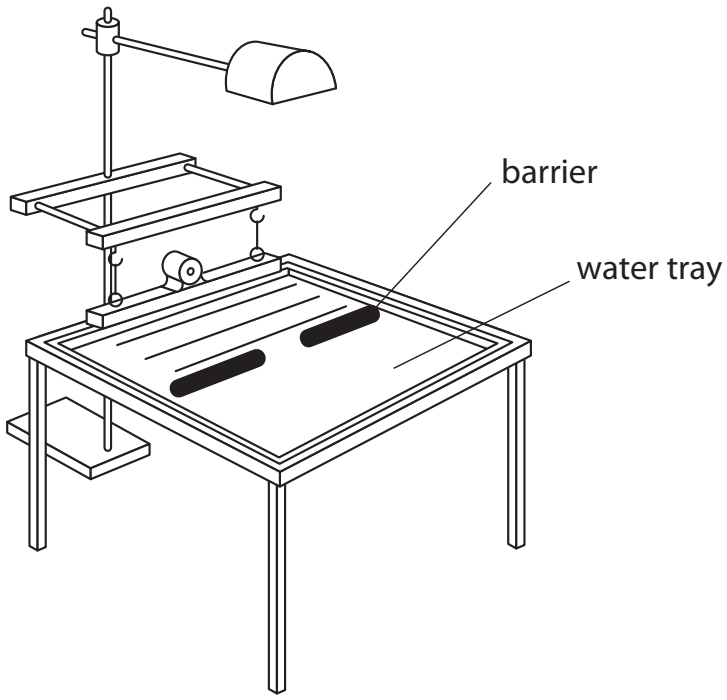
3 A student investigates different properties of waves.

(a) He uses this ripple tank to investigate diffraction.



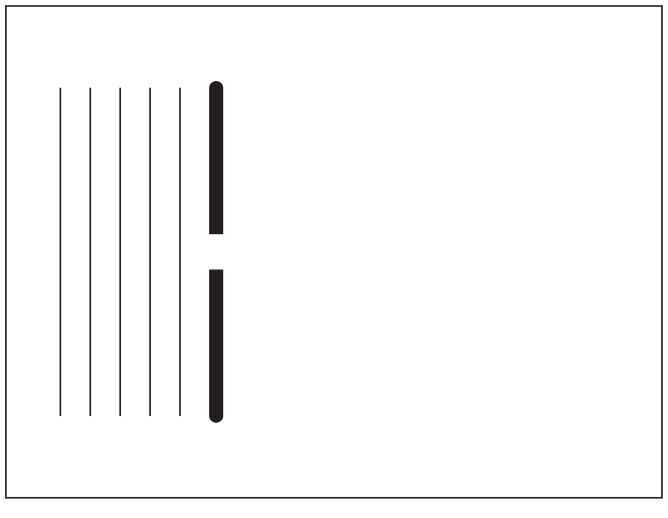
The ripple tank produces plane waves.

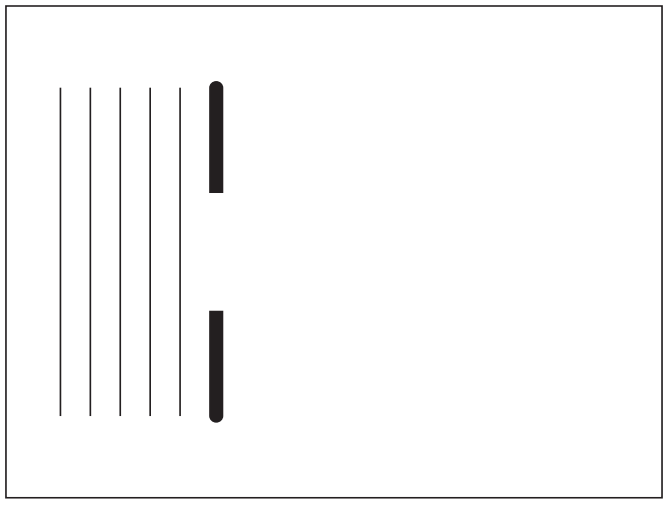
These waves hit a barrier with a gap in it.

The student keeps the wavelength constant but varies the size of the gap in the barrier.

Complete the diagrams to show what happens to the plane waves as they go through the different sized gaps in the barrier.

(3)





(b) The student removes the barrier and investigates what happens when the plane wave travels into a shallow part of the ripple tank.

(i) State the relationship between the speed, frequency and wavelength of a wave.

(1)

(ii) Waves in the deep part of the ripple tank have a speed of 6.0 cm/s and a wavelength of 4.0 cm.

Waves in the shallow part of the ripple tank have a speed of 4.0 cm/s.

The frequency of the waves stays the same.

Show that the wavelength in the shallow part of the ripple tank is approximately 3 cm.

(3)

(Total for Question 3 = 7 marks)