Waves

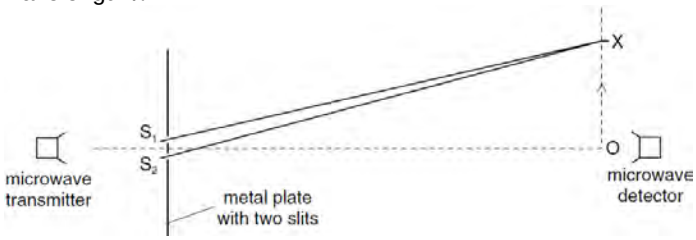
May 02

1. Which of the following summarises the change in wave characteristics on going from infra-red to ultraviolet in the electromagnetic spectrum?

	frequency	speed (in a vacuum)
A	decreases	decreases
B	decreases	remains constant
C	increases	remains constant
D	increases	increases

2. Which statement correctly relates the intensity of a sound wave to the vibrations of the molecules?
A intensity αamplitude
B intensity α(amplitude)^2
C intensity αdisplacement
D intensity α(displacement)^2

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



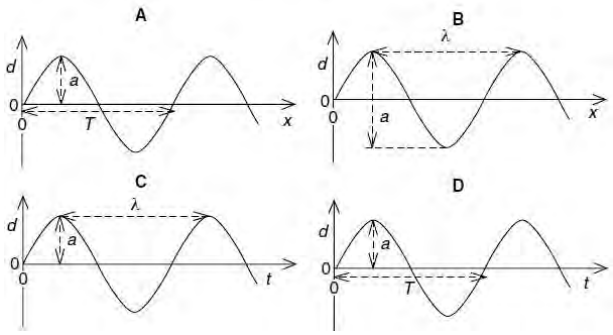
The detector is moved from O in the direction of the arrow. The signal detected decreases until thedetector reaches the point X, and then starts to increase again as the detector moves beyond X.
Which equation correctly determines the position of X?
A OX = $\lambda/2$ **B** OX = λ
C $S_2X - S_1X = \lambda/2$ **D** $S_2X - S_1X = \lambda$

4. Two progressive waves of frequency 300 Hz are superimposed to produce a stationary wave in which adjacent nodes are 1.5m apart.
What is the speed of the progressive waves?
A 100ms^{-1} **B** 200ms^{-1} **C** 450ms^{-1} **D** 900ms^{-1}

Nov 02

5. Which value is a possible wavelength for radiation in the microwave region of the electromagnetic spectrum?
A 3×10^{-2} m **B** 3×10^{-5} m **C** 3×10^{-8} m **D** 3×10^{-10}m

6 The four graphs represent a progressive wave on a stretched string. Graphs **A** and **B** show how the displacement *d* varies with distance *x* along the string at one instant. Graphs **C** and **D** show how the displacement *d* varies with time *t* at a particular value of *x*.
The labels on the graphs are intended to show the wavelength λ, the period *T*, and the amplitude *a* of the wave, but only one graph is correctly labelled. Which graph is correctly labelled?



7. A wave of amplitude *a* has an intensity of 3.0Wm^{-2}. What is the intensity of a wave of the same frequency that has an amplitude 2*a*?

A 4.2Wm^{-2} **B** 6.0Wm^{-2} **C** 9.0Wm^{-2} **D** 12Wm^{-2}

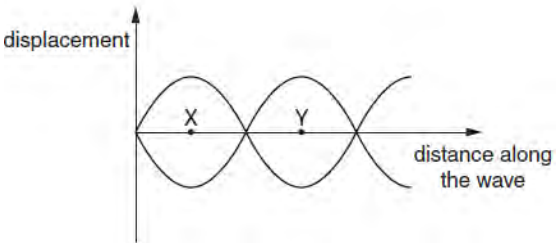
8. Coherent monochromatic light illuminates two narrow parallel slits and the interference pattern that results is observed on a screen some distance beyond the slits.
Which change increases the separation between the dark lines of the interference pattern?
A using monochromatic light of higher frequency
B using monochromatic light of a longer wavelength
C decreasing the distance between the screen and the slits
D increasing the distance between the slits

9. Monochromatic light of wavelength 590 nm is incident normally on a diffraction grating. The angle between the two second-order diffracted beams is 43°. What is the spacing of the lines on the grating?
A 0.87 μm **B** 1.6 μm **C** 1.7 μm **D** 3.2 μm

June 03

10. Which of the following is true for all transverse waves?
A They are all electromagnetic.
B They can all be polarised.
C They can all travel through a vacuum.
D They all involve the oscillation of atoms.

11. The graph represents a stationary wave at two different times.

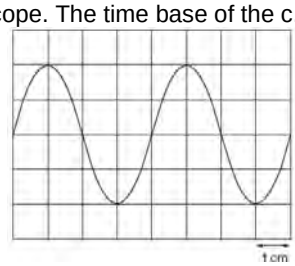


What does the distance XY represent?
A half the amplitude **B** half the frequency
C half the period **D** half the wavelength

12. Electromagnetic waves of wavelength λ and frequency *f* travel at speed *c* in a vacuum. Which of the following describes the wavelength and speed of electromagnetic waves of frequency *f* / 2?

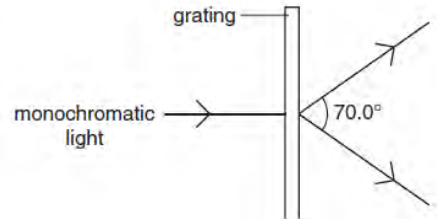
	wavelength	speed in a vacuum
A	$\lambda/2$	$c/2$
B	$\lambda/2$	c
C	2λ	c
D	2λ	$2c$

13. A sound wave is displayed on the screen of a cathode-ray oscilloscope. The time base of the c.r.o. is set at 2.5 ms / cm.



What is the frequency of the sound wave?
A 50 Hz **B** 100 Hz **C** 200 Hz **D** 400 Hz
14. 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.

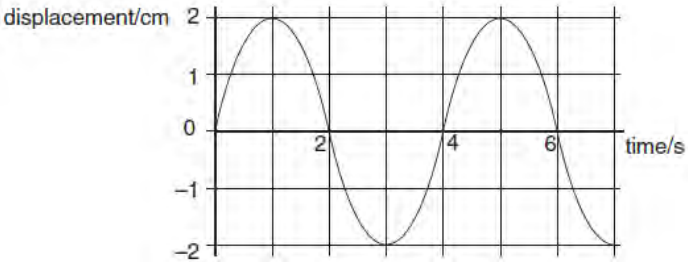
15. A diffraction grating is used to measure the wavelength of monochromatic light, as shown in the diagram.



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

Nov 03

16. The graph shows how the displacement of a particle in a wave varies with time.



Which of the following is correct?
A The wave has an amplitude of 2 cm and could be either transverse or longitudinal.
B The wave has an amplitude of 2 cm and must be transverse.
C The wave has an amplitude of 4 cm and could be either transverse or longitudinal.
D The wave has an amplitude of 4 cm and must be transverse.

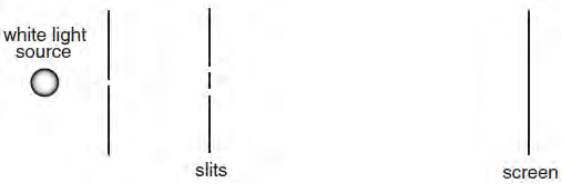
17. A stationary sound wave has a series of nodes. The distance between the first and the sixth node is 30.0 cm.
What is the wavelength of the sound wave?
A 5.0 cm **B** 6.0 cm **C** 10.0 cm **D** 12.0 cm

18. Which of the following applies to a progressive transverse wave?

	transfers energy	can be polarised
A	no	no
B	no	yes
C	yes	no
D	yes	yes

19. Which of the following 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

20. In an interference experiment, two slits are illuminated with white light.

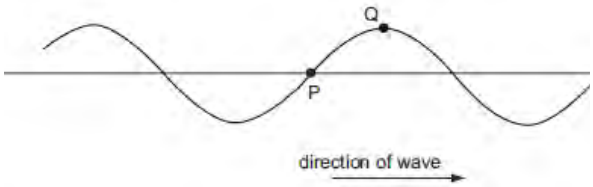


What is seen on the screen?
A The central fringe is black with black and white fringes on each side.
B The central fringe is black with coloured fringes on each side.
C The central fringe is white with black and white fringes on each side.
D The central fringe is white with coloured fringes on each side.

21. Microwaves of wavelength 3.00 cm are incident normally on a row of parallel metal rods. The separation of the rods is 8.00 cm. The first order diffraction maximum is observed at an angle of 22.0° to the direction of the incident waves.
What is the angle between the first and second order diffraction maxima?
A 22.0° **B** 26.6° **C** 44.0° **D** 48.6°

June 04

22. The diagram shows a transverse wave on a rope. The wave is travelling from left to right.
At the instant shown, the points P and Q on the rope have zero displacement and maximum displacement respectively.



Which of the following describes the direction of motion, if any, of the points P and Q at this instant?

	point P	point Q
A	downwards	stationary
B	stationary	downwards
C	stationary	upwards
D	upwards	stationary

23 A plane wave of amplitude A is incident on a surface of area S placed so that it is perpendicular to the direction of travel of the wave. The energy per unit time reaching the surface is E.
The amplitude of the wave is increased to 2 A and the area of the surface is reduced to ½ S.
How much energy per unit time reaches this smaller surface?
A 4E B 2E C E D ½ E

24. What is the approximate range of frequencies of infra-red radiation?
A 1×10^{3} Hz to 1×10^{9} Hz
B 1×10^{9} Hz to 1×10^{11} Hz
C 1×10^{11} Hz to 1×10^{14} Hz
D 1×10^{14} Hz to 1×10^{17} Hz

25. The lines of a diffraction grating have a spacing of 1.6×10^{-6} m. A beam of light is incident normally on the grating. The first order maximum makes an angle of 20^{o} with the undeviated beam.
What is the wavelength of the incident light?
A 210 nm B 270 nm C 420 nm D 550 nm

Nov 04

26. Which of the following is a longitudinal wave?
A a light wave travelling through air
B a radio wave from a broadcasting station
C a ripple on the surface of water
D a sound wave travelling through air

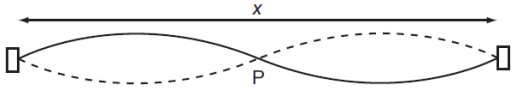
27. A stationary sound wave is set up along the line joining two loudspeakers.
Which measurement is sufficient on its own to enable you to deduce the wavelength of the wave?
A the amplitude of the sound wave
B the distance between the two loudspeakers
C the distance between two adjacent antinodes
D the frequency of the sound wave

28. A wave of amplitude 20 mm has intensity I_X. Another wave of the same frequency but of amplitude 5 mm has intensity I_Y.

What is $\frac{I_X}{I_Y}$?

A 2 B 4 C 16 D 256

29. The diagram represents a stationary wave on a stretched string.



What is represented by point P and by the length x?

	point P	length *x*
A	antinode	one wavelength
B	antinode	two wavelengths
C	node	one wavelength
D	node	two wavelengths

30. Fringes of separation y are observed on a screen 1.00 m from a Young's slit arrangement that is illuminated by yellow light of wavelength 600 nm.
At which distance from the slits would fringes of the same separation y 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

June 05

31. What do not travel at the speed of light in a vacuum?
A electrons B microwaves C radio waves D X-rays

32. The number of wavelengths of visible light in one metre is of the order of
A 10^4. B 10^6. C 10^8. D 10^{10}.

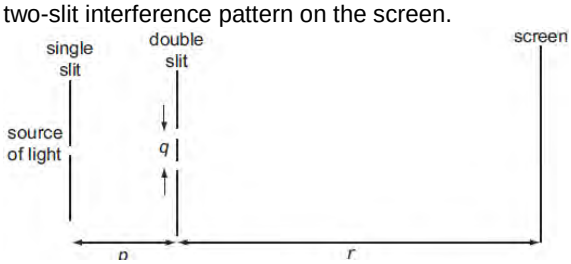
33. A health inspector is measuring the intensity of a sound. Near a loudspeaker his meter records an intensity I. This corresponds to an amplitude A of the sound wave. At another position the meter gives an intensity reading of 2 I.
What is the corresponding sound wave amplitude?
A $\frac{A}{\sqrt{2}}$ **B** $\sqrt{2}A$ **C** $2A$ **D** $4A$

34. A sound wave is set up in a long tube, closed at one end. The length of the tube is adjusted until the sound from the tube is loudest.
What is the nature of the sound wave in the tube?
A longitudinal and progressive
B longitudinal and stationary
C transverse and progressive
D transverse and stationary

35. T is a microwave transmitter placed at a fixed distance from a flat reflecting surface S.

A small microwave receiver is moved steadily from T towards S and receives signals of alternate maxima and minima of intensity.
The distance between successive maxima is 15 mm.
What is the frequency of the microwaves?
A 1.0×10^7 Hz B 2.0×10^7Hz
C 1.0×10^{10}Hz D 2.0×10^{10}Hz

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



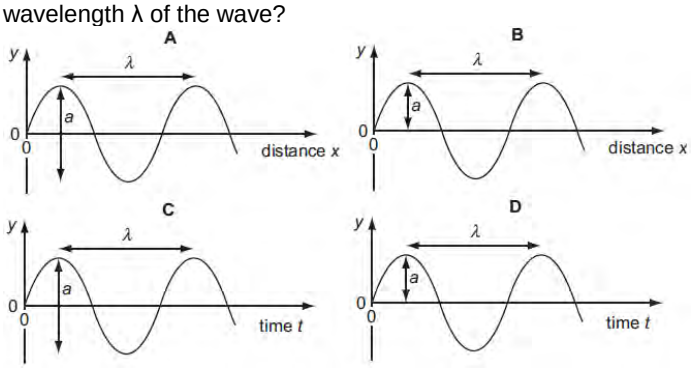
Which change to the apparatus will increase the fringe spacing?
A decreasing the distance p B decreasing the distance q
C decreasing the distance r D decreasing the λ of the light

37. A parallel beam of white light is incident normally on a diffraction grating. It is noted that 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

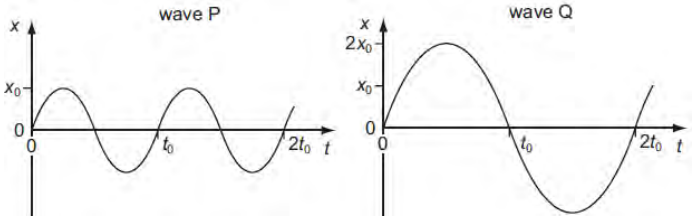
Nov 05

38. Polarisation is a phenomenon associated with a certain type of wave. Which condition must be fulfilled if a wave is to be polarised?
A It must be a light wave. B It must be a longitudinal wave.
C It must be a radio wave. D It must be a transverse wave.

39. A sound wave has displacement y at distance x from its source at time t. Which graph correctly shows the amplitude a and the wavelength λ of the wave?



40. The intensity of a progressive wave is proportional to the square of the amplitude of the wave. It is also proportional to the square of the frequency.
The variation with time t of displacement x of particles in a medium, when two progressive waves P and Q pass separately through the medium, are shown on the graphs.

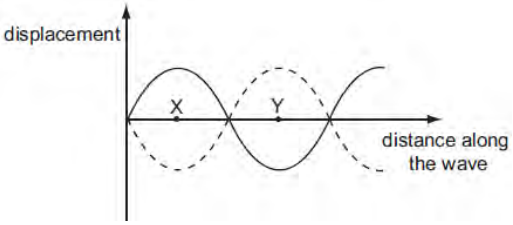


The intensity of wave P is I_0.
What is the intensity of wave Q?
A . ½ I_0 B I_0 C 8 I_0 D 16 I_0

41. A sound wave of frequency 150 Hz travels in water at a speed of 1500 m s^{-1}. It then travels through the surface of the water and into air, where its speed is 300 m s^{-1}.
Which line in the table gives the correct values for the wavelengths of the sound in water and in air?

	wavelength in water / m	wavelength in air / m
A	0.10	0.10
B	0.10	0.50
C	10	2.0
D	10	50

42. The graph represents a standing wave at two different times.



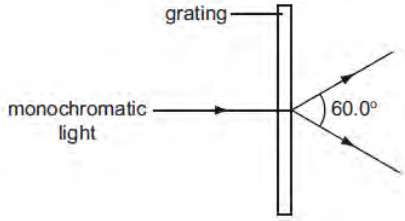
What does the distance XY represent?
A half the amplitude B half the frequency
C half the period D half the wavelength

43. 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.

44. Light of wavelength 700 nm is incident on a pair of slits, forming fringes 3.0 mm apart on a screen.
What is the fringe spacing when light of wavelength 350 nm is used and the slit separation is doubled?
A 0.75 mm B 1.5 mm C 3.0 mm D 6.0 mm

45. 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^{o}, as shown in the diagram.

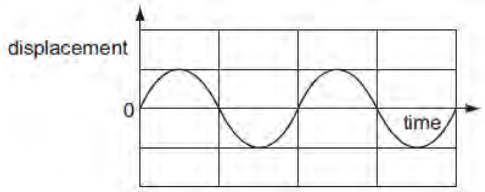


What is the wavelength of the light?
A 287 nm B 498 nm C 575 nm D 996 nm

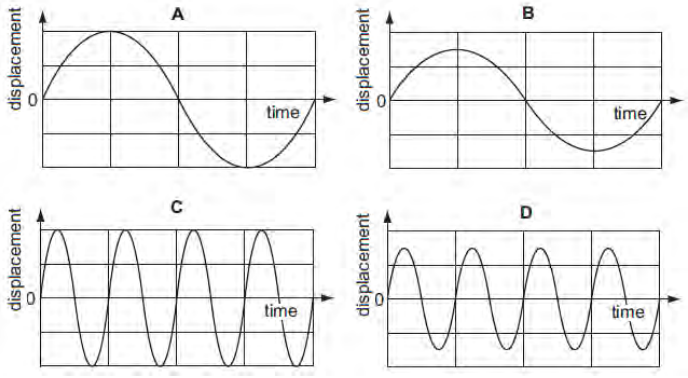
June 06

46. Which phenomenon is associated with transverse waves but not longitudinal waves?
A polarization B reflection C refraction D superposition

47. A displacement-time graph is shown for a particular wave.



A second wave of similar type has twice the intensity and half the frequency. When drawn on the same axes, what would the second wave look like?



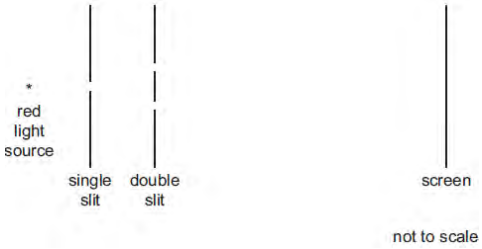
48. The frequency of a certain wave is 500 Hz and its speed is 340 m s^{-1}. What is the phase difference between the motions of two points on the wave 0.17 m apart?
A $\frac{\pi}{4}$ rad **B** $\frac{\pi}{2}$ rad **C** $\frac{3\pi}{4}$ rad **D** π rad

49. Where, in a standing wave, do the vibrations of the medium occur?
A only at the nodes C at all points between the nodes
B only at the antinodes D at all points between the antinodes

50. Monochromatic light is incident on a diffraction grating and a diffraction pattern is observed. Which line of the table gives the effect of replacing the grating with one that has more lines per metre?

	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

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

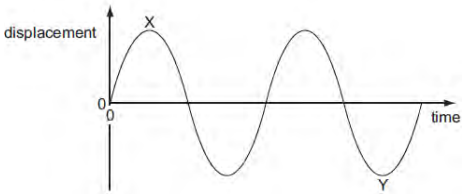


Fringes are formed on the screen. The distance between successive bright fringes is found to be 4 mm. Two changes are then made to the experimental arrangement. The double slit is replaced by another double slit which has half the spacing. The screen is moved so that its distance from the double slit 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

Nov 06

52. A wave motion is described by the oscillation of particles.
What is the name given to the number of complete oscillations of a particle in one second?
A amplitude B frequency C wavelength D wave speed

53. A displacement-time graph for a transverse wave is shown in the diagram.



The phase difference between X and Y can be expressed as $n\pi$.
What is the value of n?
A 1.5 B 2.5 C 3.0 D 6.0

54. 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

55. 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

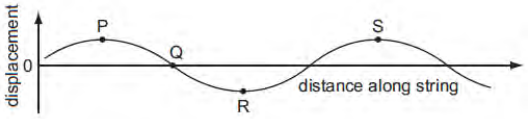
56. What may be used to produce stationary waves?
A blowing air over the top of an empty bottle
B making a loud sound near a mountain
C passing monochromatic light through a double slit
D passing water waves through a narrow slit

June 07

57. Which of the following types of wave can be polarised?
A a longitudinal progressive wave
B a longitudinal stationary wave
C a transverse stationary wave
D a transverse sound wave

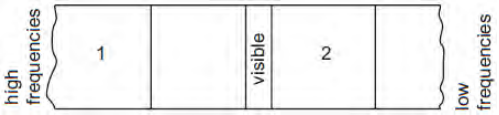
58. Sound wave X has intensity 10^{12} times greater than that of sound wave Y. By how much is the amplitude of X greater than the amplitude of Y?
A 10^6 times B 3.16×10^6 times
C 5×10^{11} times D 10^{12} times

59. The graph shows the shape at a particular instant of part of a transverse wave travelling along a string.



Which statement about the motion of points in the string is correct?
A The speed at point P is a maximum.
B The displacement at point Q is always zero.
C The energy at point R is entirely kinetic.
D The acceleration at point S is a maximum.

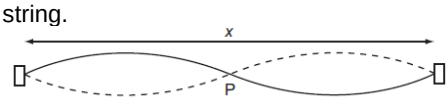
60. The diagram illustrates part of the electromagnetic



Which labels are correct for the regions marked 1 and 2?

	1	2
A	infrared	X-rays
B	microwaves	X-rays
C	ultraviolet	microwaves
D	X-rays	infrared

61. The diagram represents a stationary wave on a stretched string.



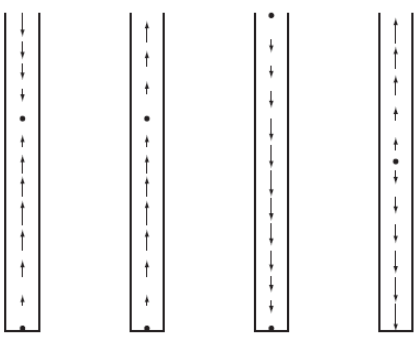
What is represented by point P and by the length x?

	point P	length *x*
A	antinode	one wavelength
B	antinode	two wavelengths
C	node	one wavelength
D	node	two wavelengths

62. A two-slit arrangement is set up to produce interference fringes on a screen. The fringes are too close together for convenient observation when a monochromatic source of violet light is used. In which way would it be possible to increase the separation of the fringes?
A Decrease the distance between the screen and the slits.
B Increase the distance between the two slits.
C Increase the width of each slit.
D Use a monochromatic source of red light.

63. A stationary longitudinal wave is set up in a pipe.
In the diagrams below, the length of each arrow represents the amplitude of the motion of the air molecules, and the arrow head shows the direction of motion at a particular instant.
Which diagram shows a stationary wave in which there are two nodes and two antinodes?

A B C D



Nov 07

64. What is the relationship between the intensity I and the amplitude a of a wave?

A $\frac{I}{a}$ = constant

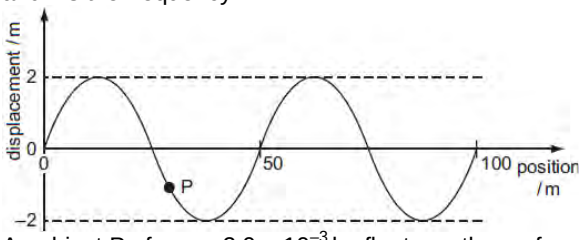
B $\frac{I}{a^2}$ = constant

C Ia = constant

D Ia^2 = constant

65. An electromagnetic wave has a frequency of 10^8Hz. In which region of the electromagnetic spectrum does the wave occur?
A infra-red B radio C ultraviolet D visible

66. The graph represents a sinusoidal wave in the sea, travelling at a speed of 8.0 m s^{-1}, at one instant of time. The maximum speed of the oscillating particles in the wave is $2\pi af$, where a is the amplitude and f is the frequency.



An object P of mass 2.0×10^{-3} kg floats on the surface.
What is the maximum kinetic energy of P due to the wave? Assume that its motion is vertical.
A 0.026 mJ B 4.0 mJ C 39 mJ D 64 mJ

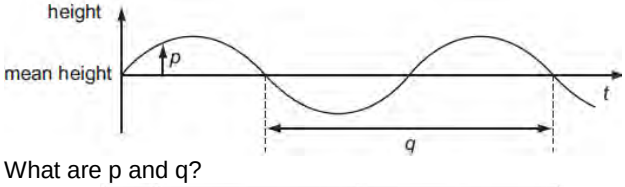
67. Monochromatic light illuminates two narrow parallel slits. The interference pattern which results is observed on a screen some distance beyond the slits.
Which change increases the separation between the dark lines of the interference pattern?

A decreasing the distance between the screen and the slits
B increasing the distance between the slits
C using monochromatic light of higher frequency
D using monochromatic light of longer wavelength

68. A narrow beam of monochromatic light is incident normally on a diffraction grating. Third-order diffracted beams are formed at angles of 45° to the original direction.
What is the highest order of diffracted beam produced by this grating?
A 3rd B 4th C 5th D 6th

June 08

69. The graph shows how the height of a water surface at a point in a harbour varies with time t as waves pass the point.

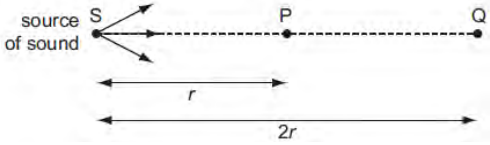


What are p and q?

	p	*q*
A	displacement	wavelength
B	displacement	period
C	amplitude	wavelength
D	amplitude	period

70. The intensity I of a sound at a point P is inversely proportional to the square of the distance x of P from the source of the sound. That is

$$I \propto \frac{1}{x^2}.$$



Air molecules at P, a distance r from S, oscillate with amplitude 8.0 μm. Point Q is situated a distance 2r from S.
What is the amplitude of oscillation of air molecules at Q?
A 1.4 μm B 2.0 μm C 2.8 μm D 4.0 μm

71. Sound waves, emitted by a small loudspeaker, are reflected by a wall. The frequency f of the waves is adjusted until a stationary wave is formed with the antinode nearest the wall at a distance x from the wall. Which expression gives f in terms of x and the speed of sound c?

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

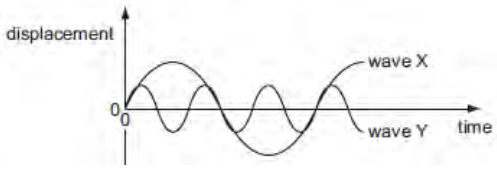
72. A diffraction grating has N lines per unit length and is placed at 90°to monochromatic light of wavelength λ.
What is the expression for θ, the angle to the normal to the grating at which the third order diffraction peak is observed?

A $\sin\theta = \frac{1}{3N\lambda}$ **B** $\sin\theta = 3N\lambda$ **C** $\sin\theta = \frac{N\lambda}{3}$ **D** $\sin\theta = \frac{3\lambda}{N}$

73. Light of wavelength 700 nm is incident on a pair of slits, forming fringes 3.0 mm apart on a screen.
What is the fringe spacing when light of wavelength 350 nm is used and the slit separation is doubled?
A 0.75 mm B 1.5 mm C 3.0 mm D 6.0 mm

Nov. 08

74. The diagram shows two waves X and Y.

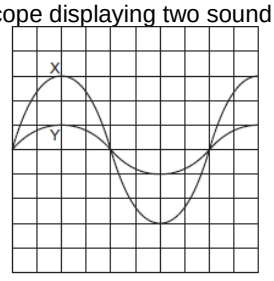


Wave X has amplitude 8 cm and frequency 100 Hz.
What are the amplitude and frequency of wave Y?

	amplitude / cm	frequency / Hz
A	2	33
B	2	300
C	4	33
D	4	300

75. Light can exhibit all of the properties listed.
Which property can sound not exhibit?
A interference B polarisation
C refraction D total internal reflection

76. The diagram represents the screen of a cathode-ray oscilloscope displaying two sound waves labelled X and Y.



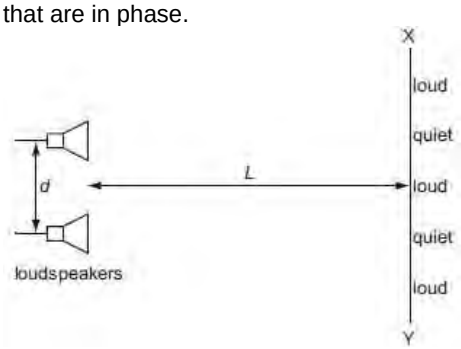
What is the ratio $\frac{\text{intensity of sound wave X}}{\text{intensity of sound wave Y}}$?

A $\frac{9}{1}$ **B** $\frac{3}{1}$ **C** $\frac{\sqrt{3}}{1}$ **D** $\frac{1}{1}$

77. T is a microwave transmitter placed at a fixed distance from a flat reflecting surface S.

A small microwave receiver is moved from T towards S and receives signals of alternate maxima and minima of intensity.
The distance between one maximum and the next is 15 mm.
What is the frequency of the microwaves?
A 1.0×10^7 Hz B 2.0×10^7 Hz
C 1.0×10^{10} Hz D 2.0×10^{10} Hz

78. The diagram shows two loudspeakers producing sound waves that are in phase.



As a student moves from X to Y, the intensity of the note she hears is alternately loud and quiet. The distance between adjacent loud and quiet regions may be reduced by
A decreasing distance d. B increasing distance L.
C decreasing the amplitude. D increasing the frequency.

June 09

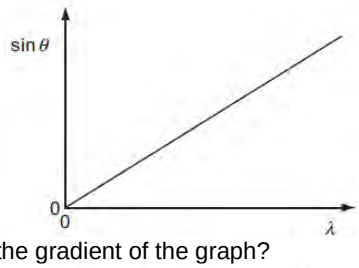
79. Diffraction is the name given to the
A. addition of two coherent waves to produce stationary wave pattern.
B. bending of waves round an obstacle.
C. change of direction when waves cross the boundary between one medium and another.
D splitting of white light into colours.

80. Which wave properties change when light passes from air into glass?
A colour and speed B frequency and wavelength
C speed and wavelength D wavelength and colour

81. 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 stationary waves oscillate at right angles to the line WZ.

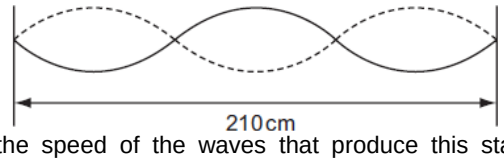
82. A diffraction grating with N lines per metre is used to deflect light of various wavelengths λ.
The diagram shows a relation between the deflection angles θ for different values of λ in the nth order interference pattern



What is the gradient of the graph?

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

83. A stationary wave of frequency 80.0 Hz is set up on a stretched string of length 210 cm.



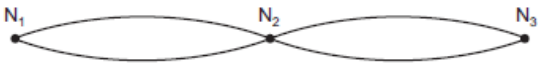
What is the speed of the waves that produce this stationary wave?
A 56.0 m s^{-1} B 112 m s^{-1} C 5600 m s^{-1} D 11 200 m s^{-1}

Nov 09

84. The order of magnitude of the frequency of the longest-wavelength ultraviolet waves can be expressed as 10^{x} Hz.
What is the value of x?
A 13 B 15 C 17 D 19

85. The light from two lasers passes through a vacuum. One laser emits red light and the other emits green light.
Which property of the two laser beams must be different?
A amplitude B frequency
C plane of polarization D speed

86. The diagram shows a standing wave on a string. The standing 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.

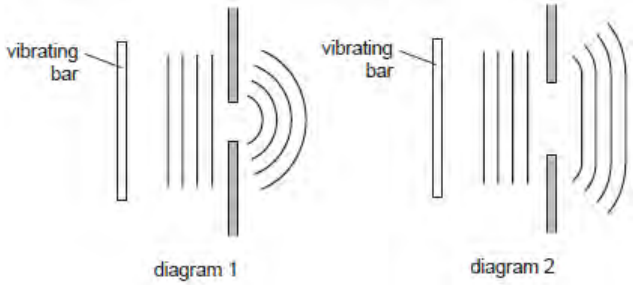
87. A parallel beam of light of wavelength 450 nm falls normally on a diffraction grating which has 300 lines / mm.
What is the total number of transmitted maxima?
A 7 B 8 C 14 D 15

June 10

88. Electromagnetic waves from an unknown source in space were found to be significantly diffracted when passing through gaps of the order of 10^{-5} m.
Which type of wave are they most likely to be?
A radio waves B microwaves
C infra-red waves D ultraviolet waves

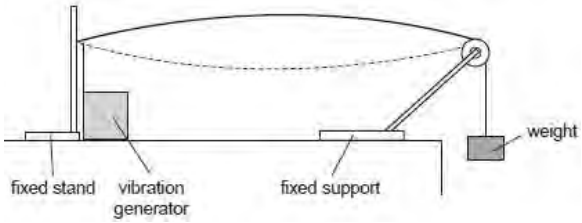
89. Using monochromatic light, interference fringes are produced on a screen placed a distance D from a pair of slits of separation a. The separation of the fringes is x. Both a and D are now doubled.
What is the new fringe separation?
A *2x* B x C 2x D 4x

90. Diagram 1 shows a ripple tank experiment in which plane waves are diffracted through a narrow slit in a metal sheet.
Diagram 2 shows the same tank with a slit of greater width.
In each case, the pattern of the waves incident on the slit and the emergent pattern are shown.



Which action would cause the waves in diagram 1 to be diffracted less and so produce an emergent pattern closer to that shown in diagram 2?
A increasing the frequency of vibration of the bar
B increasing the speed of the waves by making the water in the tank deeper
C reducing the amplitude of vibration of the bar
D reducing the length of the vibrating bar

91. The diagram shows a steel wire clamped at one end and tensioned at the other by a weight hung over a pulley.



A vibration generator is attached to the wire near the clamped end. A stationary wave with one loop is produced. The frequency of the vibration generator 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 $4f$

Answers											
1	c	16	a	31	a	46	a	61	c	76	a
2	b	17	d	32	b	47	b	62	d	77	c
3	c	18	d	33	b	48	b	63	a	78	d
4	d	19	a	34	b	49	c	64	b	79	b
5	a	20	d	35	c	50	b	65	b	80	c
6	d	21	b	36	b	51	d	66	b	81	b
7	d	22	a	37	b	52	b	67	d	82	a
8	b	23	b	38	d	53	c	68	b	83	b
9	d	24	c	39	b	54	d	69	b	84	b
10	b	25	d	40	b	55	c	70	d	85	b
11	d	26	d	41	c	56	a	71	d	86	d
12	c	27	c	42	d	57	c	72	b	87	d
13	b	28	c	43	d	58	a	73	a	88	c
14	c	29	c	44	a	59	d	74	b	89	b
15	c	30	d	45	c	60	d	75	b	90	a
										91	c