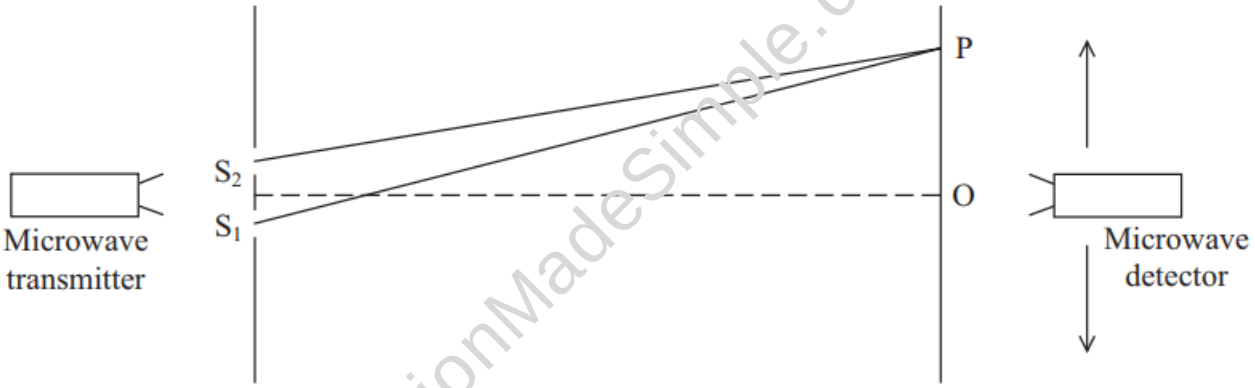
Wave Behaviour MCQ QP1

1 Two loudspeakers produce identical sounds of frequency 440 Hz which superpose to produce a standing wave. Adjacent nodes are formed 0.75 m apart.

Select the correct statement about the waves.

- ☒ **A** The frequency heard is 880 Hz.
- ☒ **B** The speed of the waves is 165 m s^{-1}.
- ☒ **C** The wavelength of the waves is 1.5 m.
- ☒ **D** The waves are travelling in the same direction.

2 The diagram shows an experiment set up to demonstrate two-source interference, using microwaves of wavelength λ.

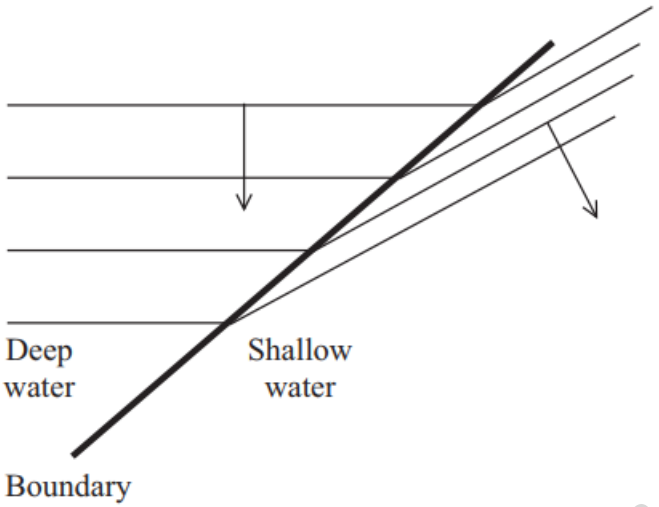


The detector is moved from C in the direction of the upwards arrow. The first position where the signal is a minimum is P.

The equation that correctly determines the position of P is

- ☒ **A** $OP = \lambda$
- ☒ **B** $OP = \lambda/2$
- ☒ **C** $S_1P - S_2P = \lambda$
- ☒ **D** $S_1P - S_2P = \lambda/2$

3 The diagram represents straight wavefronts passing across a boundary from deep water into shallow water, with a change in speed and direction.



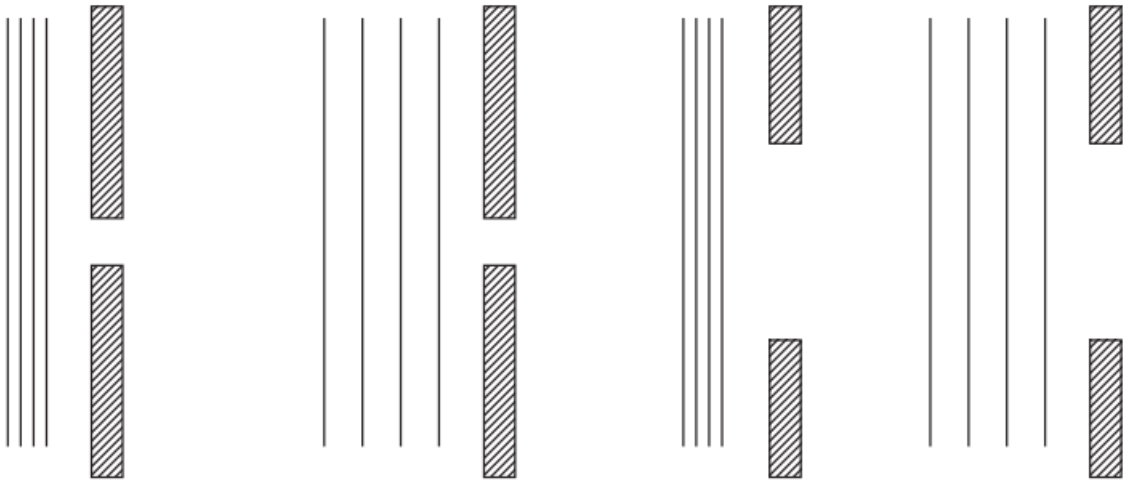
Which wave property does this diagram illustrate?

- ☒ **A** diffraction
- ☒ **B** interference
- ☒ **C** reflection
- ☒ **D** refraction

4 Two coherent sources emit waves of wavelength λ in phase. At a point where the two waves meet they have a phase difference of 90° ($\frac{\pi}{2}$ radians). Which of the following could be the path difference at this point?

- ☒ **A** 2λ
- ☒ **B** λ
- ☒ **C** $\frac{\lambda}{2}$
- ☒ **D** $\frac{\lambda}{4}$

5 The four diagrams show waves of different wavelengths approaching slits of different widths.



A **B** **C** **D**

In which diagram will the diffraction be the greatest?

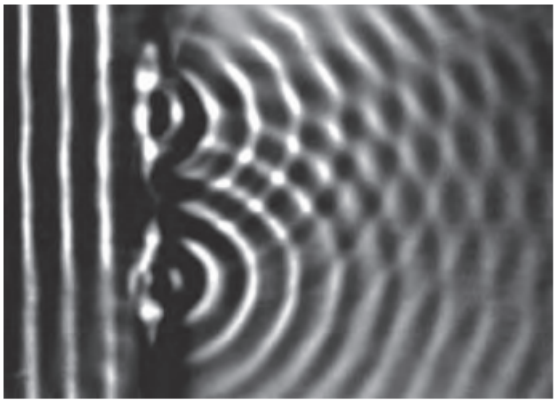
- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

6 A water wave meets a small gap in a barrier.

Which row of the table correctly describes the speed and wavelength of the water wave after passing through the gap?

	speed	**wavelength**
☒ **A**	unchanged	decreased
☒ **B**	decreased	unchanged
☒ **C**	increased	increased
☒ **D**	unchanged	unchanged

7 The photograph shows a demonstration with a ripple tank.



Plane waves travelling from the left strike a barrier with two gaps.

This demonstration does **not** involve

☒ **A** diffraction

☒ **B** interference

☒ **C** refraction

☒ **D** superposition

8 The waves, of wavelength λ, from a source divide along two paths and recombine having travelled different distances. At the point where they recombine, which line of the table could show the corresponding path difference and phase difference for the two waves?

	Path difference	**Phase difference / radians**
☒ **A**	λ	π
☒ **B**	$\lambda/2$	2π
☒ **C**	$\lambda/2$	π
☒ **D**	λ	$\pi/2$

9 Two coherent sources emit waves of wavelength λ which are in phase. The two waves meet at a point, having travelled slightly different distances. The waves now have a phase difference of 180° (π radians).

Which of the following could be the path difference at this point?

☒ **A** $\frac{\lambda}{4}$

☒ **B** $\frac{\lambda}{2}$

☒ **C** $\frac{3\lambda}{4}$

☒ **D** λ

10 Which of the following properties could **not** be demonstrated using sound waves?

☒ **A** diffraction

☒ **B** polarisation

☒ **C** reflection

☒ **D** refraction

11 A beam of light travels a distance X to arrive at a point. A second beam of light of the same frequency and initially in phase with the first beam, travels a distance Y to arrive at the same point. For destructive interference to occur between these two beams, the path difference $X–Y$ must equal

☒ **A** an odd number of wavelengths.

☒ **B** an even number of wavelengths.

☒ **C** an odd number of half wavelengths.

☒ **D** an even number of half wavelengths.

12 To be able to see smaller details in an ultrasound scan, you should

☒ **A** decrease the frequency of the ultrasound

☒ **B** decrease the wavelength of the ultrasound

☒ **C** increase the duration of the pulse of the ultrasound

☒ **D** increase the size of the screen to view the scan