Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Q1.

The ratio of the absorbed energy E_a to incident energy E_i is the coefficient of absorption of sound α.

$$\alpha = \frac{E_a}{E_i}$$

The table in Figure 17 gives the coefficient of absorption for various materials.

material	$\alpha = \frac{E_a}{E_i}$
curtains	0.55
painted walls	0.02
wood floors	0.10
carpeted floors	0.60

Figure 17

Explain why rooms with carpets and curtains are less noisy than rooms without them.
Use the information given in Figure 17 in your answer.

(2)

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(Total for question = 2 marks)

Q2.

Figure 10 shows the difference in refraction of sound waves and light waves when these waves travel from air into water.

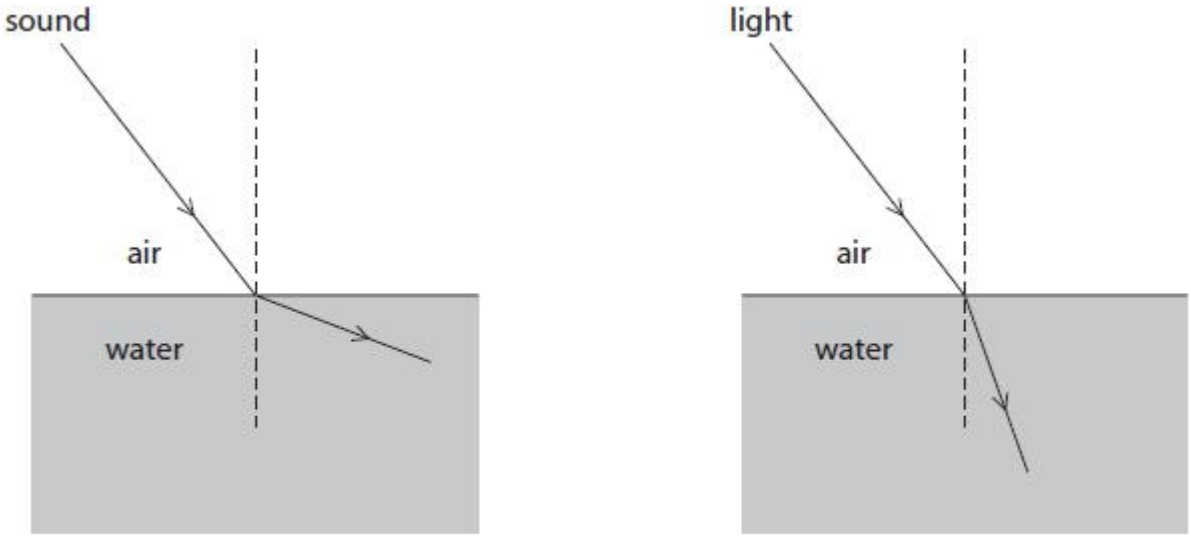

Figure 10

Explain why the refraction of the sound wave is different from the refraction of the light wave in Figure 10.

(3)

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(Total for question = 3 marks)

Q3.

(i) Figure 2 shows a student sitting on the shore of a lake watching ripples on the surface of the water moving past a toy boat.

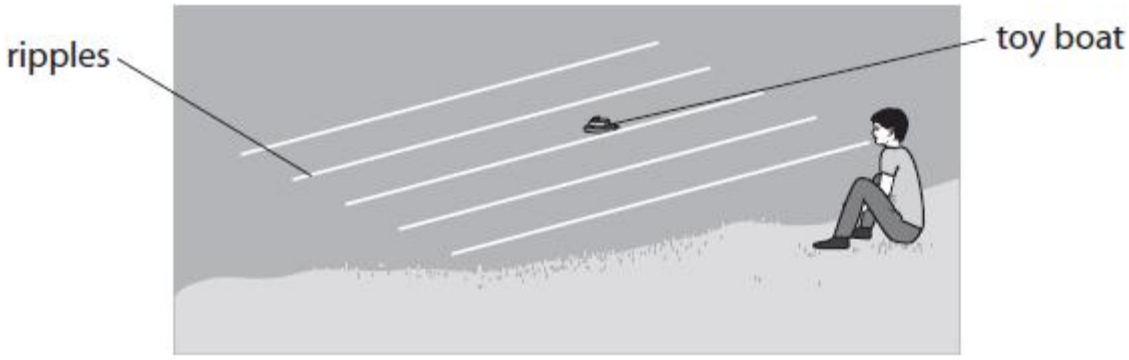

Figure 2

The student has a stopwatch.
Describe how the student could determine the frequency of the ripples on the lake.

(3)

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(ii) The speed of a water wave is 1.5 m/s.

The frequency of the wave is 0.70 Hz.
Calculate the wavelength of this wave.
Use the equation

$$v = f \times \lambda$$

(2)

wavelength = ... m

(iii) Water waves are transverse waves.

Describe the difference between transverse waves and longitudinal waves.

(2)

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(Total for question = 7 marks)

Q4.

The speed of light is 3.0×10^{8} m/s.

The wavelength of yellow light is 5.8×10^{-7} m.

Calculate the frequency of yellow light.

State the unit.

Use the equation

$$\text{frequency} = \frac{\text{speed}}{\text{wavelength}}$$

(3)

frequency = ... unit .....

(Total for question = 3 marks)

Q5.

This picture shows Galileo holding a telescope.

(a) Explain the purpose of the eyepiece in a telescope.

(2)

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(b) Galileo drew pictures of his observations of Jupiter.
Nowadays we can take photographs.
Suggest how photographs would have helped Galileo.

(1)

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(c) The telescope collects light reflected from Jupiter.
The light has a frequency of 4.30×10^{14} Hz and a speed of 3.00×10^{8} m/s.
Calculate the wavelength of the light.

(3)

wavelength =..... m

*(d) Galileo's observations of the moons of Jupiter disproved the geocentric model.
However, these observations were not enough to prove the heliocentric model of the Solar System.
Explain why Galileo's observations disproved one model but were not enough to prove the other model.

(6)

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(Total for Question = 12 marks)