General Wave Properties – 2023 June O Level 5054

1. June/2023/Paper_ 5054/21/No.7

A water wave in a ripple tank diffracts as it passes through the gap in a barrier.

Fig. 7.1 shows a drawing made by a student of the crests in the pattern.

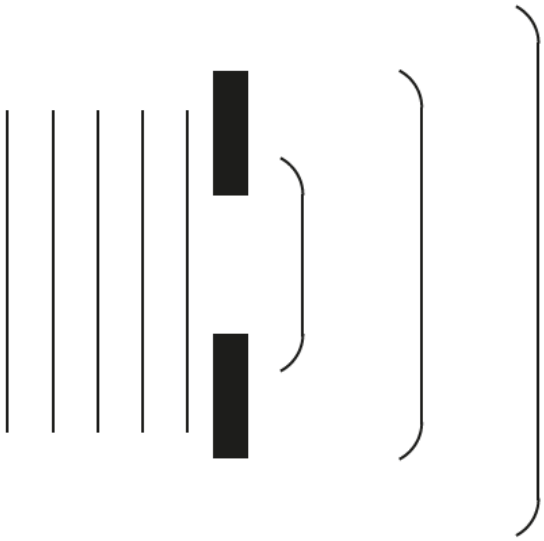

Fig. 7.1

(a) State **one** way in which the student's drawing of the crests is wrong.

.....

..... [1]

(b) The gap in the barrier is now made smaller than the wavelength, as shown in Fig. 7.2.

Complete Fig. 7.2 with at least three crests to show the new diffraction pattern.

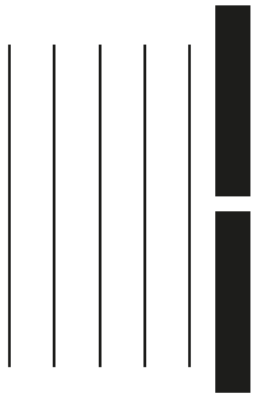

Fig. 7.2

[2]

(c) In one part of the ripple tank, the water wave has a speed of 6.0 cm/s and a wavelength of 2.0 cm.

The wave then passes into a shallower region of the tank.

The speed of the wave in the shallow region is 4.0 cm/s.

(i) Define the term 'wavelength'.

.....

..... [1]

(ii) Calculate the frequency of the wave.

frequency = ... Hz [2]

(iii) Calculate the wavelength of the wave in the shallow part of the tank.

wavelength = ... cm [1]

[Total: 7]

2. June/2023/Paper_ 5054/22/No.5

Water waves are transverse waves.

(a) Underline **two** other examples of transverse waves.

seismic P-waves **seismic S-waves** **sound** **X-rays** [1]

(b) Fig. 5.1 shows a wooden bar and a glass block in a ripple tank. The depth of water in the tank is less than the height of the glass block.

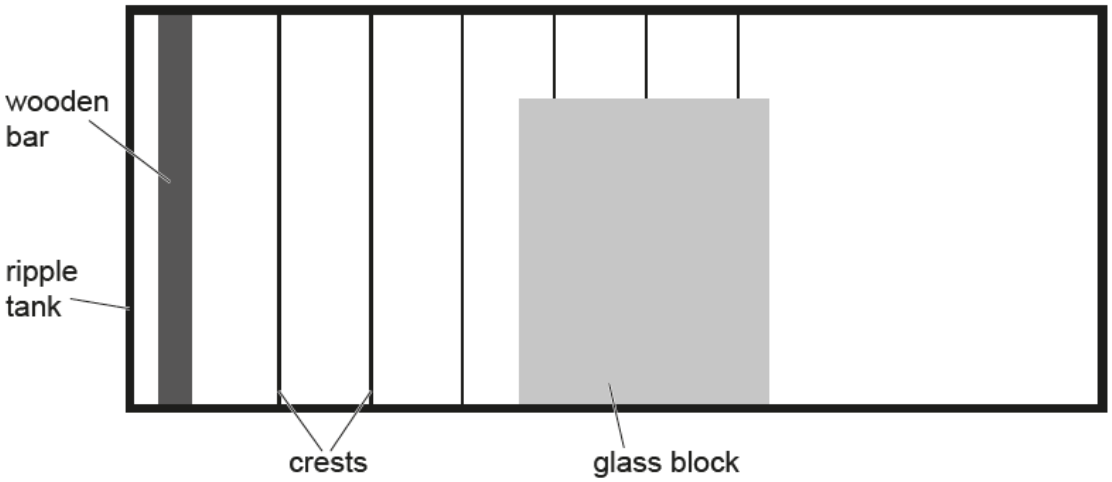

Fig. 5.1 (not to scale)

The wooden bar moves up and down once every 0.15 s to create the crests.

(i) The speed of the water wave is 27 cm / s.

Calculate the frequency and the wavelength of the wave.

frequency = ... Hz

wavelength = ... cm
[3]

(ii) The wave diffracts at the right-hand edge of the glass block.

On Fig. 5.1 draw **two** crests after they pass the glass block to show the diffraction. [2]

(iii) Describe how a wave with a smaller wavelength is made with the wooden bar.

.....

..... [1]

(iv) Describe how a decrease in wavelength affects the diffraction.

.....

..... [1]

[Total: 8]