Paper_21/No.8

A loudspeaker is made from a coil of wire fixed to a cardboard tube. The tube is attached to a cardboard cone.

Fig. 8.1 shows part of the arrangement of the loudspeaker.

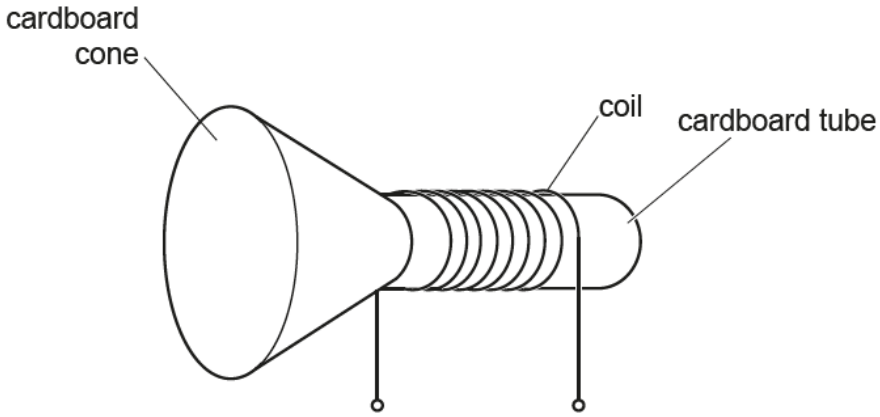


Fig. 8.1

When there is a current in the coil, the coil experiences a force.

(a) State what else is needed in a loudspeaker to make a current-carrying wire experience a force.

..... [1]

(b) A student connects the coil to the output of an alternating current (a.c.) generator. Fig. 8.2 shows how the electromotive force (e.m.f.) produced by the generator varies with time.

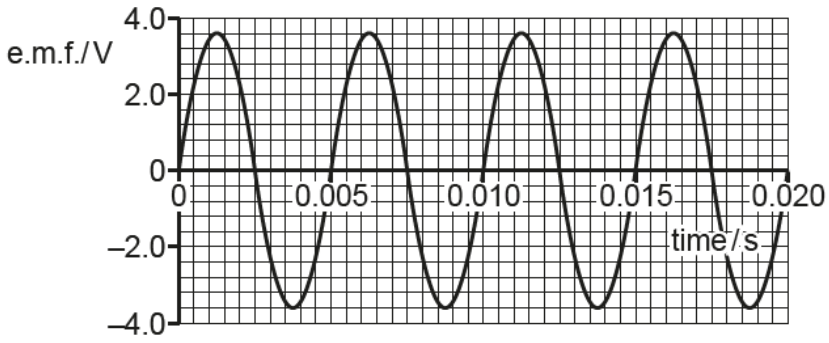


Fig. 8.2

The coil, tube and cone vibrate backwards and forwards.

(i) Explain why the e.m.f. shown in Fig. 8.2 makes the coil vibrate.

.....

.....

..... [2]

(ii) The vibrating cone produces sound in the surrounding air.

Explain, in terms of molecules, how the cone produces a sound wave that travels through the air.

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..... [3]

(iii) Sound is a longitudinal wave.

Describe the difference between a longitudinal wave and a transverse wave.

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.....

..... [2]

(iv) Using Fig. 8.2, determine the number of times that the cone reverses its direction of motion in 1.0 s.

number = ... [2]

(v) The speed of sound in air is 340 m / s.

Calculate the wavelength of the sound.

wavelength = ... [2]

(c) The student adjusts the generator so that the maximum voltage of the output is now 3.0 V. Everything else stays the same as the output shown on the graph in Fig. 8.2.

(i) Explain any effect on the loudness of the sound.

.....

..... [2]

(ii) Explain any effect on the pitch of the sound.

.....

..... [1]

[Total: 15]

5. June/2021/Paper_11/No.25

The sound from a ship is reflected by a cliff. An echo is heard by a sailor on the ship 4.0 s after the sound is made. The speed of sound in air is 320 m / s.

How far from the cliff is the ship?

A 160 m **B** 640 m **C** 1280 m **D** 2560 m

6. June/2021/Paper_12/No.29

Students are asked for the uses of ultrasound.

Three suggested uses for ultrasound are:

P cleaning jewellery

Q tanning on a sunbed

R obtaining an image of an unborn baby.

Which suggestions are correct?

A P and Q only **B** P and R only **C** Q and R only **D** P, Q and R

7. June/2021/Paper_22/No.4

(a) In a demonstration, a teacher uses a loud ticking clock, two hollow tubes A and B, a barrier and a smooth surface. The clock is used as a source of sound.

Fig. 4.1 shows tube A and the clock, both fixed in position on the left of the barrier.

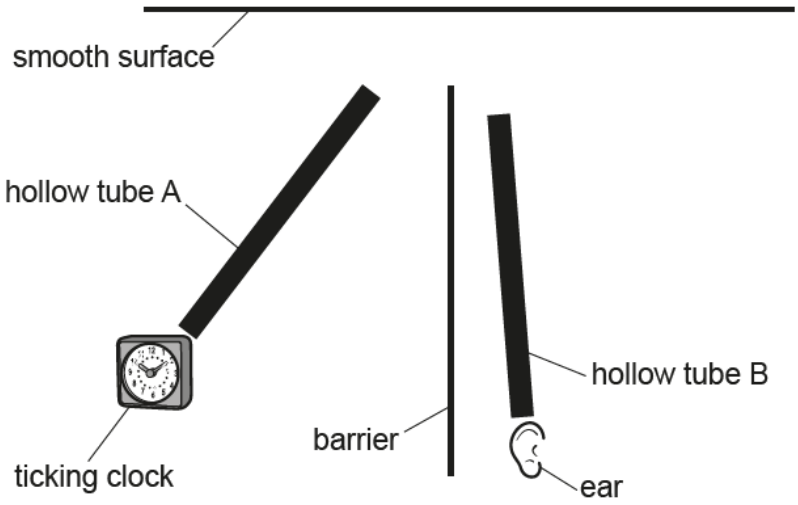

Fig. 4.1

Sound from the ticking clock passes along tube A and is incident on the smooth surface.

A student listens to the sound passing along tube B, which is on the right of the barrier.

(i) On Fig. 4.1, draw tube B in the position where the sound heard by the student is loudest. [1]

(ii) Explain your answer to **(i)**.

.....

.....

..... [2]

(b) The speed of sound in air is 330 m/s.

State a typical value for the speed of sound in a solid.

..... [1]

[Total: 4]