

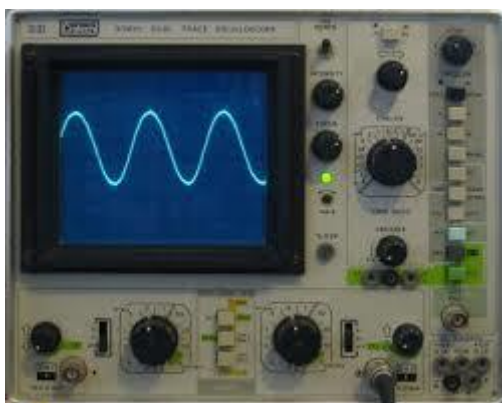
Sound Questions – NAT 5

- 1) What type of energy is given out by musical instruments?
- 2) What happens to the particles in the air when sound energy is transferred?
- 3) a) What is meant by the term 'frequency'?
b) Which **unit** is frequency measured in?
- 4)



Two tuning forks are marked, one with the number 256 and the other with 512.

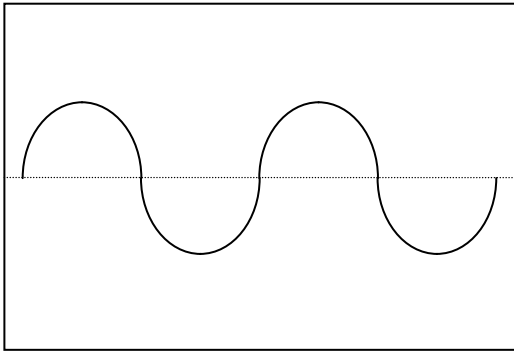
- a) What do these numbers refer to?
 - b) Which of these tuning forks are the longest, the 256 or the 512?
-
- 5) Which musical term is used to describe frequency?
 - 6) Name the instrument used to display sound waves on a screen.



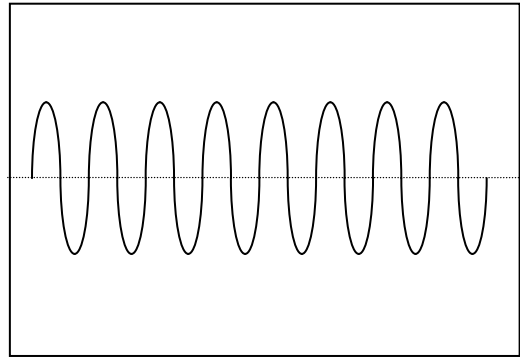
- 7) a) From which two points on a wave is the amplitude measured?
b) What is the amplitude of a wave a measure of?

8) Describe the four waves below using the terms amplitude and frequency:

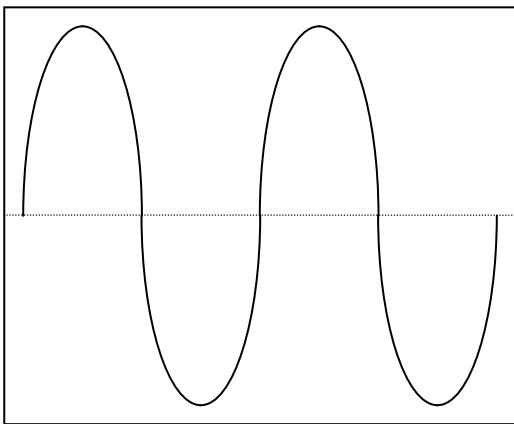
a)



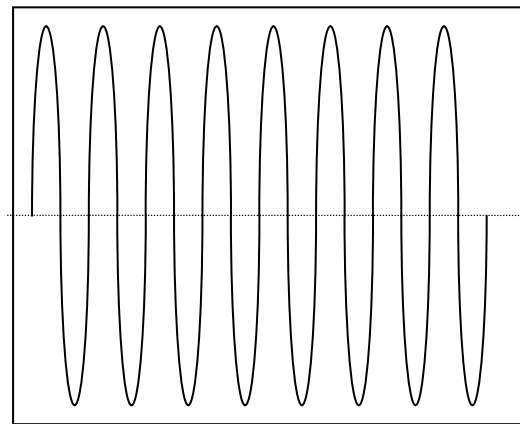
b)



c)



d)



9) a) Draw a fully labelled diagram of the apparatus used to measure the speed of sound in air.

b) Describe how you would use the apparatus and which **two quantities** would you measure to then calculate the speed of sound in air.

c) Why should the experiment be repeated at least five times?

10) a) State the accepted value for the speed of sound in air.

b) Which external factors could vary the speed of sound in air?

c) How far will sound travel in air in 3 seconds?

11) Calculate how long it would take sound to travel 1275m in air.

12)



- a) Explain how you could estimate how far away a thunderstorm is using a stopwatch.
- b) i) Calculate how long will it take sound to travel 1530m from a thunderstorm to you.
- ii) How would you know if a thunderstorm was moving towards or away from you?

13) Answer the questions from the table below.

Material	Speed of sound in the material (ms^{-1})
Aluminium	5200
Air	340
Bone	4100
Carbon Dioxide	270
Glycerol	1900
Water	1500

a) Redraw the table using the headings:

Solids	Liquids	Gases	Speed of sound in the material (ms^{-1})
--------	---------	-------	---

- b) i) Which group of materials have the highest speed of sound?
- ii) Which group of materials have the lowest speed of sound?
- iii) How do the answers in i) and ii) relate to the separation of the particles in these states?

14) If two whales are separated by 7.5km under water, then calculate how long it will take the sound waves to travel from one whale to another?

15) a) Which instrument is used to measure sound level?

b) Which unit is used to measure sound level?

16) Complete the table below using the following:

- Food blender at 0.5m
- Leaves rustling in the wind
- Inside the average home

Typical sounds	Sound Level (dB)
Threshold of hearing	0
	10
Quiet conversation	40
	50
Danger level	80
	100
Jet engine at 35m	130

17) If the sound level gets ten times louder then it will increase by 10dB.

If the sounds level gets one hundred times louder it will increase by 20dB.

How would the sound level change in the examples below?

- 70dB to 60dB
- 10db to 40dB
- 90dB to 70db.

18) Why do pneumatic drill operators, airport ground staff and drummers wear ear protectors?



19) How do noise cancellation headphones work?

20)



- State the range of human hearing.
- What are the sounds called that are greater than the upper range in a)?

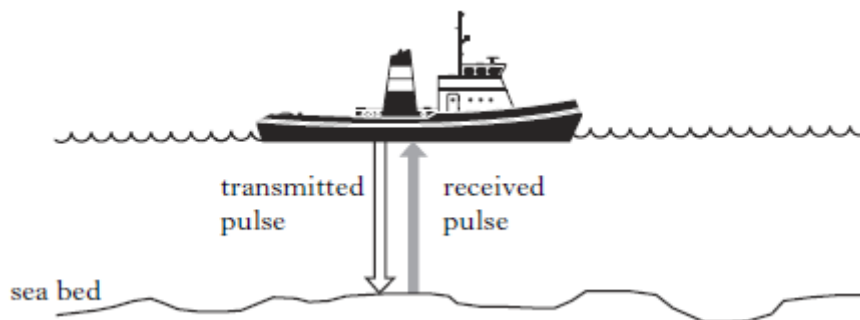
21) Why are ultrasound waves used for baby scans rather than x-rays?

22) What information can medical staff find out from an ultrasound scan of a baby?



23) Which wave effect is used in ultrasound scanning of the baby in the womb (uterus) and how is it used to produce a computerised image?

24) What is the purpose of sonar equipment used in ships and fishing boats as echo sounders?



25) If a sonar pulse from a fishing boat takes 40ms ($40 \times 10^{-3}\text{ s}$) from its transmission to receiving the reflected pulse, then calculate:

a) Total distance travelled by the sonar pulse.

b) Depth of the sea bed below the water surface.

(Speed of sound in water = 1500ms^{-1})