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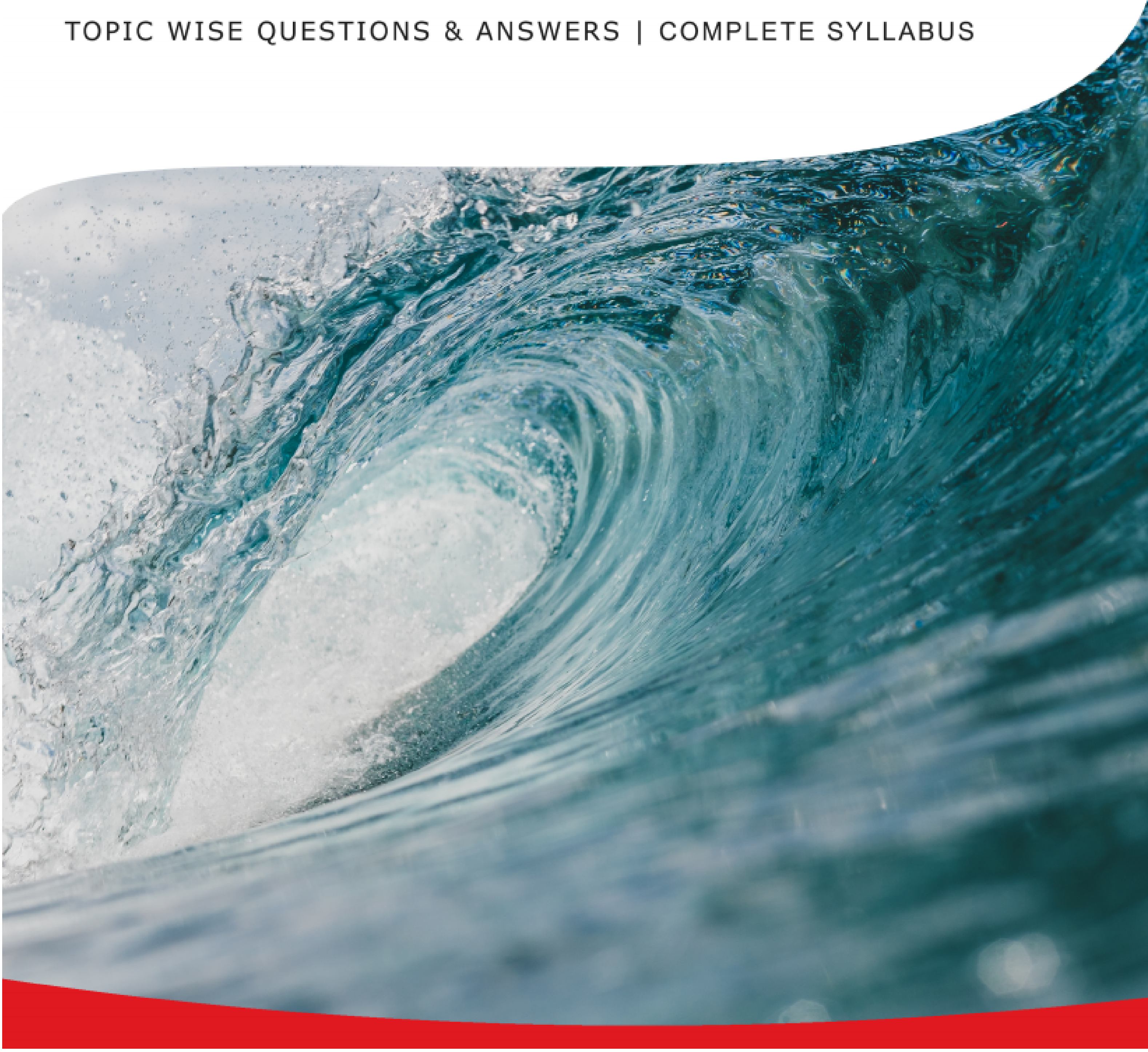
Cambridge International AS & A Level

PHYSICS (9702) P1

TOPIC WISE QUESTIONS & ANSWERS | COMPLETE SYLLABUS



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Chapter 9

Superposition

9.1 Stationary waves

880. 9702_m20_qp_12 Q: 26

A musical instrument is made using a long tube with a mouthpiece at one end. The other end is open and flared, as shown.

A musician maintains stationary sound waves with a node at the mouthpiece and an antinode at the other end. The lowest frequency of sound that the instrument can produce is 92 Hz.

Which different frequencies of sound can be produced by the instrument?

A 92 Hz, 138 Hz, 184 Hz, 230 Hz

B 92 Hz, 184 Hz, 276 Hz, 368 Hz

C 92 Hz, 276 Hz, 460 Hz, 644 Hz

D 92 Hz, 276 Hz, 828 Hz, 1288 Hz

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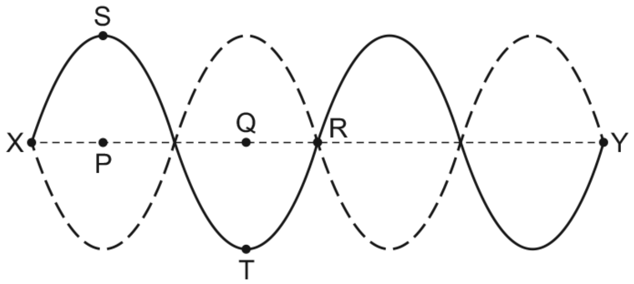
881. 9702_s20_qp_11 Q: 27

The diagram shows a string stretched between fixed points X and Y. There is a stationary wave on the string.



The solid curve shows the string at a position of maximum displacement. The dashed curve shows the other position of maximum displacement. The straight central dashed line shows the mean position of the string. Point S on the string is directly above point P. Point T on the string is directly below Q.

Which statement is correct?

A A short time later, point R on the string will be displaced.

B Points S and T on the string move in opposite directions.

C The distance between P and Q is one wavelength.

D Two points on the string that are equal distances from point R vibrate in phase.

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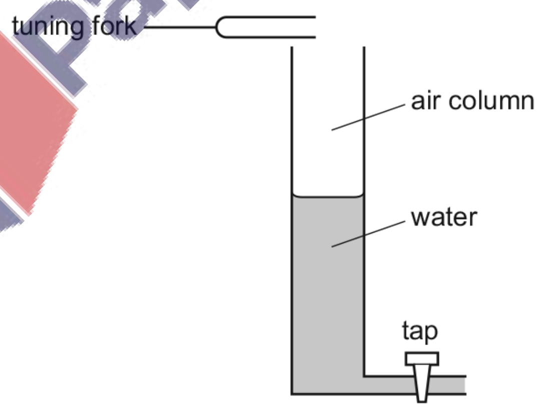
882. 9702_s20_qp_12 Q: 24

The diagram shows an experiment to produce a stationary wave in an air column. A tuning fork, placed above the column, vibrates and produces a sound wave. The length of the air column can be varied by altering the volume of the water in the tube.



The tube is filled and then water is allowed to run out of it. The first two stationary waves occur when the air column lengths are 0.14 m and 0.42 m.

What is the wavelength of the sound wave?

A 0.14 m **B** 0.28 m **C** 0.42 m **D** 0.56 m

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883. 9702_s20_qp_12 Q: 27

Two progressive waves meet at a point.

Which condition must be met for superposition of the waves to occur?

A The waves must be coherent.

B The waves must be of the same type.

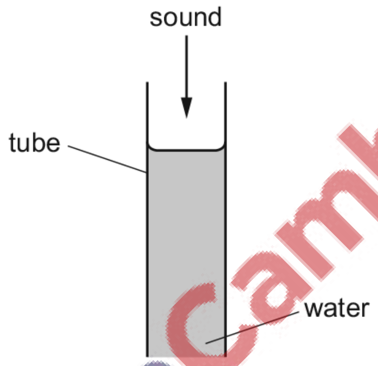
C The waves must be travelling in opposite directions.

D The waves must meet in phase.

---

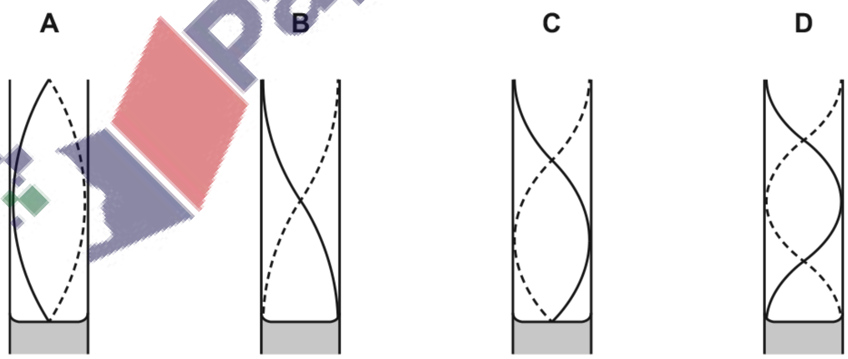
884. 9702_s20_qp_13 Q: 27

A vertical tube is partially filled with water. A sound wave moves down the tube and is reflected by the surface of the water. The frequency of the sound wave is gradually increased from zero until a much louder sound is heard.



Water is then removed from the tube until a second louder sound is heard.

Which diagram shows the new pattern of the stationary wave that is formed?



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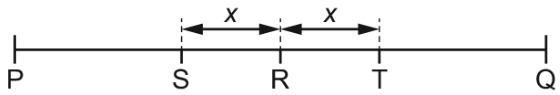
885. 9702_m19_qp_12 Q: 27

P and Q are fixed points at the end of a string. A transverse stationary wave of constant maximum amplitude is formed on the string.



P, R and Q are the only points on the string where nodes are formed. S and T are two points on the string at a distance *x* from R.

What is the relationship between points S and T?

A the same amplitude and in phase

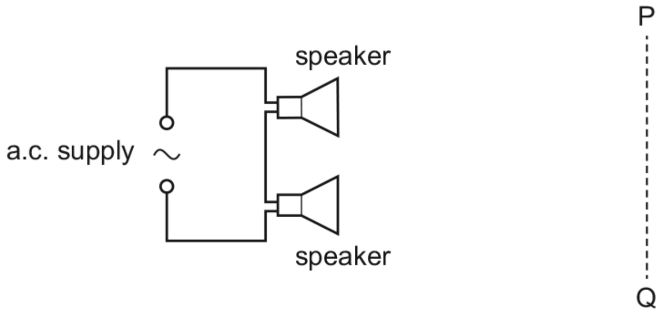
B different amplitudes and in phase

C the same amplitude and a phase difference of 180°

D different amplitudes and a phase difference of 180°

886. 9702_m19_qp_12 Q: 28

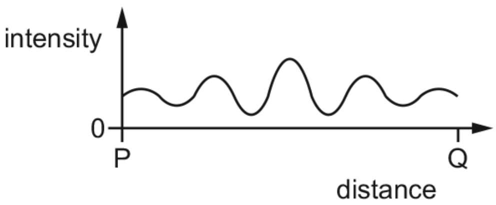
Two identical loudspeakers are connected in series to an a.c. supply, as shown.



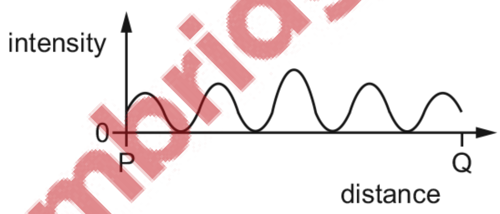
A microphone is moved along the line PQ.

Which graph best shows the variation with distance from P of the intensity of the sound detected by the microphone?

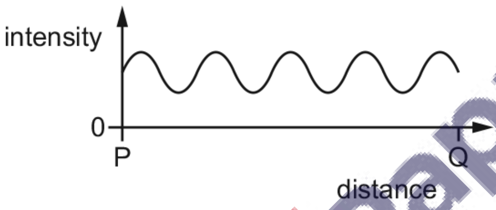
A



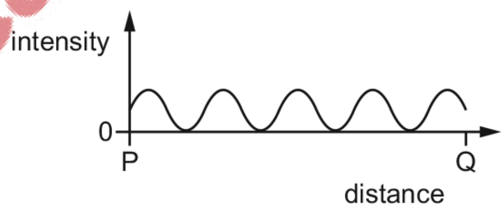
B



C



D



887. 9702_s19_qp_13 Q: 26

An elastic string is attached to an oscillator at one end and clamped at the other end so that the string is horizontal and in tension.

The oscillator is made to oscillate vertically. The frequency of oscillation is gradually increased from zero until a stationary wave is set up in the string. The frequency is then increased further to frequency *f*, when a second stationary wave is set up in the string.

The frequency is then increased further.

At which frequency does a third stationary wave occur?

A 1.2*f* **B** 1.5*f* **C** 2.0*f* **D** 3.0*f*

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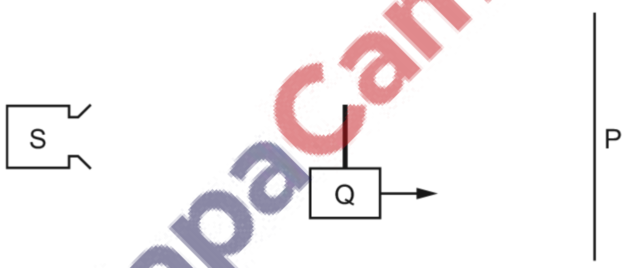
888. 9702_w19_qp_11 Q: 23

Source S emits microwaves with a constant amplitude. The microwaves hit a metal screen P and are reflected. A stationary wave is formed between S and P. The wavelength of the microwaves is much smaller than the distance between S and P.



A detector Q is moved at a slow, constant speed from S to P.

What happens to the amplitude of the signal detected by Q?

A decreases steadily

B increases and decreases regularly

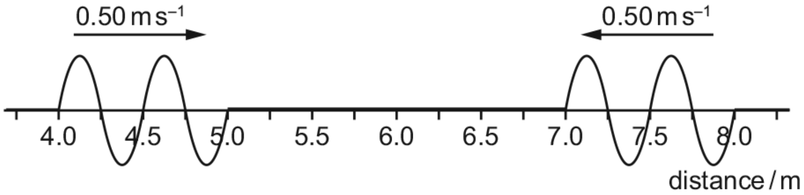
C increases steadily

D remains constant

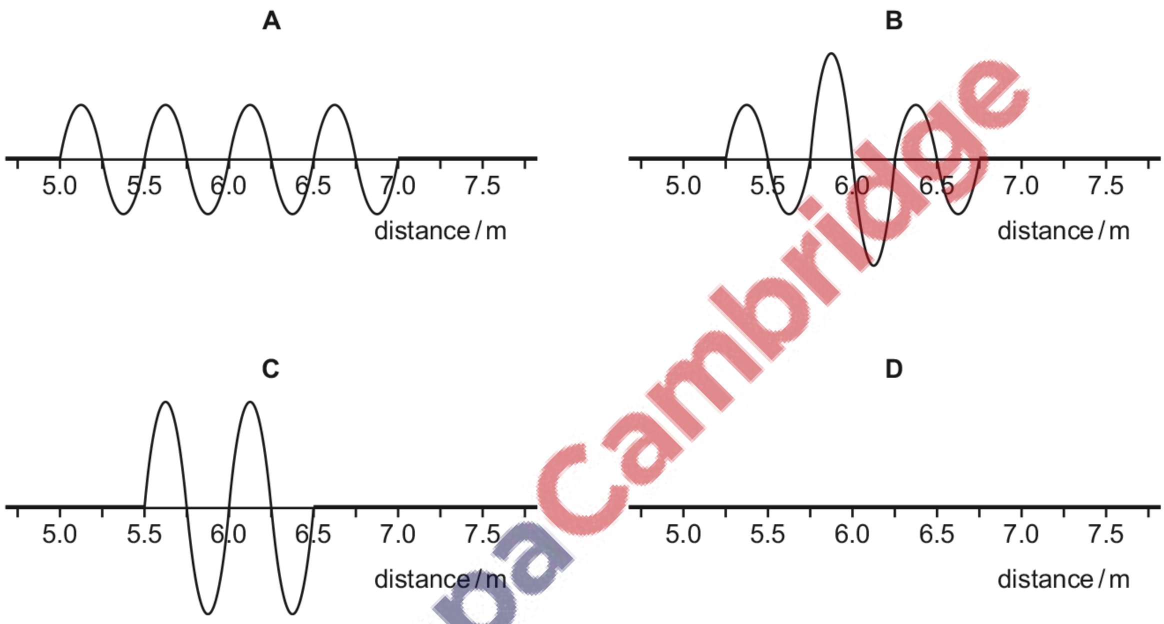
---

889. 9702_w19_qp_11 Q: 26

Two wave pulses are travelling towards each other on a long rope. The pulses have the same amplitude and wavelength and are travelling at a speed of $0.50\,m\,s^{-1}$. The diagram shows the rope at time $t = 0$.

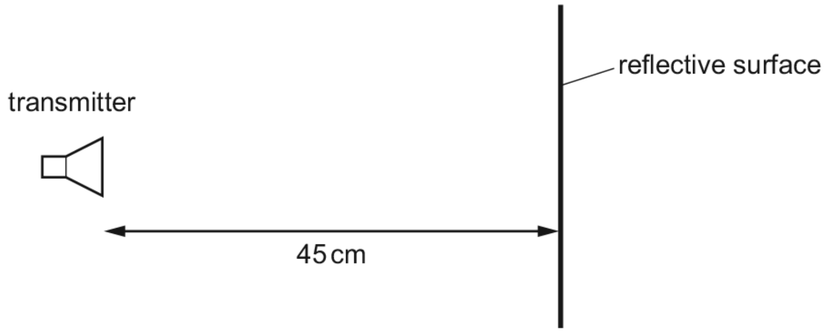


Which diagram shows the rope at time $t = 3.0\,s$?



890. 9702_w19_qp_12 Q: 25

A transmitter of electromagnetic waves is placed 45 cm from a reflective surface.



The emitted waves have a frequency of 1.00 GHz. A stationary wave is produced with a node at the transmitter and a node at the surface.

How many antinodes are in the space between the transmitter and the surface?

A 1 **B** 2 **C** 3 **D** 4

---

891. 9702_w19_qp_13 Q: 26

In an experiment to demonstrate a stationary wave, two microwave transmitters, emitting waves of wavelength 4 cm, are set facing each other, as shown.

A detector is moved along a straight line between the transmitters. It detects positions of maximum and minimum signal. The detector is a distance *d* from the left-hand transmitter.

Assume that both transmitters are at antinodes of the stationary wave.

Which row gives a value of *d* for a maximum and for a minimum?

	value of *d* for a maximum / cm	value of *d* for a minimum / cm
A	46	48
B	47	48
C	48	47
D	49	47

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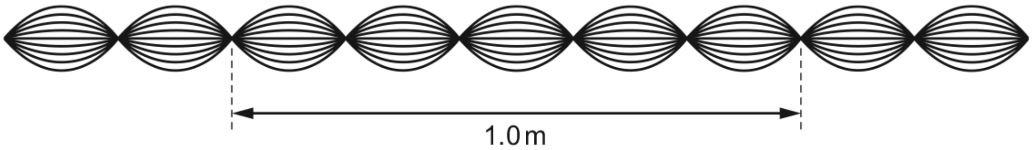
892. 9702_w19_qp_13 Q: 28

The diagram shows a sketch of a wave pattern over a short period of time.



Which description of this wave is correct?

A The wave is longitudinal, has a wavelength of 20 cm and is stationary.

B The wave is transverse, has a wavelength of 20 cm and is stationary.

C The wave is transverse, has a wavelength of 40 cm and is progressive.

D The wave is transverse, has a wavelength of 40 cm and is stationary.

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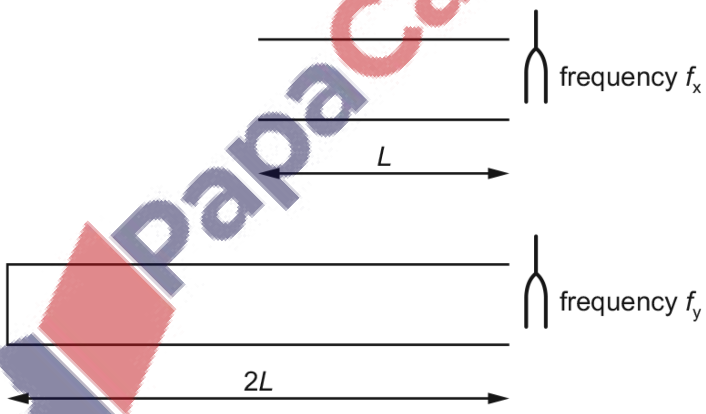
893. 9702_m18_qp_12 Q: 28

A tube of length L is open at both ends. A stationary wave is set up in this tube when a tuning fork vibrating with frequency f_x is held at one end. This is the lowest frequency of stationary wave that can be formed in this tube.

Another tube of length $2L$ is closed at one end. A stationary wave is set up in this tube when a tuning fork vibrating with frequency f_y is held at the open end. This is the lowest frequency of stationary wave that can be formed in this tube.



Assume the end correction for each tube is negligible.

Which equation is correct?

A $f_x = \frac{f_y}{4}$ **B** $f_x = \frac{f_y}{2}$ **C** $f_x = 2f_y$ **D** $f_x = 4f_y$

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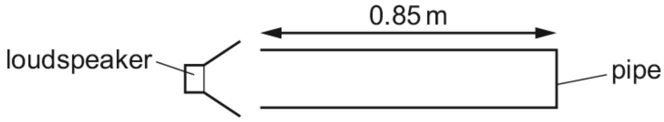
894. 9702_s18_qp_11 Q: 27

A pipe, closed at one end, has a loudspeaker at the open end. A stationary sound wave is formed in the air within the pipe with an antinode at the open end of the pipe.



The length of the pipe is 0.85 m.

The speed of sound in air is 340 m s^{-1}.

Which frequency of sound from the loudspeaker would **not** produce a stationary wave?

A 100 Hz **B** 200 Hz **C** 300 Hz **D** 500 Hz

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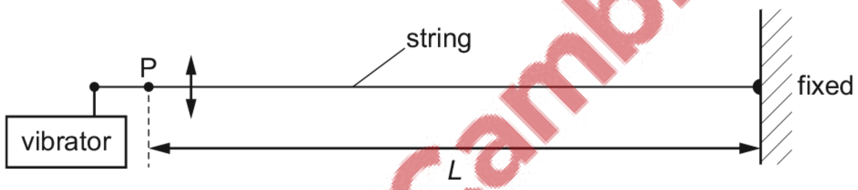
895. 9702_s18_qp_12 Q: 24

A string is fixed at one end and the other end is attached to a vibrator. The frequency of the vibrator is slowly increased from zero. A series of stationary waves is formed. Assume that for a stationary wave there is a node at point P.



What are the first five wavelengths of the stationary waves that could be formed?

A $2\frac{L}{1}, 2\frac{L}{2}, 2\frac{L}{3}, 2\frac{L}{4}, 2\frac{L}{5}$

B $2\frac{L}{2}, 2\frac{L}{3}, 2\frac{L}{4}, 2\frac{L}{5}, 2\frac{L}{6}$

C $4\frac{L}{1}, 4\frac{L}{2}, 4\frac{L}{3}, 4\frac{L}{4}, 4\frac{L}{5}$

D $4\frac{L}{1}, 4\frac{L}{3}, 4\frac{L}{5}, 4\frac{L}{7}, 4\frac{L}{9}$

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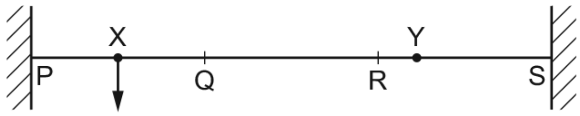
896. 9702_s18_qp_12 Q: 28

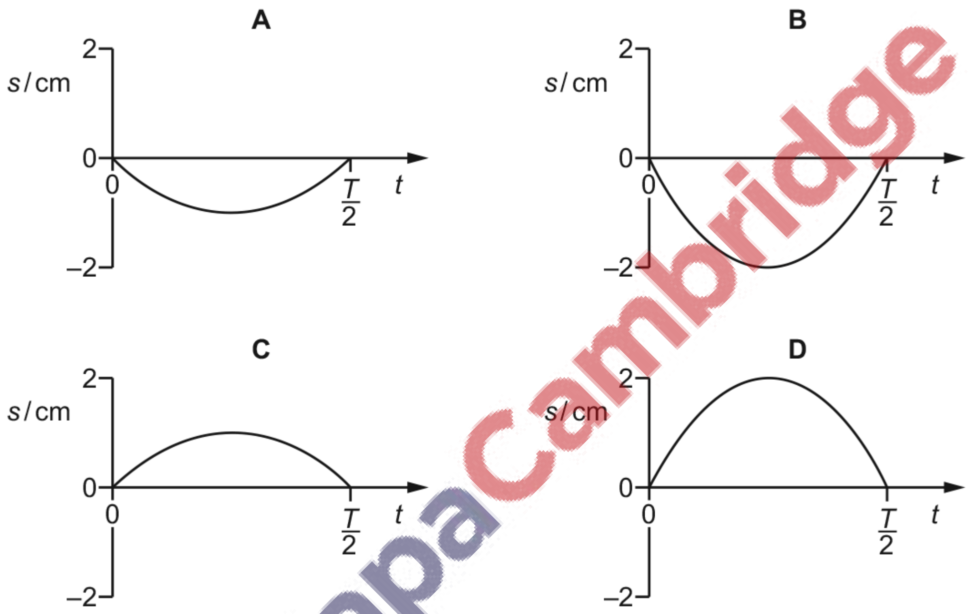
The diagram shows a stationary wave, at time t = 0, that has been set up on a string fixed between points P and S.



The nodes of the stationary wave occur on the string at P, Q, R and S. Point X is moving down at time t = 0. The points on the string vibrate with time period T and maximum amplitude 2 cm.

The displacement s is positive in the upward direction.

Which graph best shows the variation with t of the displacement s of point Y on the string?



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897. 9702_w18_qp_11 Q: 26

What may be used to produce stationary waves?

A blowing air over the top of an empty bottle

B making a loud sound near a mountain

C passing monochromatic light through a double slit

D passing water waves through a narrow slit

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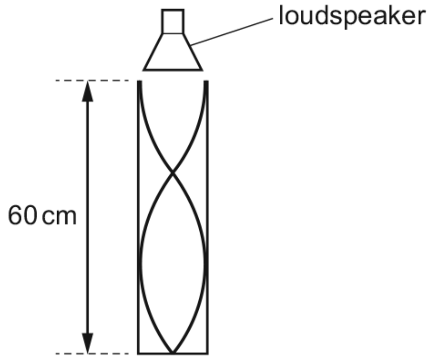
898. 9702_w18_qp_12 Q: 24

The sound from a loudspeaker placed above a tube causes resonance of the air in the tube.

A stationary wave is formed with two nodes and two antinodes as shown.



The speed of sound in the air is $340\,m\,s^{-1}$.

What is the frequency of the sound?

A 430 Hz **B** 570 Hz **C** 850 Hz **D** 1700 Hz

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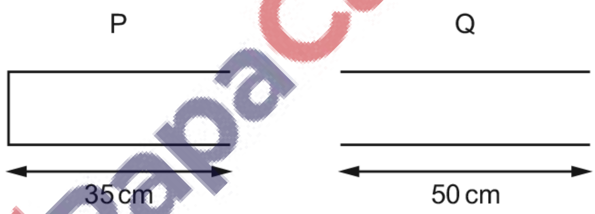
899. 9702_w18_qp_12 Q: 27

Progressive sound waves of wavelength 20 cm enter the air columns in a closed pipe P and an open pipe Q. The lengths of the pipes are shown.



In which pipe or pipes are stationary waves formed?

A P and Q

B P only

C Q only

D neither P nor Q

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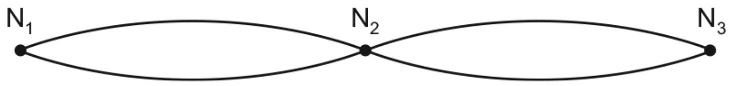
900. 9702_w18_qp_13 Q: 26

The diagram shows a stationary wave on a string. The stationary wave has three nodes N_1, N_2 and N_3.



Which statement is correct?

A All points on the string vibrate in phase.

B All points on the string vibrate with the same amplitude.

C Points equidistant from N_2 vibrate with the same frequency and in phase.

D Points equidistant from N_2 vibrate with the same frequency and the same amplitude.

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901. 9702_m17_qp_12 Q: 27

A progressive wave is incident normally on a flat reflector. The reflected wave overlaps with the incident wave and a stationary wave is formed.

At an antinode, what could be the ratio $\frac{\text{displacement of the incident wave}}{\text{displacement of the reflected wave}}$ at any instant?

A –1 **B** 0 **C** 1 **D** 2

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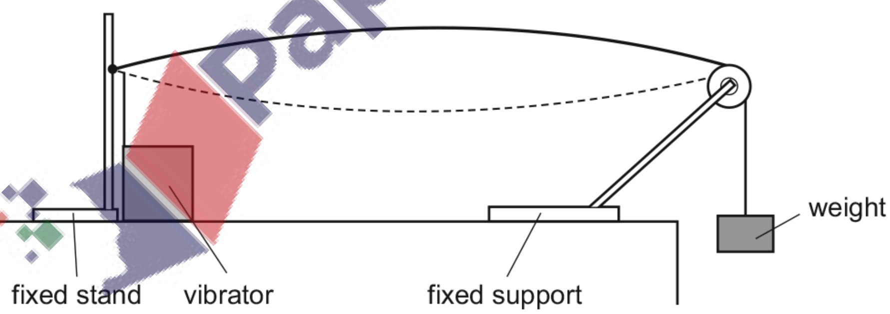
902. 9702_s17_qp_11 Q: 27

The diagram shows a steel wire clamped at one end. The other end is attached to a weight hanging over a pulley.



A vibrator is attached to the wire near the clamped end. A stationary wave with one loop is produced. The frequency of the vibrator is f.

Which frequency should be used to produce a stationary wave with two loops?

A $\frac{f}{4}$ **B** $\frac{f}{2}$ **C** $2f$ **D** $4f$

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903. 9702_s17_qp_12 Q: 27

Which row describes the oscillations of two moving particles in a stationary wave that are separated by a distance of half a wavelength?

	phase difference	amplitude
A	90°	different
B	90°	same
C	180°	different
D	180°	same

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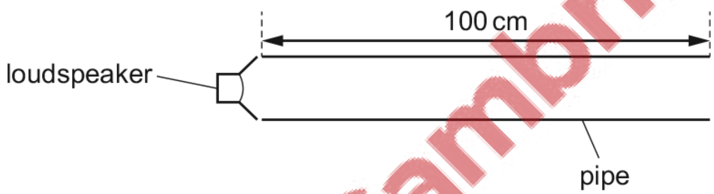
904. 9702_s17_qp_13 Q: 26

A pipe of length 100 cm is open at both ends. A loudspeaker situated at one end of the pipe can emit sound of different wavelengths.



At which wavelength can a stationary wave be produced in the pipe?

A 50 cm **B** 75 cm **C** 150 cm **D** 300 cm

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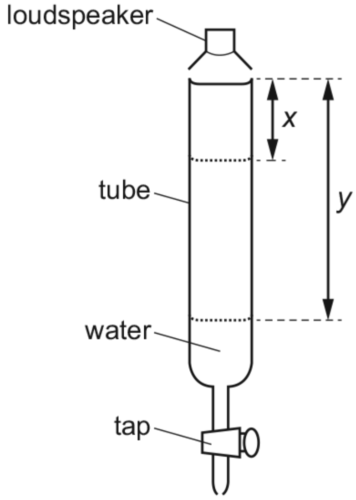
905. 9702_w17_qp_11 Q: 23

A loudspeaker emits a sound wave into a tube initially full of water.



A tap at the bottom of the tube is opened so that water slowly leaves the tube. For some lengths of the air column in the tube, the sound heard is much louder.

The first loud sound is heard when the air column in the tube has length x.

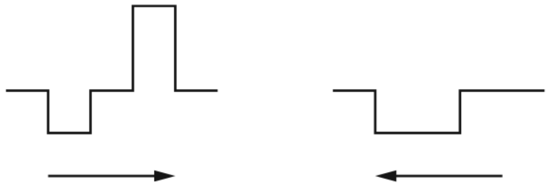
The next time that a loud sound is heard is when the air column in the tube has length y.

What is the wavelength of the sound wave from the loudspeaker?

A $2x$ **B** $4y$ **C** $2(y - x)$ **D** $4(y - x)$

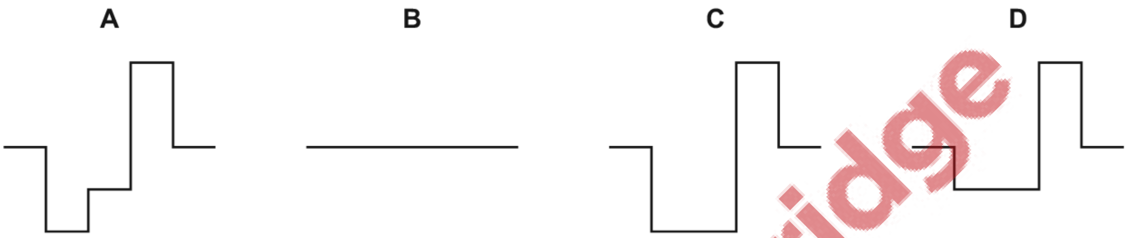
906. 9702_w17_qp_11 Q: 27

Two signals approach each other, as shown.



At one instant, the signals completely overlap.

According to the principle of superposition, what is the shape of the resulting signal at this instant?



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907. 9702_w17_qp_12 Q: 27

A stationary sound wave has a series of nodes. The distance between the first and the sixth node is 30.0 cm.

What is the wavelength of the sound wave?

A 5.0 cm **B** 6.0 cm **C** 10.0 cm **D** 12.0 cm

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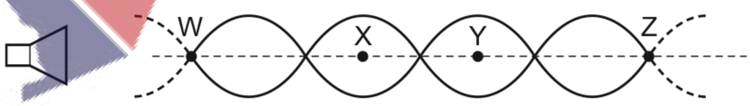
908. 9702_m16_qp_12 Q: 24

The diagram represents the pattern of stationary waves formed by the superposition of sound waves from a loudspeaker and their reflection from a metal sheet (not shown).



W, X, Y and Z are four points on the line through the centre of these waves.

Which statement about these stationary waves is correct?

A An antinode is formed at the surface of the metal sheet.

B A node is a quarter of a wavelength from an adjacent antinode.

C The oscillations at X are in phase with those at Y.

D The air particles oscillate perpendicular to the line WZ.

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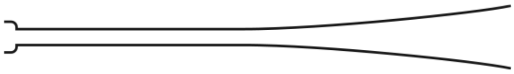
909. 9702_m16_qp_12 Q: 25

A musical instrument called a bugle is a long tube with a mouthpiece at one end. The other end is open and flared, as shown.



A musician maintains stationary sound waves with a node at the mouthpiece and an antinode at the other end. The lowest frequency of sound that the bugle can produce is 92 Hz.

Which different frequencies of sound can be produced by the bugle?

A 92 Hz, 138 Hz, 184 Hz, 230 Hz, 276 Hz

B 92 Hz, 184 Hz, 276 Hz, 368 Hz, 460 Hz

C 92 Hz, 276 Hz, 460 Hz, 644 Hz, 828 Hz

D 92 Hz, 276 Hz, 828 Hz, 2484 Hz, 7452 Hz

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910. 9702_s16_qp_11 Q: 24

Which statement concerning a stationary wave is correct?

A All the particles between two successive nodes oscillate in phase.

B The amplitude of the stationary wave is equal to the amplitude of one of the waves creating it.

C The wavelength of the stationary wave is equal to the separation of two adjacent nodes.

D There is no displacement of a particle at an antinode at any time.

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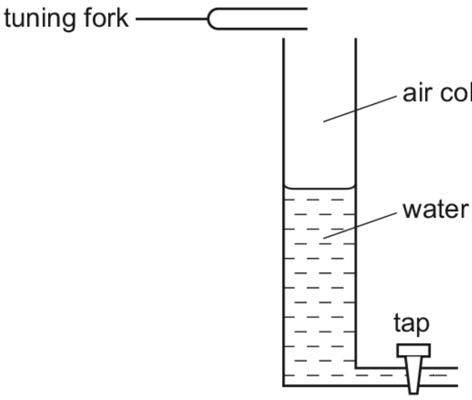
911. 9702_w16_qp_11 Q: 24

The diagram shows an experiment to produce a stationary wave in an air column. A tuning fork, placed above the column, vibrates and produces a sound wave. The length of the air column can be varied by altering the volume of the water in the tube.



The tube is filled and then water is allowed to run out of it. The first two stationary waves occur when the air column lengths are 0.14 m and 0.42 m.

What is the wavelength of the sound wave?

A 0.14 m **B** 0.28 m **C** 0.42 m **D** 0.56 m

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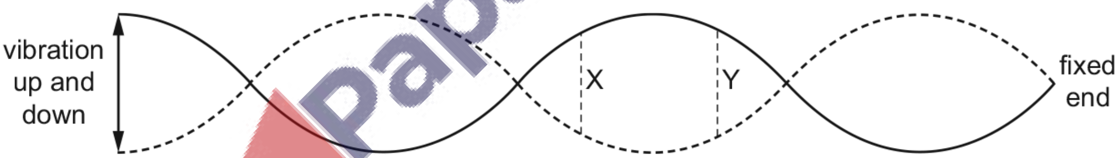
912. 9702_w16_qp_11 Q: 28

The diagram shows a long rope fixed at one end. The other end is moved up and down, setting up a stationary wave.

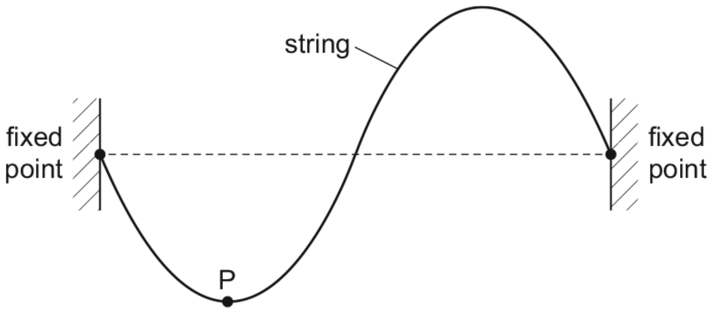


What is the phase difference between the oscillations at X and at Y?

A 0 **B** 45° **C** 90° **D** 135°

913. 9702_w16_qp_12 Q: 26

A stationary wave is formed on a stretched string. The diagram illustrates the string at an instant of time when the displacement of the string is at its maximum.



The frequency of the wave is 250 Hz. Point P on the string has a vertical displacement of –1.0 mm.

What will be the vertical displacement of the point P after a time of 5 ms?

A –1.0 mm **B** zero **C** +0.5 mm **D** +1.0 mm

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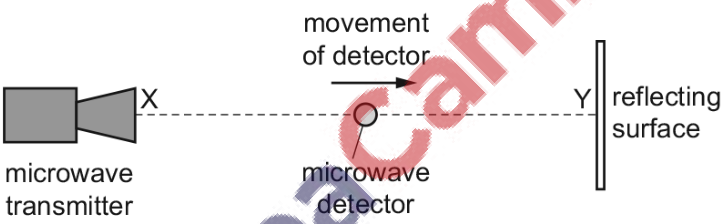
914. 9702_w16_qp_12 Q: 29

A microwave transmitter is placed at a fixed distance from a flat reflecting surface, as shown.



A microwave detector is moved steadily in a straight line from X to Y. A series of maxima and minima of intensity is obtained. The distance between adjacent maxima is 1.5 cm.

What is the frequency of the microwave radiation?

A 1.0×10^{8} Hz

B 2.0×10^{8} Hz

C 1.0×10^{10} Hz

D 2.0×10^{10} Hz

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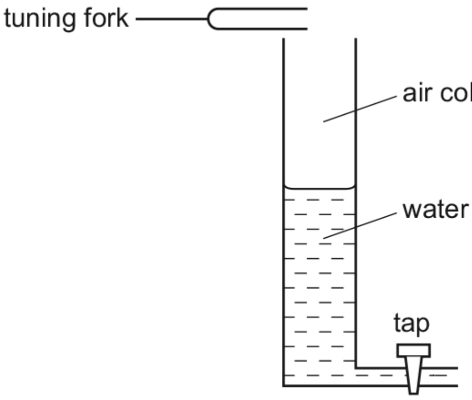
915. 9702_w16_qp_13 Q: 24

The diagram shows an experiment to produce a stationary wave in an air column. A tuning fork, placed above the column, vibrates and produces a sound wave. The length of the air column can be varied by altering the volume of the water in the tube.



The tube is filled and then water is allowed to run out of it. The first two stationary waves occur when the air column lengths are 0.14 m and 0.42 m.

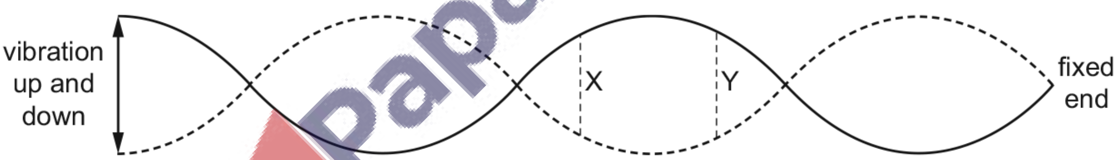
What is the wavelength of the sound wave?

A 0.14 m **B** 0.28 m **C** 0.42 m **D** 0.56 m

---

916. 9702_w16_qp_13 Q: 28

The diagram shows a long rope fixed at one end. The other end is moved up and down, setting up a stationary wave.

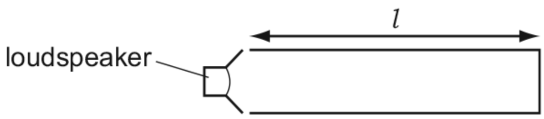


What is the phase difference between the oscillations at X and at Y?

A 0 **B** 45° **C** 90° **D** 135°

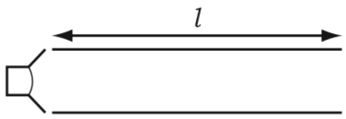
917. 9702_s15_qp_11 Q: 29

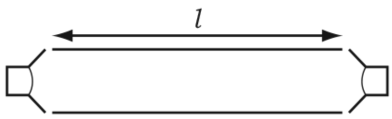
A loudspeaker emitting sound of frequency *f* is placed at the open end of a pipe of length l which is closed at the other end. A standing wave is set up in the pipe.

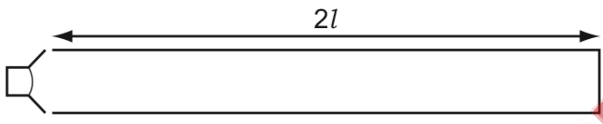


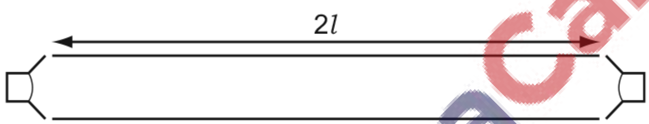
A series of pipes are then set up with either one or two loudspeakers of frequency *f*. The pairs of loudspeakers vibrate in phase with each other.

Which pipe contains a standing wave?

A


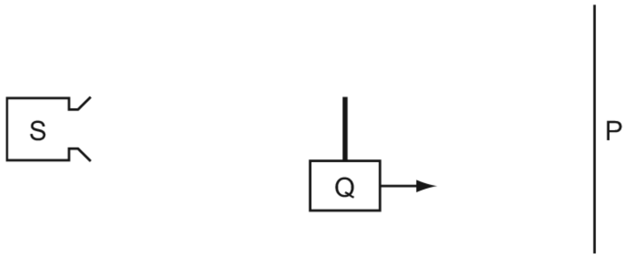
B


C


D


918. 9702_s15_qp_12 Q: 27

Source S emits microwaves with a constant amplitude. The microwaves hit a metal screen P and are reflected. A stationary wave is formed between S and P. The wavelength of the microwaves is much smaller than the distance between S and P.



A detector Q is moved at a slow, constant speed from S to P.

What happens to the amplitude of the signal detected by Q?

A decreases steadily

B increases and decreases regularly

C increases steadily

D remains constant

---

919. 9702_s15_qp_13 Q: 27

The table contains statements about stationary and progressive waves.

Which row is correct?

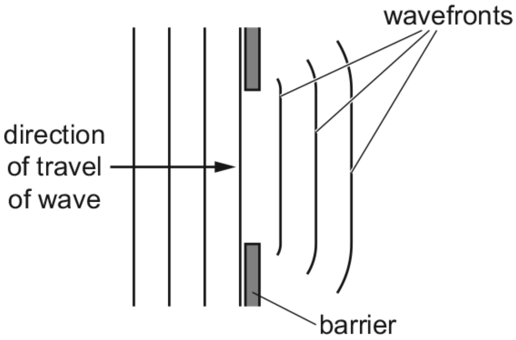
	stationary wave	progressive wave
A	all particles vibrate with the same amplitude	all particles vibrate with the same amplitude
B	energy is transferred along the wave	energy is transferred along the wave
C	particles in adjacent loops vibrate in antiphase	particles vibrate in phase with their immediate neighbours
D	particles one wavelength apart vibrate in phase	particles one wavelength apart vibrate in phase

---

9.2 Diffraction

920. 9702_m20_qp_12 Q: 27

A water wave passes through a gap between two barriers. The wavefronts spread out as shown.



What is the name of this phenomenon?

A coherence

B diffraction

C interference

D superposition

---

921. 9702_s20_qp_11 Q: 28

Which statement **must** be true for diffraction to occur when a wave passes through a gap?

A The wave is able to travel in a vacuum.

B The wave is progressive.

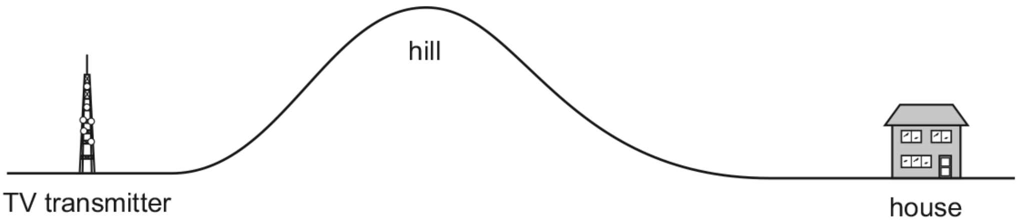
C The wave has a large amplitude.

D The wave has a long wavelength.

---

922. 9702_s20_qp_12 Q: 28

A hill separates a television (TV) transmitter from a house. The transmitter cannot be seen from the house. However, the house has good TV reception.



By which wave effect at the hill could the TV signal reach the house?

A coherence

B diffraction

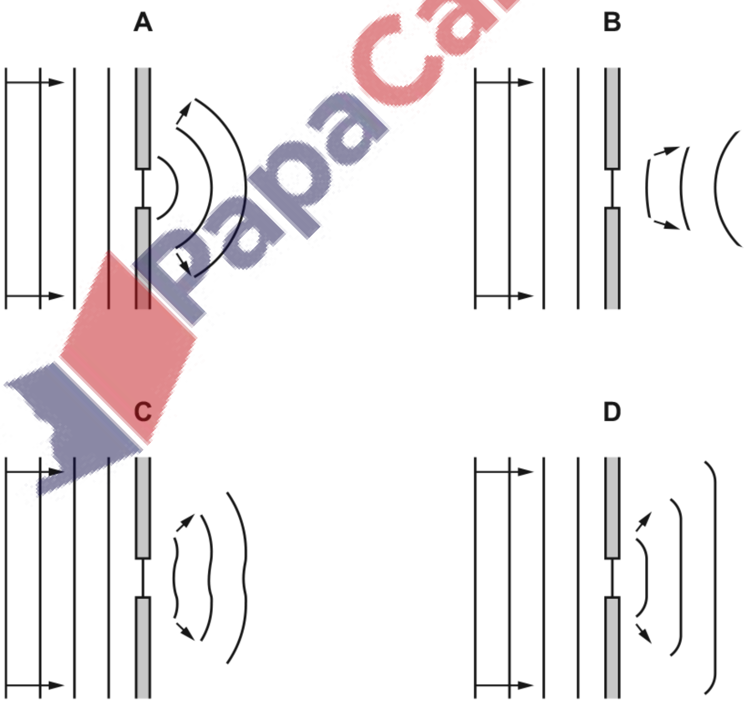
C interference

D reflection

923. 9702_s20_qp_13 Q: 28

Water waves in a ripple tank are made to pass through a small gap as shown.

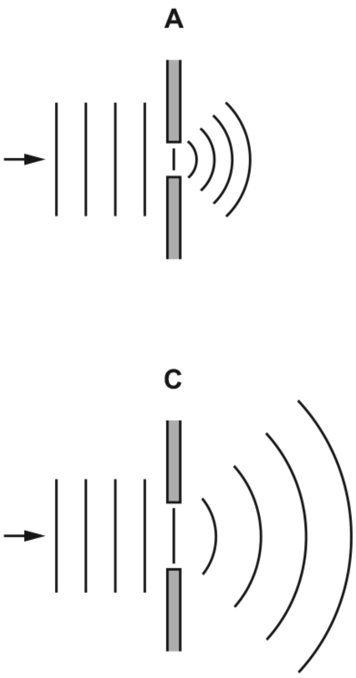
Which diagram shows the waves after they have passed through the gap?



924. 9702_s19_qp_11 Q: 28

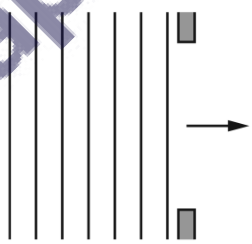
The diagrams show the diffraction of water waves in a ripple tank as they pass through a gap between two barriers.

Which diagram is correct?



925. 9702_s19_qp_13 Q: 27

In an experiment, water waves in a ripple tank are incident on a gap, as shown.



Some diffraction of the water waves is observed.

Which change to the experiment would provide a better demonstration of diffraction?

A Increase the amplitude of the waves.

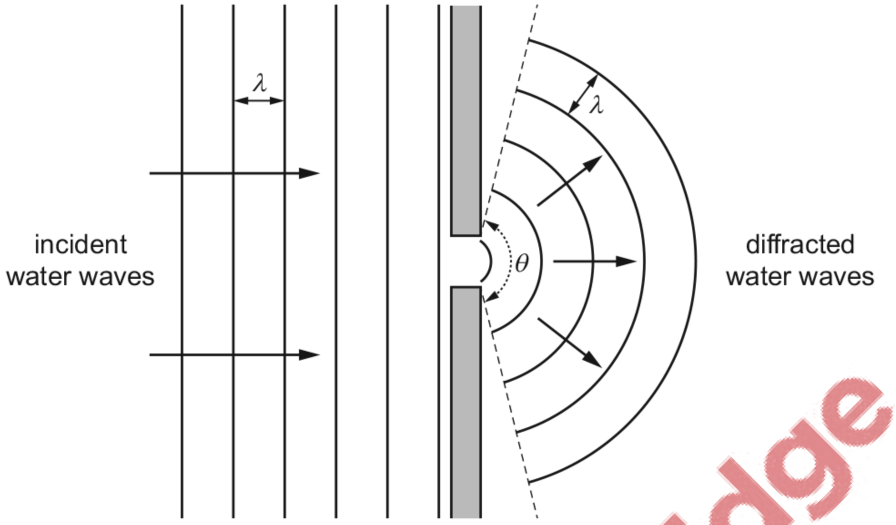
B Increase the frequency of the waves.

C Increase the wavelength of the waves.

D Increase the width of the gap.

926. 9702_w19_qp_11 Q: 27

Water waves of wavelength λ are incident normally on an obstacle with a narrow gap. The width of the gap is equal to λ. The waves from the gap emerge over an angle θ as shown.



The gap is slowly widened.

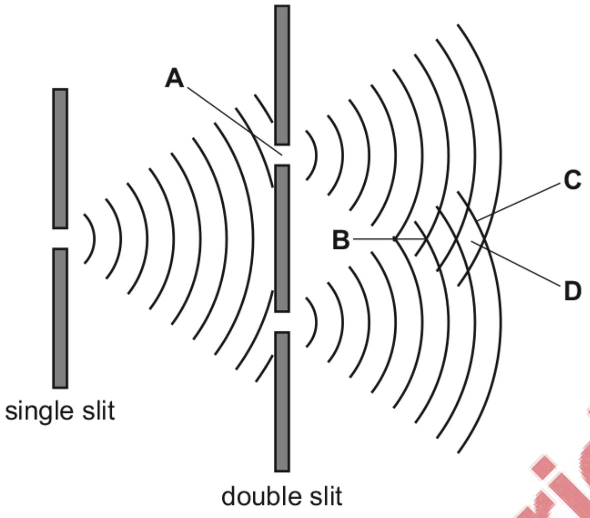
Which changes, if any, occur to θ and to the wavelength of the emerging waves?

	θ	wavelength
A	decreases	remains the same
B	increases	remains the same
C	remains the same	decreases
D	remains the same	increases

927. 9702_w19_qp_13 Q: 29

The double-slit experiment demonstrates interference between two coherent sources of light waves. In the diagram, the curved lines represent wavefronts.

At which point does complete destructive interference (a minimum) occur?



928. 9702_m18_qp_12 Q: 29

Which statement gives a condition that enables diffraction to occur?

A A source of waves moves towards a stationary observer.

B A wave is partially blocked by an obstacle.

C Two coherent waves are superposed.

D Two waves of equal speed and frequency are travelling through the same part of a medium in opposite directions.

929. 9702_s18_qp_13 Q: 25

A water wave in a ripple tank is diffracted as it passes through a gap in a barrier.

Which two factors affect the angle of diffraction of the wave?

A the amplitude and frequency of the incident wave

B the amplitude of the incident wave and the width of the gap

C the wavelength and amplitude of the incident wave

D the wavelength of the incident wave and the width of the gap

930. 9702_w18_qp_11 Q: 27

What is an example of the diffraction of a wave?

A laser light travelling along an optic fibre

B light waves forming images on a cinema screen

C microwaves passing the edge of a metal plate

D sound waves diverging as they pass through air

---

931. 9702_w18_qp_12 Q: 28

What happens when waves pass through a gap equal to their wavelength?

A There is diffraction and the wavelength decreases.

B There is diffraction and the wavelength stays the same.

C There is no diffraction and the wavelength decreases.

D There is no diffraction and the wavelength stays the same.

---

932. 9702_w18_qp_13 Q: 27

In which situation does diffraction occur?

A A wave bounces back from a surface.

B A wave passes from one medium into another.

C A wave passes through an aperture.

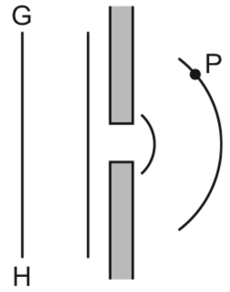
D Waves from two identical sources are superposed.

---

933. 9702_m17_qp_12 Q: 28

A monochromatic plane wave of speed c and wavelength λ is diffracted at a small aperture.

The diagram illustrates successive wavefronts.



After what time will some portion of the wavefront GH reach point P?

A $\frac{3\lambda}{2c}$ **B** $\frac{2\lambda}{c}$ **C** $\frac{3\lambda}{c}$ **D** $\frac{4\lambda}{c}$

---

934. 9702_w17_qp_11 Q: 24

Diffraction can be observed when a wave passes an obstruction. The diffraction effect is greatest when the wavelength and the obstruction are similar in size.

For waves travelling through air, what is the combination of wave and obstruction that could best demonstrate diffraction?

A microwaves passing a steel post

B radio waves passing a copper wire

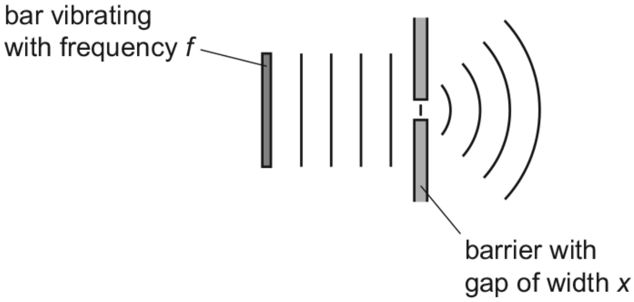
C sound waves passing a human hair

D visible light waves passing a gate post

---

935. 9702_w17_qp_11 Q: 29

A bar vibrates with frequency *f* to produce water waves in a ripple tank.



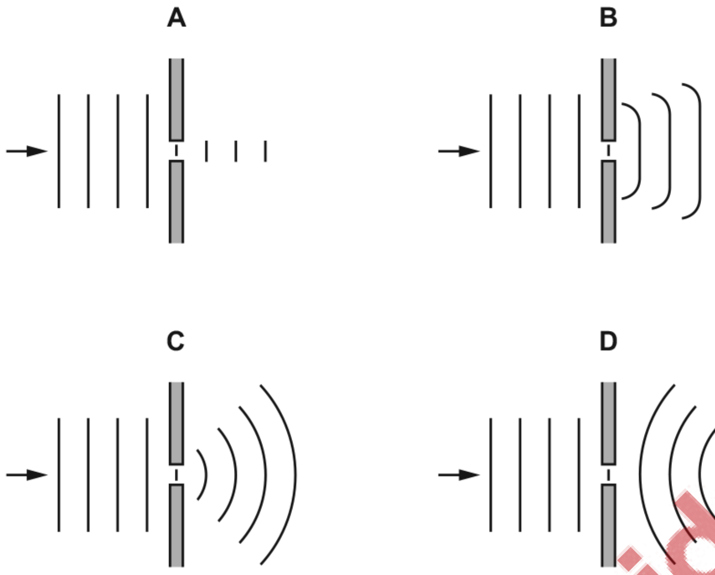
The waves pass through a gap of width *x* in a barrier so that diffraction occurs.

Which combination of vibration frequency and gap width will produce the smallest angle of diffraction?

	vibration frequency	gap width
A	$\frac{f}{2}$	$\frac{x}{2}$
B	$\frac{f}{2}$	$2x$
C	$2f$	$\frac{x}{2}$
D	$2f$	$2x$

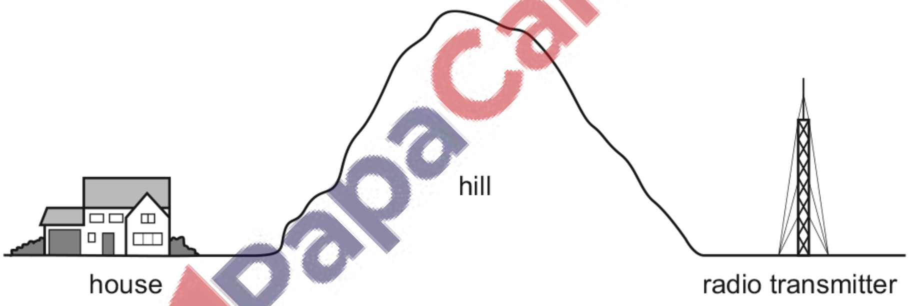
936. 9702_w17_qp_12 Q: 28

Which diagram shows the diffraction of water waves in a ripple tank?



937. 9702_w17_qp_12 Q: 29

A hill stands between a radio transmitter and a house, as shown.



The radio transmitter cannot be seen from the house, but radio waves from the transmitter are received at the house.

Why is this?

A The wavelength of light is longer than the wavelength of radio waves so there is more diffraction of light over the hill.

B The wavelength of light is shorter than the wavelength of radio waves so there is more diffraction of light over the hill.

C The wavelength of radio waves is longer than the wavelength of light so there is more diffraction of radio waves over the hill.

D The wavelength of radio waves is shorter than the wavelength of light so there is more diffraction of radio waves over the hill.

938. 9702_m16_qp_12 Q: 23

Diffraction is a term used to describe one aspect of wave behaviour.

What does diffraction make possible?

A the ability to hear around corners

B the ability to hear high frequency and low frequency sound waves

C the ability to hear loud and quiet sounds

D the ability to hear sound through a brick wall

---

939. 9702_s16_qp_11 Q: 25

Continuous water waves are diffracted through a gap in a barrier in a ripple tank.

Which change will cause the diffraction of the waves to increase?

A increasing the frequency of the waves

B increasing the width of the gap

C reducing the wavelength of the waves

D reducing the width of the gap

---

940. 9702_s16_qp_12 Q: 26

Which statement is an example of the diffraction of light?

A the addition of the amplitudes of two beams of light which are in phase

B the change in direction of a beam of light when passing from air into water

C the separation of a beam of white light into a spectrum of colours using a prism

D the spreading of a beam of light as it passes through a small hole

---

941. 9702_s15_qp_13 Q: 28

Which electromagnetic wave would cause the most significant diffraction effect for an atomic lattice of spacing around 10^{-10} m?

A infra-red

B microwave

C ultraviolet

D X-ray

9.3 Interference, twosource interference

942. 9702_m20_qp_12 Q: 28

The table shows four possible combinations of values for the laser wavelength, slit separation and slit-screen distance in a two-slit interference experiment to show the interference of visible light on a white screen.

Which combination will result in visible fringes being observed?

	laser wavelength / nm	slit separation / mm	slit-screen distance / m
A	200	0.10	5.0
B	200	100	1.0
C	600	0.10	5.0
D	600	100	1.0

943. 9702_s20_qp_11 Q: 29

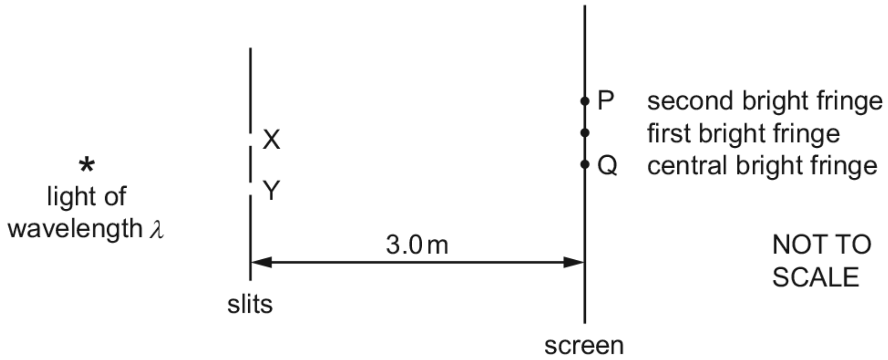
Light of a single wavelength is incident normally on two slits that are 0.20 mm apart. Interference fringes are observed on a screen that is 5.4 m away from the slits. The distance between successive bright fringes is 12 mm.

What is the wavelength of the light?

A 440 nm **B** 540 nm **C** 650 nm **D** 900 nm

944. 9702_s20_qp_12 Q: 29

The diagram shows an arrangement for demonstrating two-source interference using coherent light of a single wavelength λ.



An interference pattern is observed on a screen 3.0 m away from the slits X and Y, which have a separation of 1.0 mm.

The central bright fringe is at Q, and the **second** bright fringe from the centre is at P.

What is the distance between Q and P?

A $6.0 \times 10^{3}\lambda$

B $3.0 \times 10^{3}\lambda$

C $6.7 \times 10^{-4}\lambda$

D $3.3 \times 10^{-4}\lambda$

---

945. 9702_s20_qp_13 Q: 29

A double-slit interference experiment is set up using green light.

A pattern of interference fringes is formed on a screen.

Which single change will increase the separation of the fringes?

A increase the width of each slit

B move the screen nearer to the double slit

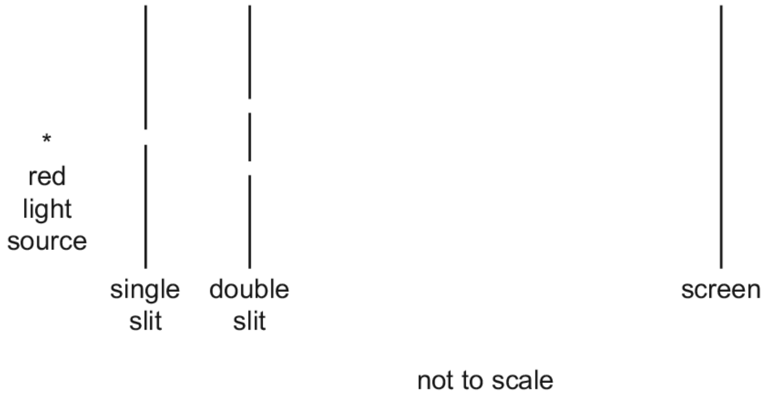
C use slits that are further apart

D use red light instead of green light

---

946. 9702_s19_qp_11 Q: 29

A double-slit interference experiment is set up as shown.



Fringes are formed on the screen. The distance between successive bright fringes is found to be 4 mm.

Two changes are then made to the experimental arrangement. The double slit is replaced by another double slit which has half the spacing. The screen is moved so that its distance from the double slit is twice as great.

What is now the distance between successive bright fringes?

A 1 mm **B** 4 mm **C** 8 mm **D** 16 mm

---

947. 9702_s19_qp_12 Q: 30

Why can an observable interference pattern **never** be obtained between two monochromatic beams of light from different lamps?

A The frequency of the light from the two lamps can never be the same.

B The light from the two lamps can never be coherent.

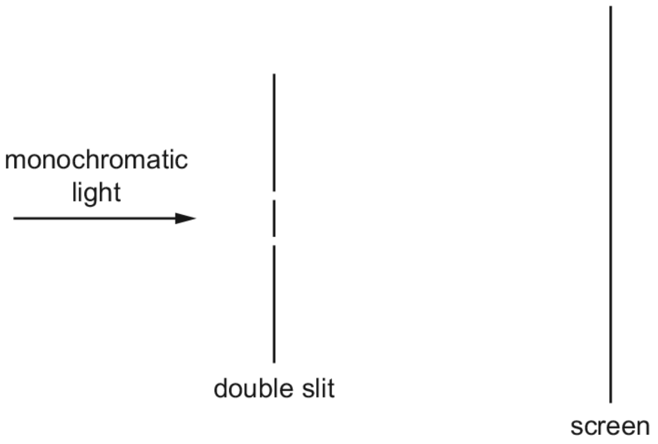
C The temperature of the filaments of the two lamps used can never be the same.

D The wavelength of the light from the two lamps must always be different.

---

948. 9702_s19_qp_12 Q: 31

A student sets up apparatus to observe the double-slit interference of monochromatic light, as shown.



Interference fringes are formed on the screen.

Which change would increase the distance between adjacent fringes?

A Decrease the distance between the two slits.

B Decrease the width of each slit.

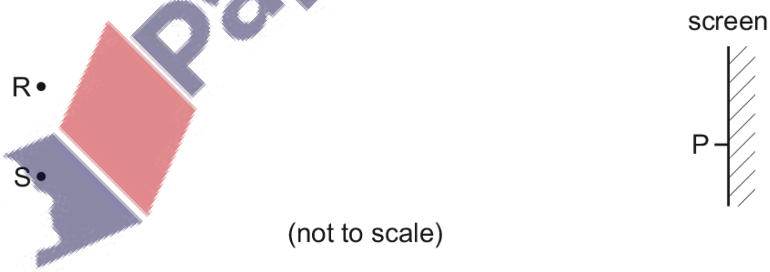
C Move the screen closer to the double slit.

D Use light of a higher frequency.

---

949. 9702_s19_qp_13 Q: 28

Light of wavelength λ is emitted from two point sources R and S and falls onto a distant screen.



At point P on the screen, the light intensity is zero.

What could explain the zero intensity at P?

A Light from the two sources is emitted 180° out of phase and the path difference to P is $\frac{1}{2}\lambda$.

B Light from the two sources is emitted in phase and the path difference to P is λ.

C Light from the two sources is emitted 90° out of phase and the path difference to P is λ.

D Light from the two sources is emitted in phase and the path difference to P is $\frac{1}{2}\lambda$.

---

950. 9702_s19_qp_13 Q: 29

Apparatus is arranged to show double-slit interference using monochromatic light. The slit separation is 0.10 mm. The distance from the double slit to the screen where the interference pattern is observed is 2.4 m and the fringe width is 12 mm.

The distance to the screen is now changed to 1.8 m and the slit separation is doubled.

What is the new fringe width?

A 1.5 mm **B** 4.5 mm **C** 6.0 mm **D** 9.0 mm

---

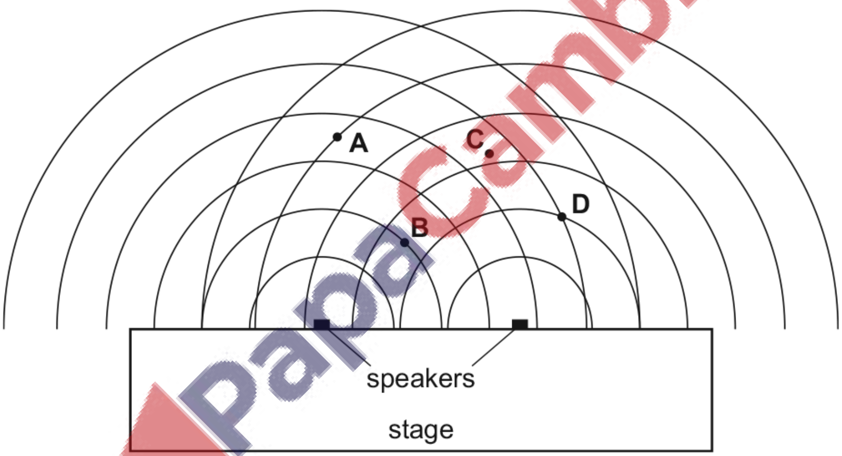
951. 9702_w19_qp_12 Q: 27

An outdoor concert has two large speakers beside the stage for broadcasting music.

In order to test the speakers, they are made to emit sound of the same wavelength and the same amplitude.

The curved lines in the diagram represent wavefronts.

Where is the loudest sound heard?



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952. 9702_m18_qp_12 Q: 26

In a double-slit interference experiment, light of frequency 6.0×10^{14} Hz is incident on a pair of slits. Bright fringes that are 3.0 mm apart are observed on a screen some distance away.

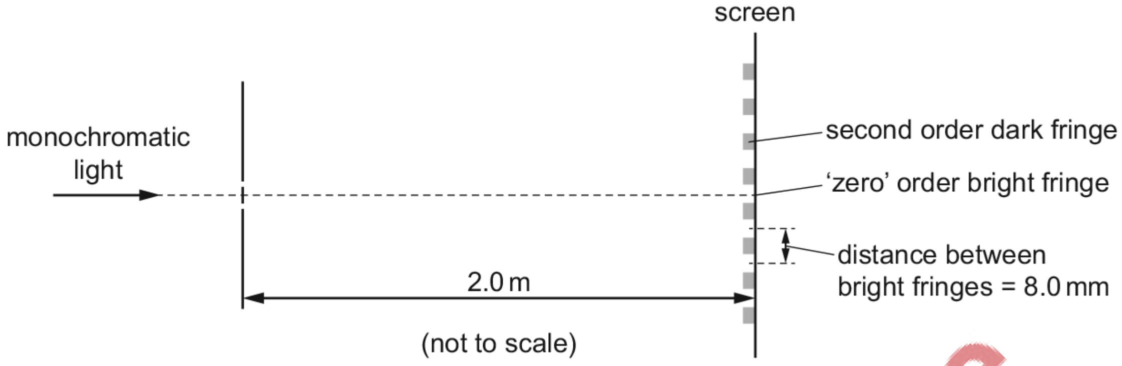
What is the separation of the bright fringes when the frequency of the light is changed to 5.0×10^{14} Hz?

A 1.8 mm **B** 2.5 mm **C** 3.0 mm **D** 3.6 mm

---

953. 9702_m18_qp_12 Q: 27

Monochromatic light is incident on a pair of narrow slits a distance of 0.1 mm apart. A series of bright and dark fringes are observed on a screen a distance of 2.0 m away. The distance between adjacent bright fringes is 8.0 mm.



What is the path difference between the light waves from the two slits that meet at the second order dark fringe?

A 2.0×10^{-7} m

B 4.0×10^{-7} m

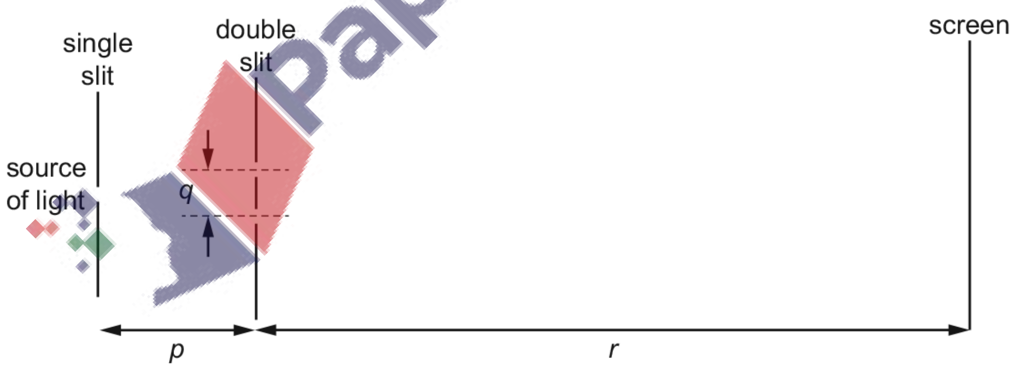
C 6.0×10^{-7} m

D 8.0×10^{-7} m

---

954. 9702_s18_qp_11 Q: 25

A teacher sets up the apparatus shown to demonstrate a double-slit interference pattern on the screen.



Which change to the apparatus will increase the fringe spacing?

A decreasing the distance *p*

B decreasing the distance *q*

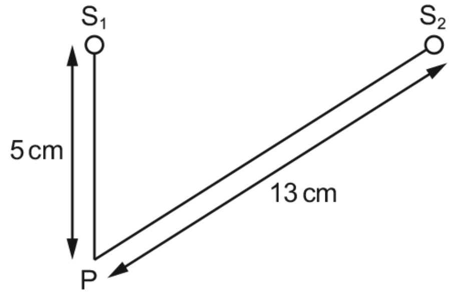
C decreasing the distance *r*

D decreasing the wavelength of the light

---

955. 9702_s18_qp_11 Q: 26

The diagram shows two sources of waves S_1 and S_2. The sources oscillate with a phase difference of 180°.



The sources each generate a wave of wavelength 2.0 cm. Each source produces a wave that has amplitude x_0 when it reaches point P.

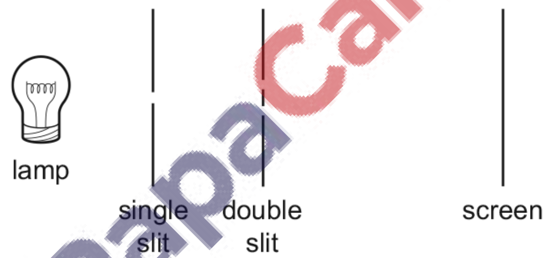
What is the amplitude of the oscillation at P?

A 0 **B** $\frac{x_0}{2}$ **C** x_0 **D** $2x_0$

---

956. 9702_s18_qp_12 Q: 29

A two-source interference experiment uses the apparatus shown.



What is the main purpose of the single slit?

A to make a narrow beam of light

B to make the same amplitude of light incident on each slit

C to provide coherent light

D to provide monochromatic light

---

957. 9702_s18_qp_13 Q: 26

A double-slit interference pattern using red light of wavelength 7.0×10^{-7} m has a fringe spacing of 3.5 mm.

Which fringe spacing would be observed for the same arrangement of apparatus but using blue light of wavelength 4.5×10^{-7} m?

A 2.3 mm **B** 3.5 mm **C** 5.4 mm **D** 9.0 mm

---

958. 9702_w18_qp_11 Q: 28

When the light from two lamps falls on a screen, no interference pattern can be obtained.

Why is this?

A The lamps are not point sources.

B The lamps emit light of different amplitudes.

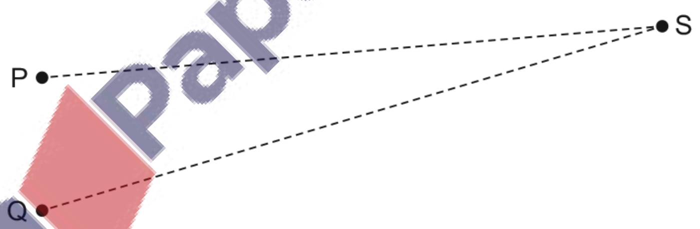
C The light from the lamps is not coherent.

D The light from the lamps is white.

---

959. 9702_w18_qp_12 Q: 29

Two sources of microwaves P and Q produce coherent waves with a phase difference of 180°. The waves have the same wavelength λ.



At the point S there is a minimum in the interference pattern produced by waves from the two sources. The distance (QS – PS) is called the path difference.

In the expressions shown, n is an integer.

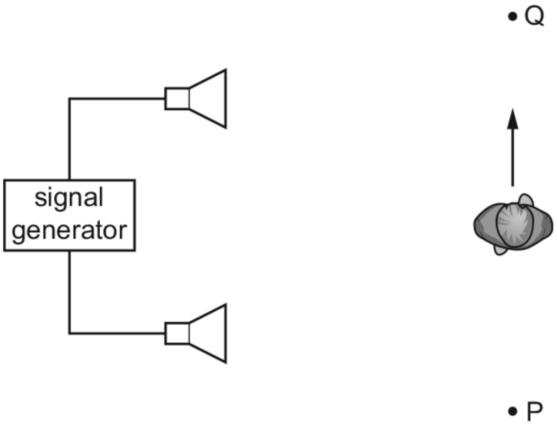
Which expression represents the path difference?

A $n\lambda$ **B** $\frac{1}{2}n\lambda$ **C** $(n + \frac{1}{2})\lambda$ **D** $(2n + \frac{1}{2})\lambda$

---

960. 9702_w18_qp_13 Q: 28

A student connects two loudspeakers to a signal generator.



As the student walks from P to Q, he notices that the loudness of the sound rises and falls repeatedly.

What causes the loudness of the sound to vary?

A diffraction of the sound waves

B Doppler shift of the sound waves

C interference of the sound waves

D reflection of the sound waves

---

961. 9702_m17_qp_12 Q: 29

In an experiment to demonstrate two-source interference of light, a beam of light is split into two beams using two slits 0.50 mm apart. These two beams are incident on a laboratory wall at a distance of 4.0 m.

The wavelength of light is 550 nm.

How far apart are two adjacent interference fringes that are formed on the laboratory wall?

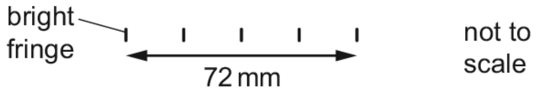
A 0.22 mm **B** 0.44 mm **C** 2.2 mm **D** 4.4 mm

---

962. 9702_s17_qp_11 Q: 29

A pattern of interference fringes is produced using a red laser, a double slit and a screen. The screen is 3.5 m from the double slit. The light from the laser has a wavelength of 640 nm.

The pattern of fringes is shown.



What is the separation of the slits?

A 1.2×10^{-4} m **B** 1.6×10^{-4} m **C** 3.1×10^{-5} m **D** 3.3×10^{-9} m

---

963. 9702_s17_qp_12 Q: 29

Two wave sources are oscillating in phase. Each source produces a wave of wavelength λ. The two waves from the sources meet at point X with a phase difference of 90°.

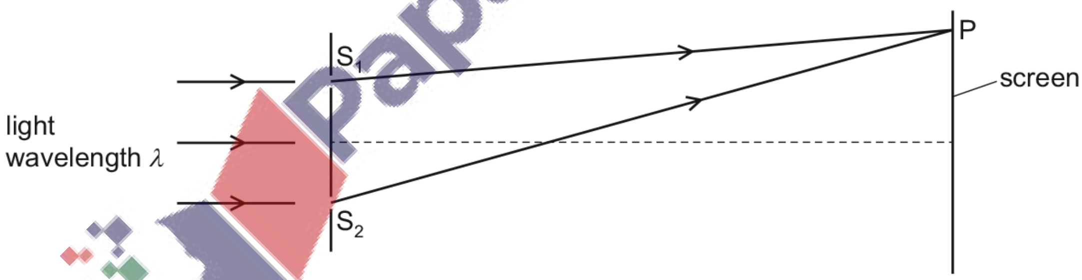
What is a possible difference in the distances from the two wave sources to point X?

A $\frac{\lambda}{8}$ **B** $\frac{\lambda}{4}$ **C** $\frac{\lambda}{2}$ **D** λ

---

964. 9702_s17_qp_13 Q: 28

Monochromatic light of wavelength λ is incident on two narrow slits S_1 and S_2, a small distance apart. A series of bright and dark fringes are observed on a screen a long distance away from the slits.



The nth **dark** fringe from the central bright fringe is observed at point P on the screen.

Which equation is correct for all positive values of n?

A $S_2P - S_1P = \frac{n\lambda}{2}$

B $S_2P - S_1P = n\lambda$

C $S_2P - S_1P = (n - \frac{1}{2})\lambda$

D $S_2P - S_1P = (n + \frac{1}{2})\lambda$

---

965. 9702_w17_qp_11 Q: 5

A double-slit interference experiment is used to determine the wavelength of light from a monochromatic source.

The following measurements are used.

slit separation a = 0.50 ± 0.02 mm

fringe separation x = 1.7 ± 0.1 mm

distance between slits and screen D = 2.000 ± 0.002 m

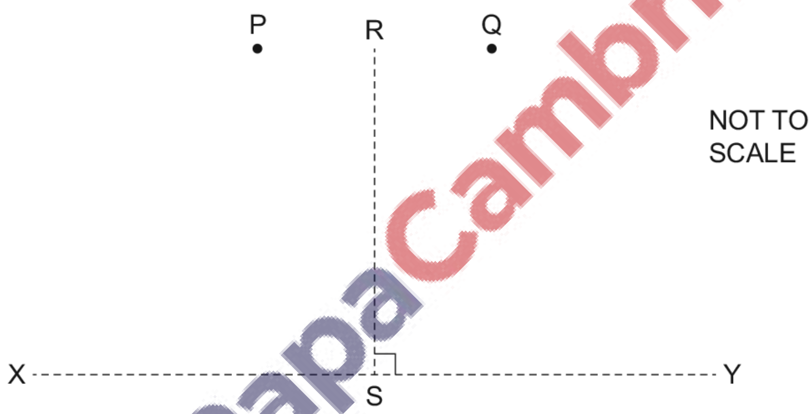
What is the percentage uncertainty in the calculated wavelength?

A 0.1% **B** 1% **C** 6% **D** 10%

---

966. 9702_w17_qp_11 Q: 28

Coherent waves are produced at P and at Q and travel outwards in all directions. The line RS is half-way between P and Q and perpendicular to the line joining P and Q. The distance RS is much greater than the distance PQ.



Along which of the lines shown is an interference pattern observed?

A both RS and XY

B RS only

C XY only

D neither RS nor XY

---

967. 9702_w17_qp_12 Q: 30

In an experiment to demonstrate double-slit interference using light, the distance from the slits to the screen is doubled and the slit separation is halved. The wavelength of the light is kept constant.

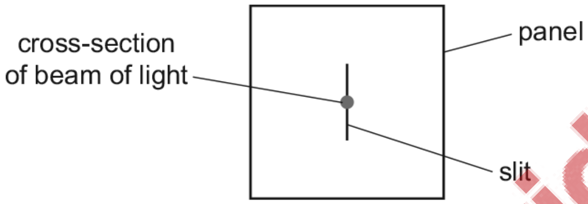
By which factor does the separation of adjacent bright fringes change?

A $\frac{1}{4}$ B $\frac{1}{2}$ C 2 D 4

---

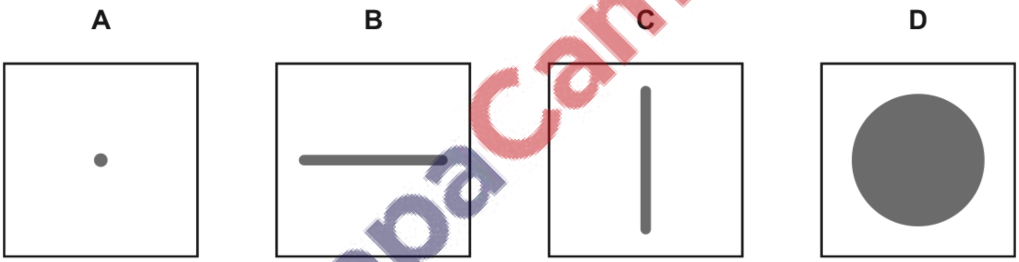
968. 9702_w17_qp_13 Q: 29

A beam of laser light is directed towards a narrow slit.



After emerging from the other side of the slit, the light then falls on a screen.

What is the pattern of light seen on the screen?

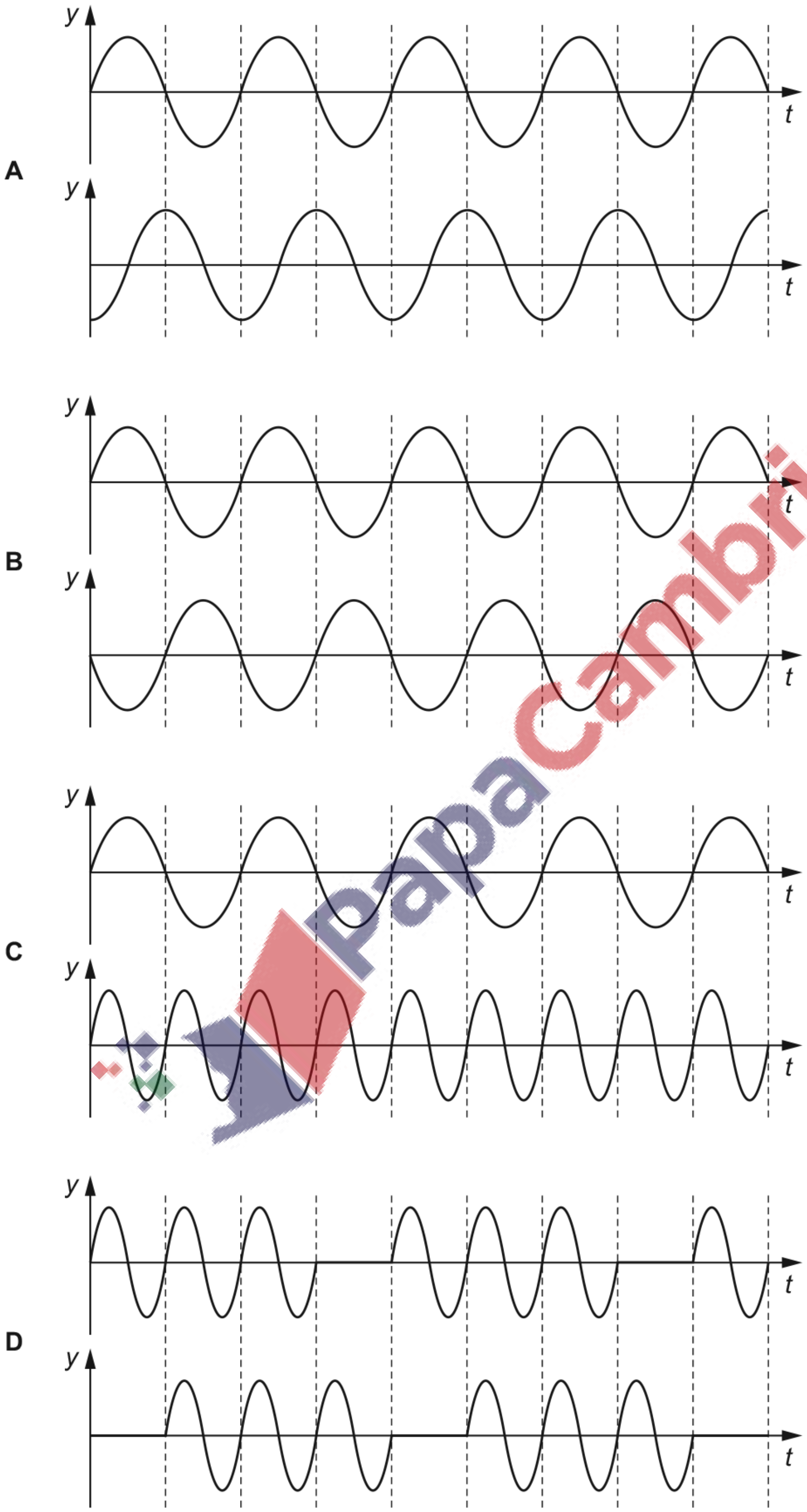


---

969. 9702_w17_qp_13 Q: 30

The diagrams show four pairs of waves. In each case the displacement y measured at a fixed point is plotted against time t.

Which pair of waves is **not** coherent?



970. 9702_s16_qp_11 Q: 27

Fringes of separation *x* are observed on a screen 1.00 m from a double slit that is illuminated by yellow light of wavelength 600 nm.

At which distance from the slits would fringes of the same separation *x* be observed when using blue light of wavelength 400 nm?

A 0.33 m **B** 0.67 m **C** 0.75 m **D** 1.50 m

---

971. 9702_s16_qp_12 Q: 27

Sound waves of wavelength λ are emitted by a loudspeaker and pass through two slits P and Q. Two sound waves from the slits meet at R.

What is the condition for an intensity maximum (loud sound) to be detected by a microphone at R?

A The amplitudes of the two waves at R must be the same.

B The distance PQ must be smaller than the wavelength λ.

C The two waves from the slits must have travelled the same distance to R.

D The two waves must be in phase at R.

---

972. 9702_s16_qp_12 Q: 28

Coherent light passes through a double slit, producing bright and dark fringes on a screen placed parallel to the plane of the double slit. The intensity of the light from each of the slits is initially the same.

The intensity of the light passing through one of the slits in the double slit is now increased. The frequency of the light remains constant.

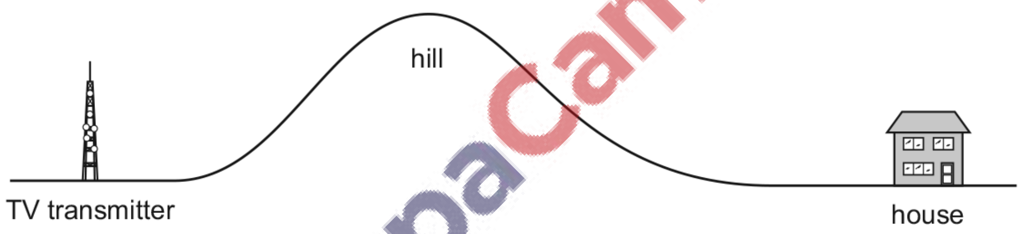
What is the effect on the appearance of the fringes on the screen?

	separation of fringes	maximum intensity of dark fringes
A	decreases	no change
B	increases	greater
C	no change	greater
D	no change	no change

---

973. 9702_s16_qp_13 Q: 26

A hill separates a television (TV) transmitter from a house. The transmitter cannot be seen from the house. However, the house has good TV reception.



By which wave effect at the hill could the TV signal reach the house?

A coherence

B diffraction

C interference

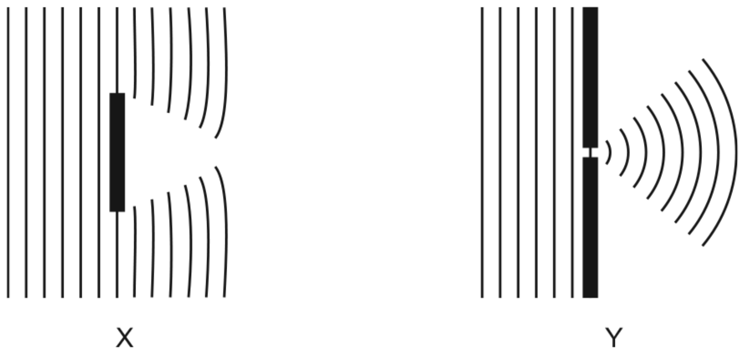
D reflection

---

974. 9702_w16_qp_11 Q: 27

Diagrams X and Y show the passage of water waves around an obstacle and through a gap.

The thick lines are barriers to the waves and each thin line represents a wavefront.



Which statement is correct?

A Diagrams X and Y both illustrate diffraction.

B Diagrams X and Y both illustrate interference.

C Only diagram X illustrates interference.

D Only diagram Y illustrates diffraction.

---

975. 9702_w16_qp_12 Q: 27

Observable interference fringes are produced using light from a double slit. The intensity of the light emerging from each slit is initially the same.

The intensity of the light emerging from one of the slits is now reduced.

How does this affect the interference pattern?

A The bright fringes and the dark fringes all become brighter.

B The bright fringes and the dark fringes all become darker.

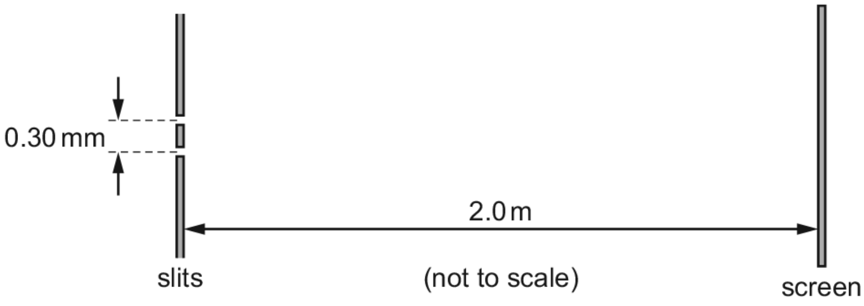
C The bright fringes become brighter and the dark fringes become darker.

D The bright fringes become darker and the dark fringes become brighter.

---

976. 9702_w16_qp_12 Q: 28

Monochromatic light of wavelength 450 nm passes through two parallel slits 0.30 mm apart. Bright fringes are observed on a screen 2.0 m away.



How far apart are the bright fringes on the screen?

A 1.3 mm **B** 1.5 mm **C** 3.0 mm **D** 6.0 mm

---

977. 9702_w16_qp_13 Q: 27

Diagrams X and Y show the passage of water waves around an obstacle and through a gap.

The thick lines are barriers to the waves and each thin line represents a wavefront.

Which statement is correct?

A Diagrams X and Y both illustrate diffraction.

B Diagrams X and Y both illustrate interference.

C Only diagram X illustrates interference.

D Only diagram Y illustrates diffraction.

---

978. 9702_s15_qp_11 Q: 30

In a double-slit experiment the distance between the fringes, on a screen, was too small to measure.

What would increase the distance between the fringes?

A increasing the distance between the light source and the slits

B increasing the distance between the slits and the screen

C increasing the distance between the slits

D increasing the frequency of the light source

---

979. 9702_s15_qp_12 Q: 26

What is **not** an **essential** condition for an observable interference pattern to occur between the waves from two sources?

A The frequencies of the two sources must be equal.

B The sources must be coherent.

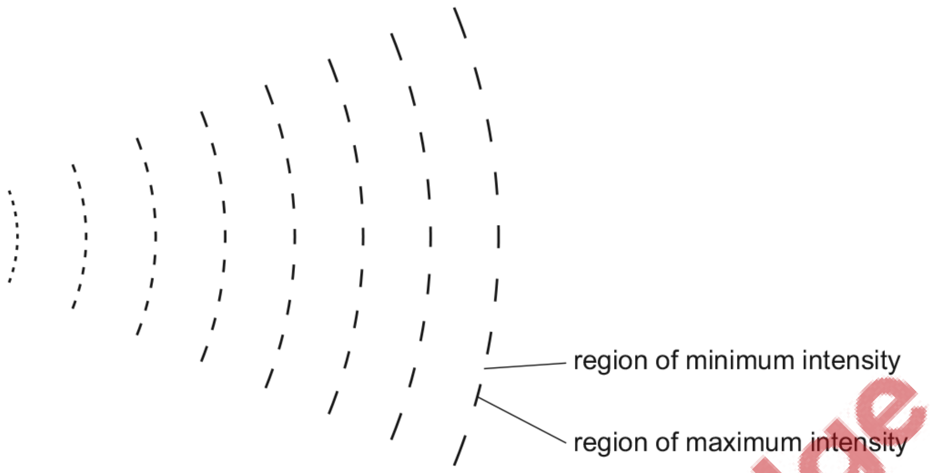
C The sources must emit waves of equal amplitude.

D The waves from the two sources must overlap.

---

980. 9702_s15_qp_12 Q: 28

A pattern of waves was observed without being able to view the source of the waves. The pattern is represented in the diagram.



What can cause this pattern?

A coherence only

B diffraction and interference

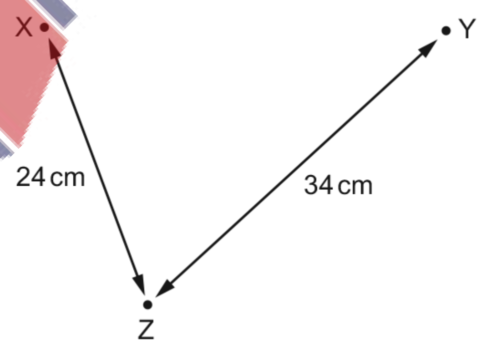
C diffraction only

D interference only

---

981. 9702_s15_qp_13 Q: 29

Wave generators at points X and Y produce water waves of the same wavelength. At point Z, the waves from X have the same amplitude as the waves from Y. Distances XZ and YZ are as shown.



When the wave generators operate in phase, the amplitude of oscillation at Z is zero.

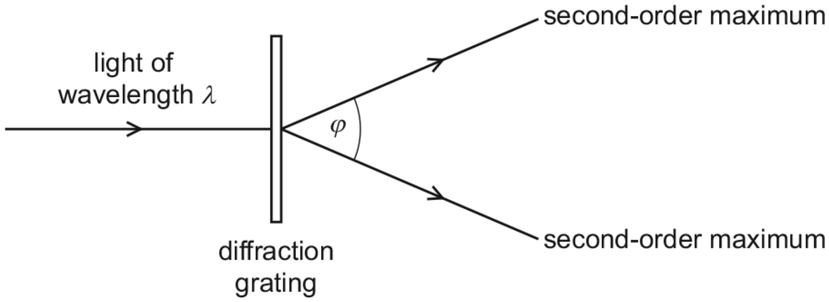
What could be the wavelength of the waves?

A 2 cm **B** 3 cm **C** 4 cm **D** 6 cm

9.4 Diffraction gratings

982. 9702_m20_qp_12 Q: 29

Light of wavelength λ is incident normally on a diffraction grating, as shown.



The angle between the two second-order maxima is φ.

Which expression gives the spacing of the lines on the diffraction grating?

A $\dfrac{\lambda}{\sin\varphi}$ **B** $\dfrac{\lambda}{\sin(\varphi/2)}$ **C** $\dfrac{2\lambda}{\sin\varphi}$ **D** $\dfrac{2\lambda}{\sin(\varphi/2)}$

---

983. 9702_s20_qp_11 Q: 30

A diffraction grating and a screen are used to determine the single wavelength λ of the light from a source.

What is an essential feature of this experiment?

A A curved screen must be used.

B The diffraction angle θ must be measured for at least two interference maxima.

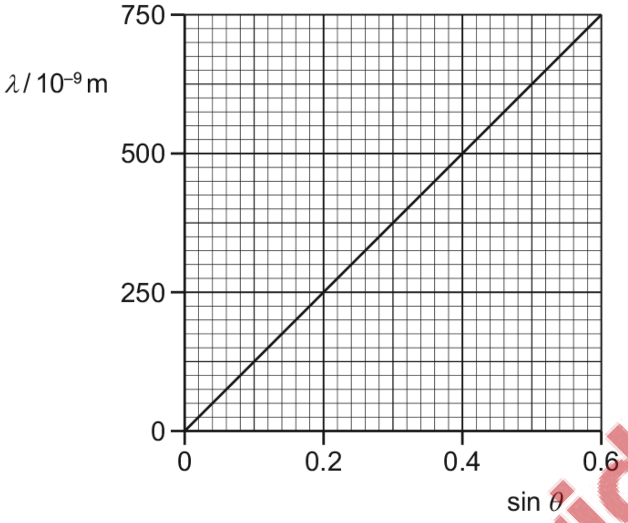
C The light waves incident on the grating must be coherent.

D The third order intensity maximum must be produced.

---

984. 9702_s20_qp_12 Q: 30

Light of wavelength λ is incident normally on a diffraction grating. The angle between the **second**-order maximum and the normal to the grating is θ. The variation with sin θ of λ is shown on the graph.

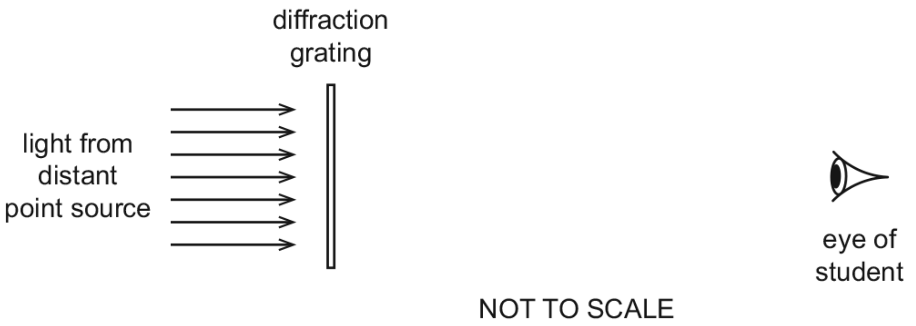


How many lines per millimetre are on the diffraction grating?

A 400 mm^{-1} **B** 625 mm^{-1} **C** 800 mm^{-1} **D** 1250 mm^{-1}

985. 9702_s20_qp_13 Q: 30

Light of a single wavelength from a distant point source falls normally onto a diffraction grating positioned with its lines vertical.



The plane of the diffraction grating is at right angles to the incident light. A student looks at the grating from a position near to the grating.

What could the student see?

A a central point source with a series of point source images on either side

B a central vertical line with a series of spectra on either side

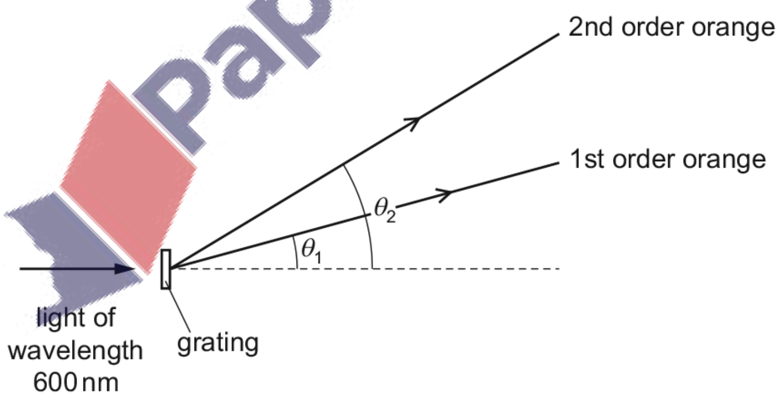
C a series of fine vertical lines

D a single point source

---

986. 9702_m19_qp_12 Q: 29

A diffraction grating experiment is set up using orange light of wavelength 600 nm. The grating has a slit separation of 2.00 μm.



What is the angular separation ($\theta_2 - \theta_1$) between the first and second order maxima of the orange light?

A 17.5° **B** 19.4° **C** 36.9° **D** 54.3°

---

987. 9702_s19_qp_11 Q: 30

The interference patterns from a diffraction grating and a double slit are compared.

Using the diffraction grating, yellow light of the first order is seen at 30° to the normal to the grating.

The same light produces interference fringes on a screen 1.0 m from the double slit. The slit separation is 500 times greater than the line spacing of the grating.

What is the fringe separation on the screen?

A 2.5×10^{-7} m

B 1.0×10^{-5} m

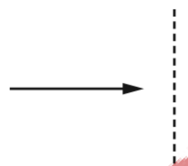
C 1.0×10^{-3} m

D 1.0×10^{-1} m

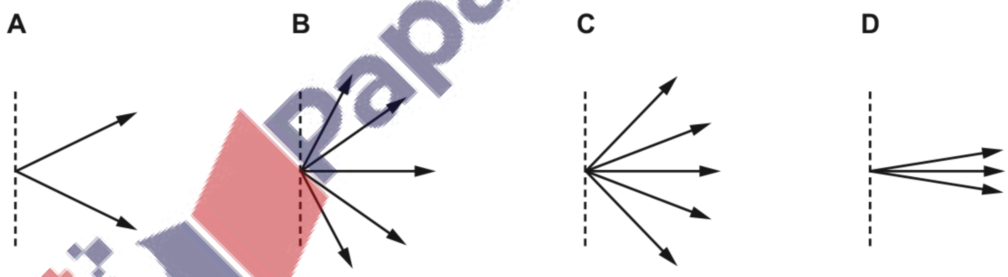
---

988. 9702_s19_qp_12 Q: 29

Monochromatic light is directed at a diffraction grating, as shown.



Which diagram could show all the possible directions of the light, after passing through the grating, that give maximum intensity?



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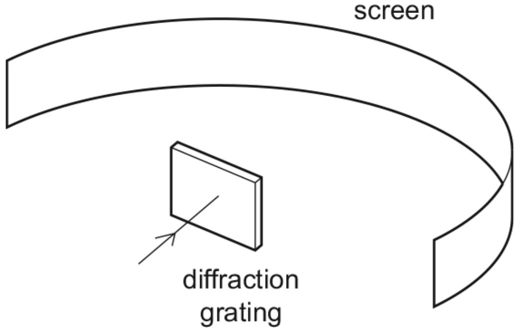
989. 9702_s19_qp_13 Q: 30

Monochromatic light of wavelength 690 nm passes through a diffraction grating with 300 lines per mm, producing a series of maxima (bright spots) on a screen.



What is the greatest number of maxima that can be observed?

A 4 **B** 5 **C** 8 **D** 9

---

990. 9702_w19_qp_11 Q: 28

Light of wavelength 720 nm from a laser X is incident normally on a diffraction grating and a diffraction pattern is observed. Light from a laser Y is then also incident normally on the same grating. The third-order maximum due to laser Y is seen at the same place as the second-order maximum due to laser X.

What is the wavelength of the light from laser Y?

A 480 nm **B** 540 nm **C** 720 nm **D** 1080 nm

---

991. 9702_w19_qp_11 Q: 29

Monochromatic light of frequency *f* is incident on a diffraction grating of line spacing *d*. The speed of light is *c*.

Which expression can be used to determine the highest order of intensity maximum produced by the grating?

A $n = \frac{d}{cf}$ **B** $n = \frac{df}{c}$ **C** $n = \frac{dc}{f}$ **D** $n = \frac{c}{df}$

---

992. 9702_w19_qp_12 Q: 28

An electromagnetic wave is incident normally on a diffraction grating.

A second-order maximum is produced at an angle of 30° to a normal to the grating.

The grating has 5000 lines per cm.

What is the wavelength of the wave?

A 2.5×10^{-7} m **B** 5.0×10^{-7} m **C** 1.0×10^{-6} m **D** 5.0×10^{-5} m

---

993. 9702_w19_qp_13 Q: 30

Light of wavelength 567 nm is incident normally on a diffraction grating. The grating has 400 lines per mm. A number of diffraction maxima are observed on the far side of the grating.

What is the angle between the second-order maximum and the third-order maximum?

A 13.1° **B** 13.9° **C** 15.9° **D** 27.0°

---

994. 9702_s18_qp_12 Q: 25

Which region of the electromagnetic spectrum has waves of wavelength 1000 times smaller than the wavelength of visible light?

A infra-red

B microwaves

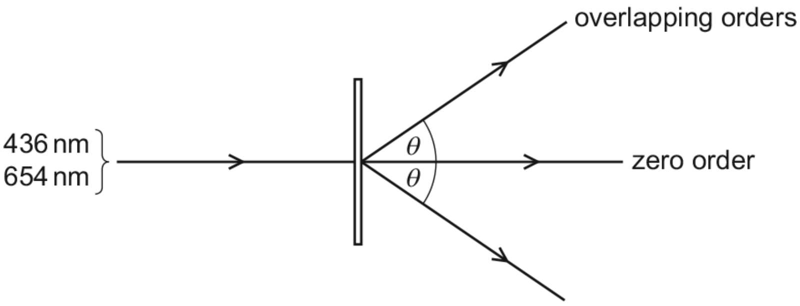
C ultraviolet

D X-rays

---

995. 9702_w18_qp_11 Q: 29

A beam of light consists of two wavelengths of 436 nm and 654 nm. A diffraction grating of 5.00×10^5 lines m^{-1} produces a diffraction pattern in which the second order of one of these wavelengths occurs at the same angle θ as the third order of the other wavelength.



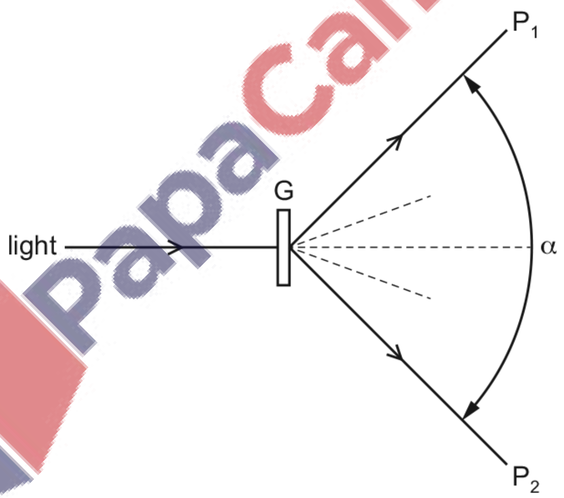
What is the angle θ?

A 19.1° **B** 25.8° **C** 40.8° **D** 78.8°

---

996. 9702_w18_qp_12 Q: 30

A parallel beam of monochromatic light of wavelength λ is incident normally on a diffraction grating G. The angle between the directions of the two second-order diffracted beams at P_1 and at P_2 is α, as shown.



What is the spacing of the lines on the grating?

A $\dfrac{2\lambda}{\sin\alpha}$ **B** $\dfrac{\lambda}{\sin\alpha}$ **C** $\dfrac{2\lambda}{\sin(\alpha/2)}$ **D** $\dfrac{\lambda}{\sin(\alpha/2)}$

---

997. 9702_w18_qp_13 Q: 29

A parallel beam of white light is incident normally on a diffraction grating. The second-order and third-order spectra partially overlap.

Which wavelength in the third-order spectrum appears at the same angle as the wavelength of 600 nm in the second-order spectrum?

A 300 nm **B** 400 nm **C** 600 nm **D** 900 nm

---

998. 9702_s17_qp_11 Q: 28

A parallel beam of light of wavelength 600 nm is incident normally on a diffraction grating. The grating has 300 lines per millimetre.

What is the total number of intensity maxima from the grating?

A 1 **B** 3 **C** 11 **D** 13

---

999. 9702_s17_qp_12 Q: 28

A parallel beam of red light of wavelength 700 nm is incident normally on a diffraction grating that has 400 lines per millimetre.

What is the total number of intensity maxima from the grating?

A 6 **B** 7 **C** 8 **D** 9

1000. 9702_s17_qp_13 Q: 27

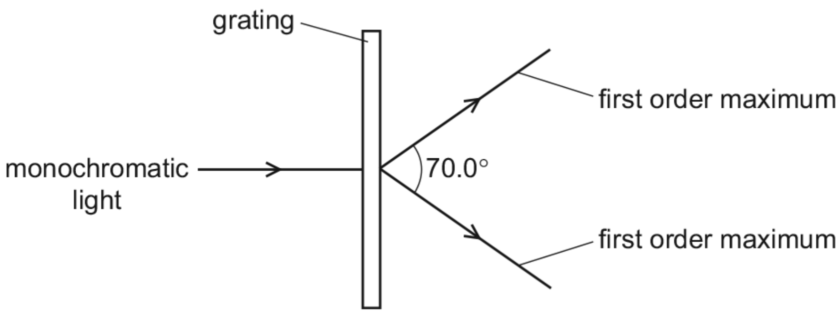
Monochromatic light is incident on a diffraction grating and a diffraction pattern is observed.

Which row shows possible effects of replacing the grating with one that has twice as many lines per millimetre?

	number of orders of diffraction visible	angle between first and second orders of diffraction
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

1001. 9702_w17_qp_11 Q: 30

A diffraction grating is used to measure the wavelength of monochromatic light, as shown in the diagram.



The spacing of the slits in the grating is 1.00×10^{-6} m. The angle between the first order diffraction maxima is 70.0°.

What is the wavelength of the light?

A 287 nm **B** 470 nm **C** 574 nm **D** 940 nm

1002. 9702_m16_qp_12 Q: 26

Monochromatic light of wavelength 5.30×10^{-7} m is incident normally on a diffraction grating. The first order maximum is observed at an angle of 15.4° to the direction of the incident light.

What is the angle between the first and second order diffraction maxima?

A 7.7° **B** 15.4° **C** 16.7° **D** 32.1°

1003. 9702_s16_qp_11 Q: 26

A parallel beam of light of wavelength 450 nm is incident normally on a diffraction grating which has 300 lines / mm.

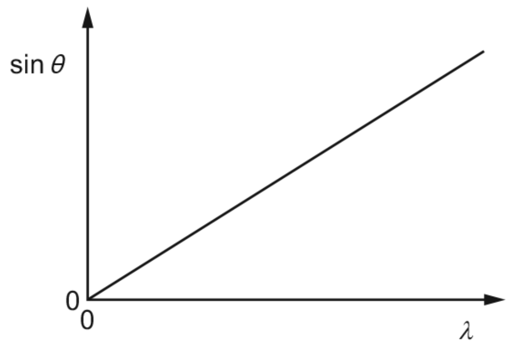
What is the total number of intensity maxima observed?

A 7 **B** 8 **C** 14 **D** 15

1004. 9702_s16_qp_13 Q: 27

A diffraction grating with N lines per metre is used to deflect light of various wavelengths λ.

The graph shows a relation between the deflection angle θ and λ for different wavelengths in the n^{th} order interference pattern.



What is the gradient of the graph?

A Nn **B** $\frac{N}{n}$ **C** $\frac{n}{N}$ **D** $\frac{1}{Nn}$

1005. 9702_s16_qp_13 Q: 28

Which wave phenomenon is **not** needed to explain the pattern of observable fringes produced by a double slit experiment?

A coherence

B diffraction

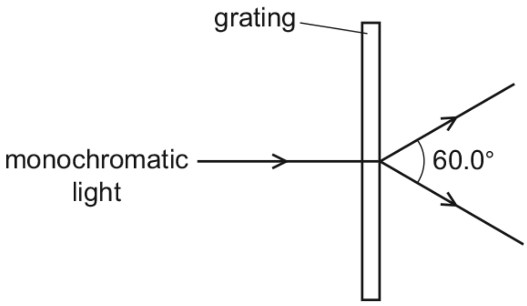
C interference

D reflection

1006. 9702_w16_qp_11 Q: 29

A diffraction grating is used to measure the wavelength of monochromatic light.

The spacing of the slits in the grating is 1.15×10^{-6} m. The angle between the first order diffraction maxima is 60.0°, as shown in the diagram.



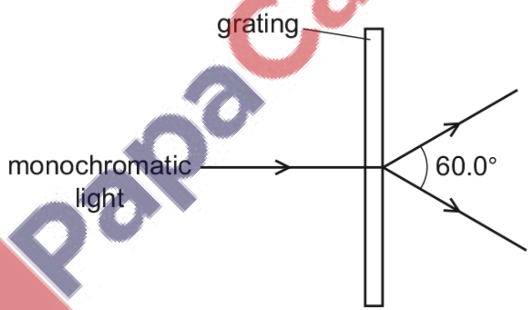
What is the wavelength of the light?

A 288 nm **B** 498 nm **C** 575 nm **D** 996 nm

1007. 9702_w16_qp_13 Q: 29

A diffraction grating is used to measure the wavelength of monochromatic light.

The spacing of the slits in the grating is 1.15×10^{-6} m. The angle between the first order diffraction maxima is 60.0°, as shown in the diagram.



What is the wavelength of the light?

A 288 nm **B** 498 nm **C** 575 nm **D** 996 nm
