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## Drawing Rays for Reflection, Refraction, Diffraction and Interference Worksheet

Q1.

Using the law of reflection, draw the reflected ray for the following figures.

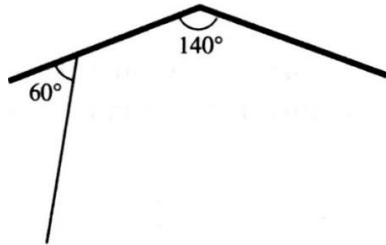


Figure 1

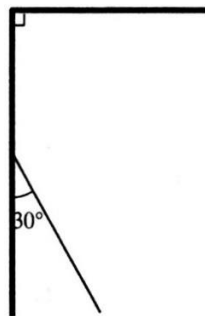
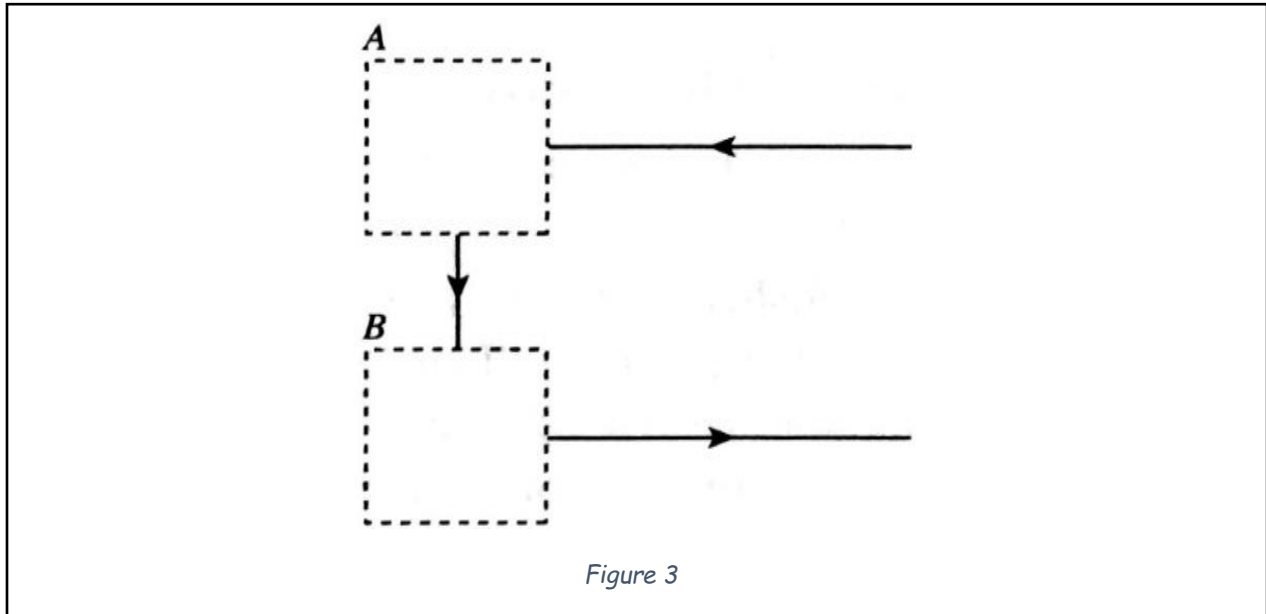


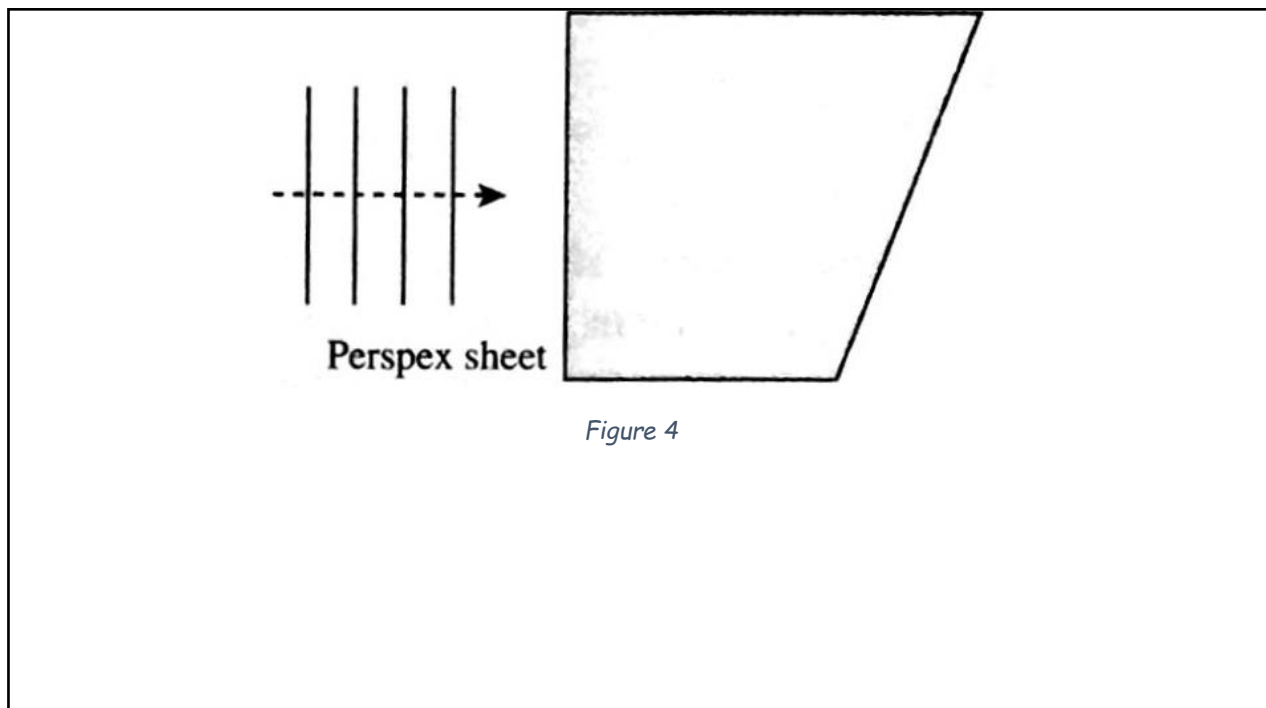
Figure 2

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**Q2.** The figure below shows an incomplete path of a light ray. Box A and box B contain a mirror each. Draw the positions of the mirror in box A and box B respectively. Then, complete the path of the light ray.



**Q3.** The figure below shows plane water waves in a ripple tank that move towards a Perspex sheet placed in the water. On the figure, draw the wavefronts above the Perspex sheet and after they have moved across the perspex sheet.



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**Q4.** The figure below shows the wavefronts of waves moving on the surface of water. The frequency of the waves is 15 Hz.

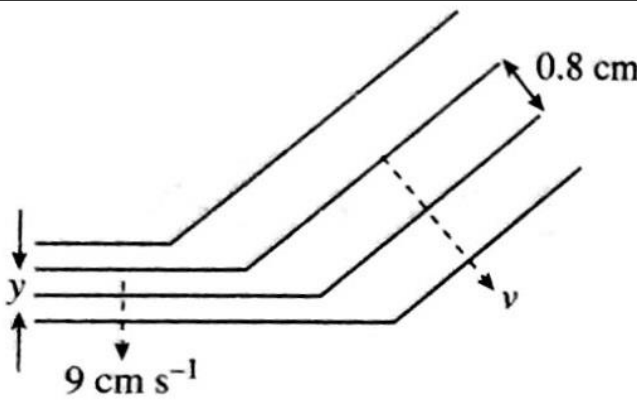


Figure 5

- On the figure, draw a line to show the boundary between the shallow region and deep region.
- $S$  is a point in the shallow region while  $D$  is a point in the deep region. On the diagram, mark the positions of  $S$  and  $D$ .
- Calculate the speed  $v$ .
- What is the value of  $y$ ?

**Q5.** In the figure below, plane wavefronts move towards a Perspex plate in a ripple tank. On the figure, draw the wavefronts as they enter the region above the Perspex plate and after they have moved across the region above the Perspex plate.

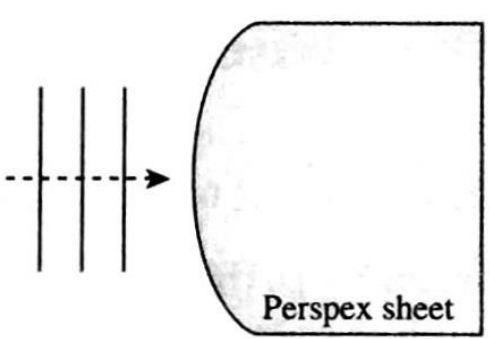


Figure 6

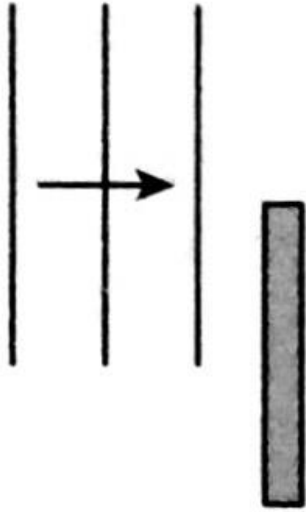
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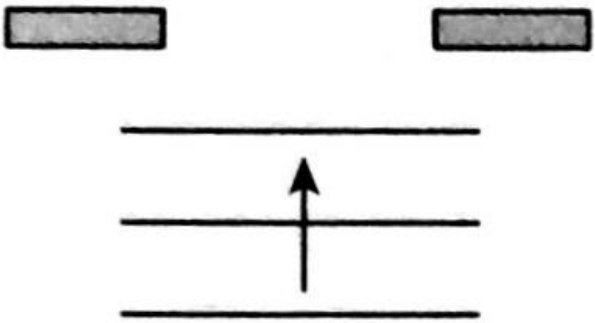
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**Q6.**

Complete each figure below by drawing the diffracted wavefronts.

(a) 

(b) 

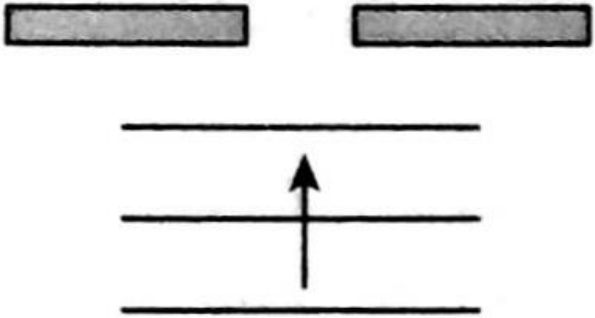
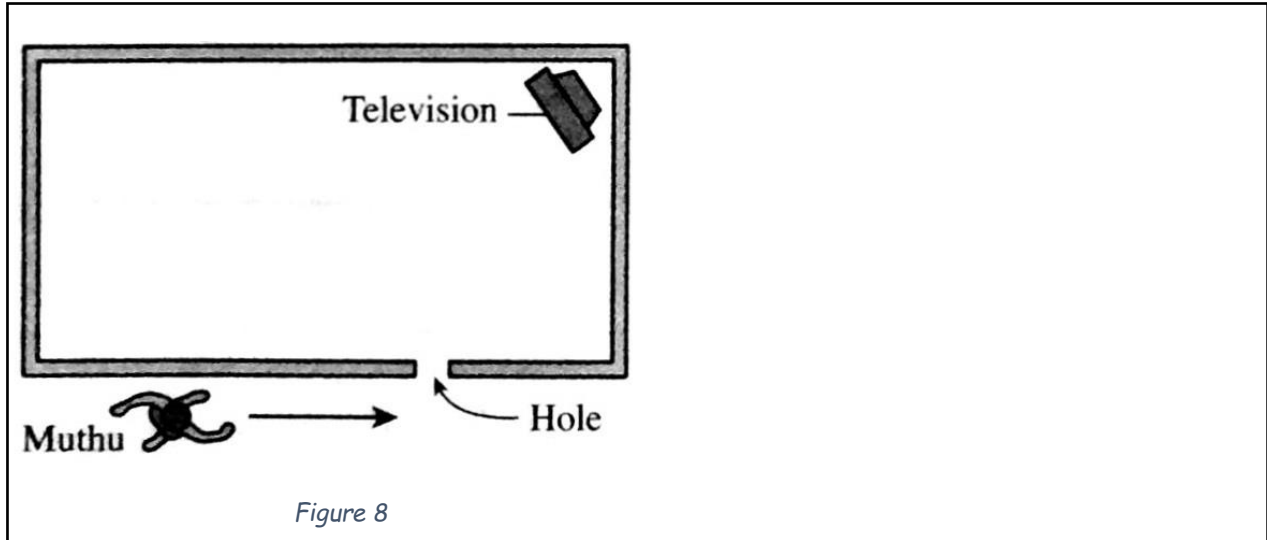
(c) 

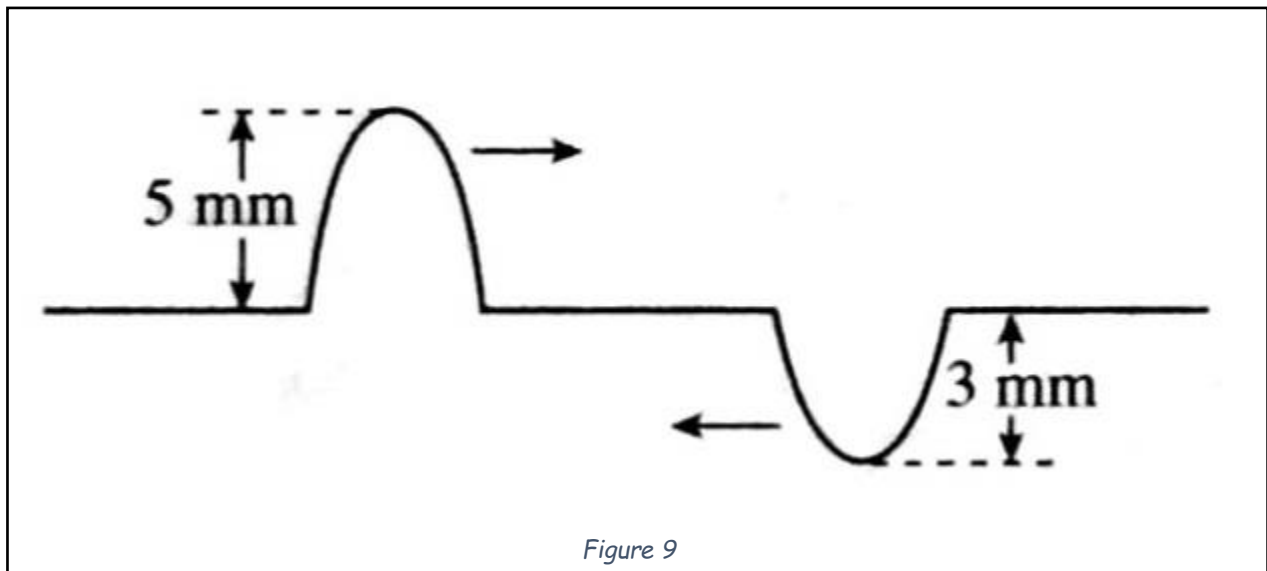
Figure 7

Signature: Name: Marks: **Q7.**

In the figure below Muthu walks outside a closed room. There is a hole at the wall. Explain why Muthu can hear the sound from the television but cannot see the television. [Sketch the wave fronts if possible]

**Q8. [Not applicable to IGCSE Students]**

The figure below shows two waves pulses moving towards each other. Sketch the shape of the resultant pulse when the pulses superimpose.



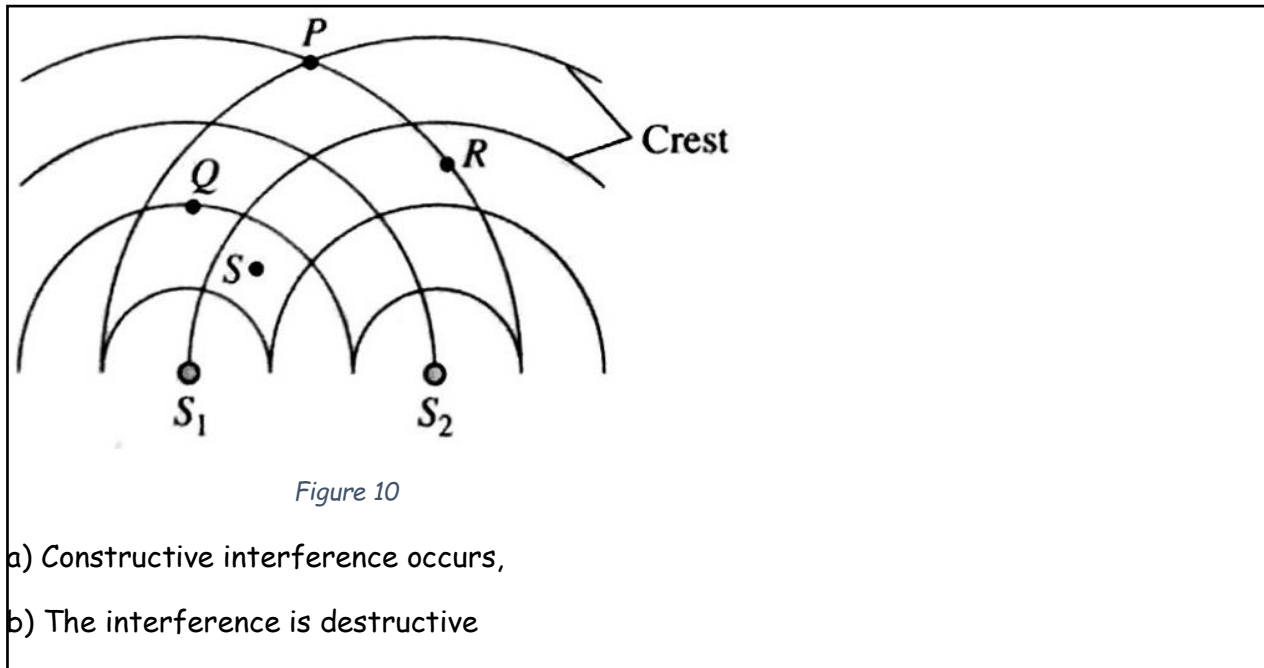
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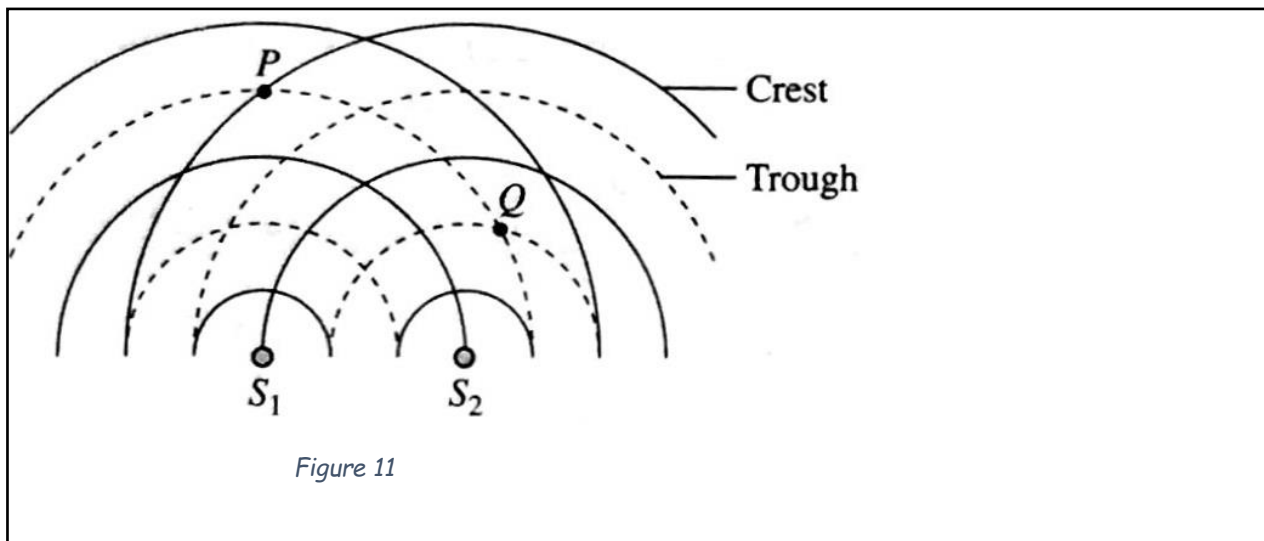
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**Q9. [Not applicable to IGCSE Students]**

The figure below shows the pattern produced by the superposition of water waves. State two points where

**Q10. [Not applicable to IGCSE Students]**

The figure below shows the interference pattern of water waves. What is the type of interference at  $P$  and  $Q$ ?



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**Q11. [Not applicable to IGCSE Students]**

In a Young's double slit experiment, the following arrangement was used.

Wavelength of blue light = 480 nm  
Distance between double slit and screen =  
4.2 m  
Distance between successive dark fringes  
= 1.8 mm

Find the distance between the slits

**Q12. [Not applicable to IGCSE Students]**

An experiment to study the interference of sound waves was conducted and the following information shows the results obtained.

Distance between loudspeakers = 1.6 m  
Frequency of the sound = 500 Hz  
Distance from the line of observation to the  
loudspeakers = 3.2 m

What is the distance between two successive loud sounds? [Speed of sound in air =  $330 \text{ ms}^{-1}$ ]

Signature: Name: Marks: **Q13.**

The first diagram shows the propagation of waves from a radio in a house to the surroundings at night. The second diagram shows the propagation of water waves from a deep region to a shallow region.

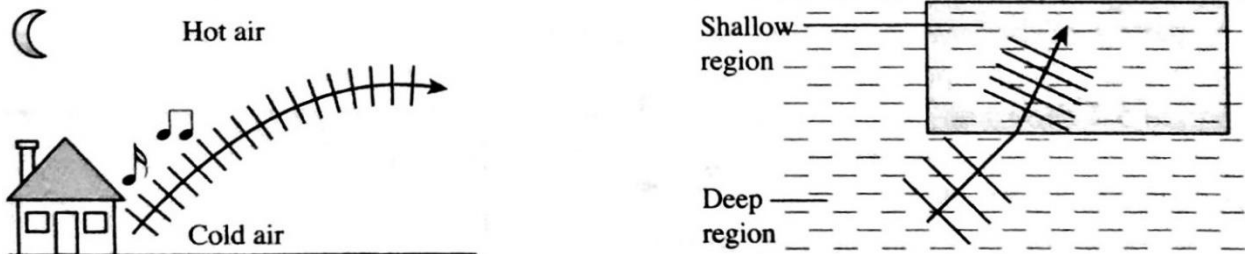


Figure 12

- Name the phenomenon shown by the waves.
- Based on both diagrams state the change in
  - the wavelengths
  - the speeds of the waves in each diagram
- What is the relationship between the wavelength and the speed of the waves?
- The following diagram shows the plan of a house and its compound. When a visitor X, presses the switch at the gate, the wireless bell gives out a ringing tone. The owner, Y, who is inside the room, can hear the ringing tone from the bell.
  - State the type of waves transmitted by the switch and wireless bell respectively.
  - State one difference between the waves transmitted by the switch and wireless bell.
  - Name the wave phenomenon that enables the waves from the switch to reach the bell.

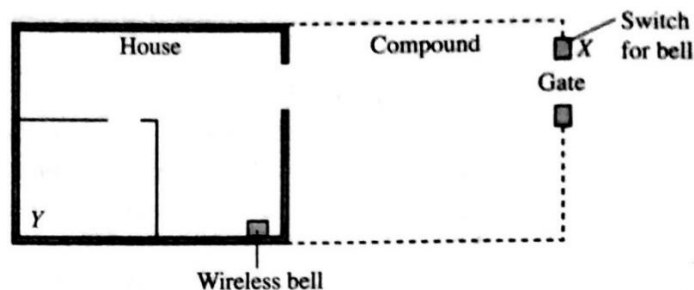


Figure 13



Signature: Name: Marks: **Q14.**

The following diagrams shows the set-up of the apparatus for an experiment to study a wave phenomenon and the pattern of the wavefronts formed on the screen when plane waves move passed a narrow obstacle and a wide obstacle.

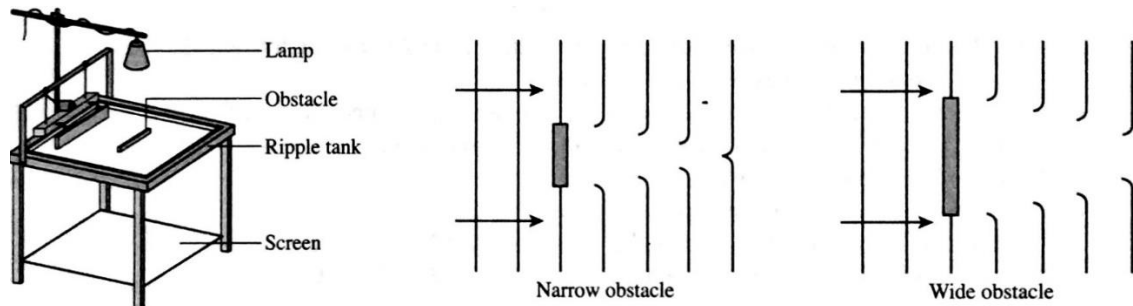


Figure 14

- a) i) The pattern on the screen consists of bright and dark bands. Explain how the dark and light bands are formed on the screen.  
 ii) Compare the wavelengths of the waves before and after passing the obstacle. Hence, compare the pattern of the wavefronts after passing the obstacle.  
 iii) Name the wave phenomenon shown in both diagrams
- b) The diagram below shows an underdeveloped coastal region where a new holiday resort consisting of chalets and a jetty is to be built. Using your knowledge of reflection, refractions and diffraction of waves, suggest how the holiday resort is to be built. Include the following aspects in your answer:  
 i) The height and energy of the waves approaching the seashore  
 ii) The location of the chalets  
 iii) The location of the jetty  
 iv) The design and structure of the retaining wall

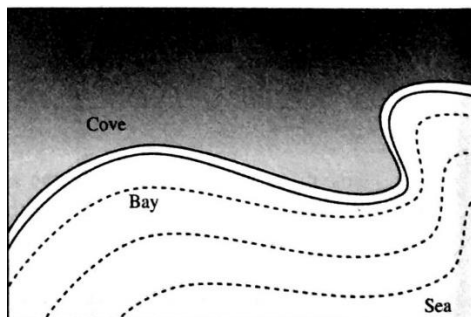


Figure 15

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