

0625 Physics Paper 2 - Waves

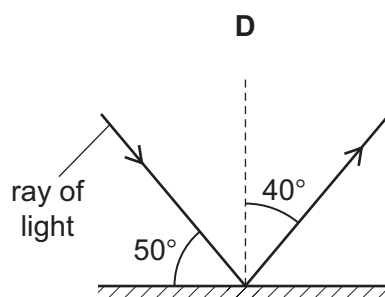
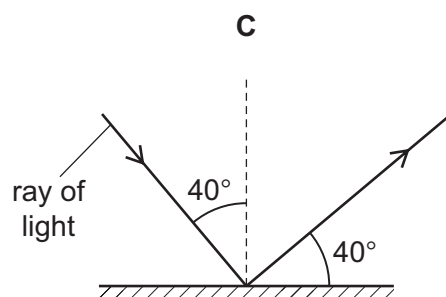
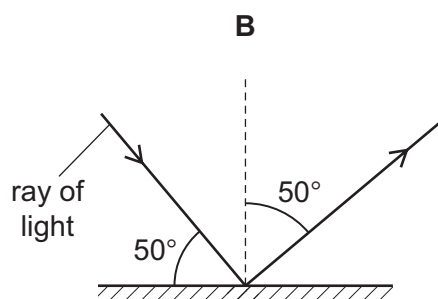
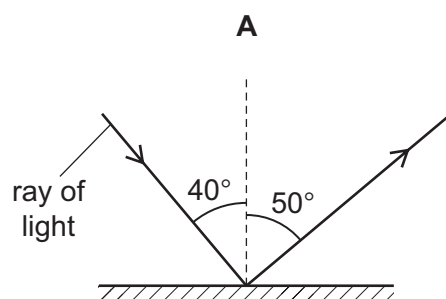
Topical questions | 470 questions

1. Question | 0625 Feb-March 2016 P2 V2 Q21

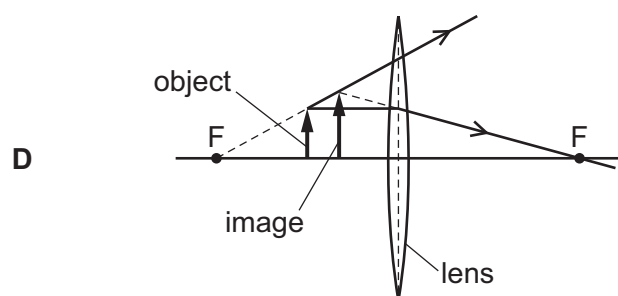
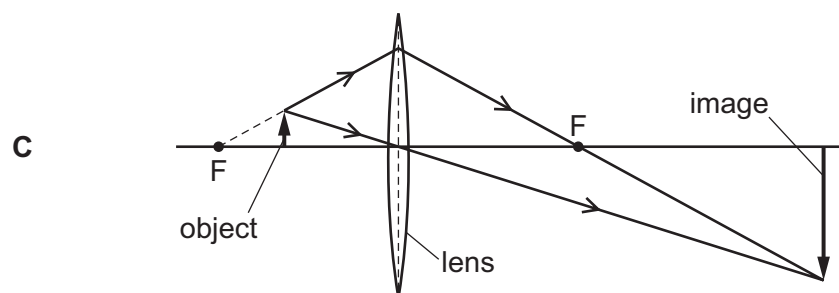
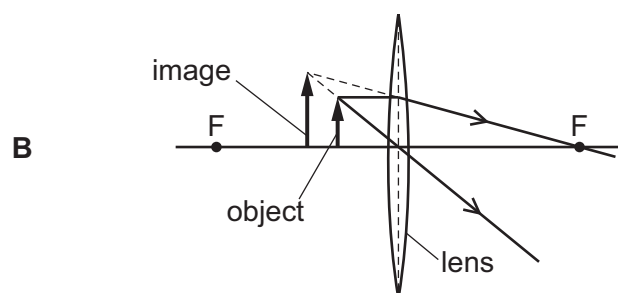
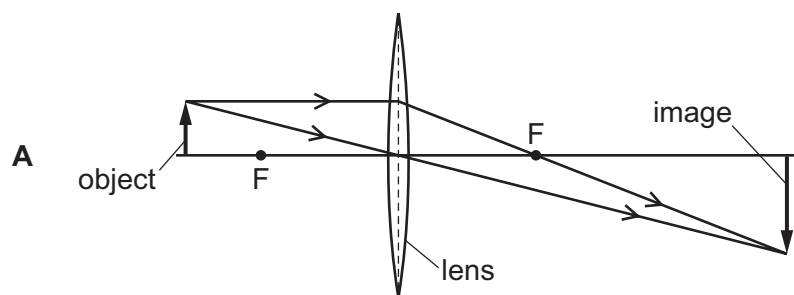
21 Which is a unit of wavelength?

- A** hertz
- B** metre
- C** metre per second
- D** second

2. Question | 0625 Feb-March 2016 P2 V2 Q22

22 Which diagram correctly shows a ray of light reflected by a plane mirror?

3. Question | 0625 Feb-March 2016 P2 V2 Q23

23 Which diagram shows how a converging lens is used as a magnifying glass?

4. Question | 0625 Feb-March 2016 P2 V2 Q24

24 A sound wave travels from a point X to a point Y.



Which diagram represents the movement of the air molecules, due to the sound wave, in the region between X and Y?



5. Question | 0625 Feb-March 2016 P2 V2 Q25

25 The speed of sound in air is 340 m/s.

Which row gives typical values for the speed of sound in a liquid and in a solid?

	speed of sound in a liquid / (m/s)	speed of sound in a solid / (m/s)
A	250	180
B	250	5000
C	1500	180
D	1500	5000

6. Question | 0625 May-June 2016 P2 V1 Q20

20 Sound waves of frequency 2.0 kHz travel through a substance at a speed of 800 m/s.

What is the wavelength of the waves?

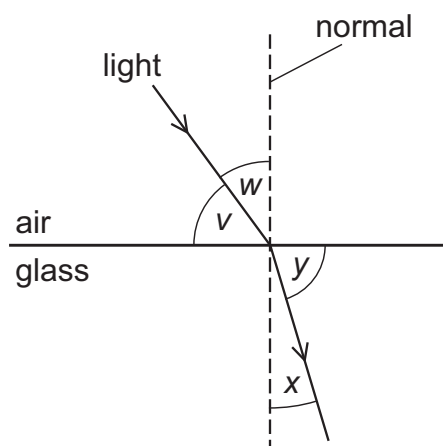
- A** 0.40 m **B** 2.5 m **C** 400 m **D** 1600 m

21 Which row shows the natures of light waves, sound waves and X-rays?

	light waves	sound waves	X-rays
A	longitudinal	longitudinal	transverse
B	longitudinal	transverse	longitudinal
C	transverse	longitudinal	transverse
D	transverse	transverse	longitudinal

22 The diagram shows light travelling from air into glass.

Four angles v , w , x and y are shown.

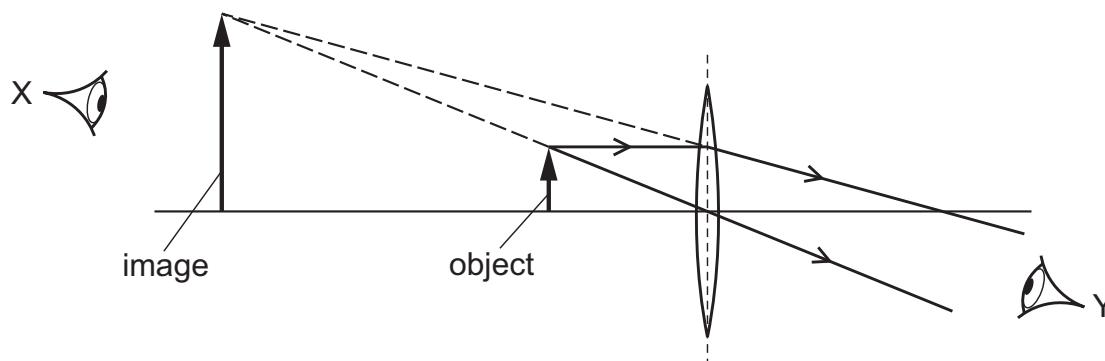


Which formula is used to calculate the refractive index n of the glass?

- A** $n = \frac{\sin v}{\sin y}$
 B $n = \frac{\sin v}{\sin x}$
 C $n = \frac{\sin w}{\sin y}$
 D $n = \frac{\sin w}{\sin x}$

9. Question | 0625 May-June 2016 P2 V1 Q23

23 The diagram shows a converging lens forming an image of an object.



Which statement about the image is correct?

- A** It is real and can be seen by an eye at X.
- B** It is real and can be seen by an eye at Y.
- C** It is virtual and can be seen by an eye at X.
- D** It is virtual and can be seen by an eye at Y.

10. Question | 0625 May-June 2016 P2 V1 Q24

24 A sound wave travels through air as a series of compressions and rarefactions.

Which row correctly compares the air pressure in a compression and the air pressure in a rarefaction to the air pressure nearby where there is no sound wave?

	air pressure in a compression	air pressure in a rarefaction
A	higher	higher
B	higher	lower
C	lower	higher
D	lower	lower

11. Question | 0625 May-June 2016 P2 V1 Q25

25 A sound wave has a certain amplitude and a certain frequency.

A second sound wave is quieter and lower in pitch than the first sound wave.

The second wave has

- A** a larger amplitude and a greater frequency.
- B** a larger amplitude and a smaller frequency.
- C** a smaller amplitude and a greater frequency.
- D** a smaller amplitude and a smaller frequency.

12. Question | 0625 May-June 2016 P2 V2 Q21

21 The frequency of a wave is doubled. The speed of the wave does not change.

What happens to the wavelength of the wave?

- A** It becomes four times as large.
- B** It does not change.
- C** It doubles.
- D** It halves.

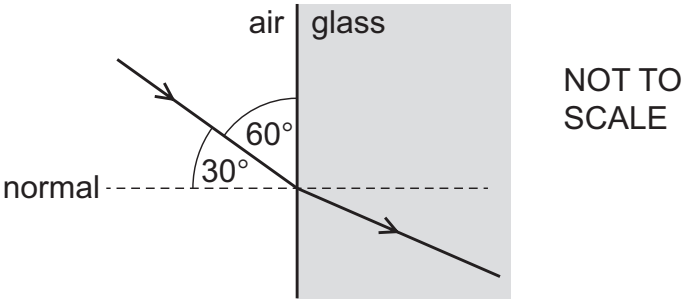
13. Question | 0625 May-June 2016 P2 V2 Q22

22 Which row shows the natures of light waves, sound waves and X-rays?

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A	longitudinal	longitudinal	transverse
B	longitudinal	transverse	longitudinal
C	transverse	longitudinal	transverse
D	transverse	transverse	longitudinal

14. Question | 0625 May-June 2016 P2 V2 Q23

23 The diagram shows light passing from air into glass.



The glass has a refractive index of 1.5.

What is the angle of refraction in the glass?

- A** 19° **B** 22° **C** 35° **D** 49°

15. Question | 0625 May-June 2016 P2 V2 Q24

24 Visible light has a frequency of approximately 5.0×10^{14} Hz.

M and N are two other types of electromagnetic radiation.

The frequency of M is 5.0×10^6 Hz.

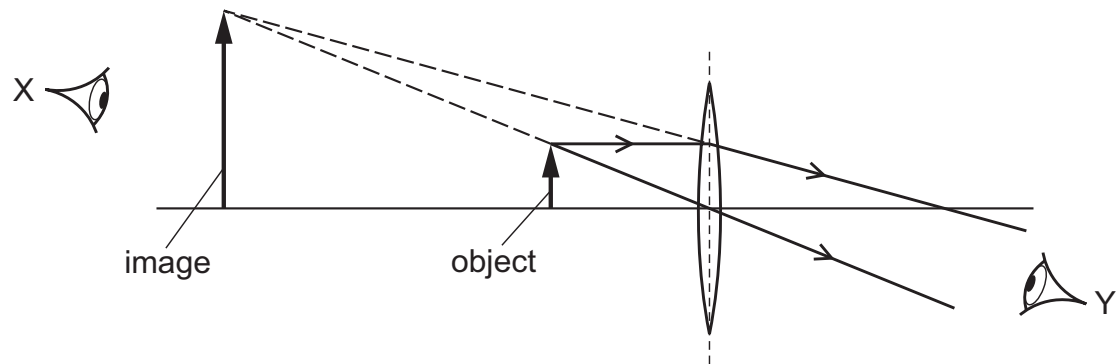
The frequency of N is 5.0×10^{15} Hz.

Which types of radiation are M and N?

	M	N
A	radio waves	infra-red
B	radio waves	ultraviolet
C	ultraviolet	X-rays
D	X-rays	infra-red

16. Question | 0625 May-June 2016 P2 V2 Q25

25 The diagram shows a converging lens forming an image of an object.



Which statement about the image is correct?

- A** It is real and can be seen by an eye at X.
- B** It is real and can be seen by an eye at Y.
- C** It is virtual and can be seen by an eye at X.
- D** It is virtual and can be seen by an eye at Y.

17. Question | 0625 May-June 2016 P2 V3 Q20

20 A water wave passes into a region where the wave travels more slowly.

As it passes into the slow region, what happens to the frequency and what happens to the wavelength of the wave?

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

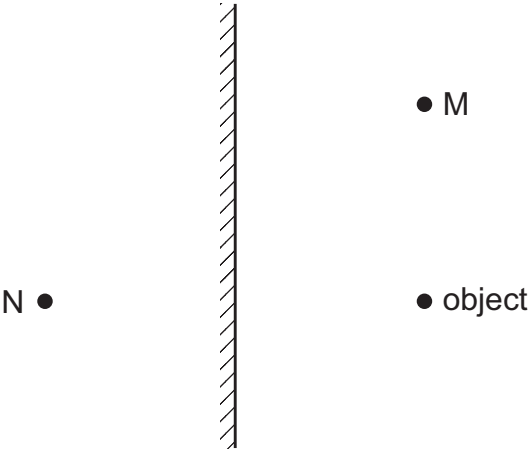
18. Question | 0625 May-June 2016 P2 V3 Q21

21 Which row shows the natures of light waves, sound waves and X-rays?

	light waves	sound waves	X-rays
A	longitudinal	longitudinal	transverse
B	longitudinal	transverse	longitudinal
C	transverse	longitudinal	transverse
D	transverse	transverse	longitudinal

19. Question | 0625 May-June 2016 P2 V3 Q22

22 The diagram shows an object in front of a plane mirror. The mirror forms an image of the object.



At which labelled point is the image formed, and which type of image is formed?

	where the image is formed	type of image
A	at M	real
B	at M	virtual
C	at N	real
D	at N	virtual

20. Question | 0625 May-June 2016 P2 V3 Q23

23 Light enters a glass block at an angle of incidence of 46° .

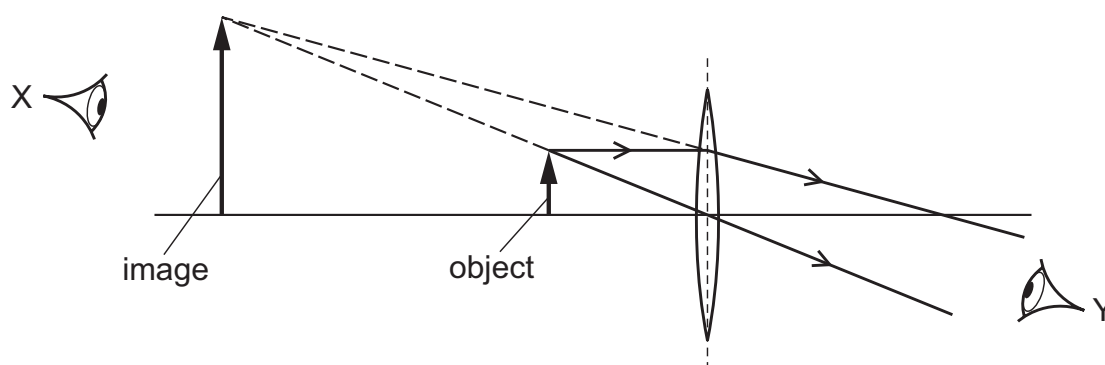
The light refracts at an angle of refraction of 26° .

What is the refractive index of the glass?

- A** 0.57 **B** 0.61 **C** 1.64 **D** 1.77

21. Question | 0625 May-June 2016 P2 V3 Q24

24 The diagram shows a converging lens forming an image of an object.

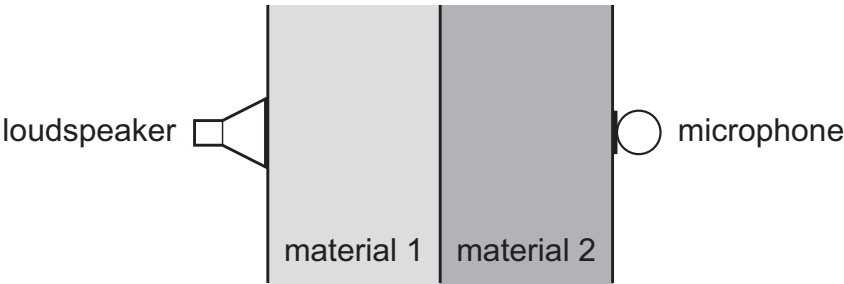


Which statement about the image is correct?

- A** It is real and can be seen by an eye at X.
B It is real and can be seen by an eye at Y.
C It is virtual and can be seen by an eye at X.
D It is virtual and can be seen by an eye at Y.

22. Question | 0625 May-June 2016 P2 V3 Q25

25 The sound from a loudspeaker must pass through two materials to reach a microphone.



Which combination of materials gives the shortest time for the sound to reach the microphone?

	material 1	material 2
A	air	hydrogen
B	air	water
C	copper	aluminium
D	water	oil

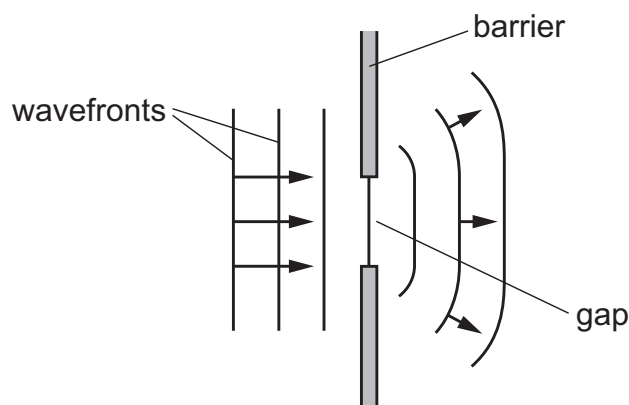
23. Question | 0625 May-June 2016 P2 V3 Q26

26 Which range of wave frequencies includes only sounds that can be heard by a human with normal hearing?

- A** 3.0 Hz to 300 Hz
- B** 30 Hz to 3000 Hz
- C** 300 Hz to 30 000 Hz
- D** 3000 Hz to 300 000 Hz

24. Question | 0625 Oct-Nov 2016 P2 V1 Q21

21 The diagram represents plane wavefronts being diffracted by passing through a gap in a barrier.



Which pair of changes **must** increase the amount of diffraction that occurs?

- A** decrease the wavelength and decrease the size of the gap
- B** decrease the wavelength and increase the size of the gap
- C** increase the wavelength and decrease the size of the gap
- D** increase the wavelength and increase the size of the gap

25. Question | 0625 Oct-Nov 2016 P2 V1 Q22

22 An image is formed by a plane mirror. A second image is formed by a lens used as a magnifying glass.

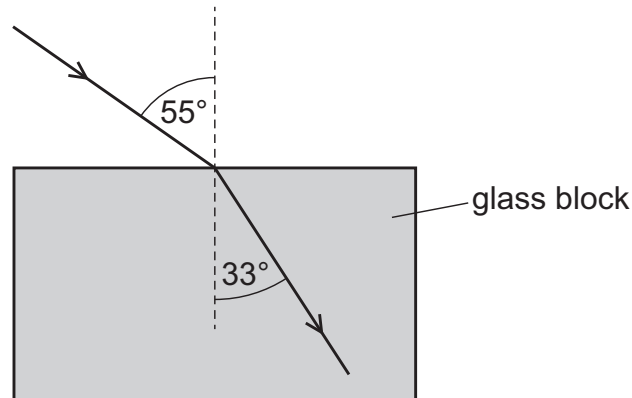
Which row states the nature of each of these images?

	plane mirror	magnifying glass
A	real	real
B	real	virtual
C	virtual	real
D	virtual	virtual

26. Question | 0625 Oct-Nov 2016 P2 V1 Q23

- 23** Light travelling at a speed of $3.0 \times 10^8 \text{ m/s}$ strikes the surface of a glass block and undergoes refraction as it enters the block.

The diagram shows a ray of this light before and after it enters the block.



What is the speed of light in the glass?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.0 \times 10^8 \text{ m/s}$
- C** $4.5 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

27. Question | 0625 Oct-Nov 2016 P2 V1 Q24

- 24** Radiation from which part of the electromagnetic spectrum is used in the remote controller for a television?

- A** infra-red waves
- B** microwaves
- C** radio waves
- D** ultraviolet waves

28. Question | 0625 Oct-Nov 2016 P2 V1 Q25

25 A girl notices that, when she shouts into a cave, she hears an echo.

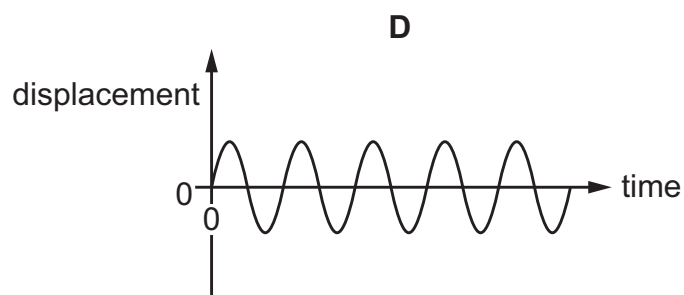
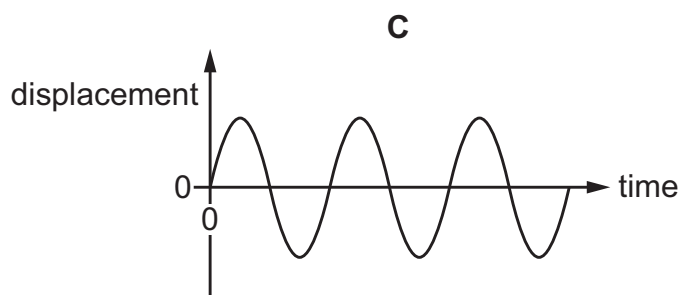
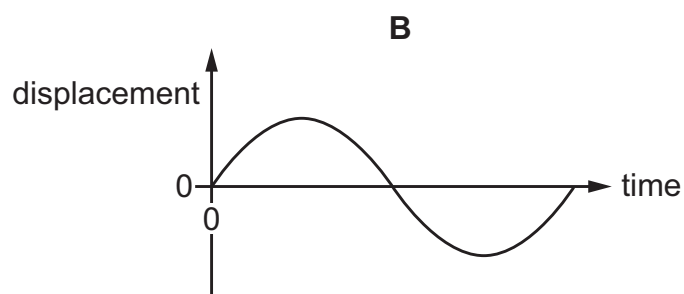
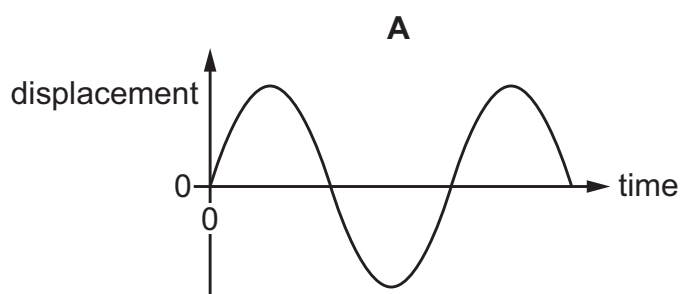
Which wave property causes the echo?

- A** diffraction
- B** dispersion
- C** reflection
- D** refraction

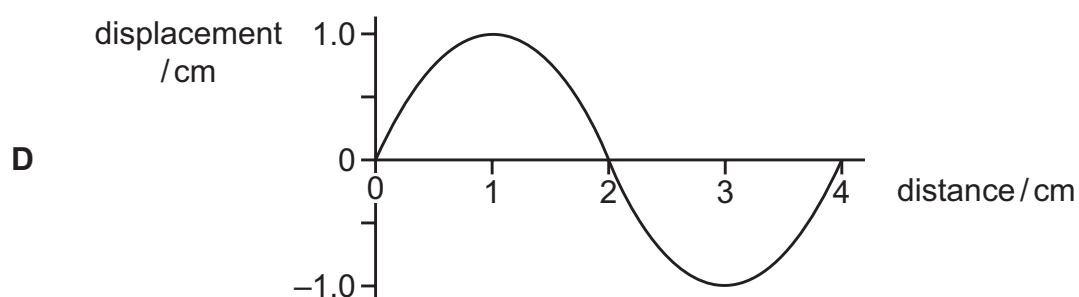
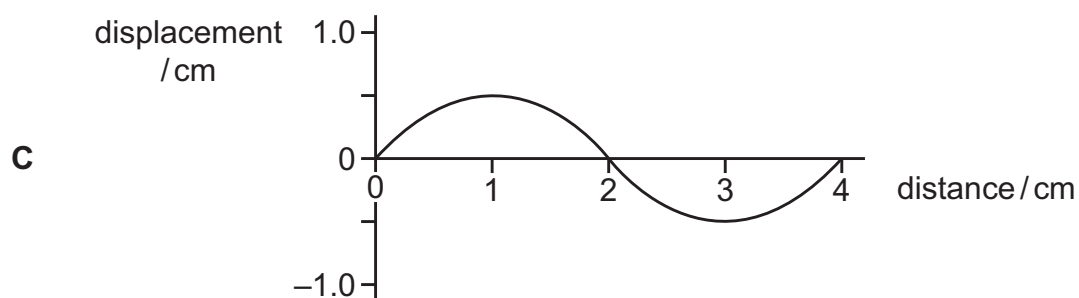
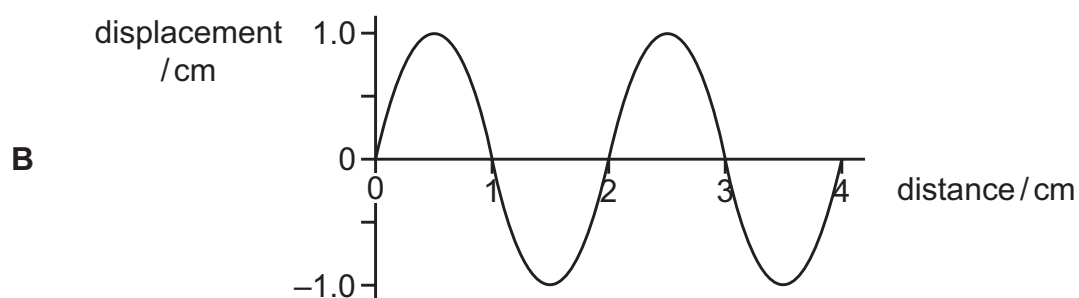
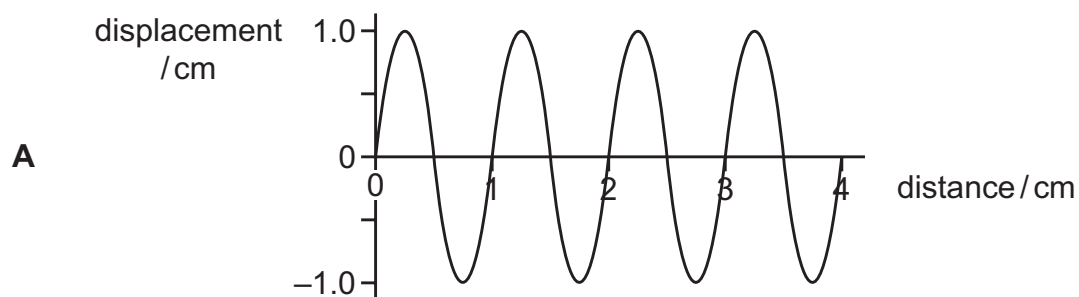
29. Question | 0625 Oct-Nov 2016 P2 V1 Q26

26 The diagrams represent the displacement in four different sound waves. All the diagrams are drawn to the same scale.

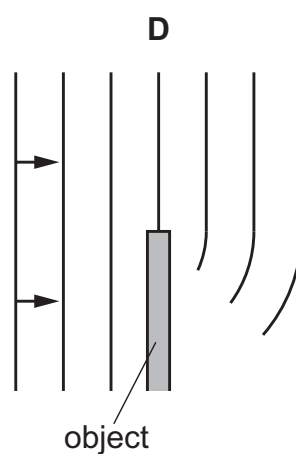
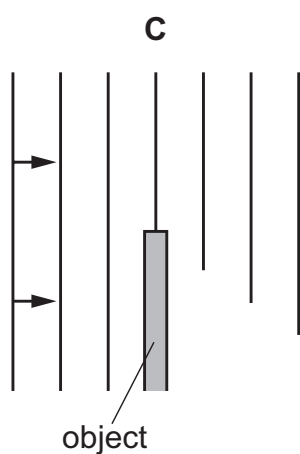
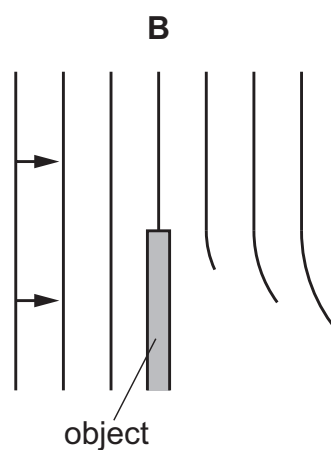
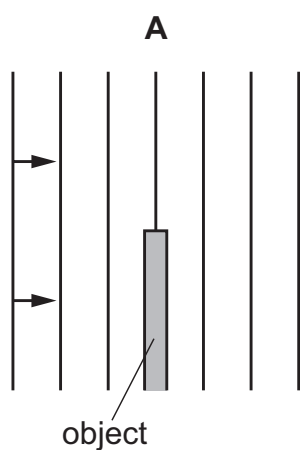
Which diagram represents the sound with the highest pitch?



20 Which wave has an amplitude equal to half its wavelength?



21 Which diagram shows what happens when plane waves pass the edge of the object shown?



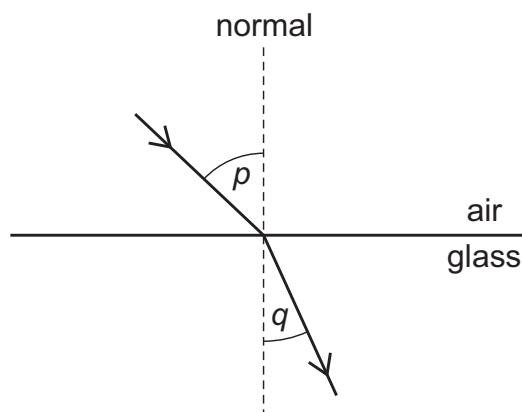
22 An image is formed by a plane mirror. A second image is formed by a lens used as a magnifying glass.

Which row states the nature of each of these images?

	plane mirror	magnifying glass
A	real	real
B	real	virtual
C	virtual	real
D	virtual	virtual

33. Question | 0625 Oct-Nov 2016 P2 V2 Q23

23 The diagram shows light passing from air into glass. Two angles p and q are marked.



Which pair of equations can both be used to calculate the refractive index n of the glass?

A $n = \frac{\text{speed of light in air}}{\text{speed of light in glass}}$, $n = \frac{\sin p}{\sin q}$

B $n = \frac{\text{speed of light in glass}}{\text{speed of light in air}}$, $n = \frac{\sin p}{\sin q}$

C $n = \frac{\text{speed of light in air}}{\text{speed of light in glass}}$, $n = \frac{\sin q}{\sin p}$

D $n = \frac{\text{speed of light in glass}}{\text{speed of light in air}}$, $n = \frac{\sin q}{\sin p}$

34. Question | 0625 Oct-Nov 2016 P2 V2 Q24

24 Which part of the electromagnetic spectrum is used to send television signals from a satellite to Earth?

- A** infra-red
- B** microwaves
- C** ultraviolet
- D** visible light

35. Question | 0625 Oct-Nov 2016 P2 V2 Q25

25 A girl notices that, when she shouts into a cave, she hears an echo.

Which wave property causes the echo?

- A** diffraction
- B** dispersion
- C** reflection
- D** refraction

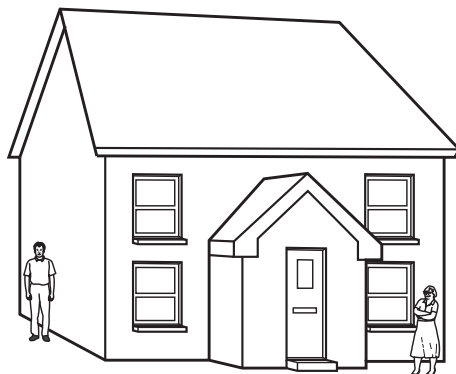
36. Question | 0625 Oct-Nov 2016 P2 V2 Q26

26 Which property of a sound wave affects the loudness of the sound?

- A** amplitude
- B** frequency
- C** speed
- D** wavelength

37. Question | 0625 Oct-Nov 2016 P2 V3 Q20

- 20** A man is talking at the side of a house. He can be heard by a woman at the front of the house even though she cannot see him.



What is the explanation for this?

- A** Sound waves are longitudinal and light waves are transverse.
- B** Sound waves are transverse and light waves are longitudinal.
- C** The sound waves have a long wavelength and the light waves have short wavelength.
- D** The sound waves have a short wavelength and the light waves have long wavelength.

38. Question | 0625 Oct-Nov 2016 P2 V3 Q21

- 21** An image is formed by a plane mirror. A second image is formed by a lens used as a magnifying glass.

Which row states the nature of each of these images?

	plane mirror	magnifying glass
A	real	real
B	real	virtual
C	virtual	real
D	virtual	virtual

39. Question | 0625 Oct-Nov 2016 P2 V3 Q22

22 The speed of light in air is $3.0 \times 10^8 \text{ m/s}$.

The critical angle for light in a transparent plastic material placed in air is 37° .

What is the speed of light in the plastic material?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.4 \times 10^8 \text{ m/s}$
- C** $3.8 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

40. Question | 0625 Oct-Nov 2016 P2 V3 Q23

23 Which description applies to infra-red radiation?

- A** longitudinal and electromagnetic
- B** longitudinal but not electromagnetic
- C** transverse and electromagnetic
- D** transverse but not electromagnetic

41. Question | 0625 Oct-Nov 2016 P2 V3 Q24

24 A girl notices that, when she shouts into a cave, she hears an echo.

Which wave property causes the echo?

- A** diffraction
- B** dispersion
- C** reflection
- D** refraction

42. Question | 0625 Oct-Nov 2016 P2 V3 Q25

- 25** A man stands 110 m from a high wall. He makes a short, sharp sound and then hears an echo from the wall.

The speed of sound in air is 330 m/s.

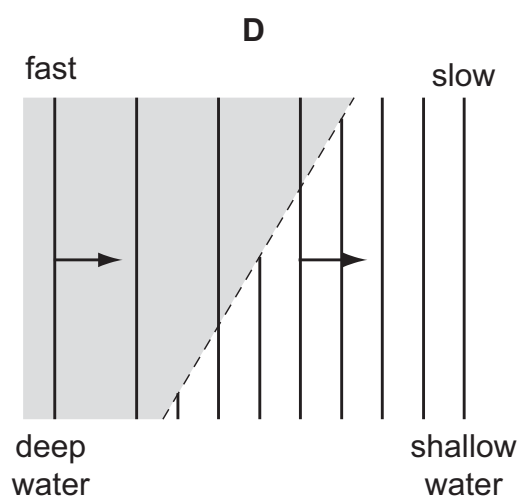
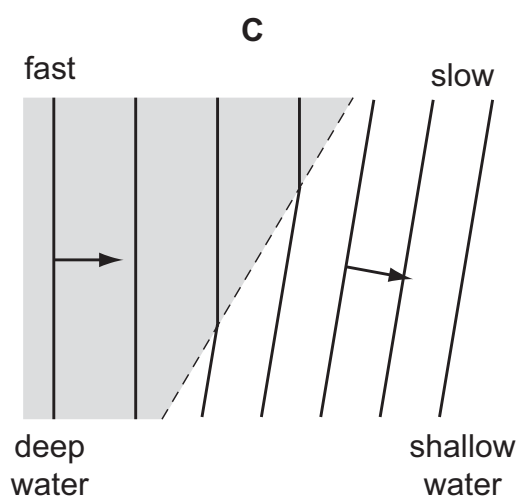
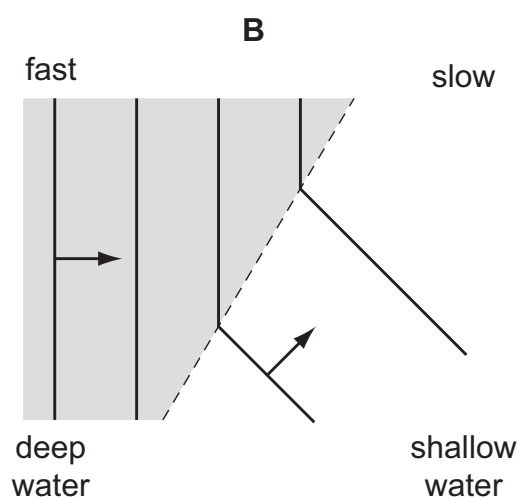
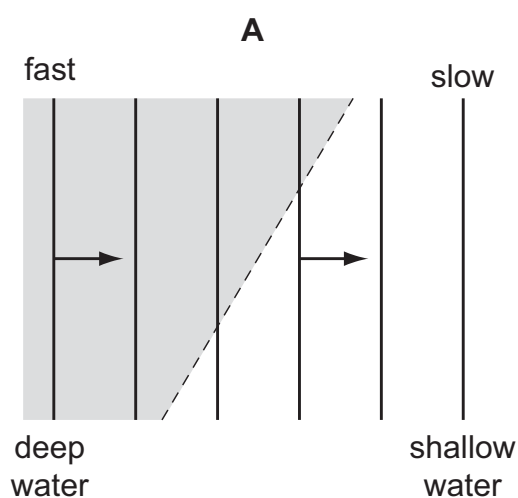
How long after making the sound does the man hear the echo?

- A** 0.33 s **B** 0.67 s **C** 1.5 s **D** 3.0 s

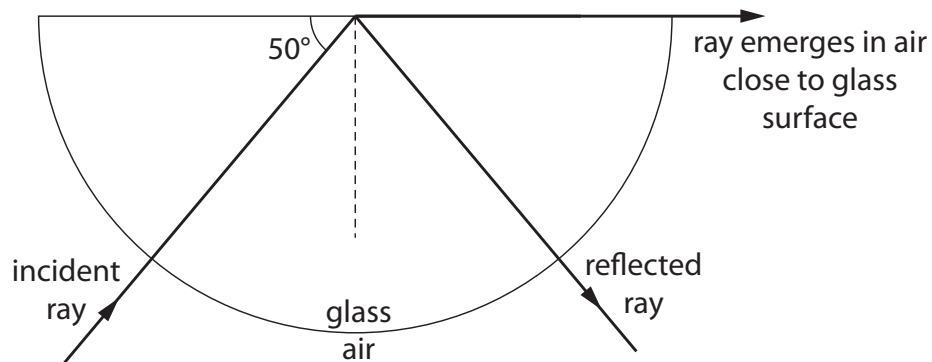
43. Question | 0625 Specimen 2016 P2 Q24

- 24** The diagrams show water waves that move more slowly after passing into shallow water.

Which diagram shows what happens to the waves?



25 The diagram shows a ray of monochromatic light passing through a semi-circular glass block.

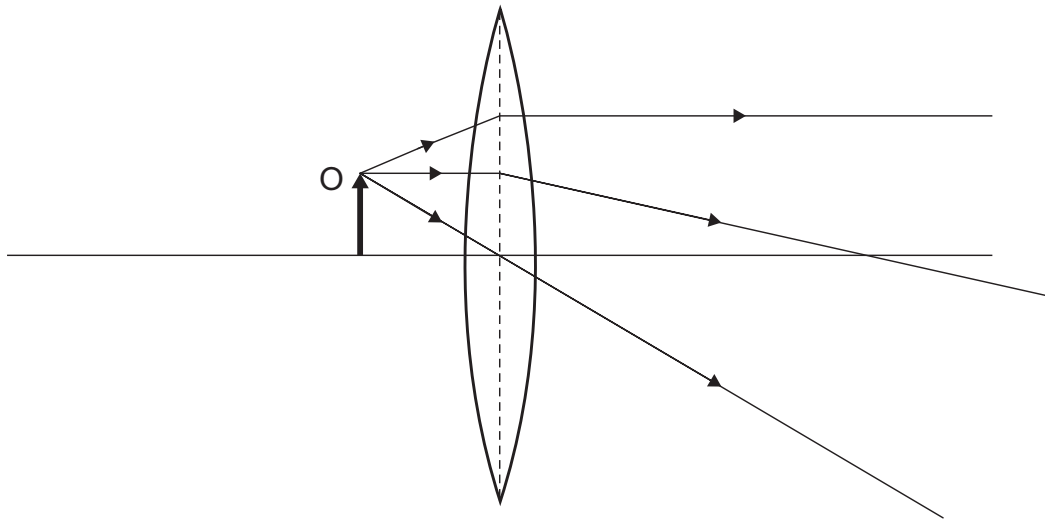


What is the refractive index of the glass?

- A** 0.64 **B** 0.77 **C** 1.31 **D** 1.56

26 An object O is placed close to a thin converging lens.

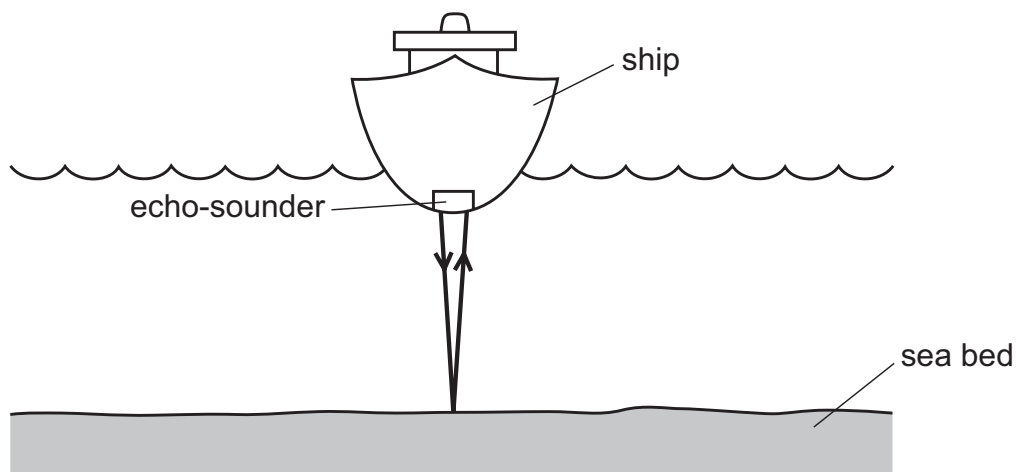
The diagram represents three rays from the top of O passing through the lens.



Which type of image is produced by the lens when the object O is in this position?

- A** real and diminished
- B** real and enlarged
- C** virtual and diminished
- D** virtual and enlarged

- 27** An echo-sounder on a ship produces a pulse of sound. The echo is received by the echo-sounder after two seconds.



The speed of sound in sea-water is 1500 m/s .

What is the depth of the sea-water below the ship?

- A** 750 m **B** 1500 m **C** 3000 m **D** 6000 m

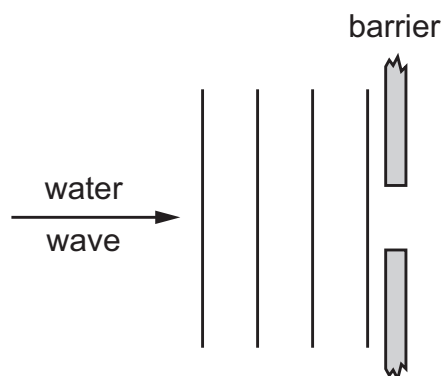
47. Question | 0625 Feb-March 2017 P2 V2 Q19

- 19** A person uses a surfboard to ride every 30th wave crest towards the beach. The wave crest travels at a speed of 1.6 m/s and the distance between each wave crest is 24 m .

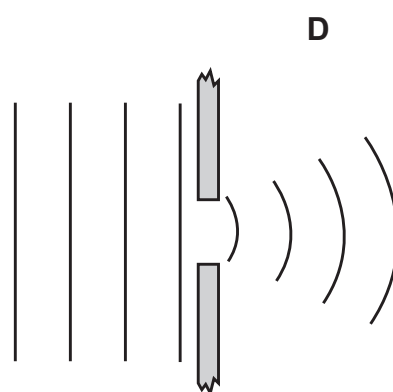
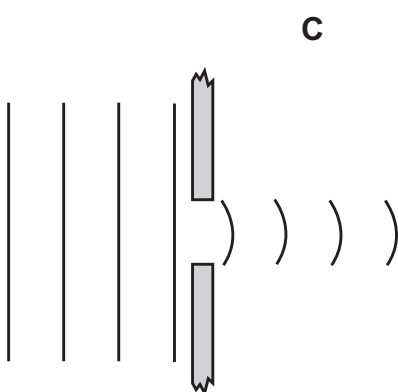
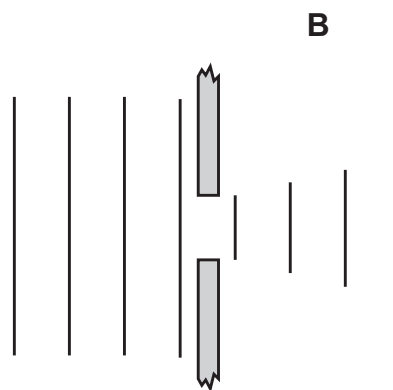
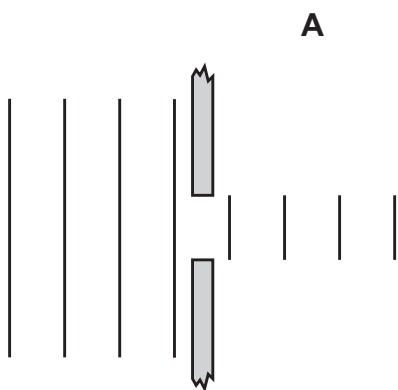
How many wave crests does the person surf in one hour?

- A** 1 **B** 2 **C** 8 **D** 450

20 In a shallow tank, a water wave moves towards a barrier with a narrow gap.



Which diagram shows the wave beyond the barrier?



21 Light passes along an optical fibre.

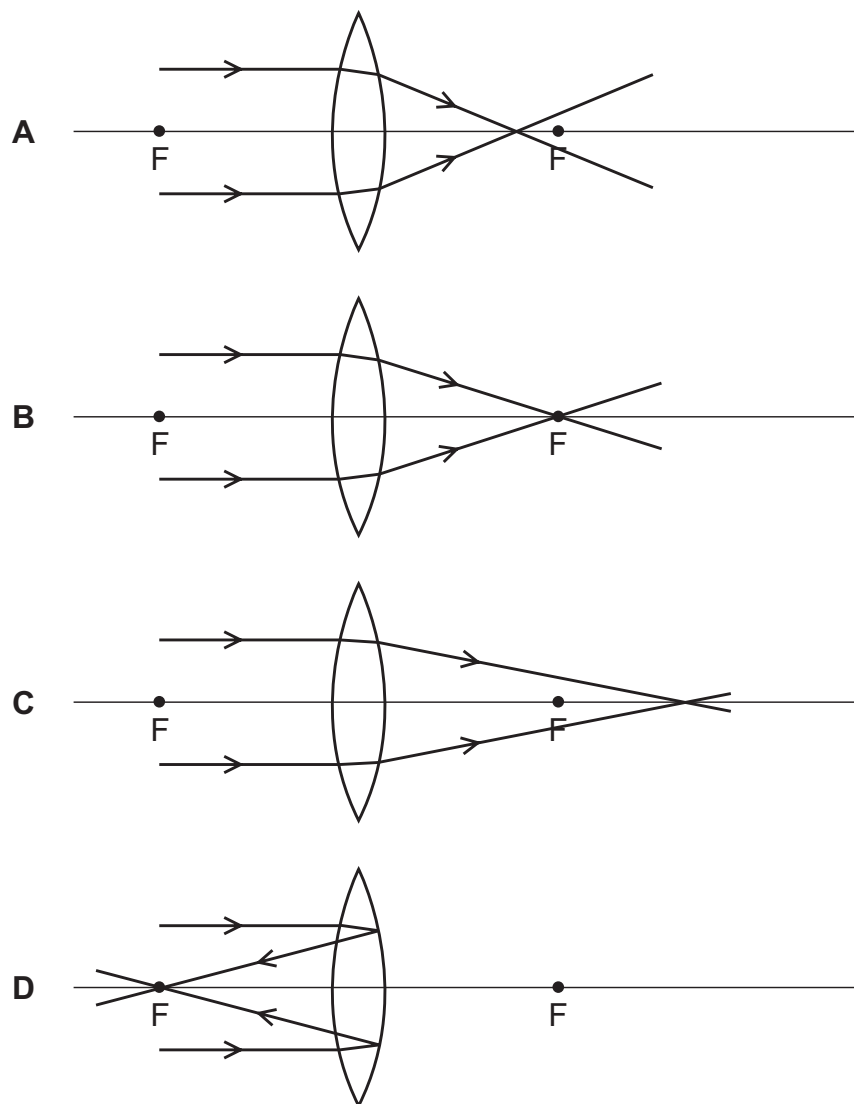
What happens to the light within the fibre?

- A** diffraction
- B** dispersion
- C** refraction
- D** total internal reflection

50. Question | 0625 Feb-March 2017 P2 V2 Q22

- 22** The points labelled F are the principal foci of a lens. A beam of parallel light is incident on the lens.

Which diagram shows the path of the light after it passes through the lens?



51. Question | 0625 Feb-March 2017 P2 V2 Q23

- 23** Which statement about sound waves is correct?

- A** They are able to travel through a vacuum.
- B** They are able to travel through solids.
- C** They are transverse waves.
- D** They travel at the same speed in all substances.

52. Question | 0625 Feb-March 2017 P2 V2 Q24

24 Which statement about ultrasound is correct?

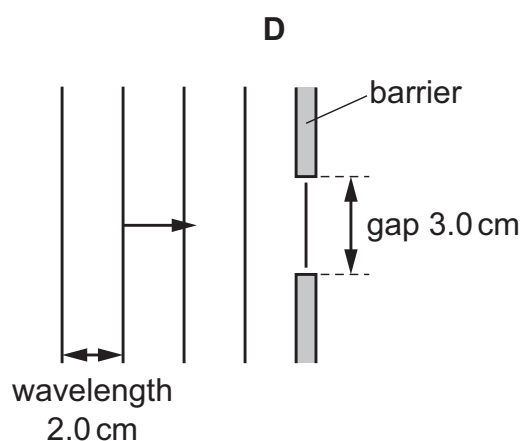
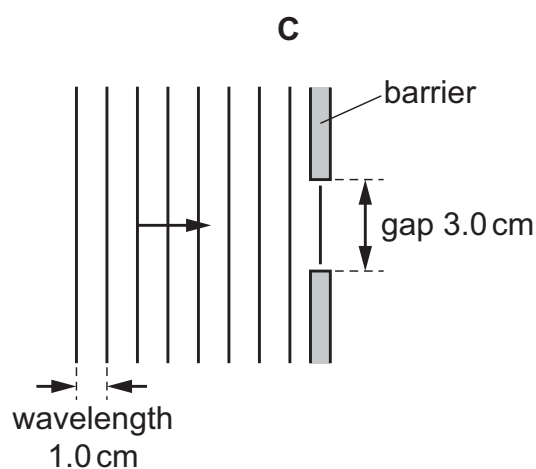
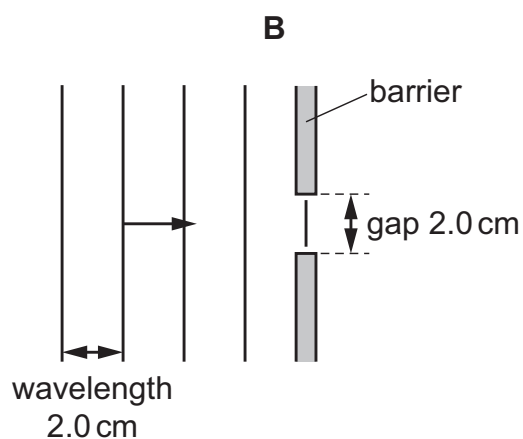
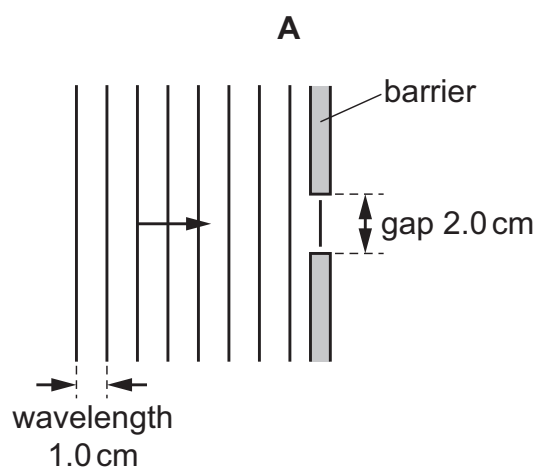
- A** It is produced by a rapidly vibrating source.
- B** It is uncomfortable to human ears.
- C** Its frequency must be greater than 300 kHz.
- D** It travels the fastest in a vacuum.

53. Question | 0625 May-June 2017 P2 V1 Q19

19 Different waves hit barriers with different sized gaps.

The waves will diffract.

In which diagram does the greatest spreading occur?



54. Question | 0625 May-June 2017 P2 V1 Q20

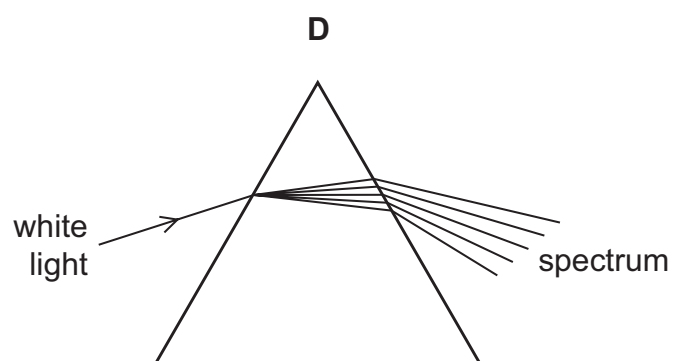
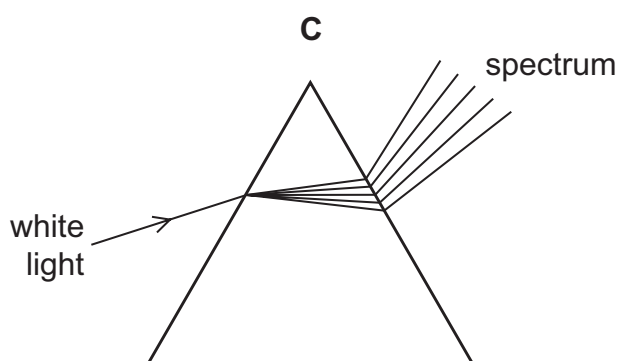
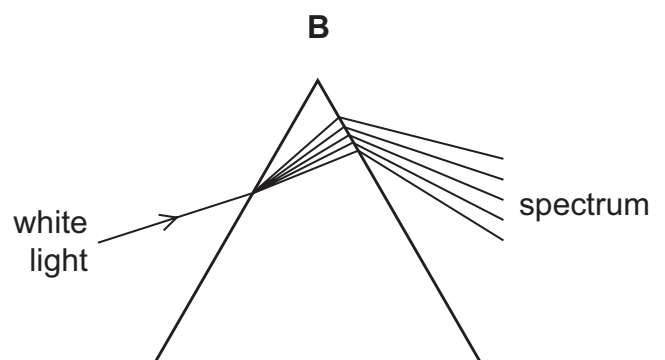
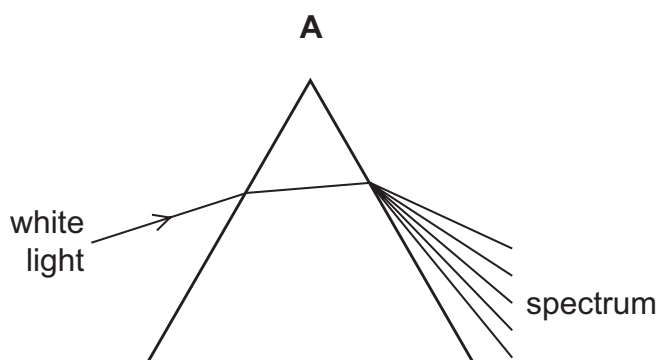
20 A converging lens is used as a magnifying glass to view an object.

Which statement is correct?

- A** The image is inverted.
- B** The image is nearer the lens than the object.
- C** The image is the same size.
- D** The image is virtual.

55. Question | 0625 May-June 2017 P2 V1 Q21

21 Which diagram shows what happens when a ray of white light passes through a prism?



56. Question | 0625 May-June 2017 P2 V1 Q22

- 22** Light travels in a vacuum and then enters a glass block. The speed of the light in the glass block is $2.0 \times 10^8 \text{ m/s}$.

Which statement about the speed of light is correct?

- A** The speed in a vacuum is 1.5 times the speed in the glass.
- B** The speed in the glass is the same as the speed in a vacuum.
- C** The speed in the glass is 1.5 times the speed in a vacuum.
- D** The speed in the glass is 1.0×10^8 times the speed in a vacuum.

57. Question | 0625 May-June 2017 P2 V1 Q23

- 23** A fire alarm is not loud enough and the pitch is too low. An engineer adjusts the alarm so that it produces a louder note of a higher pitch.

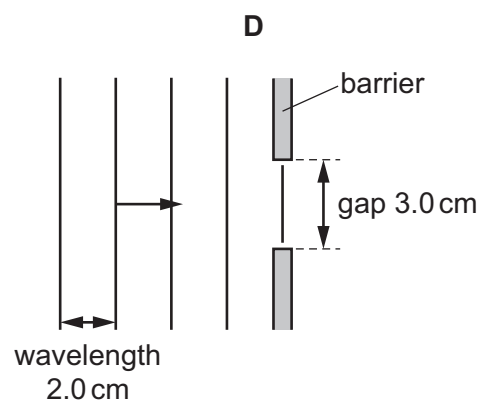
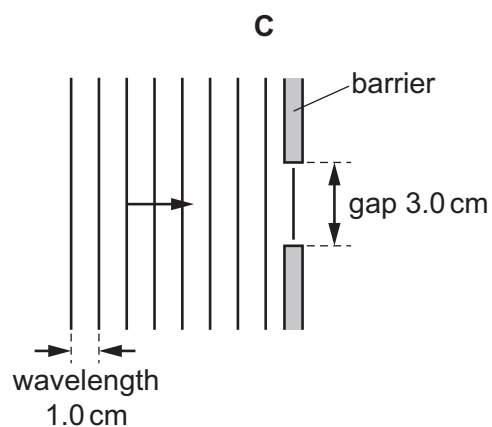
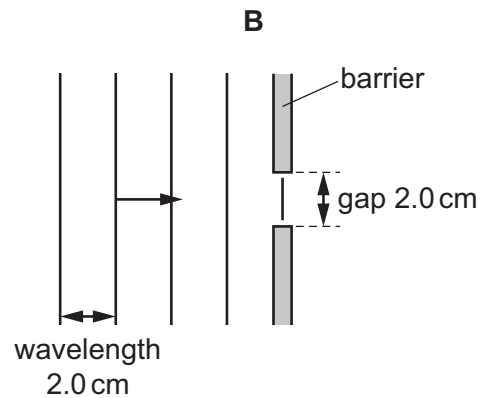
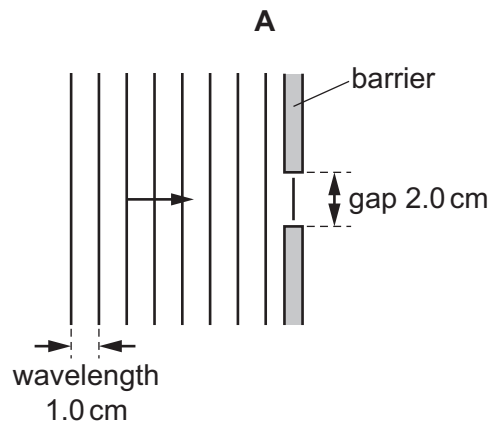
What effect does this have on the amplitude and on the frequency of the sound?

	amplitude	frequency
A	larger	greater
B	larger	smaller
C	smaller	greater
D	smaller	smaller

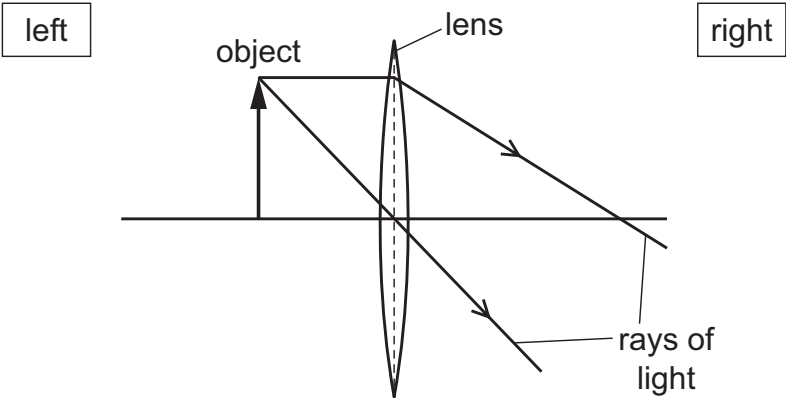
19 Different waves hit barriers with different sized gaps.

The waves will diffract.

In which diagram does the greatest spreading occur?



20 The incomplete ray diagram shows two rays of light that have passed from one point on an object through a thin converging lens.

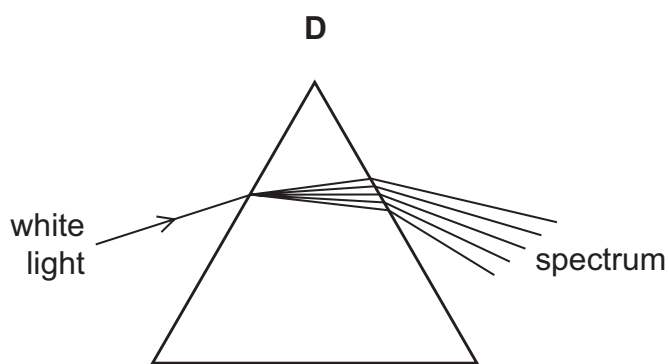
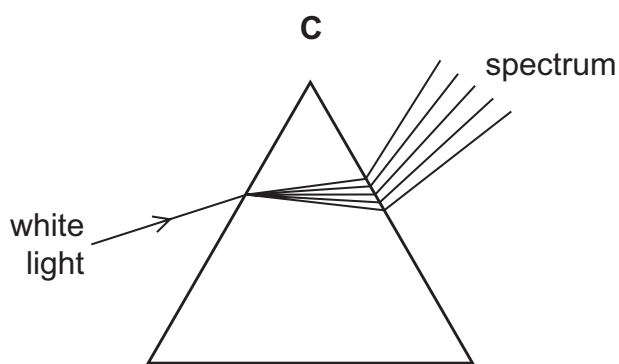
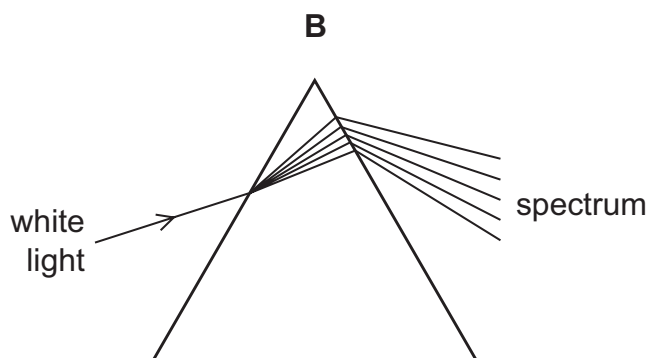
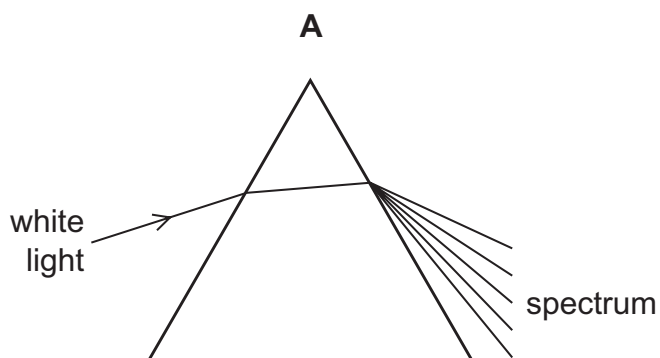


Which type of image is formed, and on which side of the lens is it formed?

	type of image	which side of lens
A	real	on the left
B	real	on the right
C	virtual	on the left
D	virtual	on the right

60. Question | 0625 May-June 2017 P2 V2 Q21

21 Which diagram shows what happens when a ray of white light passes through a prism?



61. Question | 0625 May-June 2017 P2 V2 Q22

22 Light travels in a vacuum and then enters a glass block. The speed of the light in the glass block is $2.0 \times 10^8 \text{ m/s}$.

Which statement about the speed of light is correct?

- A** The speed in a vacuum is 1.5 times the speed in the glass.
- B** The speed in the glass is the same as the speed in a vacuum.
- C** The speed in the glass is 1.5 times the speed in a vacuum.
- D** The speed in the glass is 1.0×10^8 times the speed in a vacuum.

- 23** A fire alarm is not loud enough and the pitch is too low. An engineer adjusts the alarm so that it produces a louder note of a higher pitch.

What effect does this have on the amplitude and on the frequency of the sound?

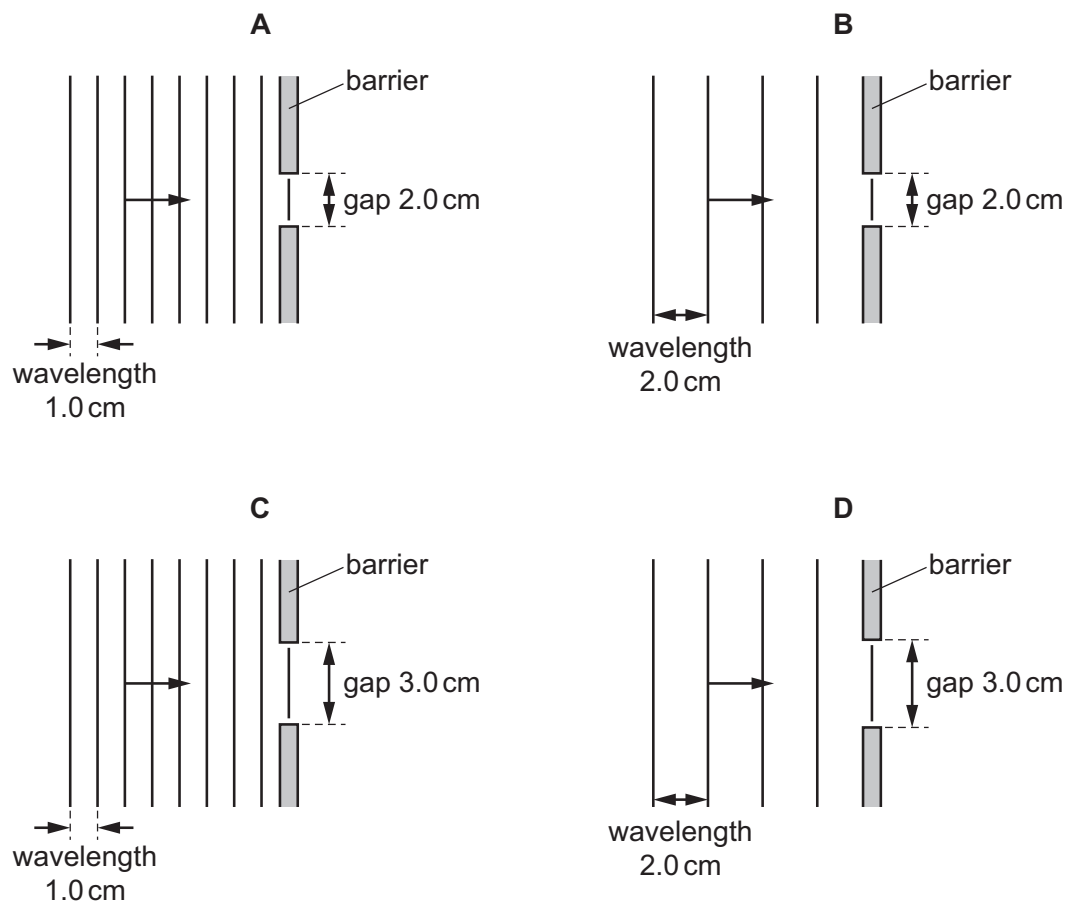
	amplitude	frequency
A	larger	greater
B	larger	smaller
C	smaller	greater
D	smaller	smaller

63. Question part 1/2 | 0625 May-June 2017 P2 V3 Q19

19 Different waves hit barriers with different sized gaps.

The waves will diffract.

In which diagram does the greatest spreading occur?

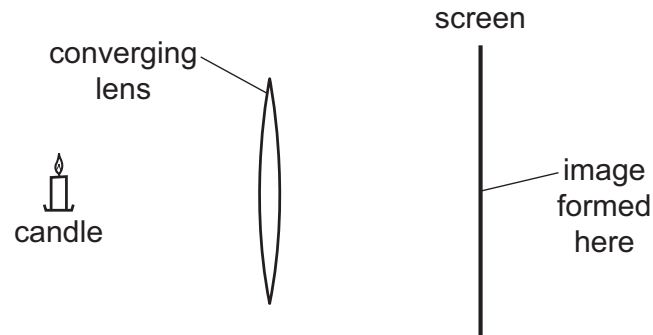


63. Question part 2/2 | 0625 May-June 2017 P2 V3 Q19

12

64. Question | 0625 May-June 2017 P2 V3 Q20

20 A converging lens is used to make an image on a screen.

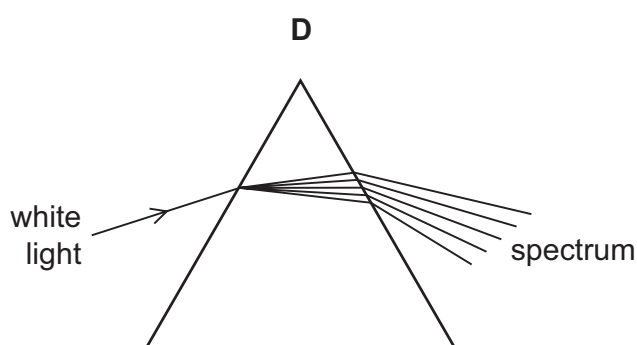
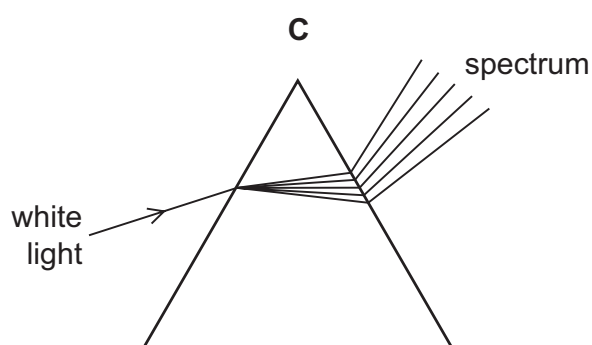
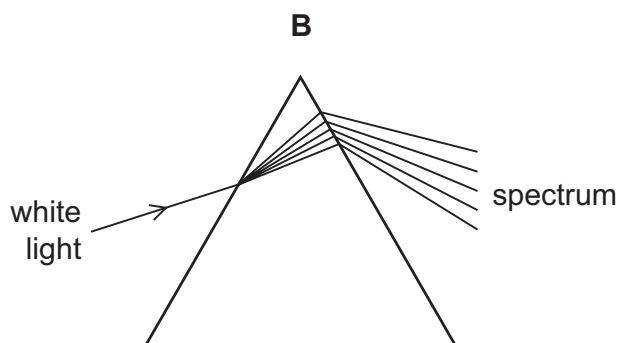
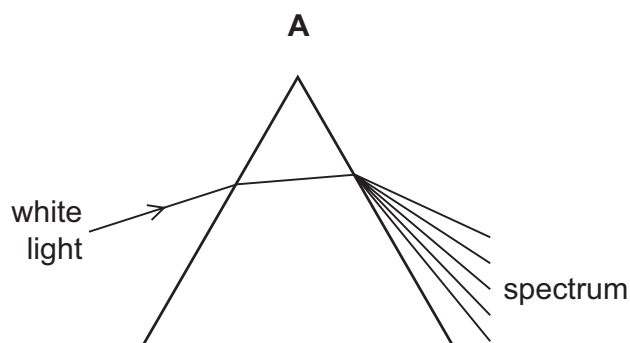


What type of image is formed on the screen?

- A** real and inverted
- B** real and upright
- C** virtual and inverted
- D** virtual and upright

65. Question part 1/2 | 0625 May-June 2017 P2 V3 Q21

21 Which diagram shows what happens when a ray of white light passes through a prism?



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65. Question part 2/2 | 0625 May-June 2017 P2 V3 Q21

13

66. Question | 0625 May-June 2017 P2 V3 Q22

22 Light travels in a vacuum and then enters a glass block. The speed of the light in the glass block is 2.0×10^8 m/s.

Which statement about the speed of light is correct?

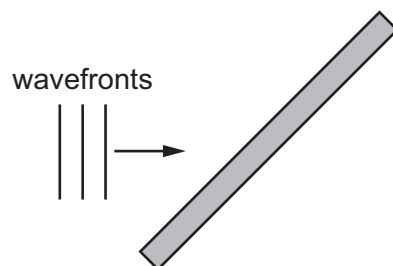
- A** The speed in a vacuum is 1.5 times the speed in the glass.
- B** The speed in the glass is the same as the speed in a vacuum.
- C** The speed in the glass is 1.5 times the speed in a vacuum.
- D** The speed in the glass is 1.0×10^8 times the speed in a vacuum.

23 A fire alarm is not loud enough and the pitch is too low. An engineer adjusts the alarm so that it produces a louder note of a higher pitch.

What effect does this have on the amplitude and on the frequency of the sound?

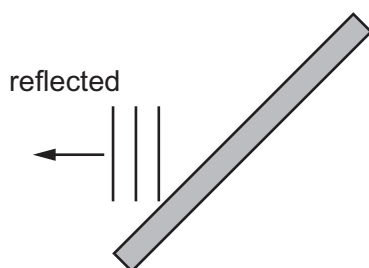
	amplitude	frequency
A	larger	greater
B	larger	smaller
C	smaller	greater
D	smaller	smaller

20 The diagram represents plane wavefronts of a water wave about to strike a solid barrier.

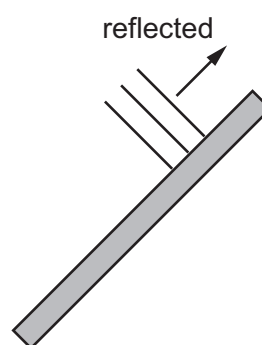


Which diagram shows the position of the wavefronts after reflection at the barrier?

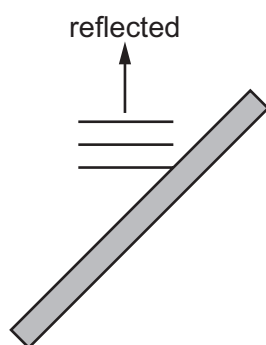
A



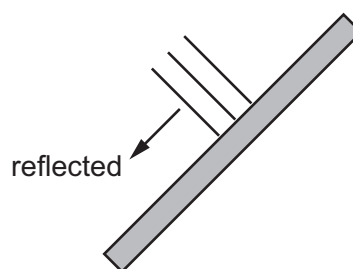
B



C

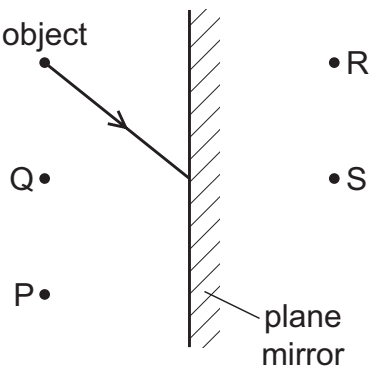


D



69. Question | 0625 Oct-Nov 2017 P2 V1 Q21

21 The diagram shows an object in front of a plane mirror. A ray of light from the object is incident on the mirror.



Through which point does the reflected ray pass, and at which point is the image of the object formed?

	point through which reflected ray passes	point at which image is formed
A	P	R
B	P	S
C	Q	R
D	Q	S

70. Question | 0625 Oct-Nov 2017 P2 V1 Q22

22 A laser is a source of light with a single frequency.

Which description of this type of light is correct?

- A** dispersed
- B** focused
- C** monochromatic
- D** refracted

71. Question | 0625 Oct-Nov 2017 P2 V1 Q23

23 Visible light, X-rays and microwaves are all components of the electromagnetic spectrum.

Which statement about the waves is correct?

- A** In a vacuum, microwaves travel faster than visible light and have a shorter wavelength.
- B** In a vacuum, microwaves travel at the same speed as visible light and have a shorter wavelength.
- C** In a vacuum, X-rays travel faster than visible light and have a shorter wavelength.
- D** In a vacuum, X-rays travel at the same speed as visible light and have a shorter wavelength.

72. Question | 0625 Oct-Nov 2017 P2 V1 Q24

24 The Moon is 380 000 km from the Earth. A laser light beam is directed from the Earth to the Moon. The beam is reflected back to the Earth.

How long does it take for the light to travel to the Moon and back to the Earth?

- A** 1.27 ms **B** 2.53 ms **C** 1.27 s **D** 2.53 s

73. Question | 0625 Oct-Nov 2017 P2 V1 Q25

25 Which wavefront is travelling at a speed closest to that of a sound wave through a solid?

- A** one that moves 10 m in 0.01 s
- B** one that moves 50 m in 0.5 s
- C** one that moves 1000 m in 100 s
- D** one that moves 2000 m in 2000 s

74. Question | 0625 Oct-Nov 2017 P2 V1 Q26

26 Different waves travel through air.

Which waves have the greatest difference in speed?

- A** ultrasound waves and sound waves
- B** ultrasound waves and ultraviolet waves
- C** ultraviolet waves and light waves
- D** ultraviolet waves and radio waves

75. Question | 0625 Oct-Nov 2017 P2 V1 Q27

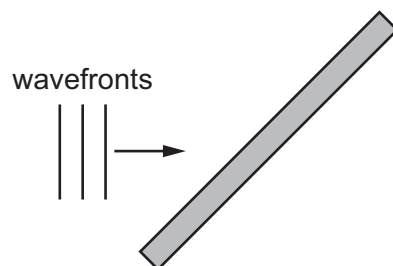
- 27** A student stands 180 m in front of a vertical, flat cliff and bangs together two pieces of wood to make a short, loud sound.

A timer records the echo of the sound 1.5 seconds after the pieces of wood are banged together.

Based on this result, what is the speed of sound?

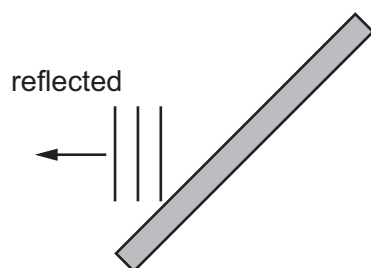
- A** 120 m/s **B** 240 m/s **C** 270 m/s **D** 540 m/s

20 The diagram represents plane wavefronts of a water wave about to strike a solid barrier.

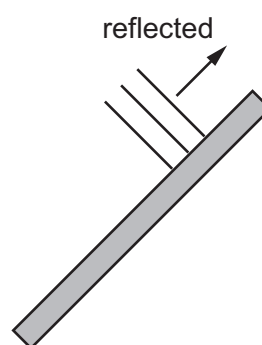


Which diagram shows the position of the wavefronts after reflection at the barrier?

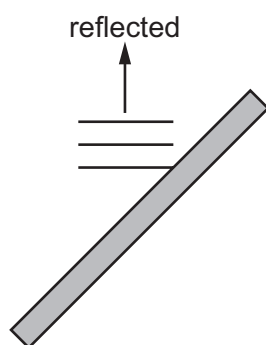
A



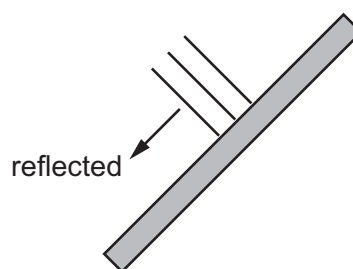
B



C



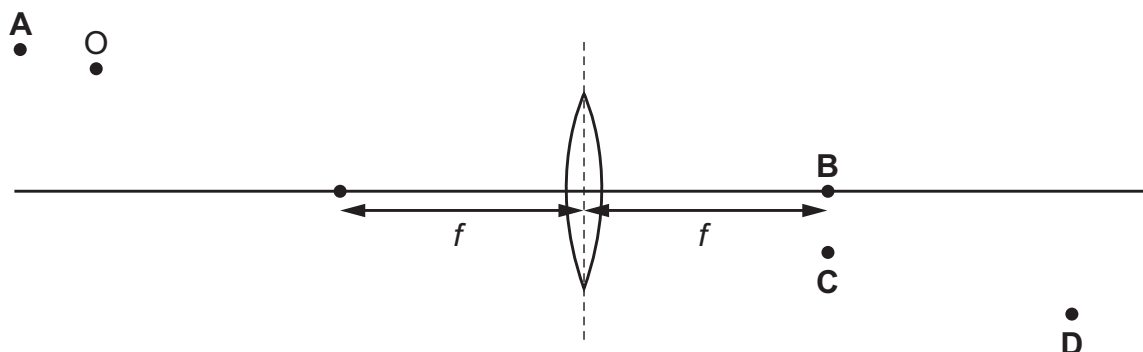
D



77. Question | 0625 Oct-Nov 2017 P2 V2 Q21

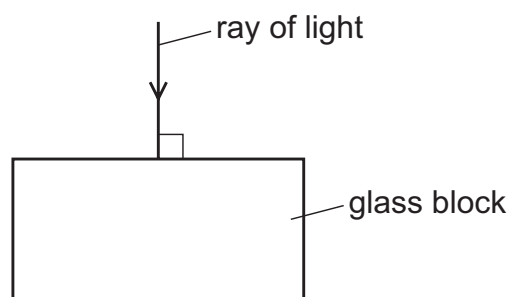
21 The diagram shows an object O in front of a thin converging lens of focal length f .

At which point will the lens form a sharp image of the object?



78. Question | 0625 Oct-Nov 2017 P2 V2 Q22

22 The diagram shows a ray of light incident on the surface of a rectangular glass block at 90° to the surface.



Which quantities remain unchanged as the light enters the glass block?

- A** direction and frequency
- B** direction and speed
- C** frequency and speed
- D** speed and wavelength

79. Question | 0625 Oct-Nov 2017 P2 V2 Q23

23 Which piece of equipment is designed to produce a type of electromagnetic wave?

- A** electric fire
- B** electric generator
- C** electric motor
- D** electromagnet

80. Question | 0625 Oct-Nov 2017 P2 V2 Q24

- 24** The Moon is 380 000 km from the Earth. A laser light beam is directed from the Earth to the Moon. The beam is reflected back to the Earth.

How long does it take for the light to travel to the Moon and back to the Earth?

- A** 1.27 ms **B** 2.53 ms **C** 1.27 s **D** 2.53 s

81. Question | 0625 Oct-Nov 2017 P2 V2 Q25

- 25** Different waves travel through air.

Which waves have the greatest difference in speed?

- A** ultrasound waves and sound waves
B ultrasound waves and ultraviolet waves
C ultraviolet waves and light waves
D ultraviolet waves and radio waves

82. Question | 0625 Oct-Nov 2017 P2 V2 Q26

- 26** The speed of sound is different in different states of matter.

The speed of sound in water is 1500 m/s.

Which row correctly compares the speed of sound in ice and the speed of sound in steam with the speed of sound in water?

	<u>speed of sound in ice</u> m/s	<u>speed of sound in steam</u> m/s
A	less than 1500	less than 1500
B	less than 1500	more than 1500
C	more than 1500	less than 1500
D	more than 1500	more than 1500

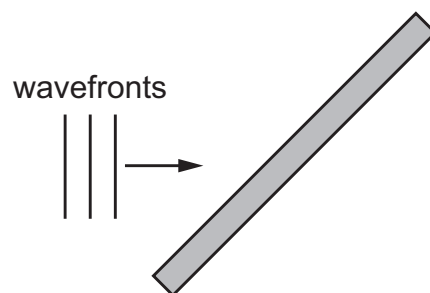
83. Question | 0625 Oct-Nov 2017 P2 V2 Q27

27 A student finds that it takes sound 0.33 seconds to travel 100 metres.

From this information, what is the speed of sound?

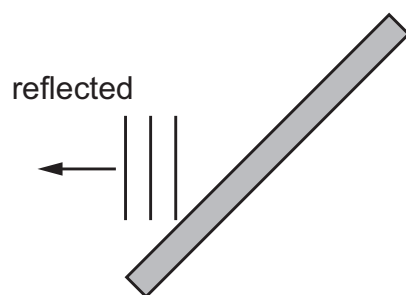
- A** 30 m/s **B** 60 m/s **C** 300 m/s **D** 600 m/s

20 The diagram represents plane wavefronts of a water wave about to strike a solid barrier.

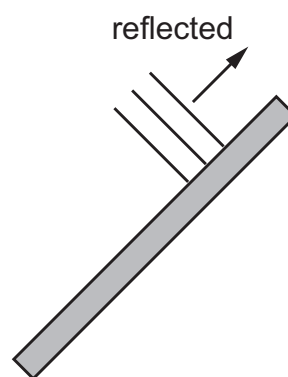


Which diagram shows the position of the wavefronts after reflection at the barrier?

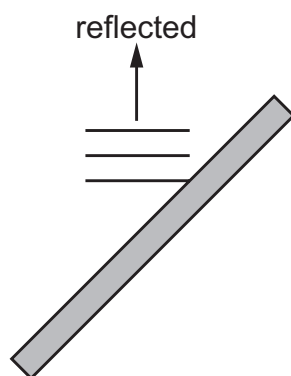
A



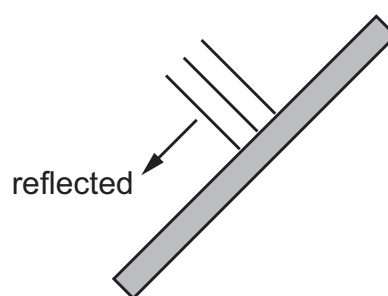
B



C

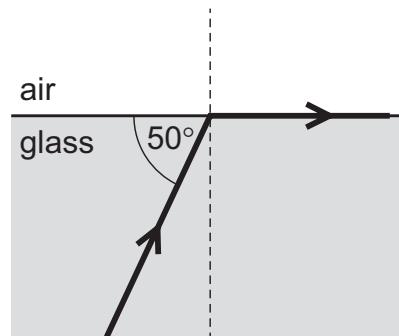


D



21 The diagram shows a ray of light in glass. The ray reaches a boundary with air.

One weak ray of light is missing from the diagram.



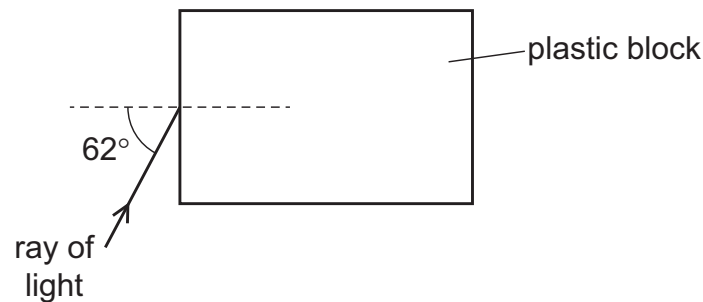
Which statement is correct?

- A** At the boundary, the speed of the light will become less.
- B** The critical angle for light at this boundary is 50° .
- C** The diagram shows an example of diffraction of light.
- D** The missing ray is a weak reflected ray.

86. Question | 0625 Oct-Nov 2017 P2 V3 Q22

22 Light travelling in air enters a plastic block at an angle of incidence of 62° .

The plastic has a refractive index of 1.48.



What is the angle of refraction?

- A** 18° **B** 28° **C** 37° **D** 42°

87. Question | 0625 Oct-Nov 2017 P2 V3 Q23

23 A sound wave travels from a medium in one state into the same medium but in another state. This causes the speed of the wave to change from approximately 300 m/s to approximately 3000 m/s.

Between which two states is the sound wave travelling?

- A** gas to solid
B liquid to gas
C liquid to solid
D solid to liquid

88. Question | 0625 Oct-Nov 2017 P2 V3 Q24

- 24** The Moon is 380 000 km from the Earth. A laser light beam is directed from the Earth to the Moon. The beam is reflected back to the Earth.

How long does it take for the light to travel to the Moon and back to the Earth?

- A** 1.27 ms **B** 2.53 ms **C** 1.27 s **D** 2.53 s

89. Question | 0625 Oct-Nov 2017 P2 V3 Q25

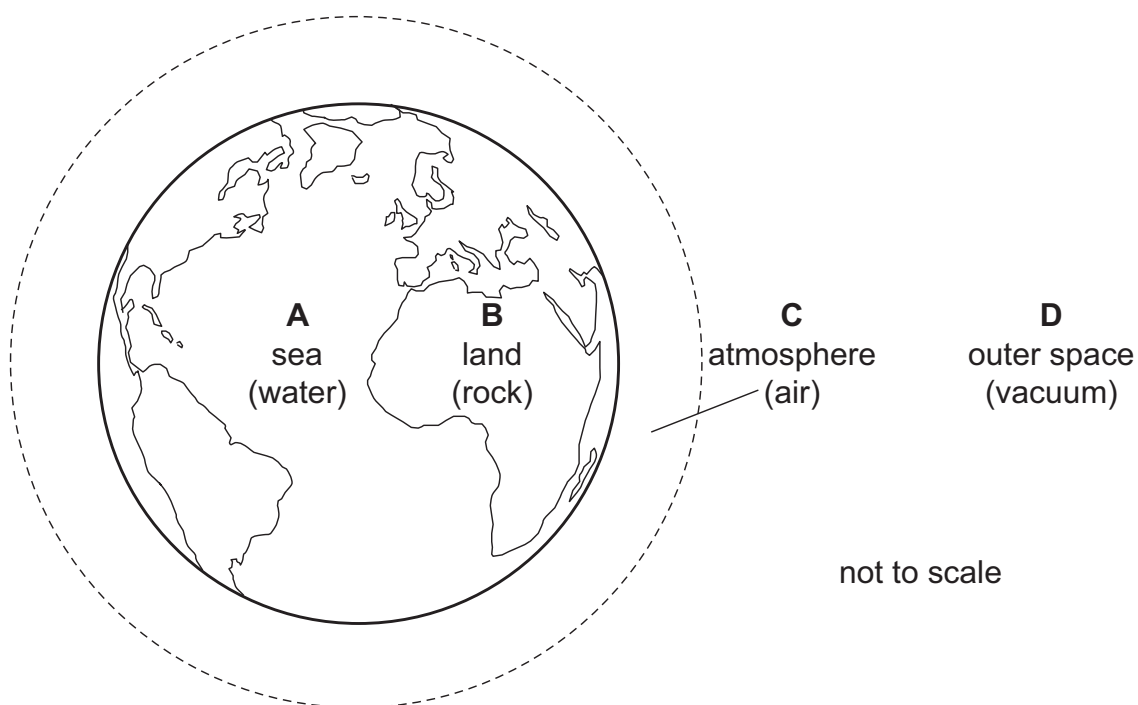
- 25** Which statement about radio waves is correct?

- A** They are used in television remote controllers.
B They can be detected by the human eye.
C They travel as longitudinal waves.
D They have the same speed in a vacuum as ultraviolet waves.

90. Question | 0625 Oct-Nov 2017 P2 V3 Q26

- 26** The diagram shows the Earth and its surroundings.

Through which labelled region can sound **not** be transmitted?



91. Question | 0625 Oct-Nov 2017 P2 V3 Q27

27 Different waves travel through air.

Which waves have the greatest difference in speed?

- A** ultrasound waves and sound waves
- B** ultrasound waves and ultraviolet waves
- C** ultraviolet waves and light waves
- D** ultraviolet waves and radio waves

92. Question | 0625 May-June 2018 P2 V1 Q19

19 Light travels at a speed of 2.0×10^8 m/s in a glass block.

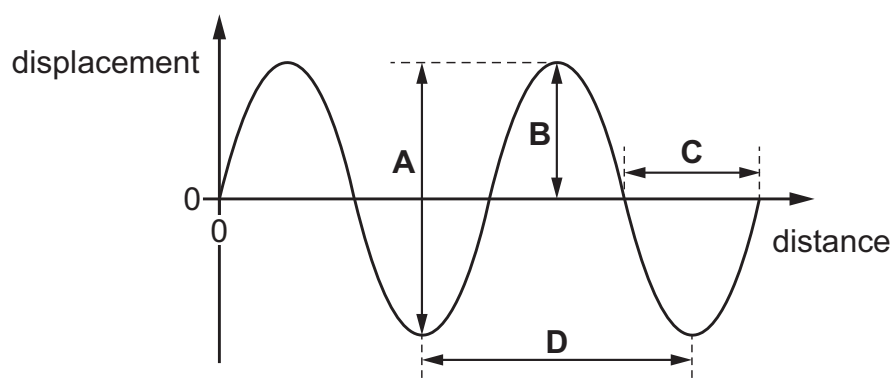
In the glass, the wavelength of the light is 4.0×10^{-7} m.

What is the frequency of the light?

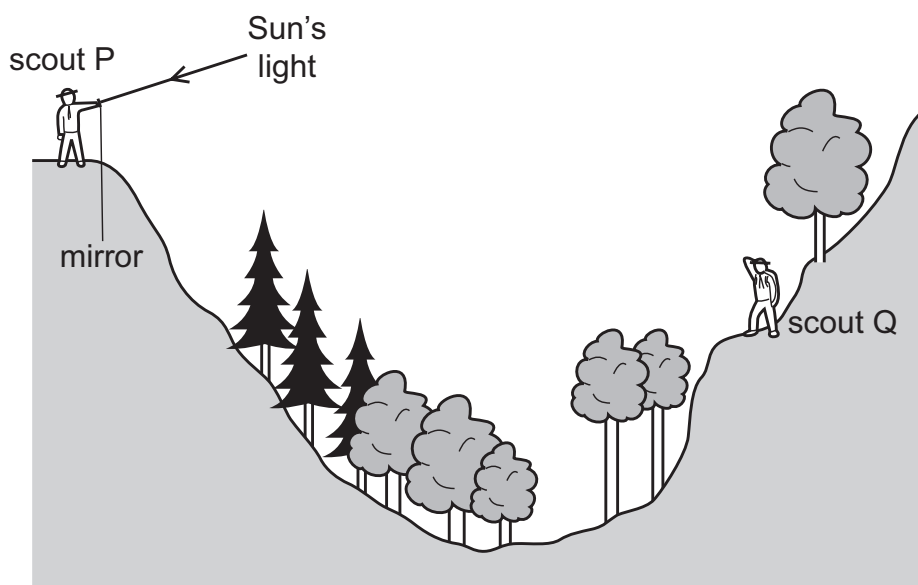
- A** 2.0×10^{-15} Hz
- B** 1.3×10^{-2} Hz
- C** 80 Hz
- D** 5.0×10^{14} Hz

93. Question | 0625 May-June 2018 P2 V1 Q20

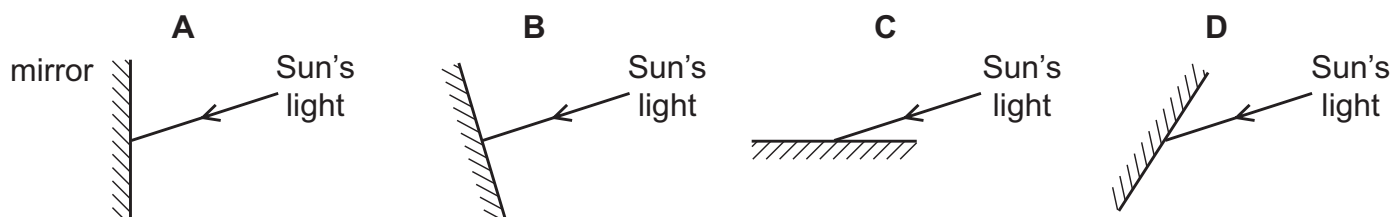
20 Which arrow on the graph shows the amplitude of the wave?



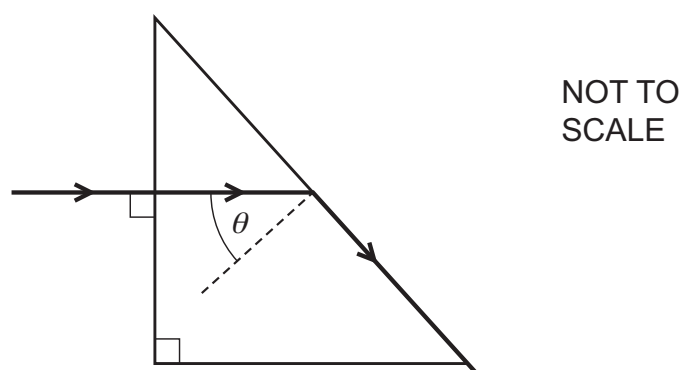
- 21** Scout P signals to scout Q on the other side of a valley by using a mirror to reflect the Sun's light.



Which mirror position allows the Sun's light to be reflected to scout Q?



- 22** A prism is made from transparent plastic. In this plastic, light travels at $0.80c$, where c is its speed in air. Light enters one face of the prism at right-angles as shown.



The light just escapes from the sloping face of the prism.

What is angle θ ?

- A** 37° **B** 39° **C** 51° **D** 53°

96. Question | 0625 May-June 2018 P2 V1 Q23

23 The Sun emits infra-red radiation and light.

Light from the Sun reaches the Earth in 8 minutes.

Which row gives correct information about the infra-red radiation?

	wavelength of infra-red radiation	time taken for infra-red radiation to reach Earth
A	longer than wavelength of light	8 minutes
B	longer than wavelength of light	much less than 8 minutes
C	shorter than wavelength of light	8 minutes
D	shorter than wavelength of light	much more than 8 minutes

97. Question | 0625 May-June 2018 P2 V1 Q24

24 A dolphin has a range of audible frequencies of 150 Hz–150 kHz.

Which range of frequencies can be heard both by humans with good hearing and by dolphins?

- A** 20 Hz–150 Hz
- B** 20 Hz–150 kHz
- C** 20 kHz–150 kHz
- D** 150 Hz–20 kHz

98. Question | 0625 May-June 2018 P2 V2 Q19

19 A tank contains water. Ripples are produced on the surface of the water.

What causes the ripples to refract?

- A** The cold water in the tank is replaced by warm water.
- B** The ripples change speed as they move from deep to shallow water.
- C** The ripples hit the wall of the tank.
- D** The ripples pass through a narrow gap.

99. Question | 0625 May-June 2018 P2 V2 Q20

20 Light travels at a speed of 2.0×10^8 m/s in a glass block.

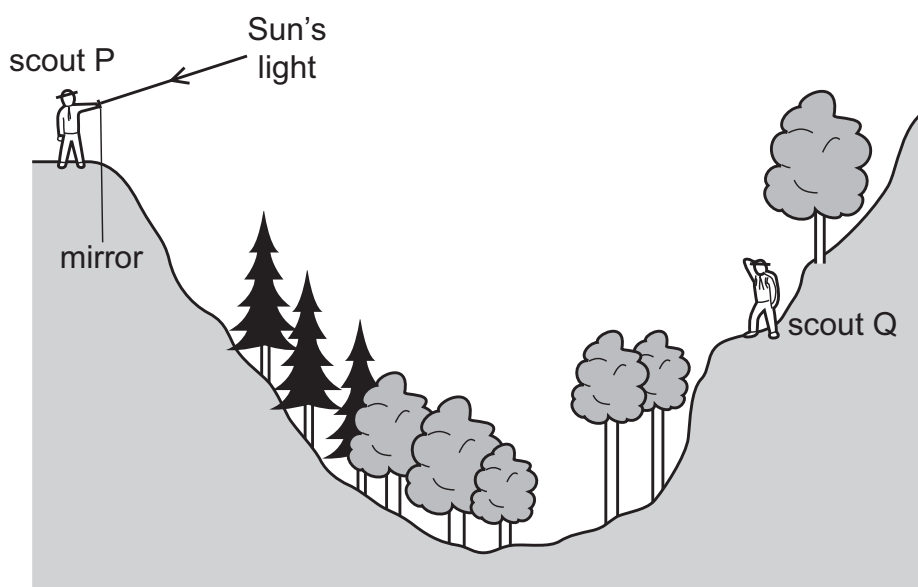
In the glass, the wavelength of the light is 4.0×10^{-7} m.

What is the frequency of the light?

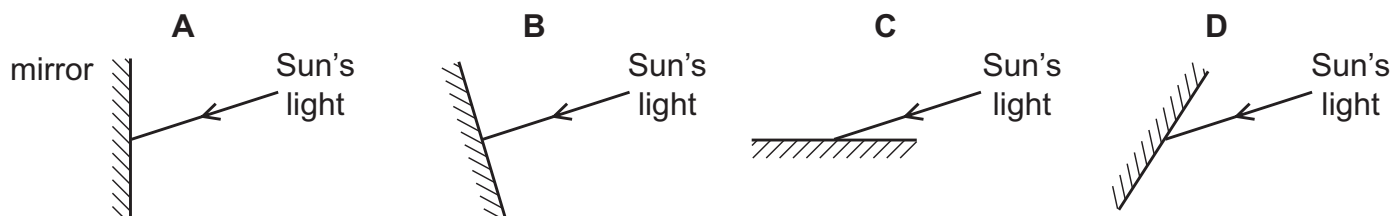
- A** 2.0×10^{-15} Hz
- B** 1.3×10^{-2} Hz
- C** 80 Hz
- D** 5.0×10^{14} Hz

100. Question | 0625 May-June 2018 P2 V2 Q21

21 Scout P signals to scout Q on the other side of a valley by using a mirror to reflect the Sun's light.



Which mirror position allows the Sun's light to be reflected to scout Q?



101. Question | 0625 May-June 2018 P2 V2 Q22

22 A scientist describes light as being monochromatic.

What does this tell you about the light?

- A** It has a single frequency.
- B** It has more than one wavelength.
- C** It travels at a single speed in a single direction.
- D** It travels at different speeds in different directions.

102. Question | 0625 May-June 2018 P2 V2 Q23

23 Which statement is **not** correct?

- A** The speed of long-wavelength infra-red radiation in a vacuum is greater than that of short-wavelength ultraviolet light.
- B** The speed of microwaves in air is approximately 3.0×10^8 m/s.
- C** The speed of γ -rays emitted from a sample of cobalt-60 is 3.0×10^5 km/s.
- D** The X-rays emitted in a supernova explosion reach the Earth at the same time as the visible light emitted.

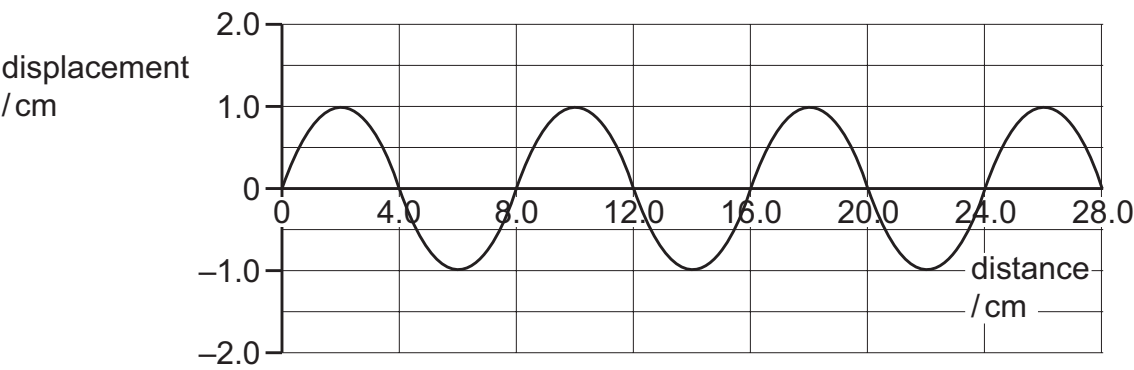
103. Question | 0625 May-June 2018 P2 V2 Q24

24 A siren is emitting a sound. As time passes, the sound becomes louder and higher pitched.

What is happening to the amplitude and to the frequency of the emitted sound wave?

	amplitude	frequency
A	decreasing	decreasing
B	decreasing	increasing
C	increasing	decreasing
D	increasing	increasing

19 The diagram shows a wave.



Which row is correct?

	amplitude of the wave / cm	wavelength of the wave / cm
A	1.0	4.0
B	1.0	8.0
C	2.0	4.0
D	2.0	8.0

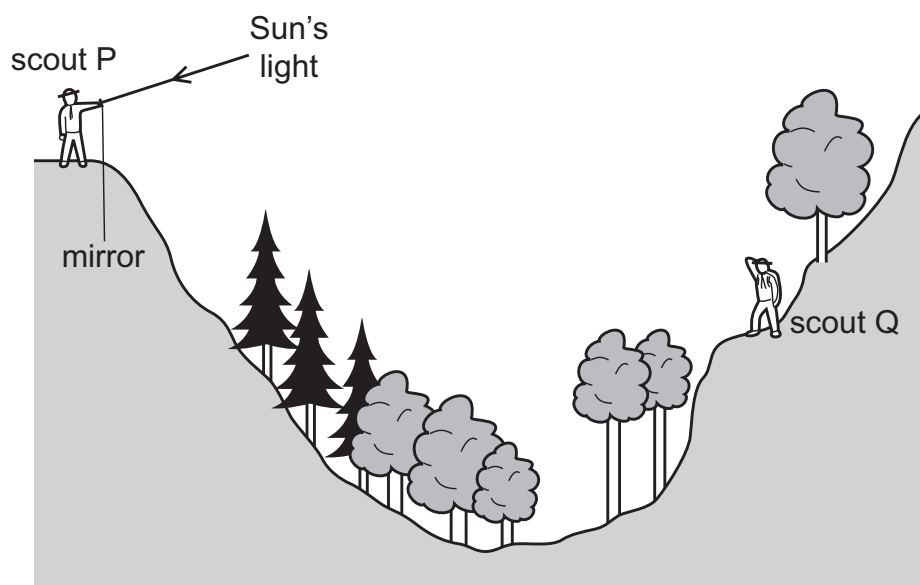
20 Light travels at a speed of 2.0×10^8 m/s in a glass block.

In the glass, the wavelength of the light is 4.0×10^{-7} m.

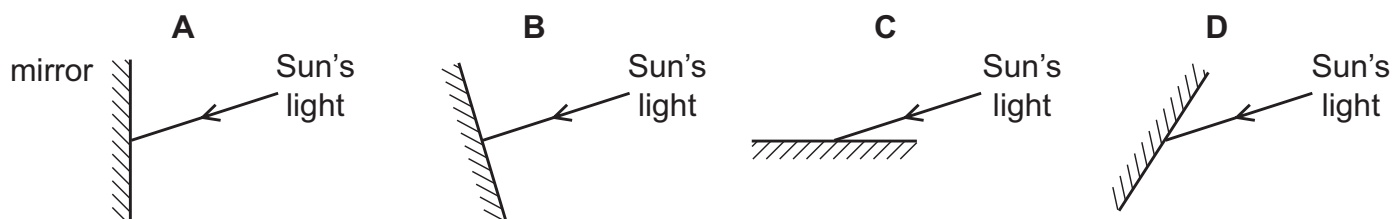
What is the frequency of the light?

- A 2.0×10^{-15} Hz
- B 1.3×10^{-2} Hz
- C 80 Hz
- D 5.0×10^{14} Hz

21 Scout P signals to scout Q on the other side of a valley by using a mirror to reflect the Sun's light.



Which mirror position allows the Sun's light to be reflected to scout Q?

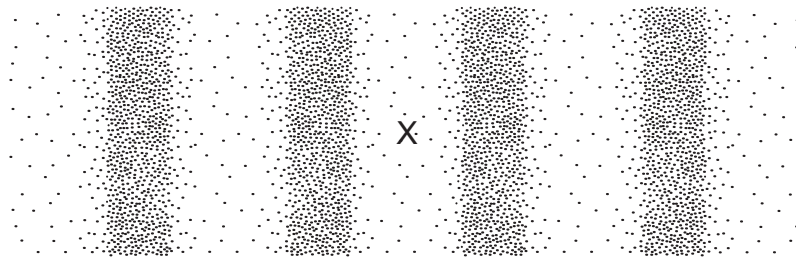


22 Images formed by lenses and mirrors can either be described as real or as virtual.

Which row describes real and virtual images of a point object?

	real images	virtual images
A	formed where light rays meet	an image in a plane mirror is an example of a virtual image
B	formed where light rays meet	can be projected onto a screen
C	formed from where light rays appear to diverge	an image in a plane mirror is an example of a virtual image
D	formed from where light rays appear to diverge	can be projected onto a screen

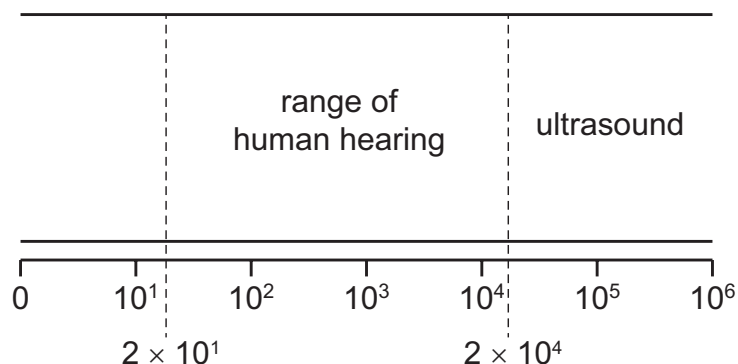
23 The diagram shows the air molecules in part of a sound wave at a particular moment in time.



Which statement is **not** correct?

- A** Earlier, there was compression at X.
- B** Later, there will be a rarefaction at X.
- C** This part of the wave is travelling horizontally across the page.
- D** This part of the wave is travelling towards the top of the page.

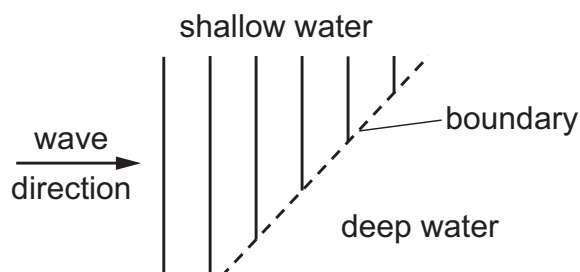
24 The diagram shows the ranges of human hearing and of ultrasound waves.



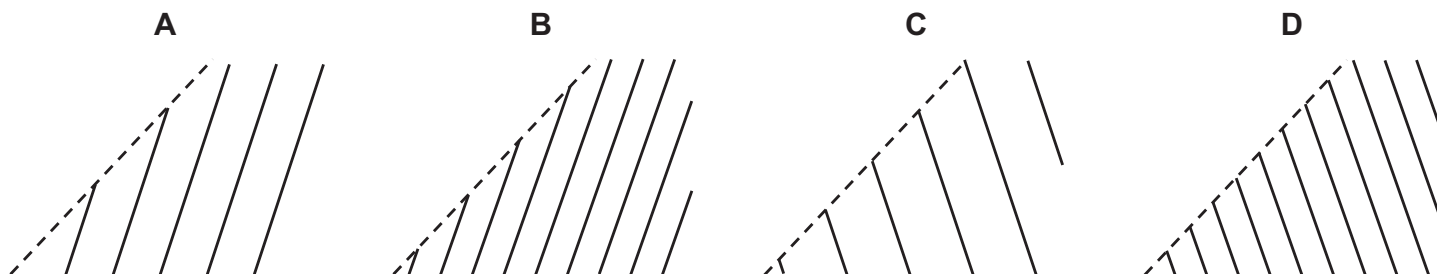
To which characteristic of sound waves do the numbers on the diagram refer?

- A** amplitude in cm
- B** frequency in Hz
- C** speed in metres/second
- D** wavelength in metres

21 Plane water waves travel from a shallow region into a deeper region. They travel more quickly in the deeper water.



Which diagram shows the wave pattern in the deeper water?



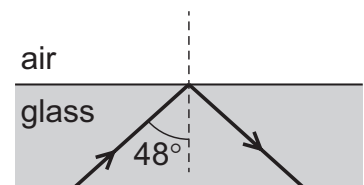
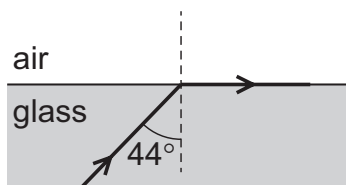
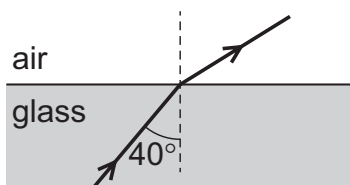
111. Question | 0625 Oct-Nov 2018 P2 V1 Q22

22 Which statement about the image formed by a plane mirror is correct?

- A** The image is larger than the object.
- B** The image is smaller than the object.
- C** The image is twice as far from the mirror as the object.
- D** The image is virtual.

112. Question | 0625 Oct-Nov 2018 P2 V1 Q23

23 A ray of light is incident on a glass-air surface. The diagrams show the ray of light at different angles of incidence in the glass.



What is the refractive index of the glass?

- A** 1.35
- B** 1.44
- C** 1.50
- D** 1.55

113. Question | 0625 Oct-Nov 2018 P2 V1 Q24

24 Different parts of the electromagnetic spectrum are used for different purposes. Below are four statements about parts of the spectrum.

statement 1: Infra-red waves are used in television remote controllers.

statement 2: Radio waves are used to transmit television pictures from satellites to Earth.

statement 3: Ultraviolet waves are used for intruder alarms.

statement 4: X-rays are used for security checks.

Which statements are correct?

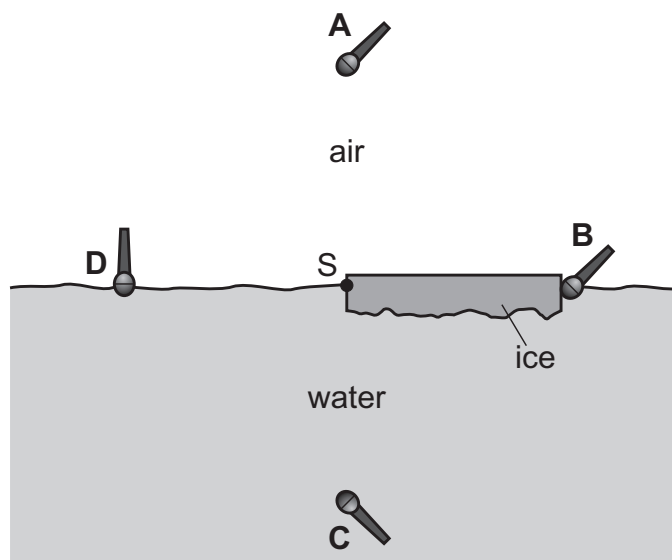
- A** 1 and 2
- B** 1 and 4
- C** 2 and 3
- D** 3 and 4

114. Question | 0625 Oct-Nov 2018 P2 V1 Q26

26 A sheet of ice floats on water. A source of sound S is positioned at the edge of the ice sheet.

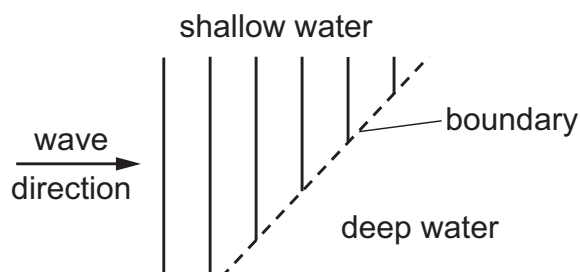
Four microphones are placed equal distances from S .

Which microphone detects the sound from S first?

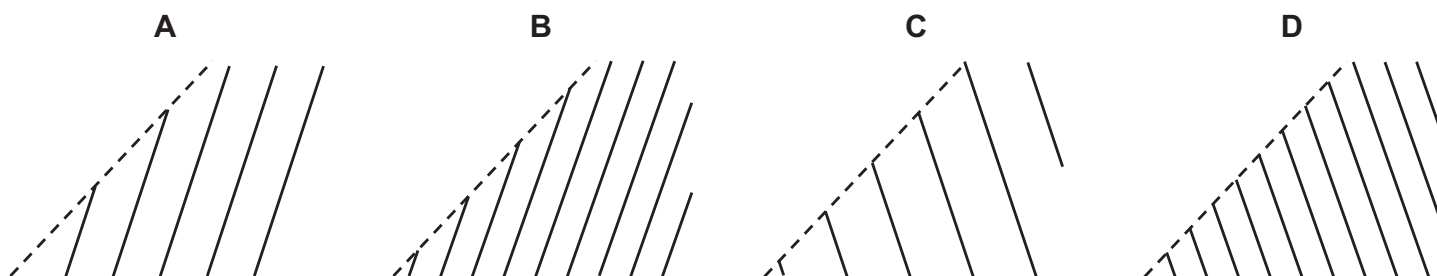


115. Question | 0625 Oct-Nov 2018 P2 V2 Q21

21 Plane water waves travel from a shallow region into a deeper region. They travel more quickly in the deeper water.

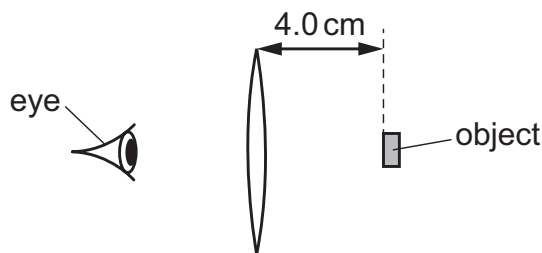


Which diagram shows the wave pattern in the deeper water?



116. Question | 0625 Oct-Nov 2018 P2 V2 Q22

- 22** A thin converging lens has a focal length of 6.0 cm. An observer looks through the lens at an object which is placed 4.0 cm from the lens.



Which description of the image that is observed is correct?

- A** diminished and inverted
- B** diminished and virtual
- C** enlarged and inverted
- D** enlarged and virtual

117. Question | 0625 Oct-Nov 2018 P2 V2 Q23

- 23** A transmitter produces radio waves of wavelength 1500 m. It takes the waves 0.025 s to travel from the transmitter to a radio receiver.

What is the distance between the radio transmitter and the receiver?

- A** 5.0×10^3 m **B** 2.0×10^5 m **C** 7.5×10^6 m **D** 1.1×10^{10} m

118. Question | 0625 Oct-Nov 2018 P2 V2 Q24

- 24** Different parts of the electromagnetic spectrum are used for different purposes. Below are four statements about parts of the spectrum.

statement 1: Infra-red waves are used in television remote controllers.

statement 2: Radio waves are used to transmit television pictures from satellites to Earth.

statement 3: Ultraviolet waves are used for intruder alarms.

statement 4: X-rays are used for security checks.

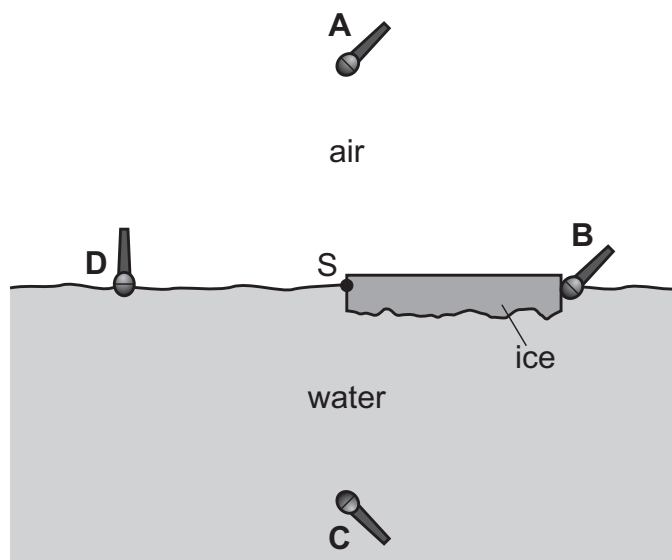
Which statements are correct?

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

25 A sheet of ice floats on water. A source of sound S is positioned at the edge of the ice sheet.

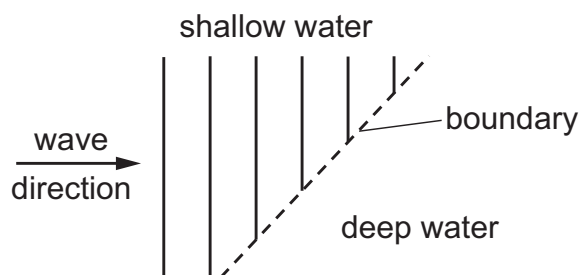
Four microphones are placed equal distances from S.

Which microphone detects the sound from S first?

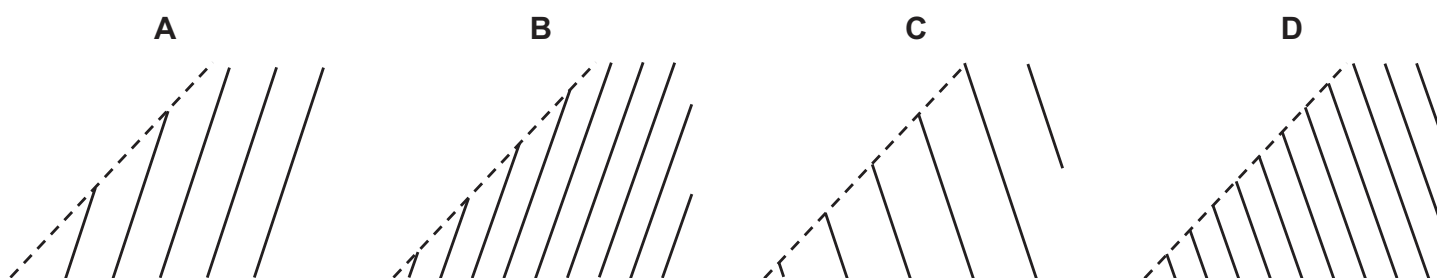


120. Question | 0625 Oct-Nov 2018 P2 V3 Q21

- 21** Plane water waves travel from a shallow region into a deeper region. They travel more quickly in the deeper water.

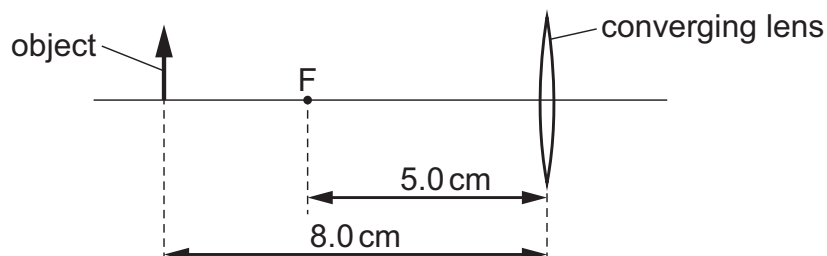


Which diagram shows the wave pattern in the deeper water?



121. Question | 0625 Oct-Nov 2018 P2 V3 Q22

- 22** An object is placed 8.0 cm from a thin converging lens of focal length 5.0 cm.



Which statement about the image formed by the lens is correct?

- A** The image is real and inverted.
- B** The image is real and upright.
- C** The image is virtual and inverted.
- D** The image is virtual and upright.

122. Question | 0625 Oct-Nov 2018 P2 V3 Q23

23 Light travels through air and then enters and travels through a parallel-sided glass block.

Which statement is correct?

- A** The angle of incidence is greater than the angle of refraction as the light leaves the block.
- B** The light emerging from the block is parallel to the light entering the block.
- C** The speed of the light decreases as it leaves the block.
- D** The wavelength of the light does not change as it enters the block.

123. Question | 0625 Oct-Nov 2018 P2 V3 Q24

24 Different parts of the electromagnetic spectrum are used for different purposes. Below are four statements about parts of the spectrum.

statement 1: Infra-red waves are used in television remote controllers.

statement 2: Radio waves are used to transmit television pictures from satellites to Earth.

statement 3: Ultraviolet waves are used for intruder alarms.

statement 4: X-rays are used for security checks.

Which statements are correct?

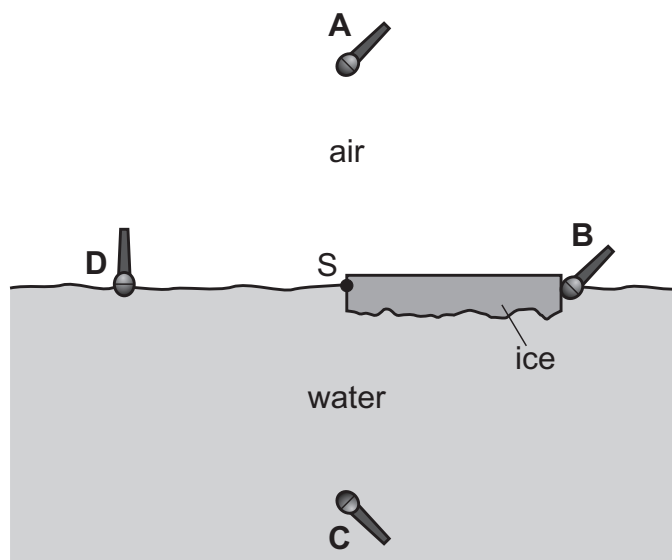
- A** 1 and 2
- B** 1 and 4
- C** 2 and 3
- D** 3 and 4

124. Question | 0625 Oct-Nov 2018 P2 V3 Q25

25 A sheet of ice floats on water. A source of sound S is positioned at the edge of the ice sheet.

Four microphones are placed equal distances from S .

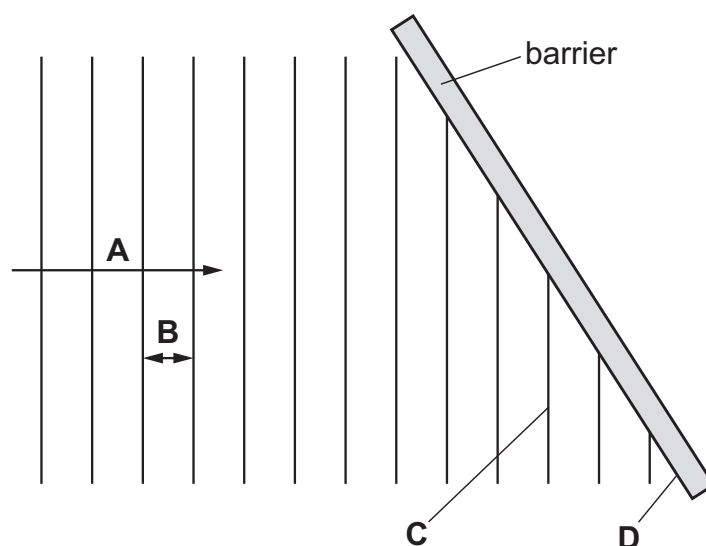
Which microphone detects the sound from S first?



125. Question | 0625 Feb-March 2019 P2 V2 Q21

21 The diagram shows a wave before it reflects from a barrier.

Which labelled section of the diagram represents a wavefront?



126. Question | 0625 Feb-March 2019 P2 V2 Q22

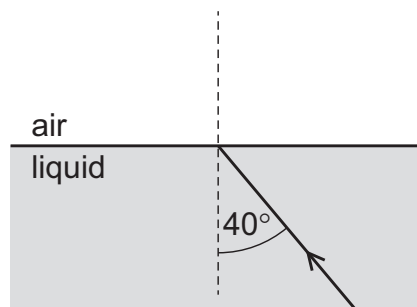
- 22** A vibrating object produces ripples on the surface of a liquid. The object completes 20 vibrations every second. The spacing of the ripples, from one crest to the next, is 3.0 cm.

What is the speed of the ripples?

- A** 0.15 cm/s **B** 6.7 cm/s **C** 60 cm/s **D** 120 cm/s

127. Question | 0625 Feb-March 2019 P2 V2 Q23

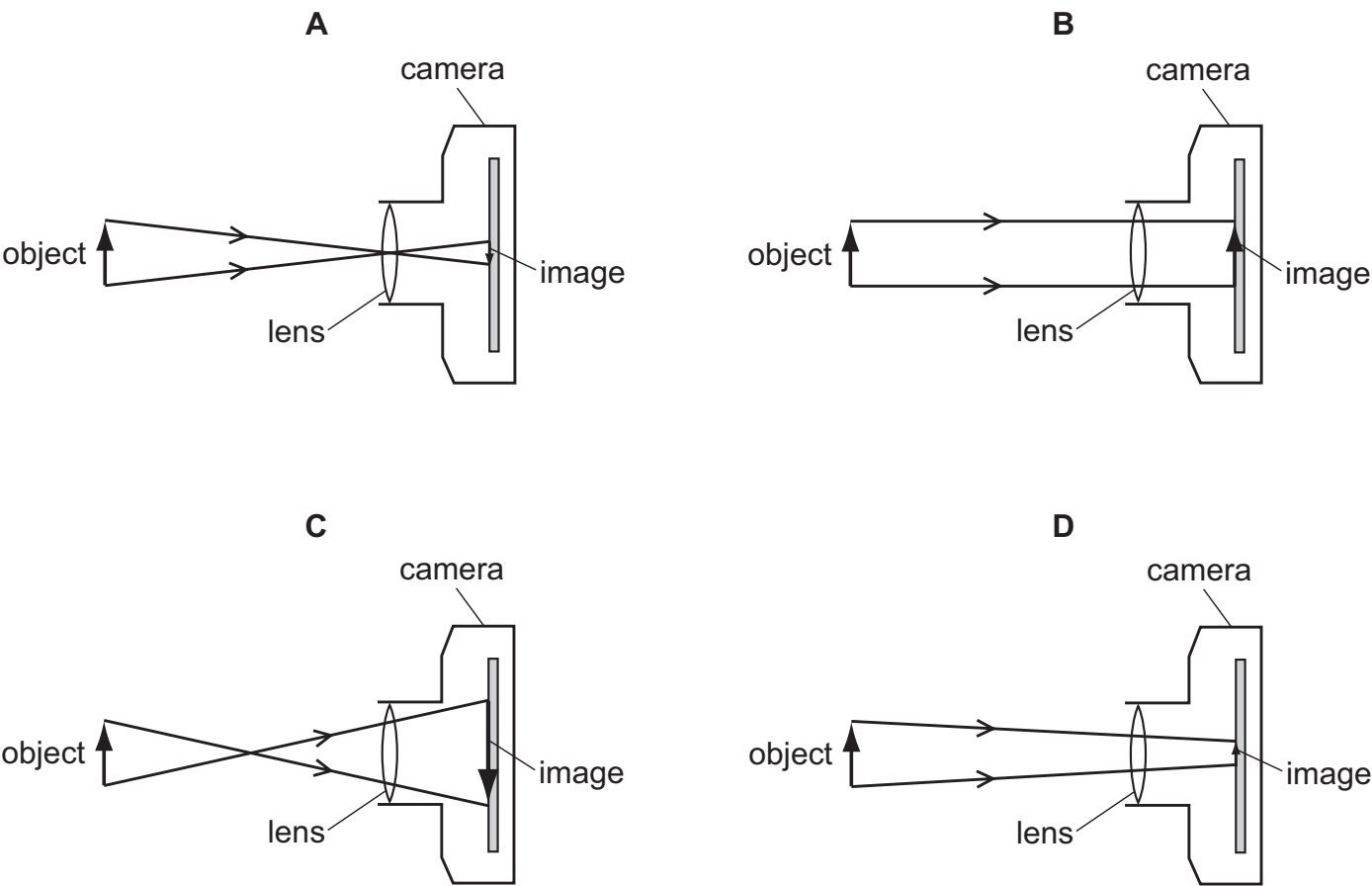
- 23** A narrow beam of light is travelling through a transparent liquid. It meets the surface as shown, at an angle of incidence of 40° . The refractive index of the liquid is 1.5.



What is the angle of refraction as the light enters the air?

- A** 25° **B** 27° **C** 60° **D** 75°

24 Which diagram correctly represents rays of light passing through a converging lens in a camera?



25 What is the speed of X-rays in a vacuum and in air?

	in a vacuum	in air
A	$3.0 \times 10^6 \text{ m/s}$	$2.0 \times 10^6 \text{ m/s}$
B	$3.0 \times 10^6 \text{ m/s}$	$3.0 \times 10^6 \text{ m/s}$
C	$3.0 \times 10^8 \text{ m/s}$	$2.0 \times 10^8 \text{ m/s}$
D	$3.0 \times 10^8 \text{ m/s}$	$3.0 \times 10^8 \text{ m/s}$

130. Question | 0625 Feb-March 2019 P2 V2 Q26

- 26** A sound wave passes a point. The air pressure at that point increases and then decreases 300 times every second.

Which descriptions apply to this sound wave?

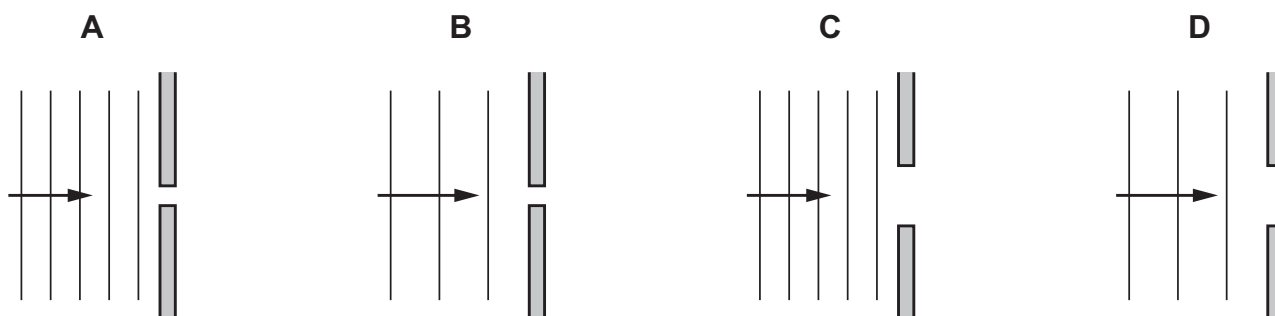
	the type of wave motion	the frequency of the sound
A	longitudinal	outside human hearing range
B	longitudinal	within human hearing range
C	transverse	outside human hearing range
D	transverse	within human hearing range

131. Question | 0625 May-June 2019 P2 V1 Q20

- 20** When water waves pass through a gap they diffract.

The diagrams show wavefronts approaching a narrow gap.

In which diagram will the diffraction be least?



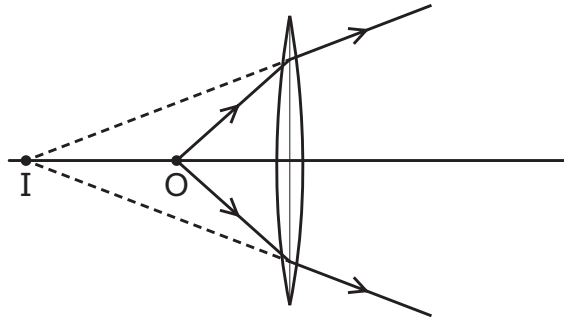
132. Question | 0625 May-June 2019 P2 V1 Q21

- 21** An object is placed 30 cm in front of a plane mirror.

Which statement describes the image of the object?

- A** The image is the same size and 30 cm from the object.
- B** The image is the same size and 60 cm from the object.
- C** The image is smaller and 30 cm from the object.
- D** The image is smaller and 60 cm from the object.

- 22** A small object O is placed near a converging lens, as shown. The lens forms an image I.



Which statement is correct?

- A** The image I is diminished.
- B** The image I is inverted.
- C** The image I is real.
- D** The object O is closer to the lens than its principal focus.

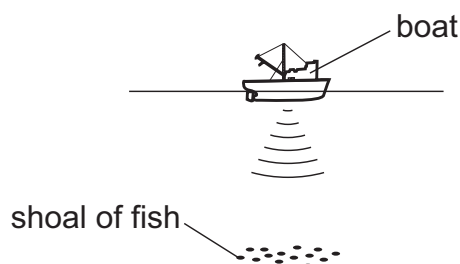
- 23** An eclipse of the Sun happens when the Moon comes between the Earth and the Sun.

Which statement is correct?

- A** Infra-red radiation from the Sun disappears before visible light and ultra-violet radiation.
- B** Ultra-violet radiation from the Sun disappears before visible light and infra-red radiation.
- C** Visible light from the Sun disappears before ultra-violet radiation and infra-red radiation.
- D** Infra-red radiation, ultra-violet radiation and visible light from the Sun all disappear at the same moment.

135. Question | 0625 May-June 2019 P2 V1 Q24

- 24** A pulse of sound is produced at the bottom of a boat. The sound travels through the water and is reflected from a shoal of fish. The sound reaches the boat again after 1.2 s. The speed of sound in the water is 1500 m/s.



How far below the bottom of the boat is the shoal of fish?

- A** 450 m **B** 900 m **C** 1800 m **D** 3600 m

136. Question | 0625 May-June 2019 P2 V1 Q25

- 25** What is the approximate value of the speed of sound in air at normal temperature?

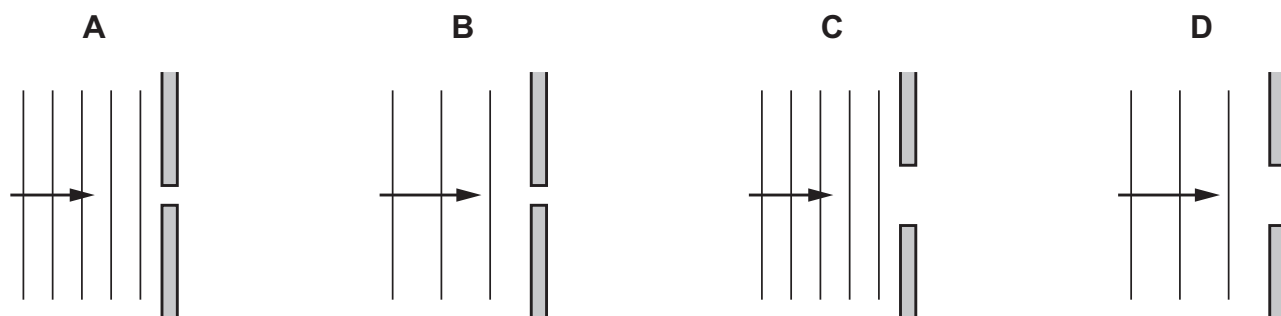
- A** 340 m/s **B** 34 000 m/s **C** 340 km/s **D** 3.0×10^8 m/s

137. Question | 0625 May-June 2019 P2 V2 Q20

- 20** When water waves pass through a gap they diffract.

The diagrams show wavefronts approaching a narrow gap.

In which diagram will the diffraction be least?



138. Question | 0625 May-June 2019 P2 V2 Q21

21 Which conditions are necessary for light to be totally internally reflected?

	the incident light is in	angle of incidence
A	the less dense medium	less than the critical angle
B	the less dense medium	greater than the critical angle
C	the more dense medium	less than the critical angle
D	the more dense medium	greater than the critical angle

139. Question | 0625 May-June 2019 P2 V2 Q22

22 Light is travelling through air. The light strikes a glass block at an angle of incidence of 45° . The glass has a refractive index of 1.4.

What is the angle of refraction of the light as it enters the glass?

- A** 29° **B** 30° **C** 32° **D** 82°

140. Question | 0625 May-June 2019 P2 V2 Q23

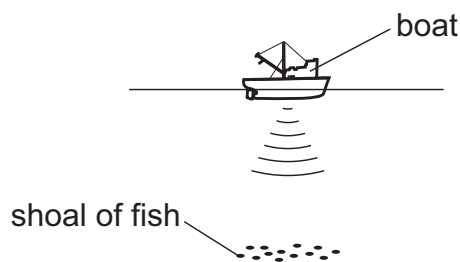
23 An eclipse of the Sun happens when the Moon comes between the Earth and the Sun.

Which statement is correct?

- A** Infra-red radiation from the Sun disappears before visible light and ultra-violet radiation.
B Ultra-violet radiation from the Sun disappears before visible light and infra-red radiation.
C Visible light from the Sun disappears before ultra-violet radiation and infra-red radiation.
D Infra-red radiation, ultra-violet radiation and visible light from the Sun all disappear at the same moment.

141. Question | 0625 May-June 2019 P2 V2 Q24

- 24** A pulse of sound is produced at the bottom of a boat. The sound travels through the water and is reflected from a shoal of fish. The sound reaches the boat again after 1.2 s. The speed of sound in the water is 1500 m/s.



How far below the bottom of the boat is the shoal of fish?

- A** 450 m **B** 900 m **C** 1800 m **D** 3600 m

142. Question | 0625 May-June 2019 P2 V2 Q25

- 25** An observer stands at the finish line of a 100 m race. He wants to time the winner's run. He starts his stop-watch as soon as he sees the smoke from the starting gun instead of when he hears the bang.

What is the reason for doing this?

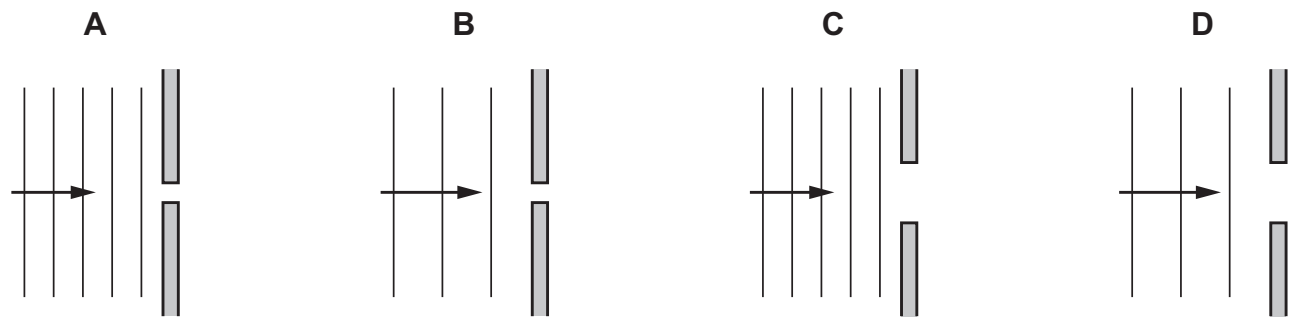
- A** Light travels much faster than sound.
B There is a risk he might respond to an echo from a wall.
C Humans react slower to sound than to light.
D Humans react more quickly to sound than to light.

143. Question | 0625 May-June 2019 P2 V3 Q19

19 When water waves pass through a gap they diffract.

The diagrams show wavefronts approaching a narrow gap.

In which diagram will the diffraction be least?



144. Question | 0625 May-June 2019 P2 V3 Q20

20 Sound travels through air at a speed of 340 m/s. A source generates sound waves at a frequency of 1.2 kHz.

What is the wavelength of the sound waves?

- A 0.28 m B 3.5 m C 280 m D 410 m

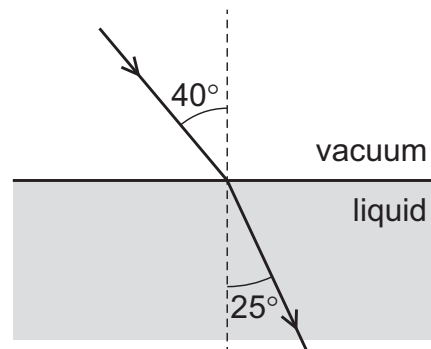
145. Question | 0625 May-June 2019 P2 V3 Q21

21 Which conditions are necessary for light to be totally internally reflected?

	the incident light is in	angle of incidence
A	the less dense medium	less than the critical angle
B	the less dense medium	greater than the critical angle
C	the more dense medium	less than the critical angle
D	the more dense medium	greater than the critical angle

146. Question | 0625 May-June 2019 P2 V3 Q22

- 22** A beam of light passes through a vacuum and then enters a liquid. The diagram shows the path it takes.



The light travels through the vacuum at a speed of $3.0 \times 10^8 \text{ m/s}$.

What is the speed of light in the liquid?

- A** $1.9 \times 10^8 \text{ m/s}$
- B** $2.0 \times 10^8 \text{ m/s}$
- C** $4.6 \times 10^8 \text{ m/s}$
- D** $4.8 \times 10^8 \text{ m/s}$

147. Question | 0625 May-June 2019 P2 V3 Q23

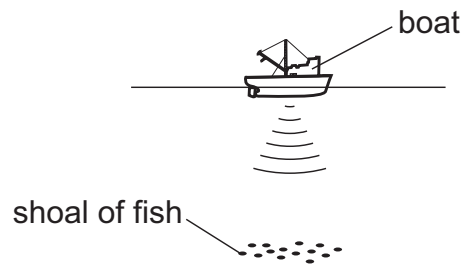
- 23** An eclipse of the Sun happens when the Moon comes between the Earth and the Sun.

Which statement is correct?

- A** Infra-red radiation from the Sun disappears before visible light and ultra-violet radiation.
- B** Ultra-violet radiation from the Sun disappears before visible light and infra-red radiation.
- C** Visible light from the Sun disappears before ultra-violet radiation and infra-red radiation.
- D** Infra-red radiation, ultra-violet radiation and visible light from the Sun all disappear at the same moment.

148. Question | 0625 May-June 2019 P2 V3 Q24

- 24** A pulse of sound is produced at the bottom of a boat. The sound travels through the water and is reflected from a shoal of fish. The sound reaches the boat again after 1.2 s. The speed of sound in the water is 1500 m/s.



How far below the bottom of the boat is the shoal of fish?

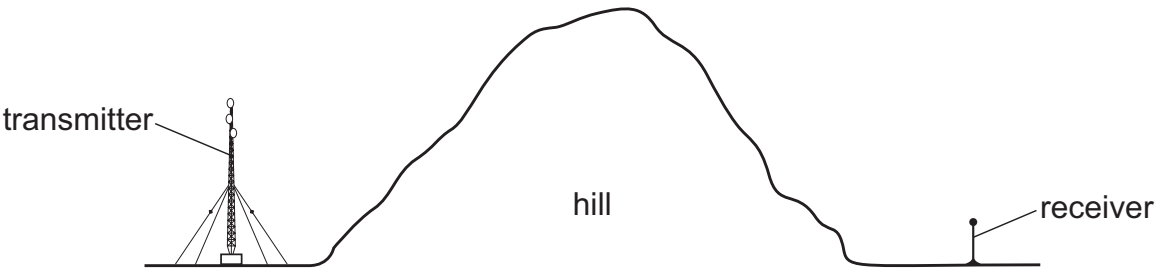
- A** 450 m **B** 900 m **C** 1800 m **D** 3600 m

149. Question | 0625 May-June 2019 P2 V3 Q25

- 25** Which statement about ultrasound is correct?

- A** It has a higher frequency than audible sound, and it is a longitudinal wave.
B It has a higher frequency than audible sound, and it is a transverse wave.
C It has a lower frequency than audible sound, and it is a longitudinal wave.
D It has a lower frequency than audible sound, and it is a transverse wave.

21 A large hill blocks the direct path between a transmitter of radio waves and a receiver, as shown.



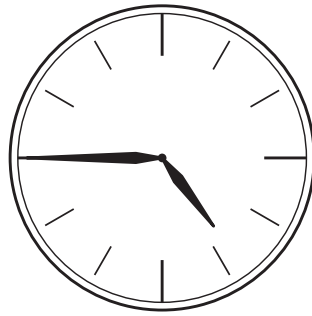
The receiver picks up the signal from the transmitter even though the radio waves do not travel through the hill.

Which row is correct?

	A possible way for this to happen is	A stronger signal is received using
A	diffraction round the hill.	longer wavelengths.
B	diffraction round the hill.	shorter wavelengths.
C	refraction round the hill.	longer wavelengths.
D	refraction round the hill.	shorter wavelengths.

151. Question | 0625 Oct-Nov 2019 P2 V1 Q22

22 The diagram shows the image of a clock in a plane mirror.



Which is the actual time?

A 04:15

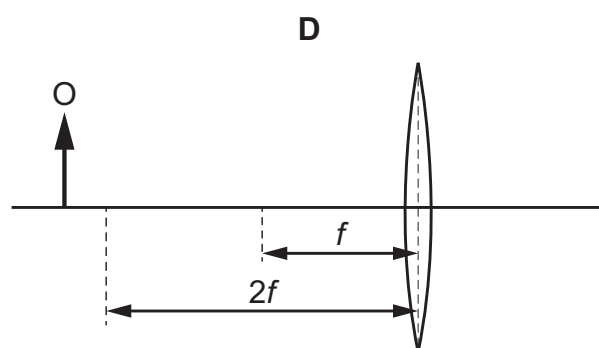
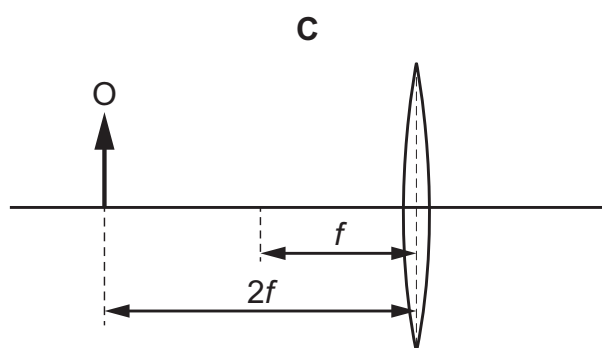
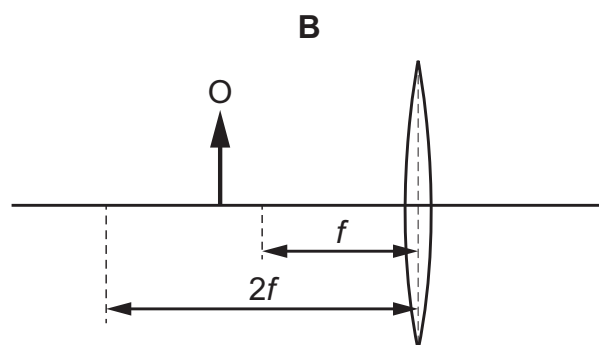
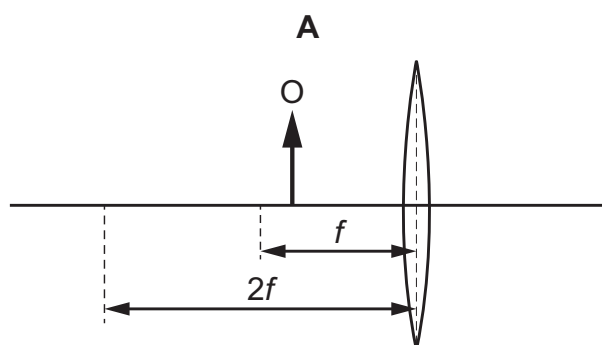
B 04:45

C 07:15

D 07:45

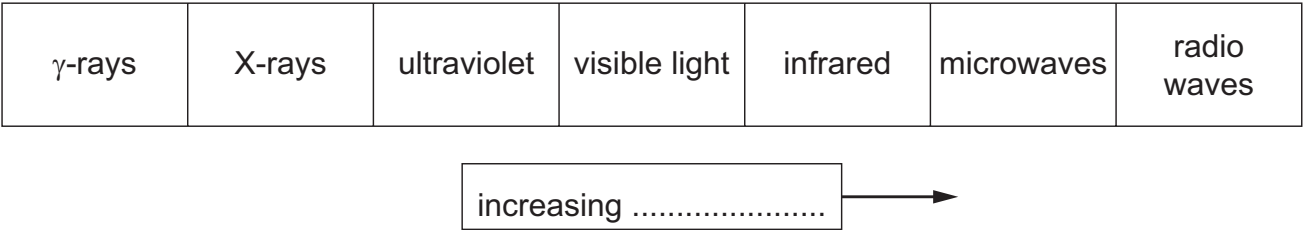
23 A converging lens produces an image of an object O. The focal length of the lens is f .

Which position of the object produces a virtual image?



153. Question | 0625 Oct-Nov 2019 P2 V1 Q24

24 The diagram shows the electromagnetic spectrum.



A word is missing from the label below the spectrum.

Which word is missing?

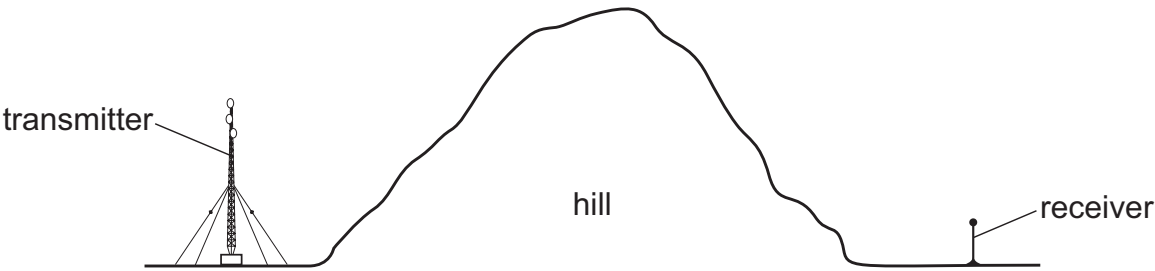
- A amplitude
- B frequency
- C speed
- D wavelength

154. Question | 0625 Oct-Nov 2019 P2 V1 Q25

25 Which row gives a possible set of values for the speed of sound in ice, in water and in steam?

	speed of sound in ice m/s	speed of sound in water m/s	speed of sound in steam m/s
A	500	1500	4000
B	1500	4000	500
C	4000	500	1500
D	4000	1500	500

22 A large hill blocks the direct path between a transmitter of radio waves and a receiver, as shown.



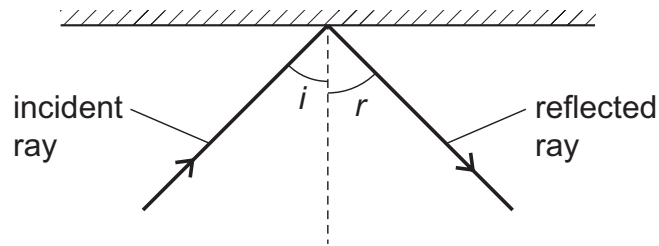
The receiver picks up the signal from the transmitter even though the radio waves do not travel through the hill.

Which row is correct?

	A possible way for this to happen is	A stronger signal is received using
A	diffraction round the hill.	longer wavelengths.
B	diffraction round the hill.	shorter wavelengths.
C	refraction round the hill.	longer wavelengths.
D	refraction round the hill.	shorter wavelengths.

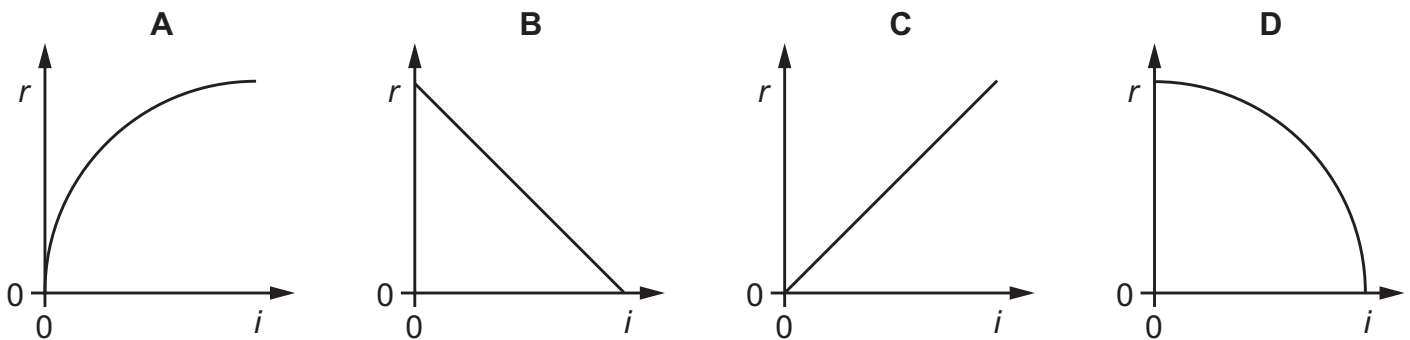
156. Question | 0625 Oct-Nov 2019 P2 V2 Q23

- 23** A ray of light is incident on a plane mirror. A student measures the angle of incidence i and the angle of reflection r .



The student varies the angle of incidence and then plots a graph of r against i .

What does the graph look like?

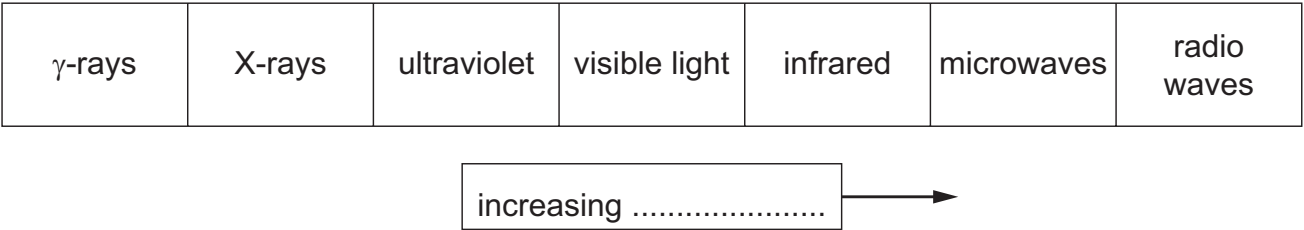


157. Question | 0625 Oct-Nov 2019 P2 V2 Q24

- 24** What is monochromatic light?

- A** light of a single amplitude
- B** light of a single frequency
- C** light of more than one colour
- D** light which travels with constant velocity

25 The diagram shows the electromagnetic spectrum.



A word is missing from the label below the spectrum.

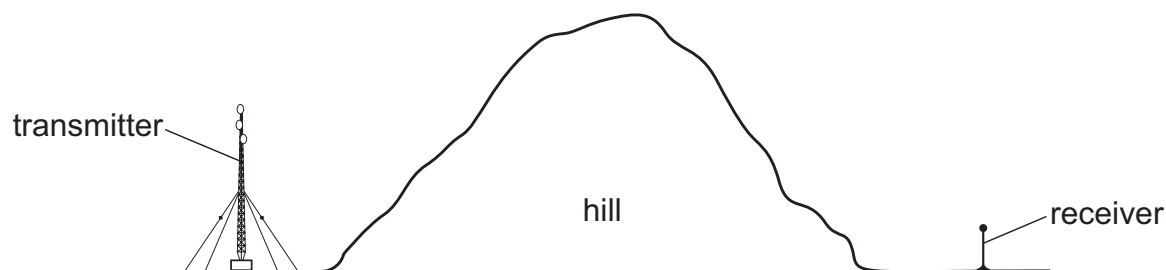
Which word is missing?

- A amplitude
- B frequency
- C speed
- D wavelength

26 Which row gives a possible set of values for the speed of sound in ice, in water and in steam?

	speed of sound in ice m/s	speed of sound in water m/s	speed of sound in steam m/s
A	500	1500	4000
B	1500	4000	500
C	4000	500	1500
D	4000	1500	500

- 21** A large hill blocks the direct path between a transmitter of radio waves and a receiver, as shown.



The receiver picks up the signal from the transmitter even though the radio waves do not travel through the hill.

Which row is correct?

	A possible way for this to happen is	A stronger signal is received using
A	diffraction round the hill.	longer wavelengths.
B	diffraction round the hill.	shorter wavelengths.
C	refraction round the hill.	longer wavelengths.
D	refraction round the hill.	shorter wavelengths.

- 22** A person stands 1.0 m in front of a plane mirror. The mirror is moved away from the person at a speed of 1.0 m/s.

Which statement is correct?

- A** The image moves away from the person at a speed of 1.0 m/s.
- B** The image moves away from the person at a speed of 2.0 m/s.
- C** The image moves towards the person at a speed of 1.0 m/s.
- D** The image moves towards the person at a speed of 2.0 m/s.

162. Question | 0625 Oct-Nov 2019 P2 V3 Q23

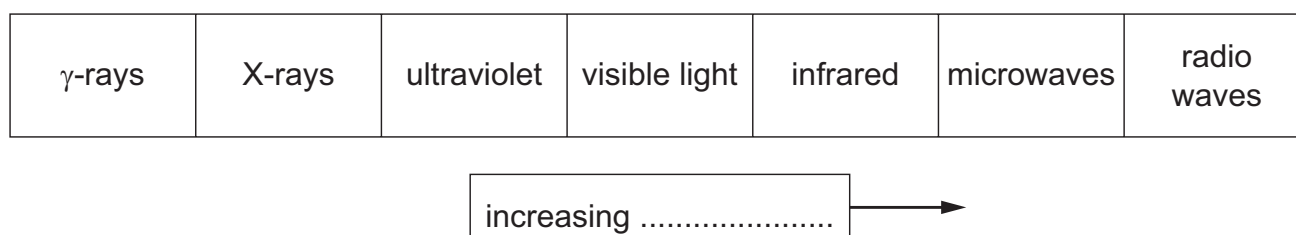
23 White light is refracted and dispersed when it enters a glass prism from air.

Which colour has the lowest speed as it moves through the glass prism?

- A** blue light
- B** orange light
- C** red light
- D** violet light

163. Question | 0625 Oct-Nov 2019 P2 V3 Q24

24 The diagram shows the electromagnetic spectrum.



A word is missing from the label below the spectrum.

Which word is missing?

- A** amplitude
- B** frequency
- C** speed
- D** wavelength

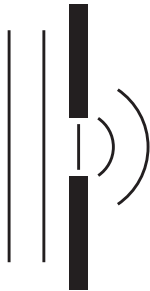
164. Question | 0625 Oct-Nov 2019 P2 V3 Q25

25 Which row gives a possible set of values for the speed of sound in ice, in water and in steam?

	speed of sound in ice m/s	speed of sound in water m/s	speed of sound in steam m/s
A	500	1500	4000
B	1500	4000	500
C	4000	500	1500
D	4000	1500	500

165. Question | 0625 Feb-March 2020 P2 V2 Q23

23 Four students A, B, C and D, investigate the diffraction of water waves through a gap.

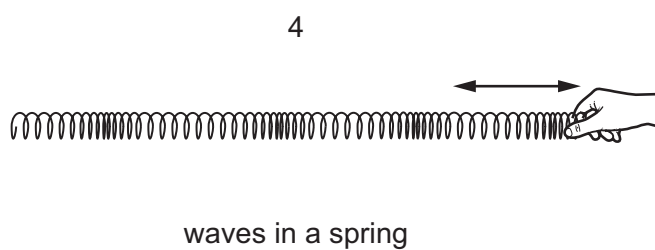
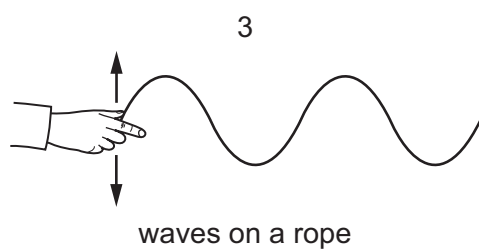
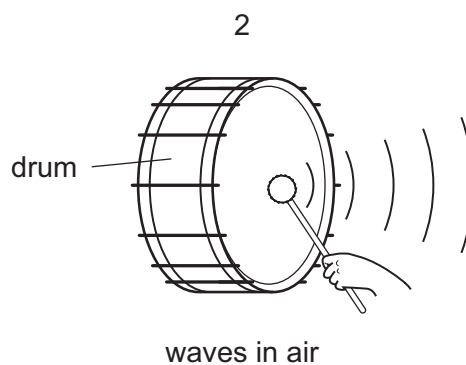
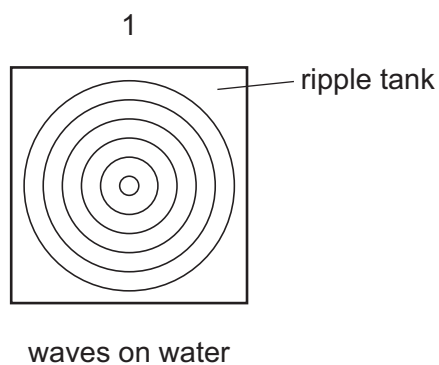


Each student uses a different gap size and a different wavelength for the water waves.

Which student produces the waves which have the most diffraction?

	gap size /cm	wavelength /cm
A	2.0	1.8
B	3.0	2.1
C	4.0	2.0
D	5.0	0.9

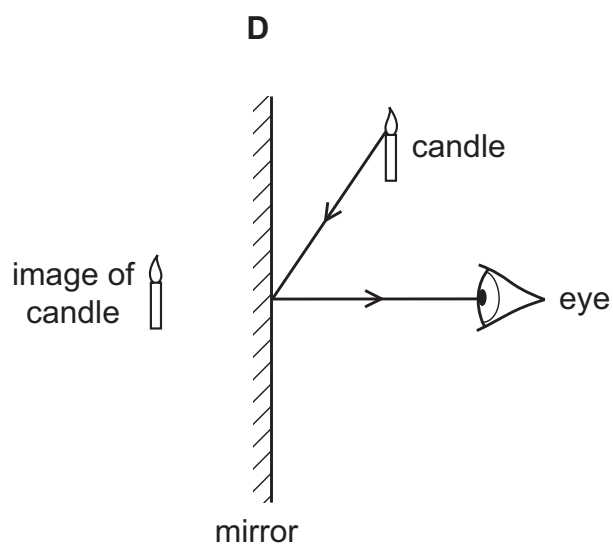
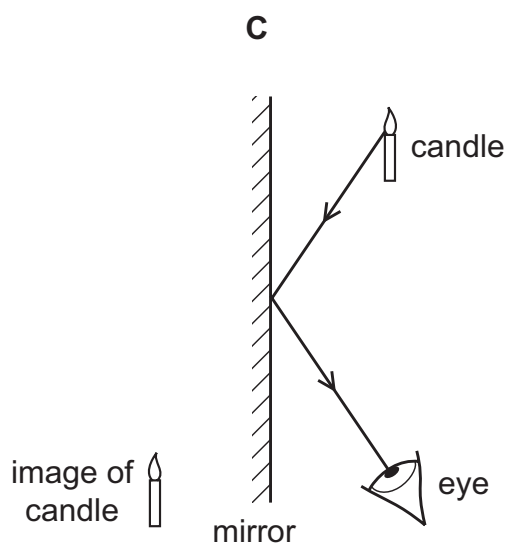
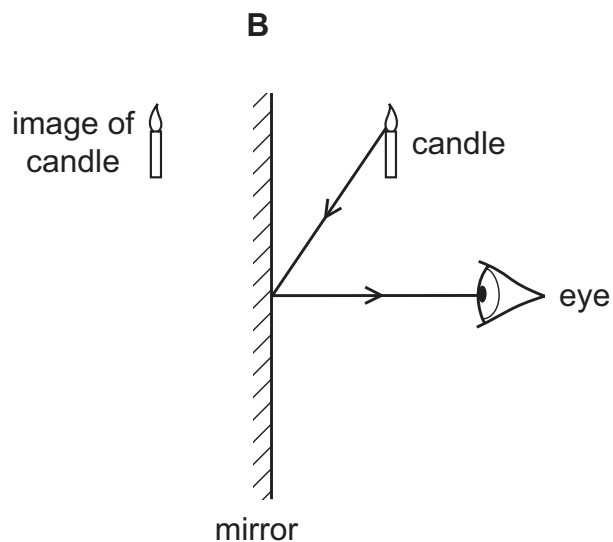
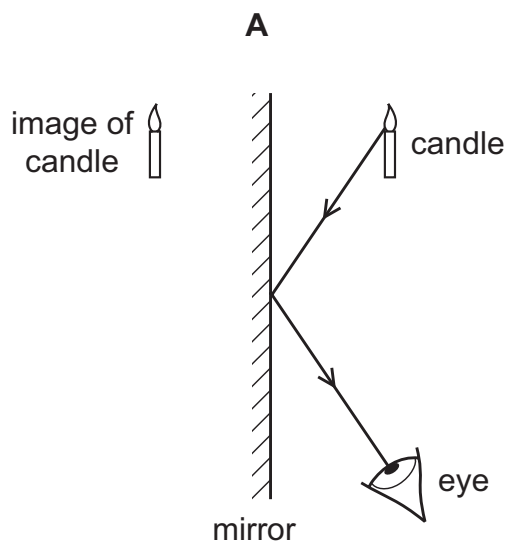
24 The diagrams show examples of wave motion.



Which waves are longitudinal?

- A** 1 only **B** 2 and 3 only **C** 2, 3 and 4 **D** 2 and 4 only

- 25** Which diagram shows how the light from a candle is reflected by a mirror, and shows the position of the image formed?



168. Question | 0625 Feb-March 2020 P2 V2 Q26

26 A converging lens can be used as a magnifying glass.

What will be the nature of the image?

- A** real, inverted, diminished
- B** real, upright, enlarged
- C** virtual, inverted, enlarged
- D** virtual, upright, enlarged

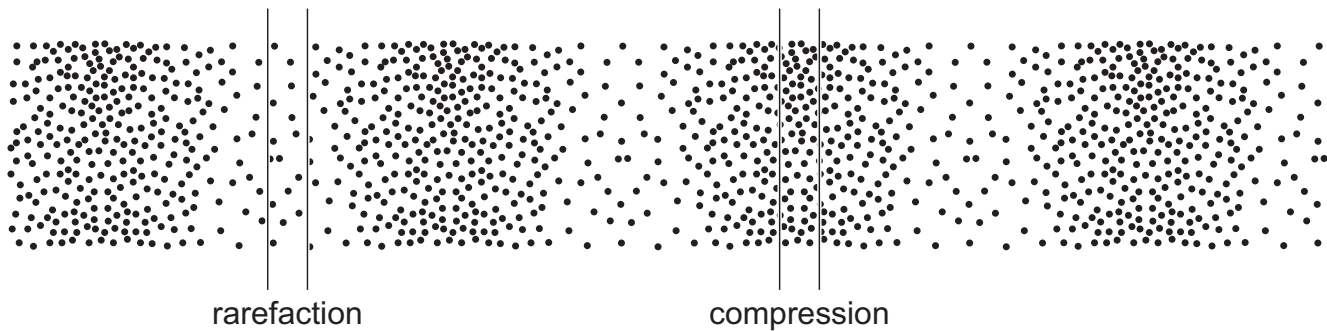
169. Question | 0625 Feb-March 2020 P2 V2 Q27

27 The wavelength of blue light changes from $4.7 \times 10^{-7} \text{ m}$ to $3.5 \times 10^{-7} \text{ m}$ as it passes from air to water.

What is the speed of this light in water?

- A** $7.4 \times 10^7 \text{ m/s}$
- B** $1.3 \times 10^8 \text{ m/s}$
- C** $2.2 \times 10^8 \text{ m/s}$
- D** $3.0 \times 10^8 \text{ m/s}$

28 The diagram shows compressions and rarefactions in air as a sound wave moves from left to right.



A quieter sound of the same frequency is made.

What will happen to the number of particles in a region of rarefaction and in a region of compression?

	number of particles in region of rarefaction	number of particles in region of compression
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

0625 Physics Paper 2 - Waves

Topical questions | 470 questions

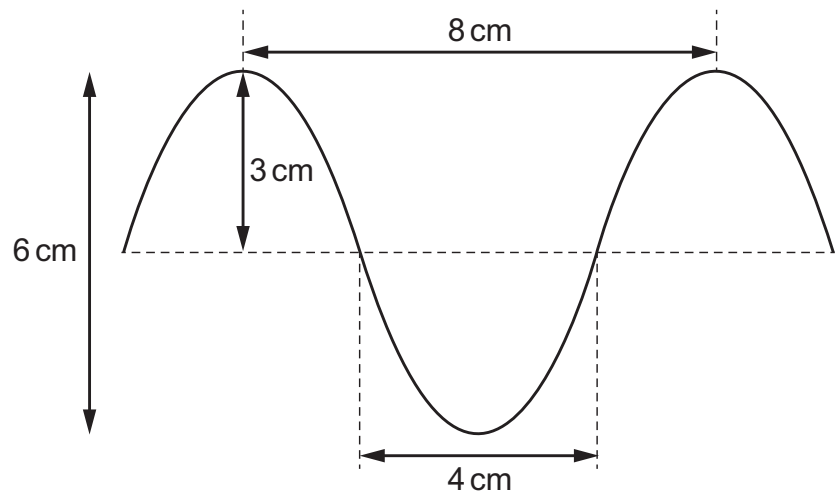
171. Question | 0625 May-June 2020 P2 V1 Q20

20 A wave of frequency 6600 Hz travels 1320 m in 4.0 s.

What is the wavelength?

- A** 0.050 m **B** 0.80 m **C** 1.3 m **D** 20 m

21 The diagram shows a wave.

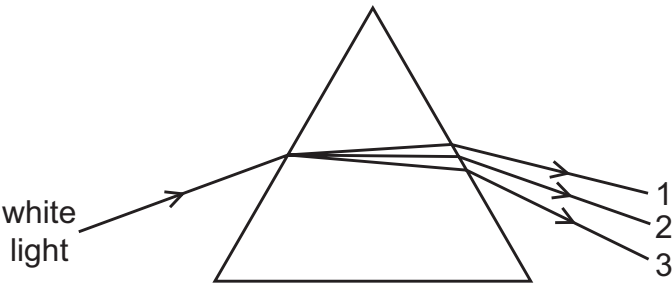


What are the amplitude and the wavelength of this wave?

	amplitude / cm	wavelength / cm
A	3	4
B	3	8
C	6	4
D	6	8

- 22** Which statement is correct?
- A** The speed of light in glass is equal to the speed of light in a vacuum multiplied by the refractive index of glass.
 - B** The incident angle of a light ray at an air-glass surface is the angle between the ray and the glass surface.
 - C** The sine of the critical angle at an air-glass surface is equal to $\frac{1}{\text{refractive index of glass}}$.
 - D** The angle of refraction for light passing through an air-glass surface is proportional to the angle of incidence at that surface.

- 23** A narrow beam of white light passes through a prism and is dispersed into a spectrum.



Which row is correct?

	colour 1	colour 2	colour 3
A	blue	yellow	red
B	red	blue	yellow
C	red	yellow	blue
D	yellow	blue	red

175. Question | 0625 May-June 2020 P2 V1 Q24

24 An intruder alarm sensor detects that a person is warmer than his surroundings.

Which type of electromagnetic wave does the sensor detect?

- A** infrared
- B** radio
- C** ultraviolet
- D** visible light

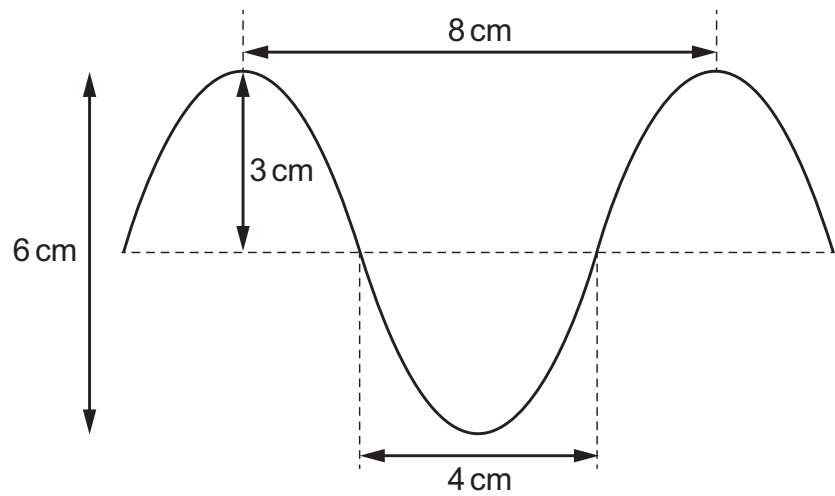
176. Question | 0625 May-June 2020 P2 V1 Q25

25 Sound travels through air as a series of compressions and rarefactions.

Which statement correctly compares a compression with a rarefaction?

- A** In a compression the wavelength is longer than in a rarefaction.
- B** In a compression the wavelength is shorter than in a rarefaction.
- C** In a compression the density of the air is greater than in a rarefaction.
- D** In a compression the density of the air is lower than in a rarefaction.

20 The diagram shows a wave.



What are the amplitude and the wavelength of this wave?

	amplitude / cm	wavelength / cm
A	3	4
B	3	8
C	6	4
D	6	8

178. Question | 0625 May-June 2020 P2 V2 Q21

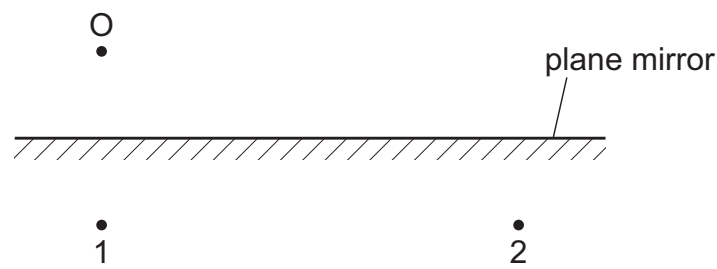
21 The frequency of the microwaves used in a microwave oven is 2400 MHz.

What is the wavelength of these microwaves?

- A** 0.125 m **B** 8.00 m **C** 125 m **D** 7200 m

179. Question | 0625 May-June 2020 P2 V2 Q22

22 An object O is placed in front of a plane mirror as shown.



Which row is correct?

	position of the image	nature of the image
A	1	real
B	1	virtual
C	2	real
D	2	virtual

180. Question | 0625 May-June 2020 P2 V2 Q23

23 Which statement is correct?

- A** The speed of light in glass is equal to the speed of light in a vacuum multiplied by the refractive index of glass.
- B** The incident angle of a light ray at an air-glass surface is the angle between the ray and the glass surface.
- C** The sine of the critical angle at an air-glass surface is equal to $\frac{1}{\text{refractive index of glass}}$.
- D** The angle of refraction for light passing through an air-glass surface is proportional to the angle of incidence at that surface.

181. Question | 0625 May-June 2020 P2 V2 Q24

24 An intruder alarm sensor detects that a person is warmer than his surroundings.

Which type of electromagnetic wave does the sensor detect?

- A** infrared
- B** radio
- C** ultraviolet
- D** visible light

182. Question | 0625 May-June 2020 P2 V2 Q25

- 25** A dolphin sends out a sound wave. An echo returns 0.010 s later from a fish which is 7.5 m from the dolphin.

What is the speed of the sound wave in water?

- A** 0.075 m/s **B** 0.15 m/s **C** 750 m/s **D** 1500 m/s

183. Question | 0625 May-June 2020 P2 V3 Q20

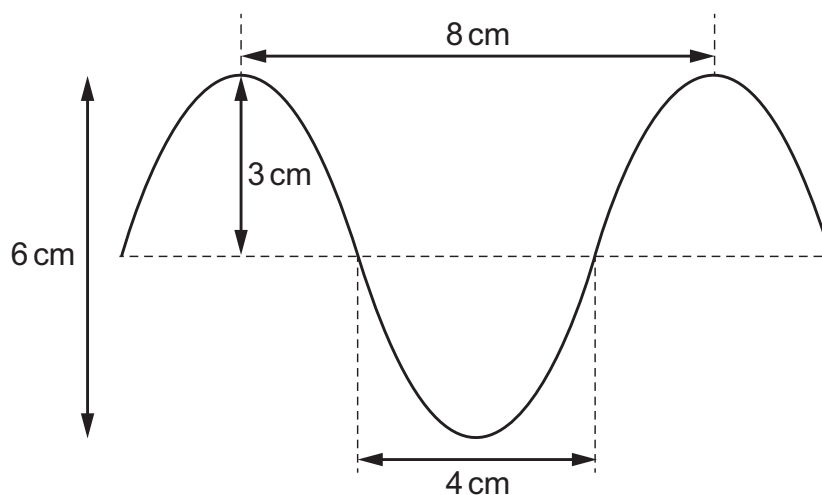
- 20** An earthquake-monitoring station records the arrival of 16 complete waves of an earthquake wave in 20 s.

The speed of the earthquake wave is 6.0 km/s.

What is the wavelength of the earthquake wave?

- A** 1.3×10^{-4} m
B 2.1×10^{-4} m
C 4.8×10^3 m
D 7.5×10^3 m

21 The diagram shows a wave.



What are the amplitude and the wavelength of this wave?

	amplitude / cm	wavelength / cm
A	3	4
B	3	8
C	6	4
D	6	8

22 Which statement is correct?

- A** The speed of light in glass is equal to the speed of light in a vacuum multiplied by the refractive index of glass.
- B** The incident angle of a light ray at an air-glass surface is the angle between the ray and the glass surface.
- C** The sine of the critical angle at an air-glass surface is equal to $\frac{1}{\text{refractive index of glass}}$.
- D** The angle of refraction for light passing through an air-glass surface is proportional to the angle of incidence at that surface.

186. Question | 0625 May-June 2020 P2 V3 Q23

23 Which statement about converging lenses is correct?

- A** A real image of an object projected onto a screen by a converging lens is always inverted.
- B** The image formed by a converging lens is always upright.
- C** The image formed by a converging lens when used as a magnifying glass is a real image.
- D** Parallel rays entering a converging lens are focused at a distance greater than the focal length from the lens.

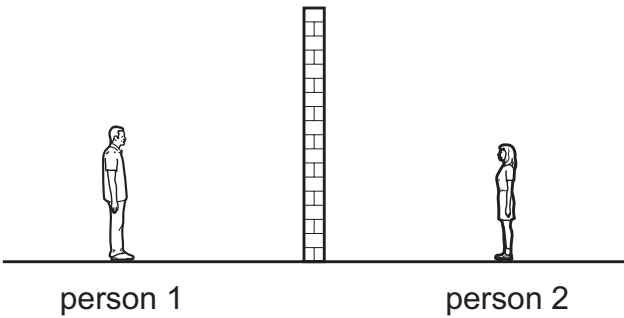
187. Question | 0625 May-June 2020 P2 V3 Q24

24 An intruder alarm sensor detects that a person is warmer than his surroundings.

Which type of electromagnetic wave does the sensor detect?

- A** infrared
- B** radio
- C** ultraviolet
- D** visible light

25 Two people are standing outdoors on either side of a high wall.



Person 1 can hear person 2 talking although he cannot see her.

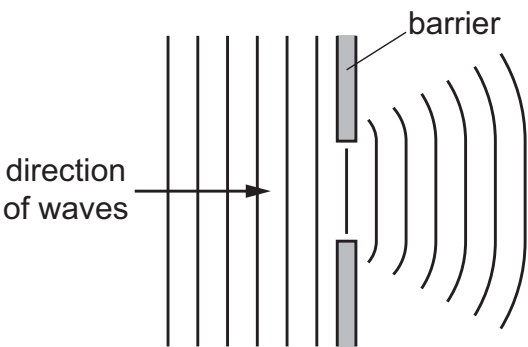
Which statement explains this?

- A** The sound waves have diffracted around the wall.
- B** The sound waves have passed unaffected through the wall.
- C** The sound waves have reflected around the wall.
- D** The sound waves have refracted around the wall.

21 Which row correctly describes light waves?

	wave type	direction of vibrations
A	longitudinal	parallel to direction of wave travel
B	longitudinal	perpendicular to direction of wave travel
C	transverse	parallel to direction of wave travel
D	transverse	perpendicular to direction of wave travel

22 The diagram shows part of a diffracted wave pattern.



Changes are made to the wavelength and to the gap size to produce a semicircular diffracted wave pattern.

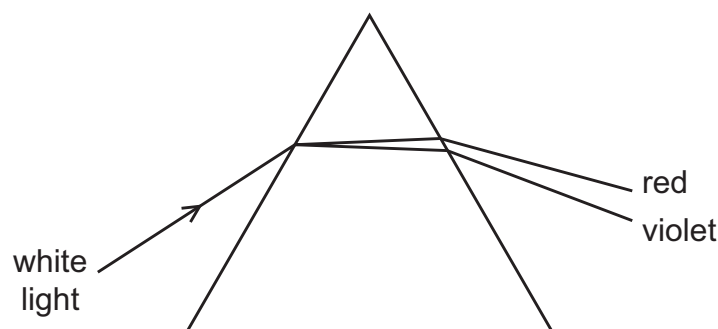
Which row produces the required semicircular diffracted wave pattern?

	gap in barrier	wavelength
A	larger	same
B	larger	smaller
C	same	larger
D	same	smaller

23 Which statement about a thin converging lens is correct?

- A** All rays of light refracted by the lens pass through the principal focus.
- B** All rays initially parallel to the principal axis of the lens are refracted through the principal focus.
- C** The focal length of the lens is the distance between the image and the principal focus.
- D** The focal length of the lens is the distance between the object and the image.

24 The diagram shows white light passing through a prism.



Which description of what happens as the light passes into the prism is correct?

- A** The speed of the red light is less than the speed of the violet light and the red light is the least refracted.
- B** The speed of the red light is greater than the speed of the violet light and the red light is the least refracted.
- C** The speed of the violet light is less than the speed of the red light and the violet light is the least refracted.
- D** The speed of the violet light is greater than the speed of the red light and the violet light is the least refracted.

25 Which row gives possible values for the speed of sound?

	<u>speed in gas</u> m/s	<u>speed in liquid</u> m/s	<u>speed in solid</u> m/s
A	972	1450	3560
B	972	3560	1450
C	1450	3560	972
D	3560	972	1450

194. Question | 0625 Oct-Nov 2020 P2 V1 Q26

- 26** A police car with its siren sounding is stationary in heavy traffic. A pedestrian notices that, although the loudness of the sound produced does not change, the pitch varies.

Which row describes the amplitude and the frequency of the sound?

	amplitude	frequency
A	constant	constant
B	constant	varying
C	varying	constant
D	varying	varying

195. Question | 0625 Oct-Nov 2020 P2 V2 Q21

- 21** Which row correctly describes light waves?

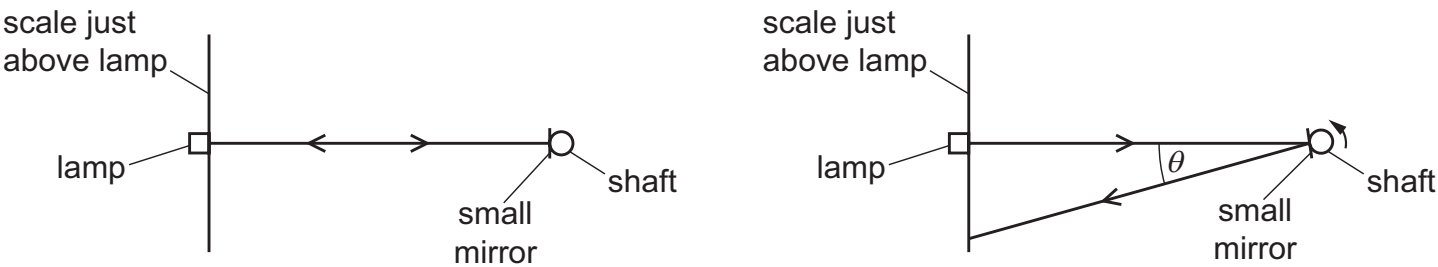
	wave type	direction of vibrations
A	longitudinal	parallel to direction of wave travel
B	longitudinal	perpendicular to direction of wave travel
C	transverse	parallel to direction of wave travel
D	transverse	perpendicular to direction of wave travel

22 A radio transmitter broadcasts at a frequency of 200 kHz.

What is the wavelength of these radio waves?

- A** $6.7 \times 10^{-4} \text{ m}$ **B** 1.5 m **C** $1.5 \times 10^3 \text{ m}$ **D** $1.5 \times 10^6 \text{ m}$

23 An optical lever is a very sensitive device for detecting small rotations. A lamp sends a narrow beam of light on to a small plane mirror attached to a shaft whose rotation is to be measured. The operation of the device is shown in plan view.



The beam from the lamp reflects from the mirror to give a small spot of light on a scale placed just above the lamp. The shaft and mirror rotate through 1° . The spot of light moves along the scale.

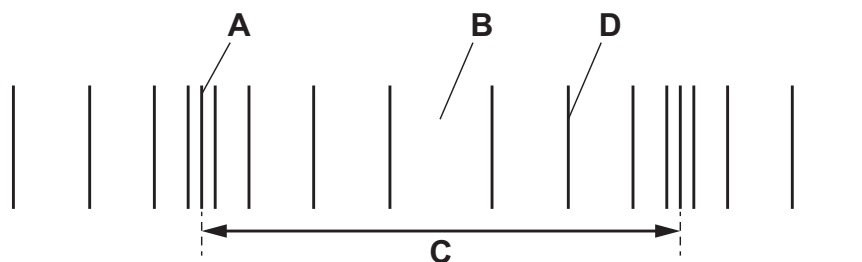
The table shows the angle θ through which the reflected beam rotates and the conditions required for high sensitivity.

Which row is correct?

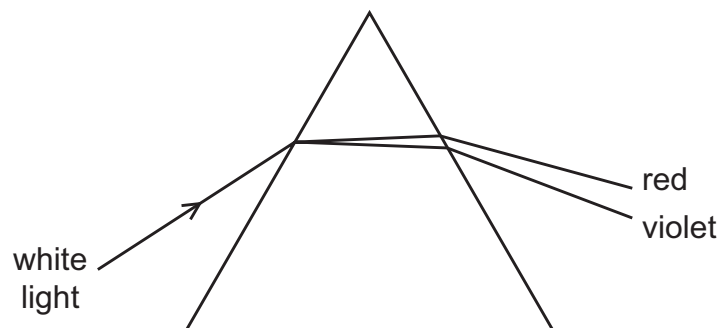
	angle θ	to achieve high sensitivity
A	1°	the lamp and scale need to be as close to the mirror as possible
B	1°	the lamp and scale need to be as far from the mirror as possible
C	2°	the lamp and scale need to be as close to the mirror as possible
D	2°	the lamp and scale need to be as far from the mirror as possible

24 A student draws a diagram to illustrate the different sections of a longitudinal wave.

Which labelled section is a rarefaction?



25 The diagram shows white light passing through a prism.



Which description of what happens as the light passes into the prism is correct?

- A** The speed of the red light is less than the speed of the violet light and the red light is the least refracted.
- B** The speed of the red light is greater than the speed of the violet light and the red light is the least refracted.
- C** The speed of the violet light is less than the speed of the red light and the violet light is the least refracted.
- D** The speed of the violet light is greater than the speed of the red light and the violet light is the least refracted.

200. Question | 0625 Oct-Nov 2020 P2 V2 Q26

- 26** A police car with its siren sounding is stationary in heavy traffic. A pedestrian notices that, although the loudness of the sound produced does not change, the pitch varies.

Which row describes the amplitude and the frequency of the sound?

	amplitude	frequency
A	constant	constant
B	constant	varying
C	varying	constant
D	varying	varying

201. Question | 0625 Oct-Nov 2020 P2 V3 Q21

- 21** Which row correctly describes light waves?

	wave type	direction of vibrations
A	longitudinal	parallel to direction of wave travel
B	longitudinal	perpendicular to direction of wave travel
C	transverse	parallel to direction of wave travel
D	transverse	perpendicular to direction of wave travel

202. Question | 0625 Oct-Nov 2020 P2 V3 Q22

- 22** A water wave has a speed of 2.0 m/s.

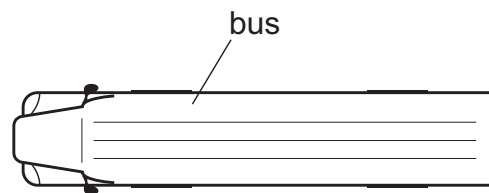
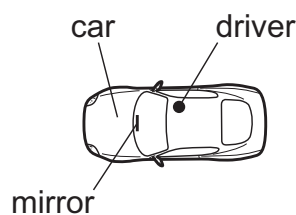
4.0 complete waves pass a point every 10 seconds.

What is the wavelength of the wave?

- A** 0.50 m **B** 0.80 m **C** 5.0 m **D** 8.0 m

203. Question | 0625 Oct-Nov 2020 P2 V3 Q23

- 23** A driver sits in a car. She has a rear-view plane mirror 0.5 m in front of her. A bus is 7.5 m behind the driver.



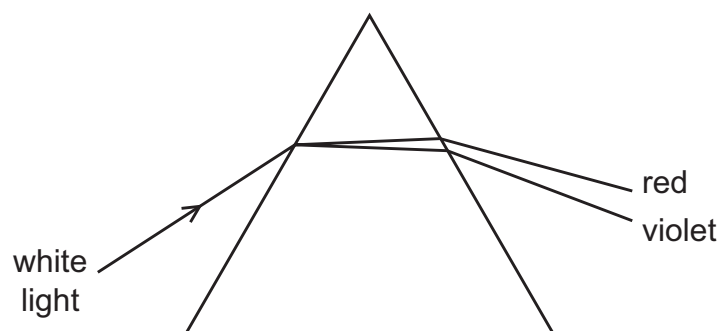
The driver looks at the image of the bus in her mirror.

How far is the image away from her?

- A** 1.0 m **B** 7.5 m **C** 8.0 m **D** 8.5 m

204. Question | 0625 Oct-Nov 2020 P2 V3 Q24

- 24** The diagram shows white light passing through a prism.



Which description of what happens as the light passes into the prism is correct?

- A** The speed of the red light is less than the speed of the violet light and the red light is the least refracted.
- B** The speed of the red light is greater than the speed of the violet light and the red light is the least refracted.
- C** The speed of the violet light is less than the speed of the red light and the violet light is the least refracted.
- D** The speed of the violet light is greater than the speed of the red light and the violet light is the least refracted.

205. Question | 0625 Oct-Nov 2020 P2 V3 Q25

- 25** The diagram shows three types of electromagnetic radiation listed in a particular order. The electromagnetic radiation is travelling in a vacuum.



Which quantities increase in magnitude going from left to right across the list?

- A** frequency only
- B** neither speed nor frequency
- C** speed and frequency
- D** speed only

206. Question | 0625 Oct-Nov 2020 P2 V3 Q26

- 26** A sound wave travels through air.

What name is given to a region in which the air molecules are further apart than normal?

- A** compression
- B** contraction
- C** rarefaction
- D** vacuum

207. Question | 0625 Oct-Nov 2020 P2 V3 Q27

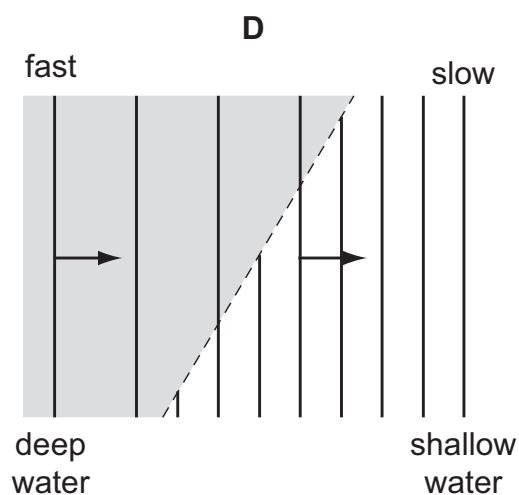
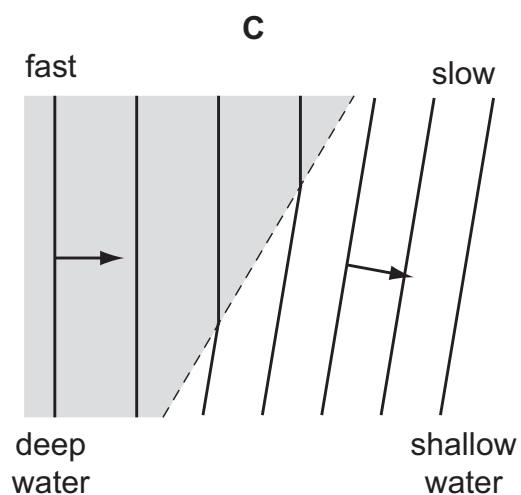
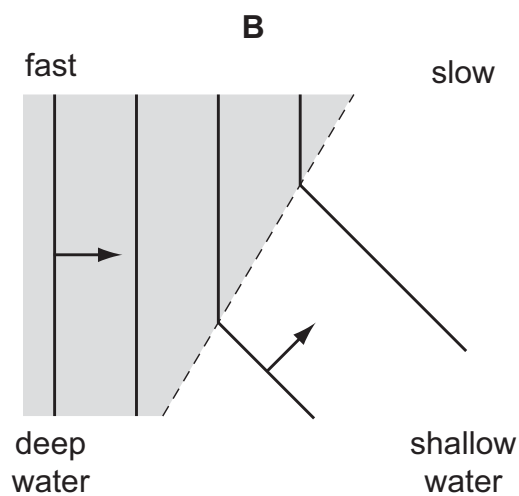
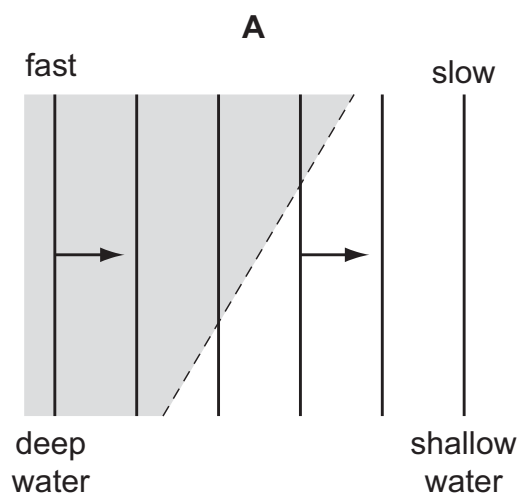
- 27** A police car with its siren sounding is stationary in heavy traffic. A pedestrian notices that, although the loudness of the sound produced does not change, the pitch varies.

Which row describes the amplitude and the frequency of the sound?

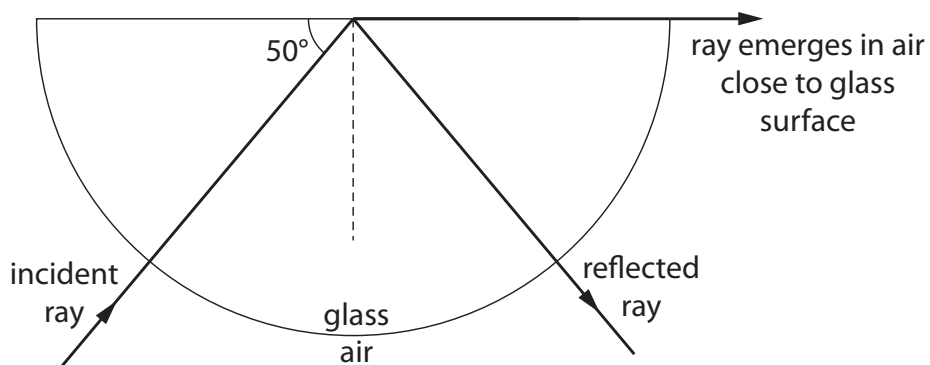
	amplitude	frequency
A	constant	constant
B	constant	varying
C	varying	constant
D	varying	varying

24 The diagrams show water waves that move more slowly after passing into shallow water.

Which diagram shows what happens to the waves?



25 The diagram shows a ray of monochromatic light passing through a semi-circular glass block.

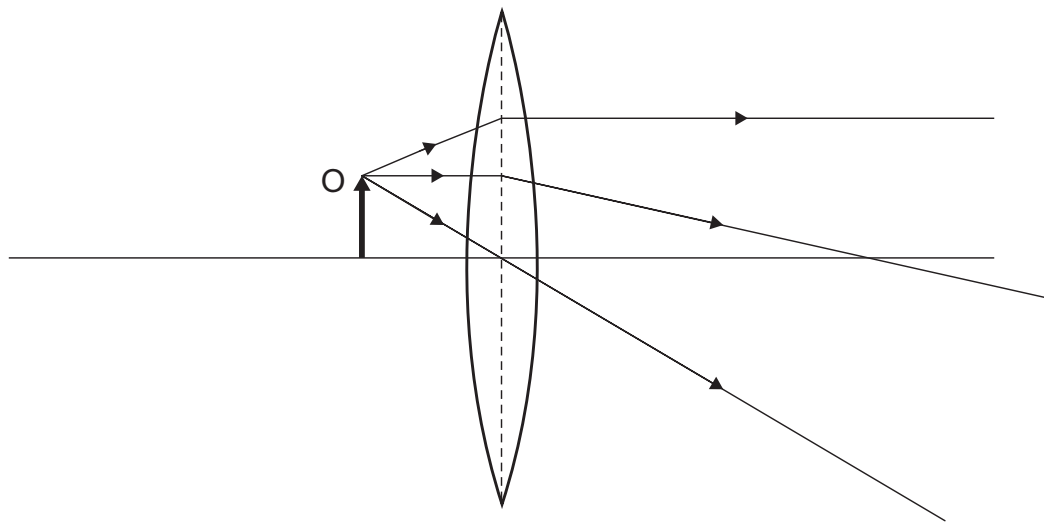


What is the refractive index of the glass?

- A** 0.64 **B** 0.77 **C** 1.31 **D** 1.56

26 An object O is placed close to a thin converging lens.

The diagram represents three rays from the top of O passing through the lens.

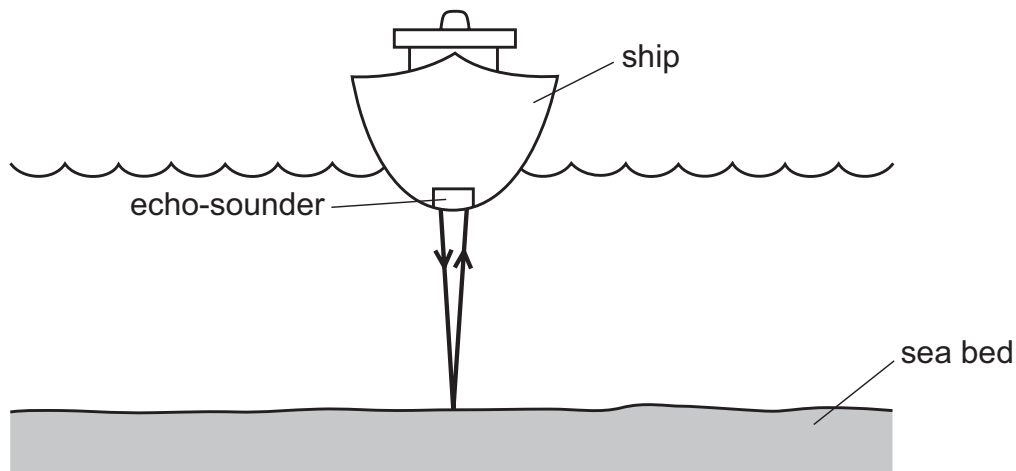


Which type of image is produced by the lens when the object O is in this position?

- A** real and diminished
- B** real and enlarged
- C** virtual and diminished
- D** virtual and enlarged

211. Question | 0625 Specimen 2020 P2 Q27

- 27** An echo-sounder on a ship produces a pulse of sound. The echo is received by the echo-sounder after two seconds.



The speed of sound in sea-water is 1500 m/s .

What is the depth of the sea-water below the ship?

- A** 750 m **B** 1500 m **C** 3000 m **D** 6000 m

212. Question | 0625 Feb-March 2021 P2 V2 Q20

- 20** What is the approximate wavelength in air of the highest frequency sound that can be heard by a normal healthy person?

- A** 0.02 m **B** 60 m **C** 20 000 m **D** 7 000 000 m

213. Question | 0625 Feb-March 2021 P2 V2 Q21

- 21** What causes the change in direction when light travels from air into glass?

- A** The amplitude of the light changes.
B The colour of the light changes.
C The frequency of the light changes.
D The speed of the light changes.

214. Question | 0625 Feb-March 2021 P2 V2 Q22

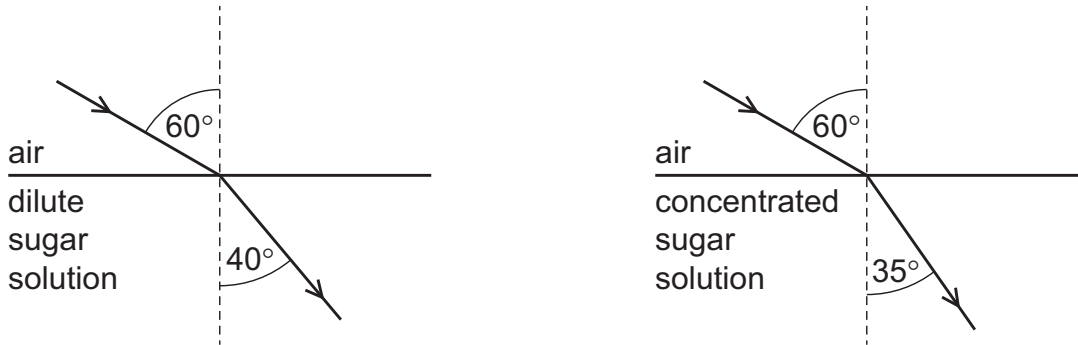
22 Light from a torch is incident on a plane mirror. The angle of incidence is 38° .

What is the angle of reflection?

- A** 38° **B** 52° **C** 76° **D** 142°

215. Question | 0625 Feb-March 2021 P2 V2 Q23

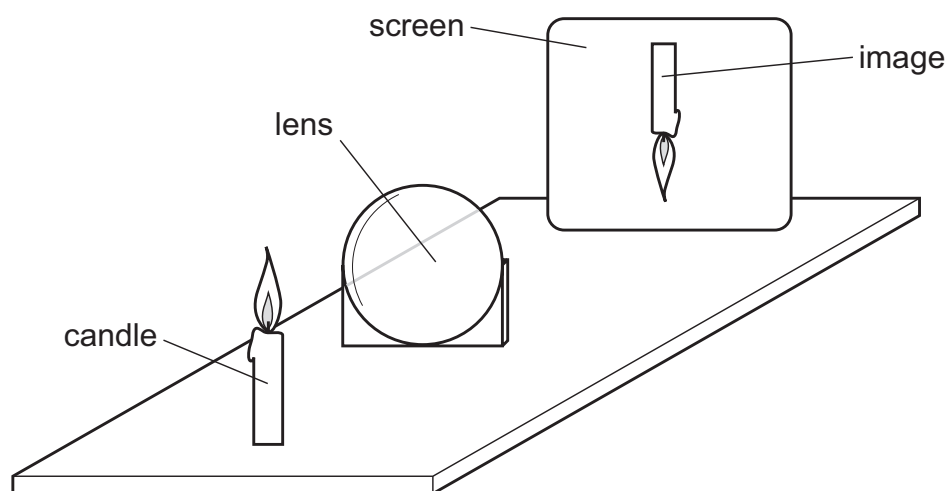
23 Two rays with an angle of incidence of 60° pass into dilute and concentrated sugar-water solutions. The refractions are shown.



Which row is correct?

	refractive index as concentration increases	speed through solution as concentration increases
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

24 A thin converging lens is used to produce a sharp image of a candle.



Various sharp images are produced on the screen by moving the lens and the screen backwards and forwards.

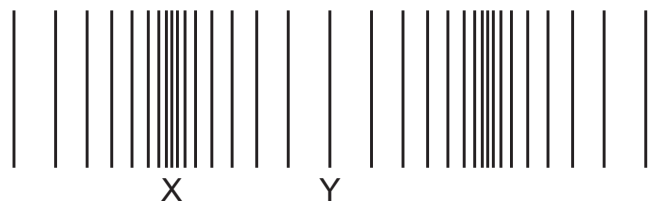
Which statement is **always** correct?

- A** The image is at the principal focus (focal point) of the lens.
- B** The image is bigger than the object.
- C** The image is closer to the lens than the object.
- D** The image is inverted.

25 Which row gives the approximate speeds at which ultraviolet waves travel in air and in a vacuum?

	<u>speed in air</u> m/s	<u>speed in a vacuum</u> m/s
A	340	3.0×10^8
B	340	340
C	3.0×10^8	340
D	3.0×10^8	3.0×10^8

26 The diagram represents a sound wave.



What are the names of the parts of the sound wave labelled X and Y?

	X	Y
A	amplitude	wavelength
B	compression	rarefaction
C	rarefaction	amplitude
D	wavelength	compression

27 The speed of sound is different in different states of matter.

The speed of sound in liquid water is 1500 m/s.

Which row correctly compares the speed of sound in ice and the speed of sound in water vapour with the speed of sound in water?

	<u>speed of sound in ice</u> m/s	<u>speed of sound in steam</u> m/s
A	less than 1500	less than 1500
B	less than 1500	more than 1500
C	more than 1500	less than 1500
D	more than 1500	more than 1500

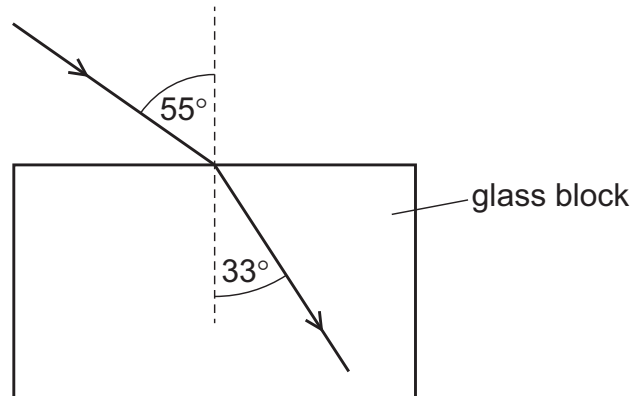
21 A water wave passes into a region where the wave travels more slowly.

As it passes into the slow region, what happens to the frequency and what happens to the wavelength of the wave?

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

- 22** Light travelling at a speed of $3.0 \times 10^8 \text{ m/s}$ strikes the surface of a glass block and undergoes refraction as it enters the block.

The diagram shows a ray of this light before and after it enters the block.

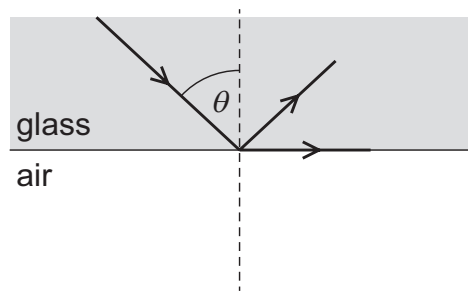


What is the speed of light in the glass?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.0 \times 10^8 \text{ m/s}$
- C** $4.5 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

222. Question | 0625 May-June 2021 P2 V1 Q23

- 23** The diagram shows a narrow beam of light incident on a glass-air boundary. Some of the light emerges along the surface of the glass and some is reflected back into the glass.



Which row is correct?

	this is an example of total internal reflection	angle θ is the critical angle
A	no	yes
B	no	no
C	yes	no
D	yes	yes

223. Question | 0625 May-June 2021 P2 V1 Q25

- 25** A remote-controlled vehicle is travelling on the surface of a planet. The vehicle senses an obstacle ahead. It sends a radio message to the control room from where it is being controlled. The control room is 2.4×10^6 km away from the vehicle. The control room sends a message back to the vehicle telling it to stop.

What is the minimum time that elapses between the vehicle sensing the obstacle and receiving the message back from the control room?

- A** 8.0 ms **B** 16 ms **C** 8.0 s **D** 16 s

224. Question | 0625 May-June 2021 P2 V1 Q26

26 A sound wave is travelling outwards from a loudspeaker into the surrounding air.

Here are three statements.

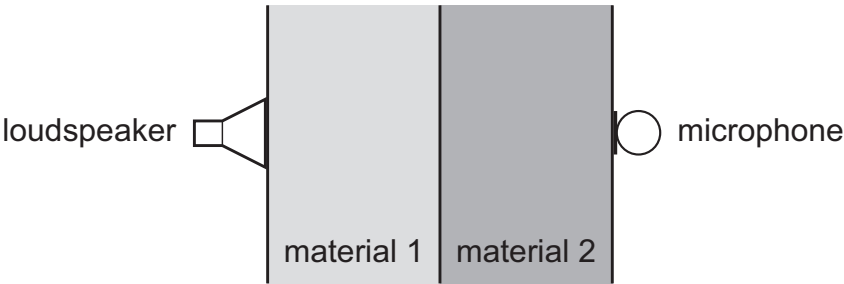
- 1 The air pressure is lower at a rarefaction compared with undisturbed air.
- 2 The density of the air is less at a compression compared with undisturbed air.
- 3 The distance from a compression to a rarefaction equals half a wavelength.

Which statements about the sound wave are correct?

- A** 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

225. Question | 0625 May-June 2021 P2 V1 Q27

27 The sound from a loudspeaker must pass through two materials to reach a microphone.



Which combination of materials gives the shortest time for the sound to reach the microphone?

	material 1	material 2
A	air	hydrogen
B	air	water
C	copper	aluminium
D	water	oil

226. Question | 0625 May-June 2021 P2 V1 Q28

28 Diagram 1 shows a small compass needle with its poles marked. It is not near any magnetic materials.

Diagram 2 shows a bar magnet with its poles marked. The compass needle is placed at point P.

diagram 1



diagram 2



•P

In which direction will the N pole of the compass needle point?

- A** to the left
- B** to the right
- C** down the page
- D** up the page

227. Question | 0625 May-June 2021 P2 V2 Q21

21 A water wave passes into a region where the wave travels more slowly.

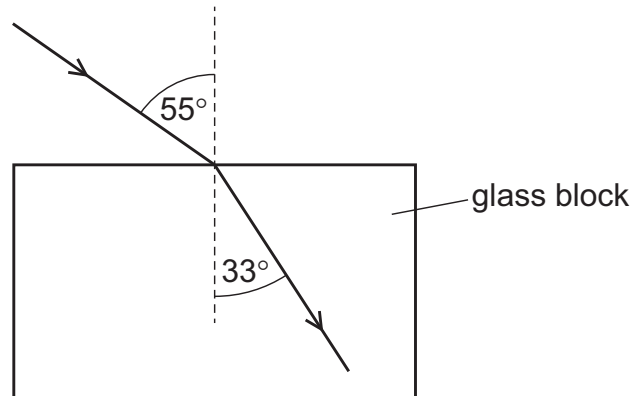
As it passes into the slow region, what happens to the frequency and what happens to the wavelength of the wave?

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

228. Question | 0625 May-June 2021 P2 V2 Q22

- 22** Light travelling at a speed of $3.0 \times 10^8 \text{ m/s}$ strikes the surface of a glass block and undergoes refraction as it enters the block.

The diagram shows a ray of this light before and after it enters the block.



What is the speed of light in the glass?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.0 \times 10^8 \text{ m/s}$
- C** $4.5 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

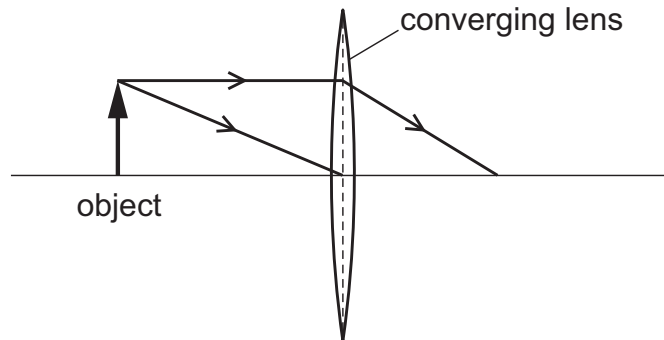
229. Question | 0625 May-June 2021 P2 V2 Q23

- 23** Which statement about the image of an object formed in a plane mirror is correct?

- A** It is smaller than the object.
- B** It is the same size as the object.
- C** It is larger than the object.
- D** It is inverted.

24 An object is placed in front of a thin converging lens.

The diagram shows the paths of two rays from the top of the object.



An image of the object is formed on a screen to the right of the lens.

How does this image compare with the object?

- A** It is larger and inverted.
- B** It is larger and the same way up.
- C** It is smaller and inverted.
- D** It is smaller and the same way up.

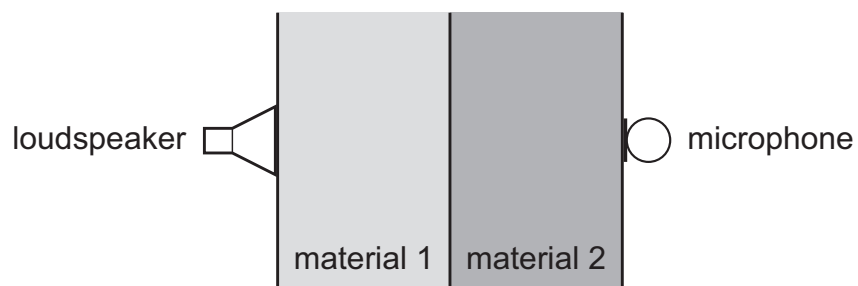
25 Here are three statements about the speed of electromagnetic waves.

- 1 The speed of an electromagnetic wave in a vacuum is 340 m/s.
- 2 The speed of an electromagnetic wave in a vacuum is 3.0×10^8 m/s.
- 3 The speed of an electromagnetic wave in a vacuum is approximately the same as in air.

Which statements are correct?

- A** 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

26 The sound from a loudspeaker must pass through two materials to reach a microphone.



Which combination of materials gives the shortest time for the sound to reach the microphone?

	material 1	material 2
A	air	hydrogen
B	air	water
C	copper	aluminium
D	water	oil

21 A water wave passes into a region where the wave travels more slowly.

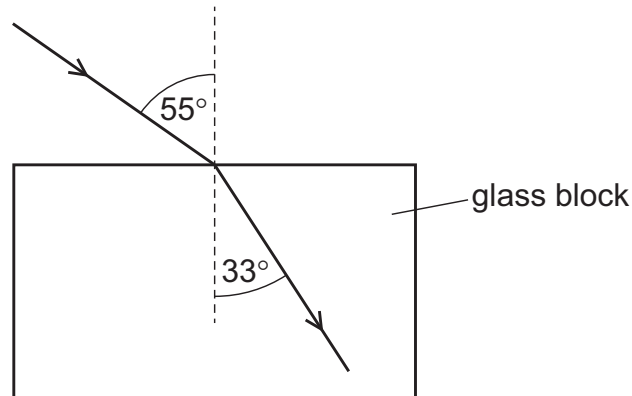
As it passes into the slow region, what happens to the frequency and what happens to the wavelength of the wave?

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

234. Question | 0625 May-June 2021 P2 V3 Q22

- 22** Light travelling at a speed of $3.0 \times 10^8 \text{ m/s}$ strikes the surface of a glass block and undergoes refraction as it enters the block.

The diagram shows a ray of this light before and after it enters the block.



What is the speed of light in the glass?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.0 \times 10^8 \text{ m/s}$
- C** $4.5 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

235. Question | 0625 May-June 2021 P2 V3 Q23

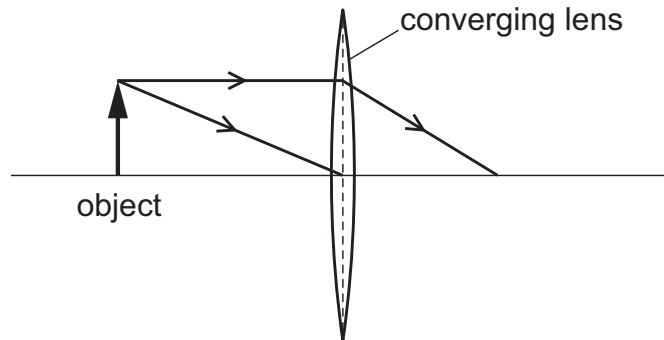
- 23** A beam of light is monochromatic.

What does monochromatic mean?

- A** All the waves in the beam must have the same frequency only.
- B** All the waves in the beam must have the same amplitude only.
- C** All the waves in the beam must have the same speed only.
- D** All the waves in the beam must have the same amplitude, frequency and speed.

24 An object is placed in front of a thin converging lens.

The diagram shows the paths of two rays from the top of the object.



An image of the object is formed on a screen to the right of the lens.

How does this image compare with the object?

- A** It is larger and inverted.
- B** It is larger and the same way up.
- C** It is smaller and inverted.
- D** It is smaller and the same way up.

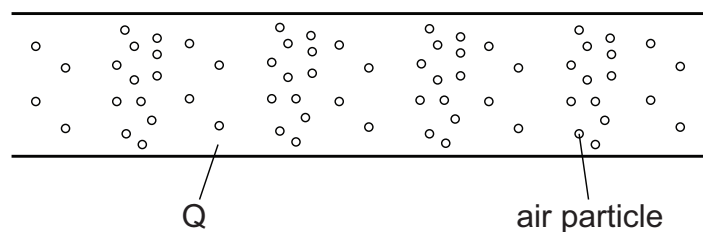
237. Question | 0625 May-June 2021 P2 V3 Q25

- 25** Which row correctly describes what happens to the frequency and to the speed of electromagnetic waves as we move through the spectrum from γ -rays to radio waves?

	frequency	speed in a vacuum
A	decreases	increases
B	decreases	remains the same
C	increases	decreases
D	increases	remains the same

238. Question | 0625 May-June 2021 P2 V3 Q26

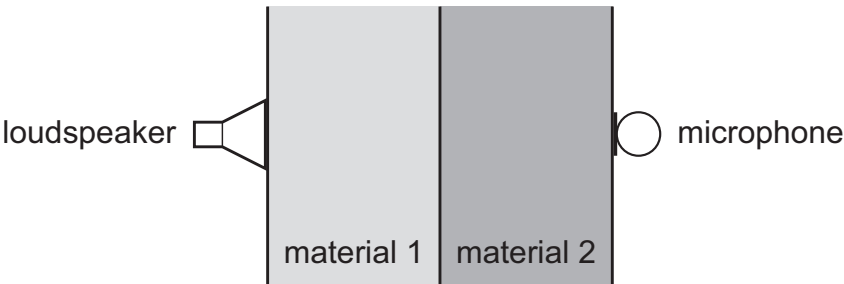
- 26** The diagram shows a model of a sound wave passing through air in an open tube.



What is the region Q?

- A** a compression which is a region of high pressure
- B** a compression which is a region of low pressure
- C** a rarefaction which is a region of high pressure
- D** a rarefaction which is a region of low pressure

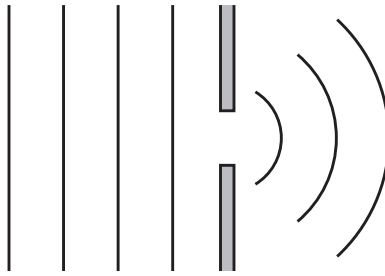
27 The sound from a loudspeaker must pass through two materials to reach a microphone.



Which combination of materials gives the shortest time for the sound to reach the microphone?

	material 1	material 2
A	air	hydrogen
B	air	water
C	copper	aluminium
D	water	oil

17 The diagram shows waves in a ripple tank containing water.



The waves approach a barrier and pass through the gap in the barrier.

The size of the gap is about the same size as the wavelength of the ripples.

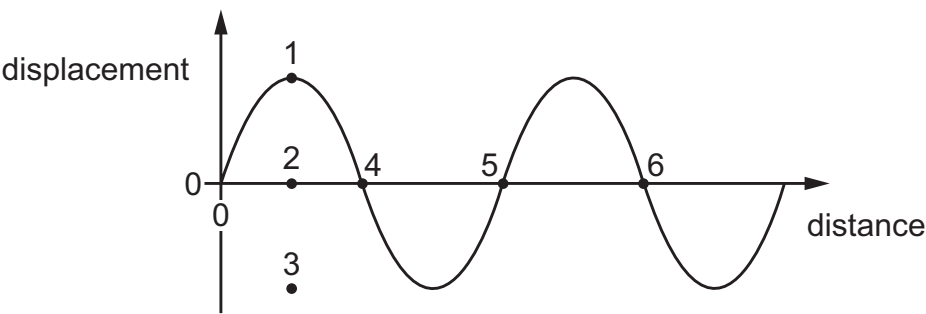
The gap size is increased.

What happens to the ripple pattern to the right of the barrier?

- A** The ripples are closer together.
- B** The ripples are further apart.
- C** The ripples are more curved.
- D** The ripples are less curved.

241. Question | 0625 Oct-Nov 2021 P2 V1 Q18

18 The diagram shows a wave.



Which row correctly indicates the amplitude and the wavelength of the wave?

	amplitude	wavelength
A	the distance between 1 and 2	the distance between 4 and 5
B	the distance between 1 and 2	the distance between 4 and 6
C	the distance between 1 and 3	the distance between 4 and 5
D	the distance between 1 and 3	the distance between 4 and 6

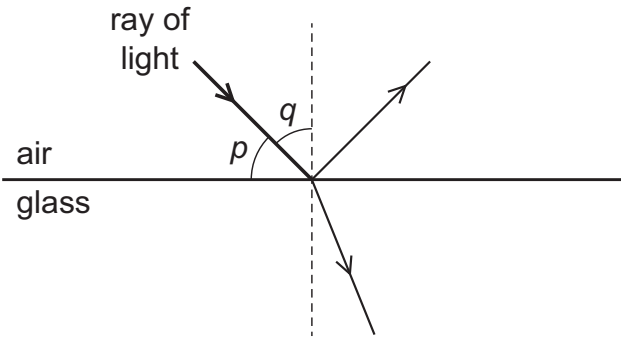
242. Question | 0625 Oct-Nov 2021 P2 V1 Q19

19 Two beams of light are both the same colour of red. One beam is travelling through air. The other beam is travelling through water. Each beam has a different brightness.

Which quantity is the same for both sets of waves?

- A amplitude
- B frequency
- C speed
- D wavelength

20 The diagram shows a ray of light in air incident on a glass block. Some of the light is refracted and some of the light is reflected. Two angles, p and q , are marked on the diagram.

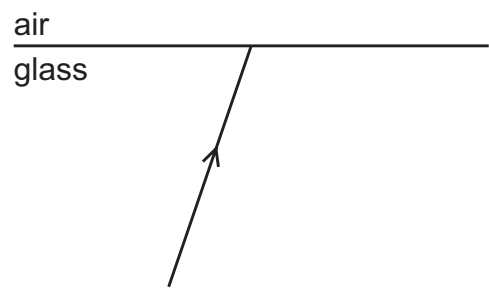


Which row gives the angle of incidence and states whether total internal reflection occurs?

	angle of incidence	total internal reflection
A	p	no
B	p	yes
C	q	no
D	q	yes

244. Question | 0625 Oct-Nov 2021 P2 V1 Q21

21 The diagram shows a ray of light in glass incident on the surface between the glass and air.



What happens if the angle of incidence is made larger than the critical angle for the glass?

- A** The angle of refraction becomes equal to 90° .
- B** There is a refracted ray and a ray reflected inside the glass.
- C** There is a refracted ray only.
- D** There is only a ray reflected inside the glass.

245. Question | 0625 Oct-Nov 2021 P2 V1 Q22

22 The Sun emits infrared radiation and light.

Light from the Sun reaches the Earth in 8 minutes.

Which row gives correct information about the infrared radiation?

	wavelength of infrared radiation	time taken for infrared radiation to reach the Earth
A	longer than wavelength of light	8 minutes
B	longer than wavelength of light	much less than 8 minutes
C	shorter than wavelength of light	8 minutes
D	shorter than wavelength of light	much more than 8 minutes

246. Question | 0625 Oct-Nov 2021 P2 V1 Q23

23 Which list shows regions of the electromagnetic spectrum in order of increasing frequency?

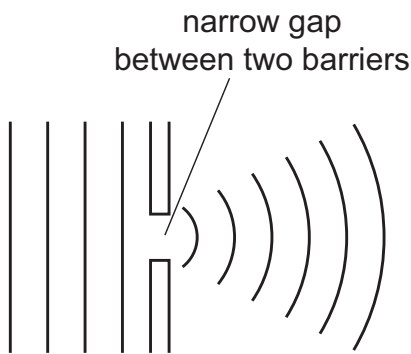
- A** X-ray $\rightarrow$ ultraviolet $\rightarrow$ visible light $\rightarrow$ infrared
- B** X-ray $\rightarrow$ infrared $\rightarrow$ visible light $\rightarrow$ ultraviolet
- C** infrared $\rightarrow$ visible light $\rightarrow$ ultraviolet $\rightarrow$ X-ray
- D** ultraviolet $\rightarrow$ visible light $\rightarrow$ infrared $\rightarrow$ X-ray

247. Question | 0625 Oct-Nov 2021 P2 V1 Q24

- 24** What is ultrasound?
- A** sound waves that are so loud that they damage human hearing
 - B** sound waves that are too high-pitched for humans to hear
 - C** sound waves that are too low-pitched for humans to hear
 - D** sound waves that are too quiet for humans to hear

248. Question | 0625 Oct-Nov 2021 P2 V2 Q17

- 17** The diagram shows the pattern of water waves as they pass through a narrow gap.



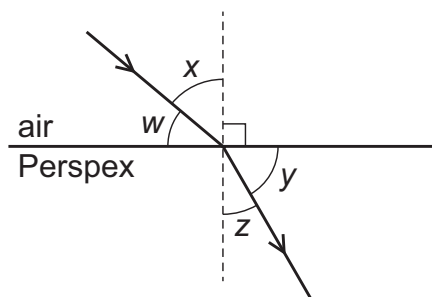
Which row names the process shown and describes the effect of using a wider gap?

	name of process	wider gap
A	refraction	waves spread out less
B	refraction	waves spread out more
C	diffraction	waves spread out less
D	diffraction	waves spread out more

18 Which row is **not** correct for a wave on the surface of water?

	quantity	usual unit
A	amplitude	m
B	frequency	Hz
C	wavelength	λ
D	speed	m/s

19 The diagram shows how a ray of light refracts when going from air to Perspex.

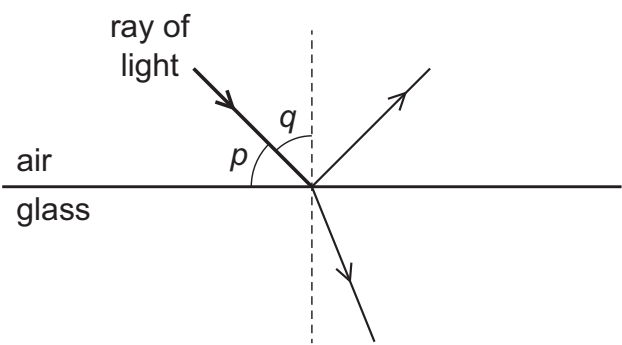


The critical angle of Perspex is c .

Which expression is correct?

- A** $\frac{\sin x}{\sin z} = \sin c$
- B** $\frac{\sin z}{\sin x} = \sin c$
- C** $\frac{\sin w}{\sin y} = \sin c$
- D** $\frac{\sin y}{\sin w} = \sin c$

20 The diagram shows a ray of light in air incident on a glass block. Some of the light is refracted and some of the light is reflected. Two angles, p and q , are marked on the diagram.



Which row gives the angle of incidence and states whether total internal reflection occurs?

	angle of incidence	total internal reflection
A	p	no
B	p	yes
C	q	no
D	q	yes

21 The letter F is reflected in a mirror.



What does the optical image look like?

A

F

B

Ǝ

C

⌒

D

⌒

22 The Sun emits infrared radiation and light.

Light from the Sun reaches the Earth in 8 minutes.

Which row gives correct information about the infrared radiation?

	wavelength of infrared radiation	time taken for infrared radiation to reach the Earth
A	longer than wavelength of light	8 minutes
B	longer than wavelength of light	much less than 8 minutes
C	shorter than wavelength of light	8 minutes
D	shorter than wavelength of light	much more than 8 minutes

254. Question | 0625 Oct-Nov 2021 P2 V2 Q23

23 Which statement about electromagnetic waves is **not** correct?

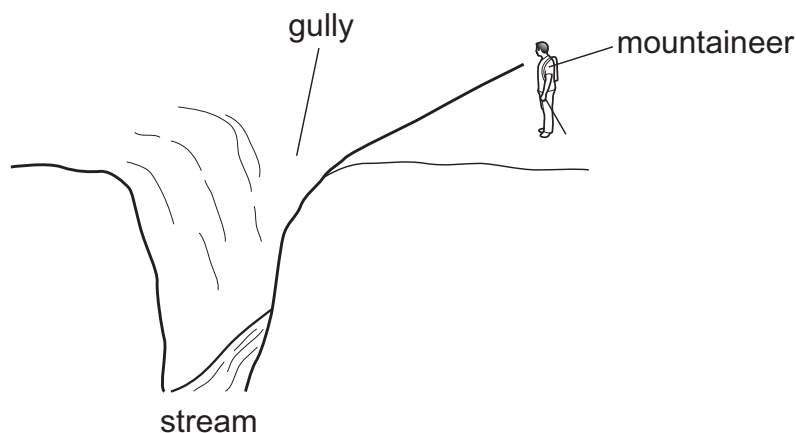
- A** They travel at 3×10^8 m/s in a vacuum.
- B** They transfer energy.
- C** They travel at 340 m/s in air.
- D** They are transverse waves.

255. Question | 0625 Oct-Nov 2021 P2 V2 Q24

24 What is ultrasound?

- A** sound waves that are so loud that they damage human hearing
- B** sound waves that are too high-pitched for humans to hear
- C** sound waves that are too low-pitched for humans to hear
- D** sound waves that are too quiet for humans to hear

- 17** In the diagram, the mountaineer can hear the stream although he cannot see it. When he is closer to the gully, he can both hear and see the stream. When he is further from the gully, he can neither hear nor see the stream.



Which statement is **not** correct?

- A** As he approaches the gully edge, he hears first the short wavelength, higher frequencies and then the long wavelength, lower frequencies.
- B** As he approaches the gully edge, the sound becomes louder.
- C** He hears the stream because some of the sound is diffracted.
- D** He hears the stream because some of the sound is reflected from the opposite wall of the gully.

- 18** Which row correctly defines the frequency and the speed of a wave?

	frequency	speed
A	number of waves	distance travelled per unit time
B	number of waves	time taken for one complete wave to pass a point
C	number of waves passing per unit time	distance travelled per unit time
D	number of waves passing per unit time	time taken for one complete wave to pass a point

19 A ray of light travels from air into a glass block.

	in air	in glass
speed of ray	v_a	v_g
wavelength of ray	λ_a	λ_g
frequency of ray	f_a	f_g

Three suggestions as to how the refractive index of glass n may be calculated are listed.

1 $n = \frac{v_a}{v_g}$

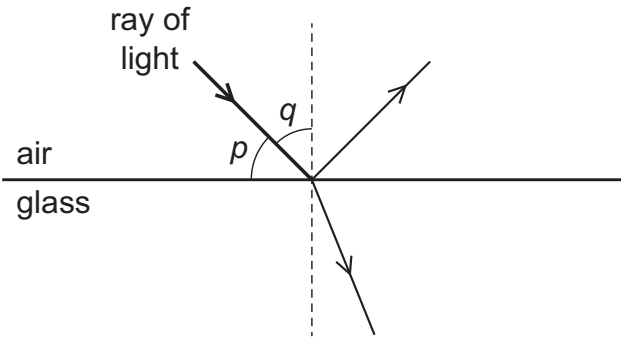
2 $n = \frac{\lambda_a}{\lambda_g}$

3 $n = \frac{f_a}{f_g}$

Which suggestions are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

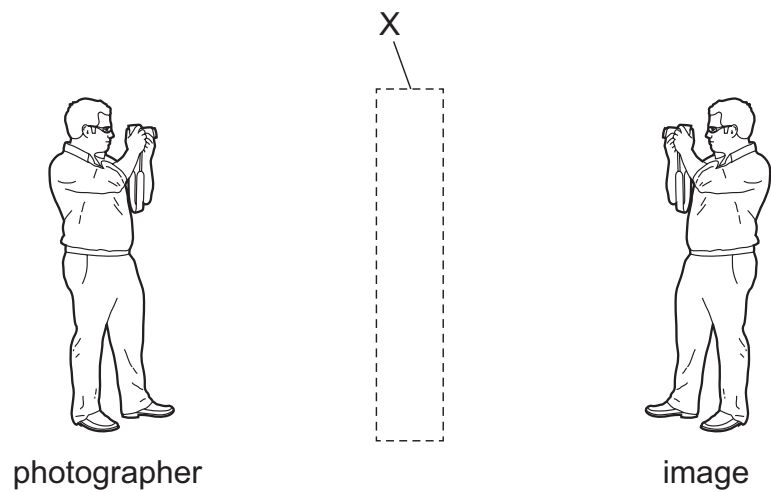
20 The diagram shows a ray of light in air incident on a glass block. Some of the light is refracted and some of the light is reflected. Two angles, p and q , are marked on the diagram.



Which row gives the angle of incidence and states whether total internal reflection occurs?

	angle of incidence	total internal reflection
A	p	no
B	p	yes
C	q	no
D	q	yes

21 A photographer sees his image as shown.



What could X be?

A



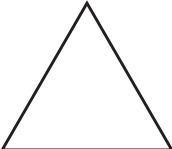
mirror

B



translucent glass block

C



transparent glass prism

D



transparent semicircular glass block

22 The Sun emits infrared radiation and light.

Light from the Sun reaches the Earth in 8 minutes.

Which row gives correct information about the infrared radiation?

	wavelength of infrared radiation	time taken for infrared radiation to reach the Earth
A	longer than wavelength of light	8 minutes
B	longer than wavelength of light	much less than 8 minutes
C	shorter than wavelength of light	8 minutes
D	shorter than wavelength of light	much more than 8 minutes

262. Question | 0625 Oct-Nov 2021 P2 V3 Q23

- 23** Which row gives the typical values of the speed of sound at room temperature in the materials stated?

	<u>speed of sound</u> m/s		
	air	water	iron
A	340	1500	5100
B	340	5100	1500
C	5100	1500	340
D	3.0×10^8	3.0×10^8	3.0×10^8

263. Question | 0625 Oct-Nov 2021 P2 V3 Q24

- 24** What is ultrasound?

- A** sound waves that are so loud that they damage human hearing
- B** sound waves that are too high-pitched for humans to hear
- C** sound waves that are too low-pitched for humans to hear
- D** sound waves that are too quiet for humans to hear

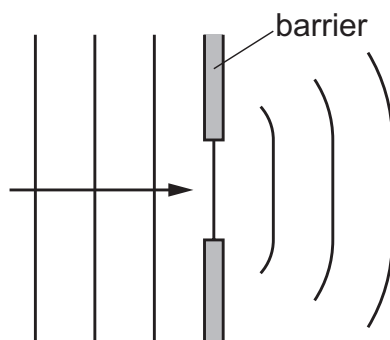
264. Question | 0625 Feb-March 2022 P2 V2 Q21

- 21** A tank contains water. Ripples are produced on the surface of the water. Refraction is observed.

What causes the ripples to refract?

- A** The cold water in the tank is replaced by warm water.
- B** The ripples change speed as they move from deep to shallow water.
- C** The ripples hit the wall of the tank.
- D** The ripples pass through a narrow gap.

22 The diagram shows wavefronts of a water wave passing through a gap in a barrier.

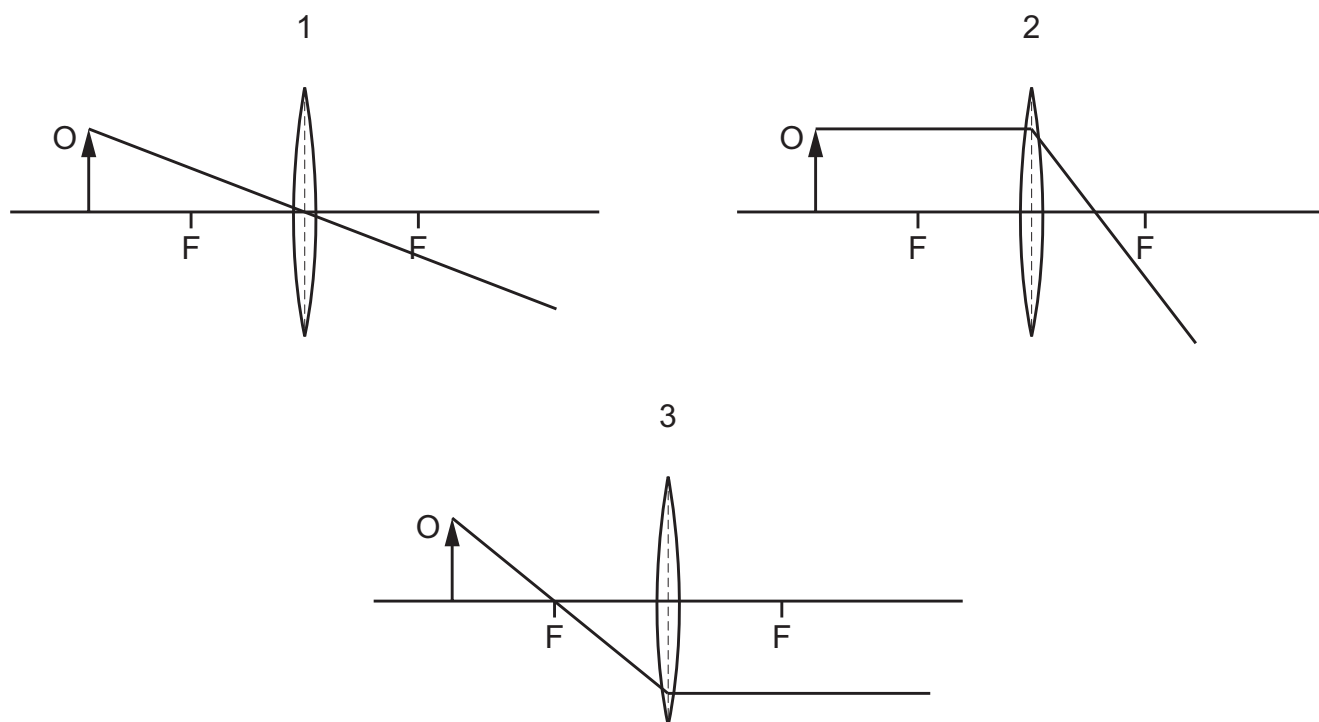


Which change will increase the diffraction of the wave as it passes through the gap?

- A** Increase the amplitude of the wave.
- B** Increase the width of the gap.
- C** Reduce the depth of water.
- D** Reduce the frequency of the wave.

23 The diagrams each show a ray of light from an object O passing through a thin converging lens.

The principal focuses in each diagram are labelled F.

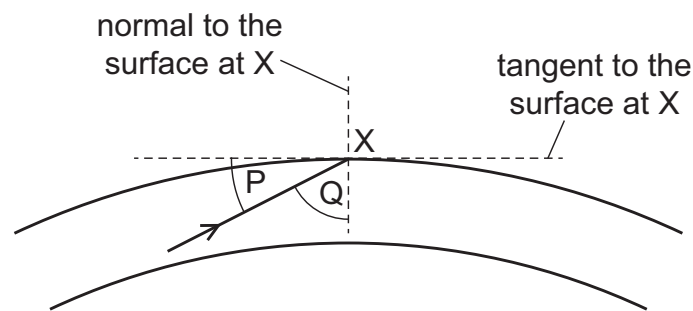


Which diagrams are correct?

- A** 1 and 2
- B** 2 only
- C** 1 and 3
- D** 3 only

267. Question | 0625 Feb-March 2022 P2 V2 Q24

- 24** The diagram shows a ray of light inside an optical fibre approaching point X.



The light is totally reflected within the fibre.

The refractive index of the material of the optical fibre is 1.39.

Which condition ensures that total internal reflection occurs?

- A** $Q < 45^\circ$ **B** $Q > 47^\circ$ **C** $P > 47^\circ$ **D** $P = Q$

268. Question | 0625 Feb-March 2022 P2 V2 Q25

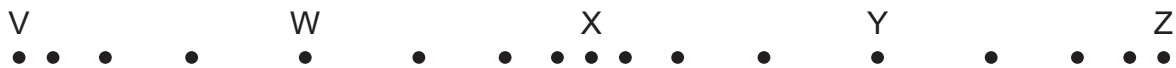
- 25** An eclipse of the Sun happens when the Moon comes between the Earth and the Sun.

Which statement is correct?

- A** Infrared radiation from the Sun disappears before visible light and ultraviolet radiation.
B Ultraviolet radiation from the Sun disappears before visible light and infrared radiation.
C Visible light from the Sun disappears before ultraviolet radiation and infrared radiation.
D Infrared radiation, ultraviolet radiation and visible light from the Sun all disappear at the same moment.

269. Question | 0625 Feb-March 2022 P2 V2 Q26

26 The diagram shows air particles in a sound wave.

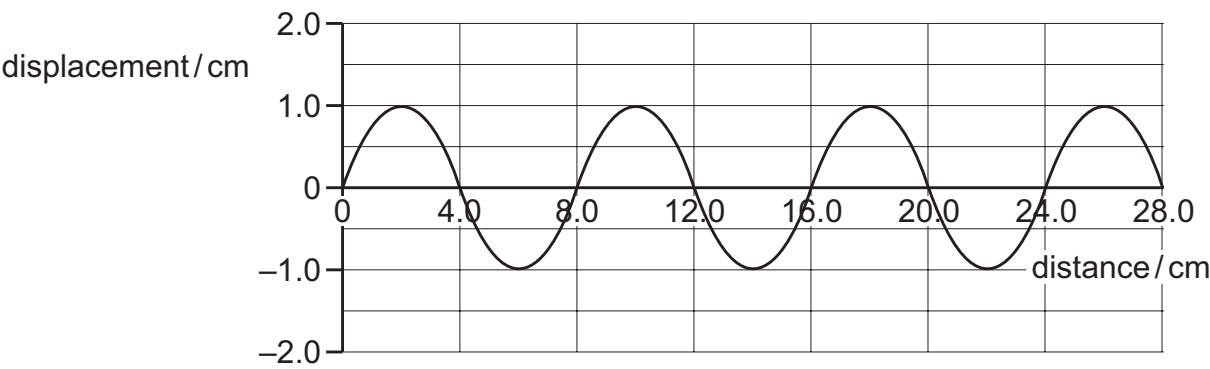


Which row correctly identifies the position of a compression and position of a rarefaction?

	compression	rarefaction
A	X	Y
B	Y	X
C	V	Z
D	Z	V

270. Question | 0625 May-June 2022 P2 V1 Q21

21 The diagram shows a wave.



Which row is correct?

	amplitude of the wave / cm	wavelength of the wave / cm
A	1.0	4.0
B	1.0	8.0
C	2.0	4.0
D	2.0	8.0

271. Question | 0625 May-June 2022 P2 V1 Q22

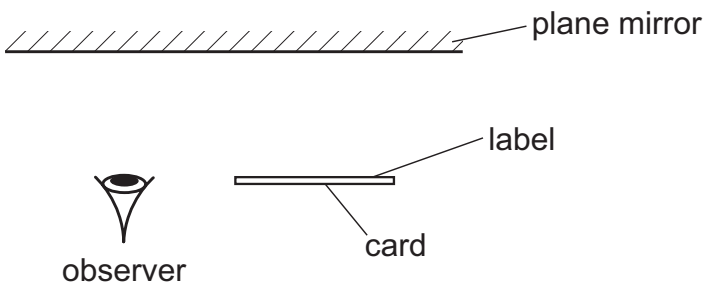
- 22** A sound wave is created by a loudspeaker that vibrates backwards and forwards 96 000 times per minute.

The speed of sound is 320 m/s.

What is the wavelength of the sound wave?

- A** 0.20 m **B** 5.0 m **C** 300 m **D** 18 000 m

23 A card is placed in front of a plane mirror so that its label is facing the mirror, as shown.



The label is shown.



How does the image of the label formed by the mirror appear to the observer?

A

B

C

D

24 A thin converging lens can produce both real and virtual images.

Which row describes a real and a virtual image?

	real image	virtual image
A	rays converge to form the image	image can be projected onto a screen
B	rays converge to form the image	image cannot be projected onto a screen
C	rays diverge to form the image	image can be projected onto a screen
D	rays diverge to form the image	image cannot be projected onto a screen

274. Question | 0625 May-June 2022 P2 V1 Q25

25 The speed of light in air is $3.0 \times 10^8 \text{ m/s}$.

The critical angle for light in a transparent plastic material placed in air is 37° .

What is the speed of light in the plastic material?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.4 \times 10^8 \text{ m/s}$
- C** $3.8 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

275. Question | 0625 May-June 2022 P2 V1 Q26

26 Which part of the electromagnetic spectrum is used by a remote controller for a television?

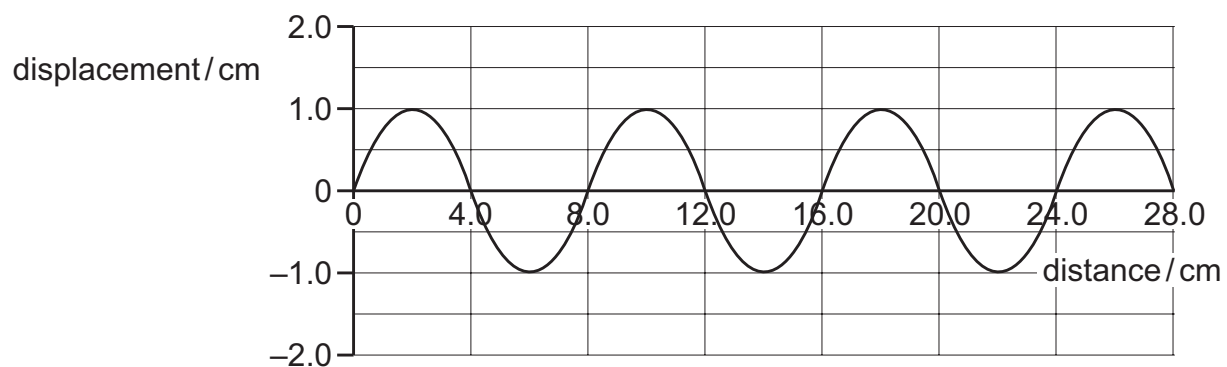
- A** infrared waves
- B** microwaves
- C** radio waves
- D** visible light

276. Question | 0625 May-June 2022 P2 V1 Q27

27 Which statement correctly compares radio waves and X-rays?

- A** Radio waves have a longer wavelength and a greater speed in a vacuum.
- B** Radio waves have a longer wavelength and the same speed in a vacuum.
- C** Radio waves have a shorter wavelength and a greater speed in a vacuum.
- D** Radio waves have a shorter wavelength and the same speed in a vacuum.

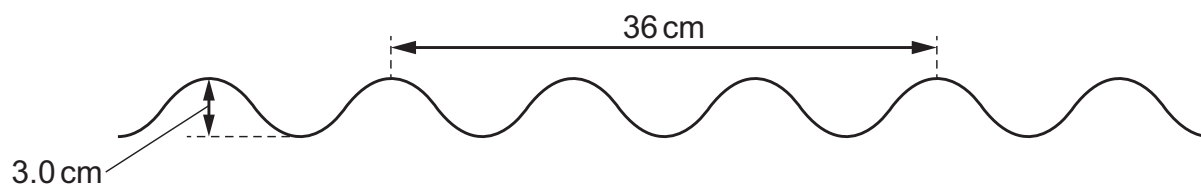
21 The diagram shows a wave.



Which row is correct?

	amplitude of the wave / cm	wavelength of the wave / cm
A	1.0	4.0
B	1.0	8.0
C	2.0	4.0
D	2.0	8.0

22 The water wave shown has a frequency of 4.0 Hz.

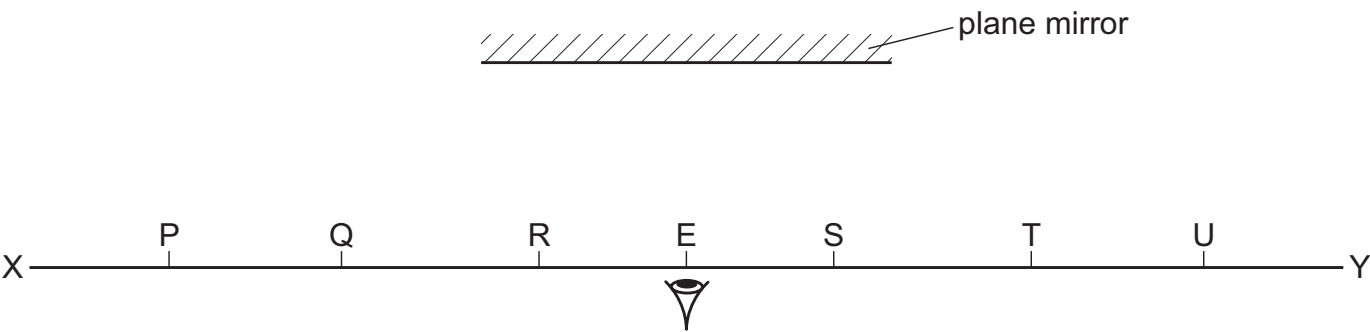


What is the speed of the wave?

- A** 3.0 cm/s **B** 12 cm/s **C** 48 cm/s **D** 72 cm/s

279. Question | 0625 May-June 2022 P2 V2 Q23

23 A student uses one eye to look at images in a plane mirror.



Objects are placed on the line XY.

Which objects give rise to images that can be seen by the eye at E?

- A** P, Q, R, S, T and U
- B** Q, R, S and T only
- C** P and U only
- D** R and S only

280. Question | 0625 May-June 2022 P2 V2 Q24

24 An object is placed in front of a converging lens of focal length 15 cm.

Which row describes the image of the object?

	distance of object from lens / cm	nature of the image
A	40	real, upright, diminished
B	30	virtual, inverted, enlarged
C	20	real, inverted, diminished
D	10	virtual, upright, enlarged

281. Question | 0625 May-June 2022 P2 V2 Q25

25 The speed of light in air is $3.0 \times 10^8 \text{ m/s}$.

The critical angle for light in a transparent plastic material placed in air is 37° .

What is the speed of light in the plastic material?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.4 \times 10^8 \text{ m/s}$
- C** $3.8 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

282. Question | 0625 May-June 2022 P2 V2 Q26

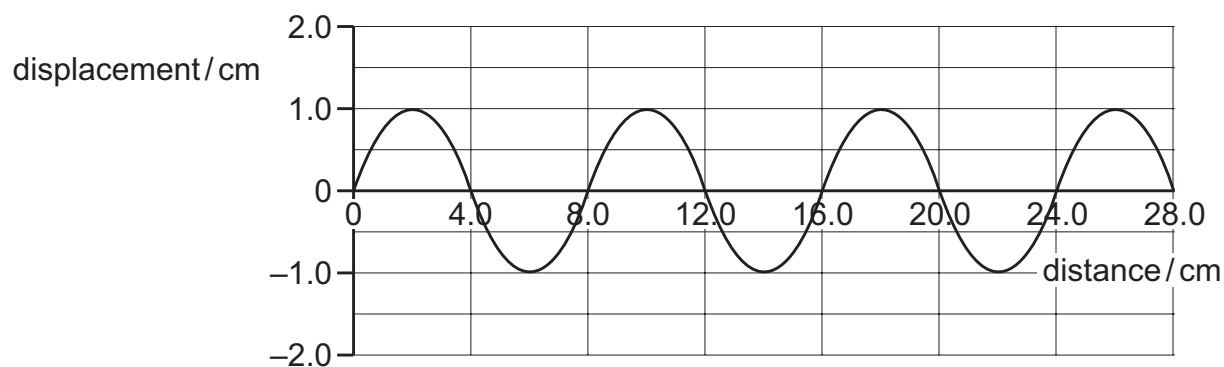
26 Which type of waves are produced by a television remote controller?

- A** infrared waves
- B** radio waves
- C** ultraviolet waves
- D** visible light

27 Which statement correctly compares radio waves and X-rays?

- A** Radio waves have a longer wavelength and a greater speed in a vacuum.
- B** Radio waves have a longer wavelength and the same speed in a vacuum.
- C** Radio waves have a shorter wavelength and a greater speed in a vacuum.
- D** Radio waves have a shorter wavelength and the same speed in a vacuum.

21 The diagram shows a wave.



Which row is correct?

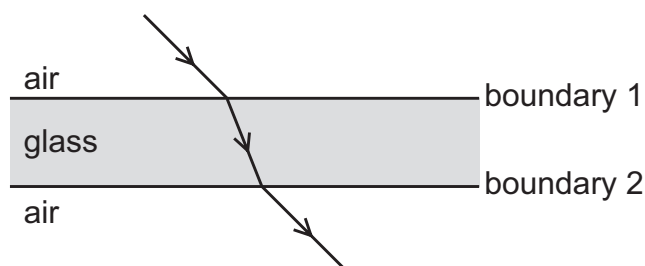
	amplitude of the wave / cm	wavelength of the wave / cm
A	1.0	4.0
B	1.0	8.0
C	2.0	4.0
D	2.0	8.0

22 The wavelength of a beam of X-rays, travelling through air, is 5.4×10^{-10} m.

What is its frequency?

- A** 5.6×10^{-17} Hz
- B** 5.6×10^{11} Hz
- C** 5.6×10^{17} Hz
- D** 5.6×10^{18} Hz

23 A ray of light passes from air through a sheet of glass and out the other side, as shown.



Which two angles are equal to each other?

- A** angle of incidence at boundary 1 and angle of incidence at boundary 2
- B** angle of incidence at boundary 1 and angle of refraction at boundary 1
- C** angle of incidence at boundary 1 and angle of refraction at boundary 2
- D** angle of refraction at boundary 1 and angle of refraction at boundary 2

287. Question | 0625 May-June 2022 P2 V3 Q24

24 A plane mirror is fixed to a vertical wall.

A boy looks at the image of himself in the mirror.

Which statement describes the image formed?

- A** real and upright
- B** real and upside down
- C** virtual and upright
- D** virtual and upside down

288. Question | 0625 May-June 2022 P2 V3 Q25

25 The speed of light in air is $3.0 \times 10^8 \text{ m/s}$.

The critical angle for light in a transparent plastic material placed in air is 37° .

What is the speed of light in the plastic material?

- A** $1.8 \times 10^8 \text{ m/s}$
- B** $2.4 \times 10^8 \text{ m/s}$
- C** $3.8 \times 10^8 \text{ m/s}$
- D** $5.0 \times 10^8 \text{ m/s}$

289. Question | 0625 May-June 2022 P2 V3 Q27

27 Which statement correctly compares radio waves and X-rays?

- A** Radio waves have a longer wavelength and a greater speed in a vacuum.
- B** Radio waves have a longer wavelength and the same speed in a vacuum.
- C** Radio waves have a shorter wavelength and a greater speed in a vacuum.
- D** Radio waves have a shorter wavelength and the same speed in a vacuum.

30 A student compares the wavelength and uses of infrared waves with microwaves.

Which row is correct?

	wavelength of infrared compared to microwaves	use of infrared waves
A	longer	intruder alarms
B	longer	satellite television
C	shorter	intruder alarms
D	shorter	satellite television

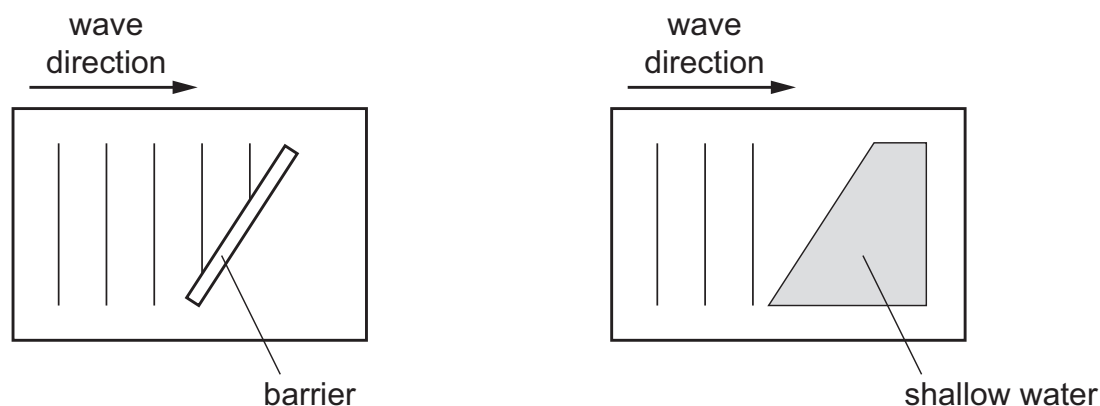
291. Question | 0625 Oct-Nov 2022 P2 V1 Q17

17 A wave source produces 3000 crests every minute. The wave has a speed of 300 m/s.

What is the wavelength of the wave?

- A** 0.10 m **B** 0.17 m **C** 6.0 m **D** 10.0 m

18 The diagrams show two sets of wavefronts in a ripple tank.



A student makes two statements about the waves.

- 1 When the waves reflect from the barrier the direction changes but the wavelength remains the same.
- 2 When the waves refract as they enter the shallow water the direction remains the same, but the wavelength changes.

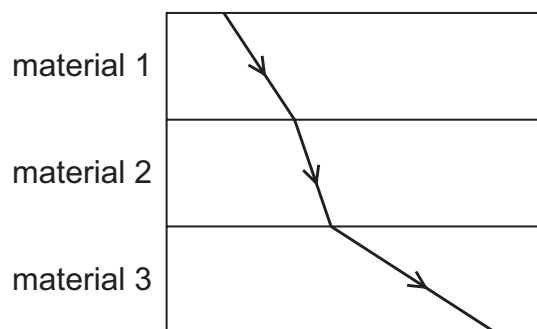
Which statements are correct?

- A** statement 1 and statement 2
- B** statement 1 only
- C** statement 2 only
- D** neither statement 1 nor statement 2

293. Question | 0625 Oct-Nov 2022 P2 V1 Q19

19 A composite block is made by joining together three transparent materials.

The diagram shows a ray of light passing through the composite block.



Which list gives the three materials in order of the speeds of light in the materials, from slowest to fastest?

- A** 1 → 2 → 3 **B** 1 → 3 → 2 **C** 2 → 1 → 3 **D** 2 → 3 → 1

294. Question | 0625 Oct-Nov 2022 P2 V1 Q20

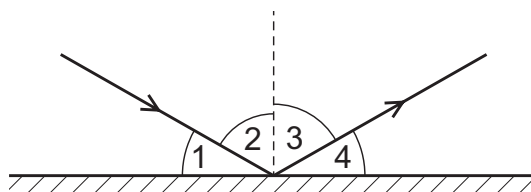
20 An object is placed 30 cm in front of a plane mirror.

Which statement describes the image of the object?

- A** The image is the same size and 30 cm from the object.
B The image is the same size and 60 cm from the object.
C The image is smaller and 30 cm from the object.
D The image is smaller and 60 cm from the object.

295. Question | 0625 Oct-Nov 2022 P2 V1 Q21

21 A ray of light is shone onto the surface of a mirror.



Which two angles represent the angle of incidence and the angle of reflection?

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

296. Question | 0625 Oct-Nov 2022 P2 V1 Q22

22 The speed of sound in air is 330 m/s.

How do the speeds of sound in concrete and water compare with this speed?

	speed in concrete	speed in water
A	greater	greater
B	greater	less
C	less	greater
D	less	less

297. Question | 0625 Oct-Nov 2022 P2 V1 Q23

23 What is the speed of microwaves in air?

- A** $3 \times 10^8 \mu\text{m/s}$
- B** $3 \times 10^8 \text{cm/s}$
- C** $3 \times 10^8 \text{m/s}$
- D** $3 \times 10^8 \text{km/s}$

298. Question | 0625 Oct-Nov 2022 P2 V1 Q24

24 An observer stands at the finish line of a 100 m race. He wants to time the winner's run. He starts his stop-watch as soon as he sees the smoke from the starting gun instead of when he hears the bang.

What is the reason for doing this?

- A** Light travels much faster than sound.
- B** There is a risk he might respond to an echo from a wall.
- C** Humans react slower to sound than to light.
- D** Humans react more quickly to sound than to light.

299. Question | 0625 Oct-Nov 2022 P2 V2 Q16

16 Which piece of equipment is designed to produce a type of electromagnetic wave?

- A** electric fire
- B** electric generator
- C** electric motor
- D** electromagnet

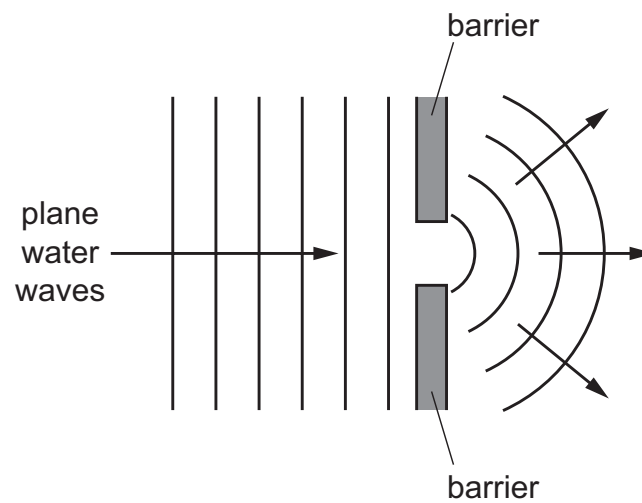
300. Question | 0625 Oct-Nov 2022 P2 V2 Q17

17 A sound wave travels from air into water.

Which row describes what happens to the frequency and the wavelength of the wave?

	frequency	wavelength
A	decreases	increases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	increases

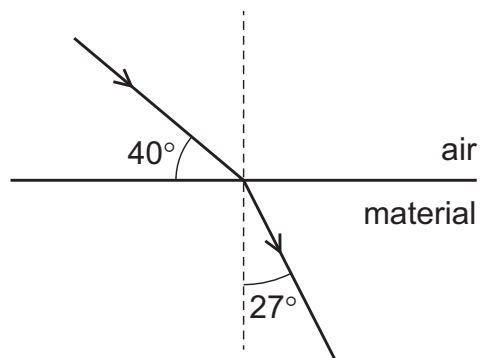
- 18** The diagram shows plane water waves in a ripple tank passing through a gap between two barriers and spreading out.



Which name is given to this effect?

- A** diffraction
- B** reflection
- C** refraction
- D** total internal reflection

19 A ray of light travels from air into a material, as shown.

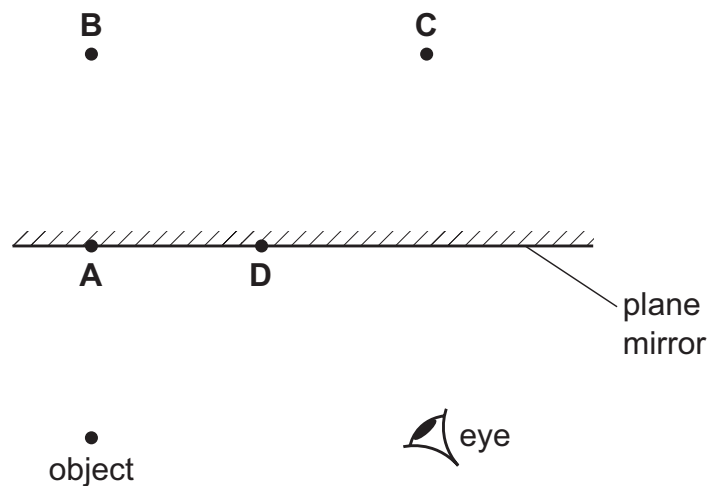


What is the refractive index of the material?

- A** 1.4 **B** 1.5 **C** 1.7 **D** 1.9

20 The diagram shows an object in front of a plane mirror.

At which labelled position is the image of the object formed?



304. Question | 0625 Oct-Nov 2022 P2 V2 Q21

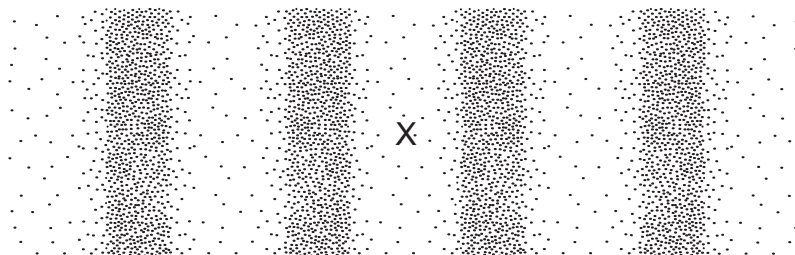
- 21** The angle between an incident ray and the surface of a plane mirror reflecting the ray is 70° .

What is the angle of incidence?

- A** 20° **B** 40° **C** 70° **D** 140°

305. Question | 0625 Oct-Nov 2022 P2 V2 Q22

- 22** The diagram shows the air molecules in part of a sound wave at a particular moment in time.



Which statement is **not** correct?

- A** Earlier, there was compression at X.
B Later, there will be a rarefaction at X.
C This part of the wave is travelling horizontally across the page.
D This part of the wave is travelling towards the top of the page.

306. Question | 0625 Oct-Nov 2022 P2 V2 Q23

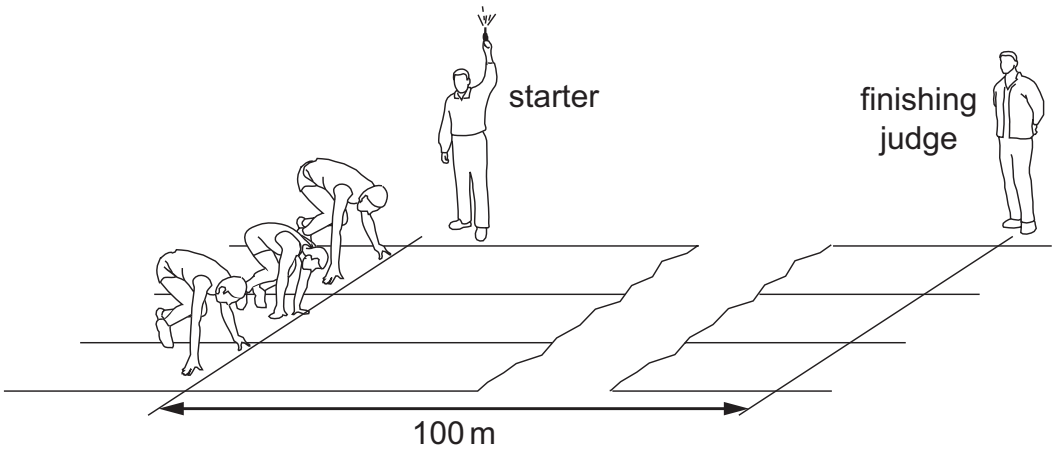
- 23** An object is reflected in a plane mirror.

Which description of the image is correct?

- A** diminished and real
B enlarged and virtual
C same size and real
D same size and virtual

307. Question | 0625 Oct-Nov 2022 P2 V2 Q24

24 A 100 m race is started by firing a gun. The gun makes a bang and a puff of smoke at the same time.



When does the finishing judge see the smoke and when does he hear the bang?

	sees the smoke	hears the bang
A	almost immediately	almost immediately
B	almost immediately	after about 0.3 s
C	after about 0.3 s	almost immediately
D	after about 0.3 s	after about 0.3 s

308. Question | 0625 Oct-Nov 2022 P2 V3 Q16

- 16** Which piece of equipment is designed to produce a type of electromagnetic wave?
- A** electric fire
 - B** electric generator
 - C** electric motor
 - D** electromagnet

309. Question | 0625 Oct-Nov 2022 P2 V3 Q17

- 17** A passing boat causes a floating object on a lake to bob up and down 18 times in 12 s. The wavelength of the wave created by the boat is 48 cm.
- What is the velocity of these water waves?
- A** 32 cm/s **B** 72 cm/s **C** 576 cm/s **D** 864 cm/s

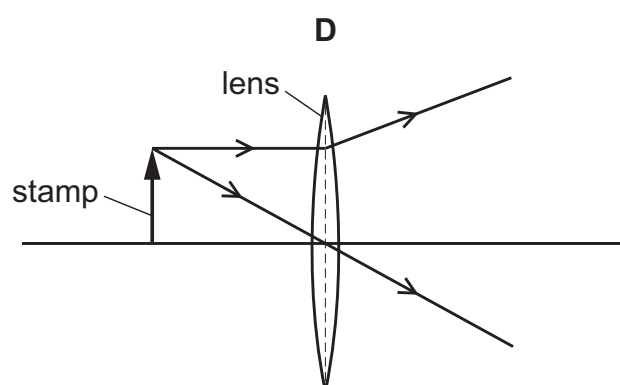
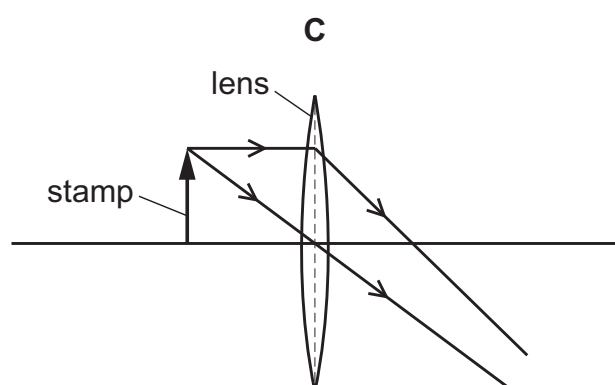
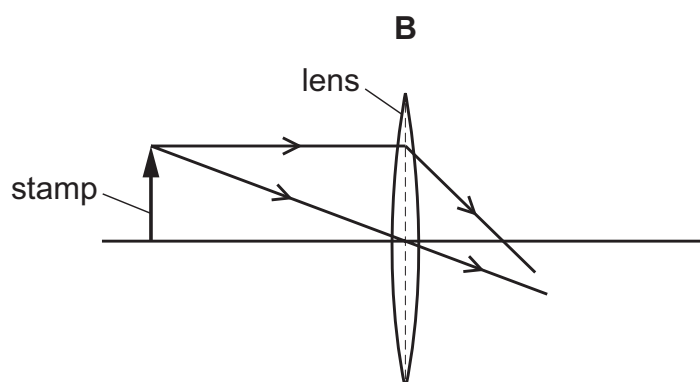
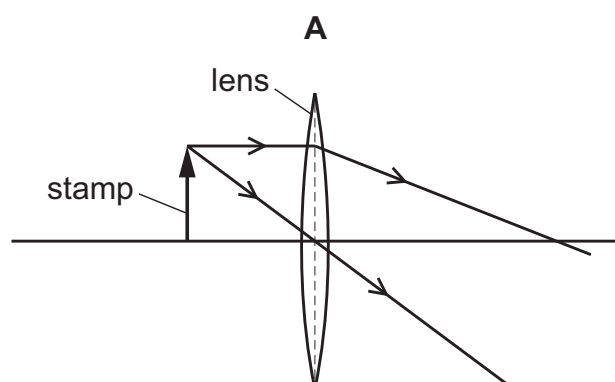
18 Wavefronts are incident on a boundary.

What is needed for the wave to refract at the boundary?

- A** a shiny surface at the boundary
- B** a small gap in the boundary
- C** different mediums either side of the boundary in which the frequency of the wave is different
- D** different mediums either side of the boundary in which the speed of the wave is different

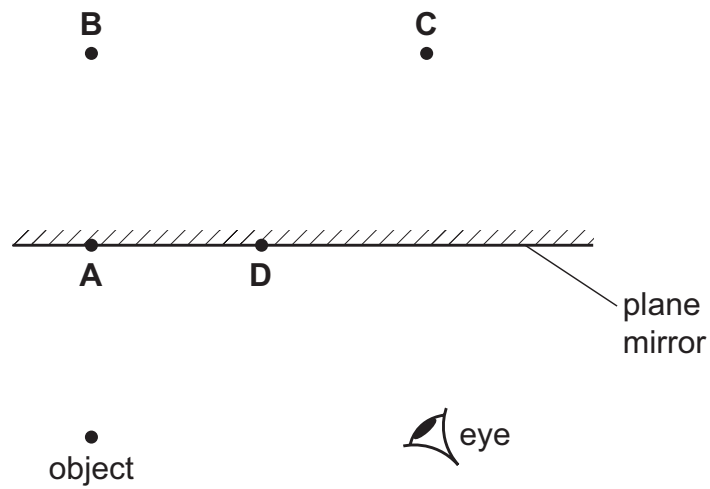
19 A person uses a magnifying glass to look at a stamp.

Which ray diagram shows a thin converging lens being used to do this?



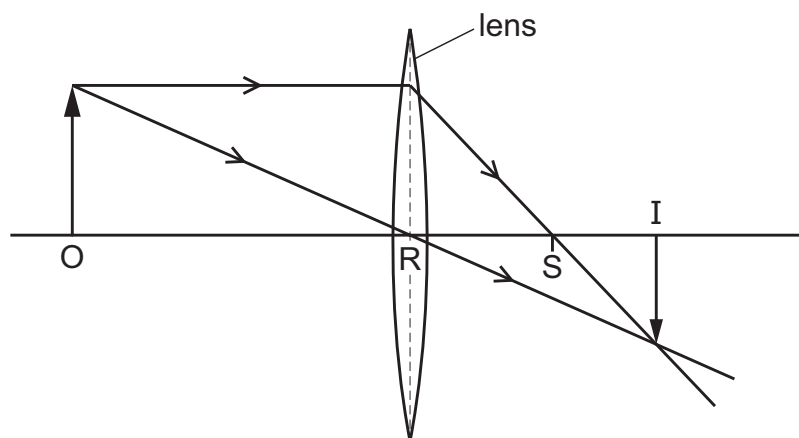
20 The diagram shows an object in front of a plane mirror.

At which labelled position is the image of the object formed?



313. Question | 0625 Oct-Nov 2022 P2 V3 Q21

- 21** The diagram shows the action of a thin converging lens on two rays of light. The rays are from the top of an object O. An inverted image I is formed.

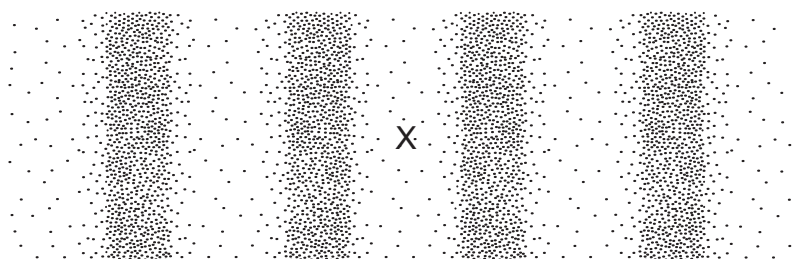


Which name is given to the distance RS?

- A** principal axis
- B** principal focus
- C** focal length
- D** real length

314. Question | 0625 Oct-Nov 2022 P2 V3 Q22

- 22** The diagram shows the air molecules in part of a sound wave at a particular moment in time.



Which statement is **not** correct?

- A** Earlier, there was compression at X.
- B** Later, there will be a rarefaction at X.
- C** This part of the wave is travelling horizontally across the page.
- D** This part of the wave is travelling towards the top of the page.

315. Question | 0625 Oct-Nov 2022 P2 V3 Q23

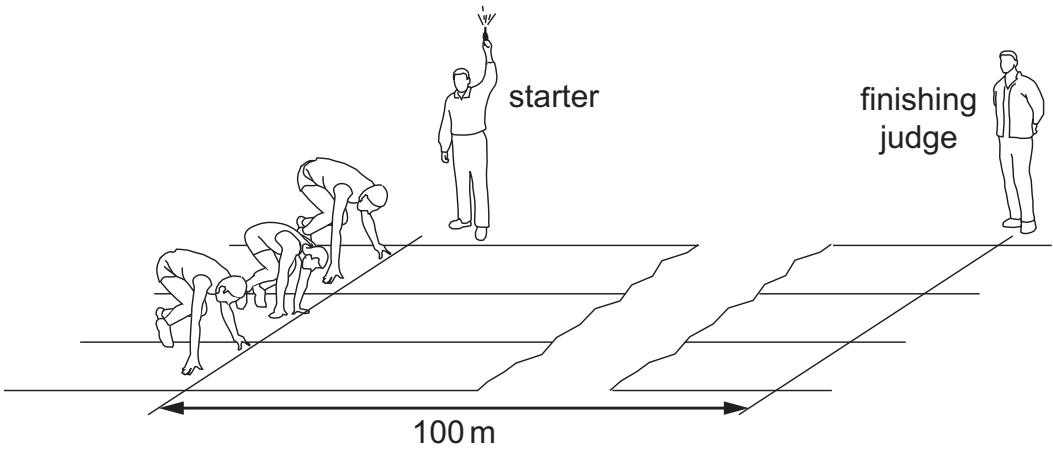
23 The speed of light in a vacuum is $3.0 \times 10^8 \text{ m/s}$.

Which value is closest to the speed of light in air?

- A** $3.0 \times 10^2 \text{ m/s}$
- B** $3.0 \times 10^4 \text{ m/s}$
- C** $3.0 \times 10^6 \text{ m/s}$
- D** $3.0 \times 10^8 \text{ m/s}$

316. Question | 0625 Oct-Nov 2022 P2 V3 Q24

24 A 100 m race is started by firing a gun. The gun makes a bang and a puff of smoke at the same time.



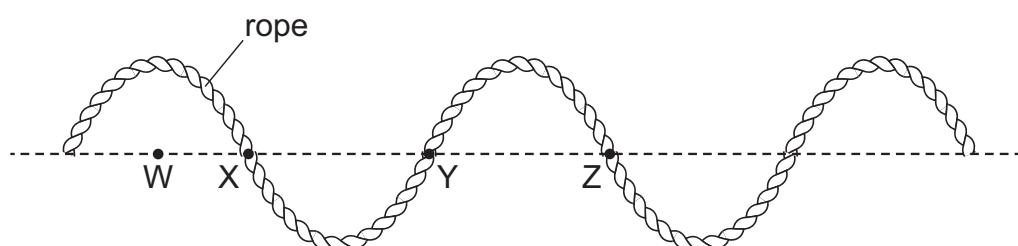
When does the finishing judge see the smoke and when does he hear the bang?

	sees the smoke	hears the bang
A	almost immediately	almost immediately
B	almost immediately	after about 0.3 s
C	after about 0.3 s	almost immediately
D	after about 0.3 s	after about 0.3 s

317. Question | 0625 Feb-March 2023 P2 V2 Q18

18 A transverse wave moves along a rope.

The diagram shows the position of the rope at one particular time.

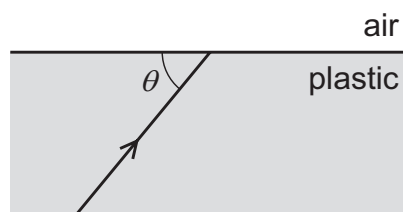


Which two labelled points are one wavelength apart?

- A** W and X **B** W and Z **C** X and Z **D** Y and Z

318. Question | 0625 Feb-March 2023 P2 V2 Q19

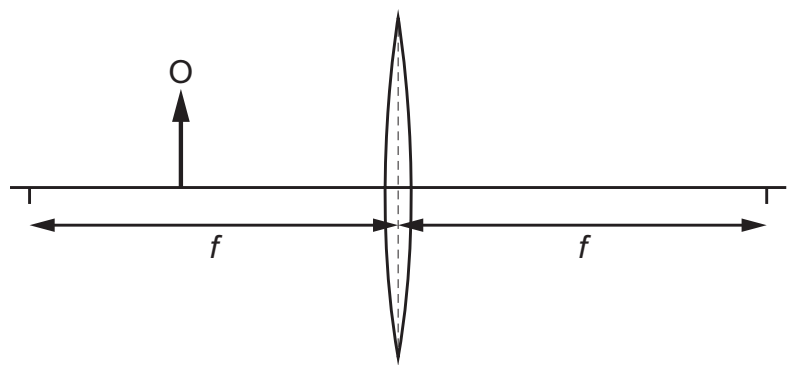
19 Light in transparent plastic meets a boundary with air. Light is transmitted into the air only if the angle marked θ in the diagram is greater than 36° .



What is the refractive index of the plastic?

- A** 0.59 **B** 0.81 **C** 1.2 **D** 1.7

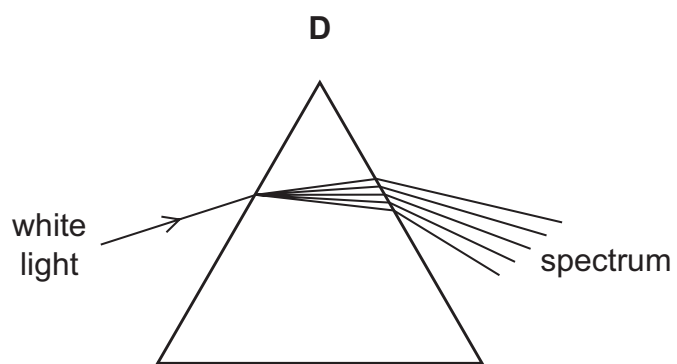
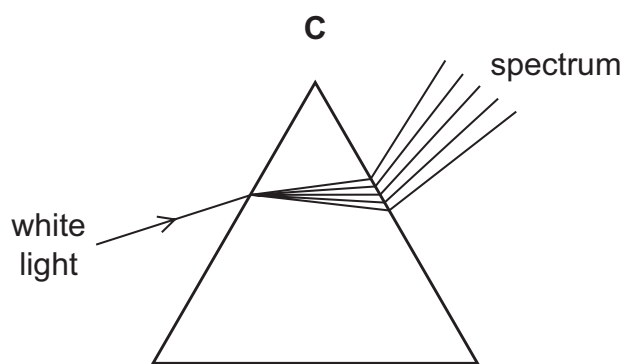
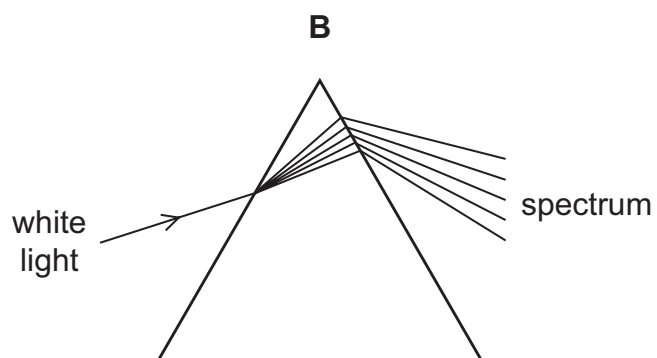
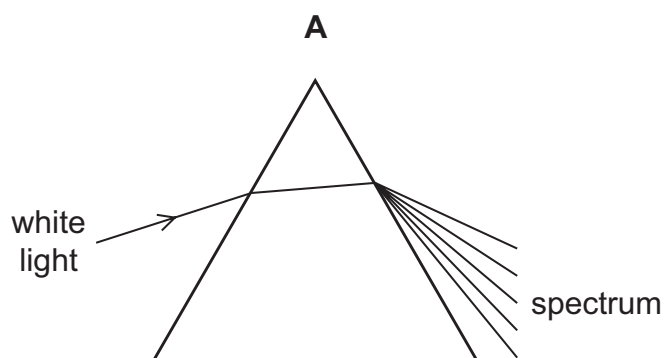
20 A thin converging lens has a focal length f . An object O is placed to the left of the lens, as shown.



Where is the image formed and how does its size compare to the object?

	image position	image size
A	on the opposite side of the lens to the object	larger than the object
B	on the opposite side of the lens to the object	smaller than the object
C	on the same side of the lens as the object	larger than the object
D	on the same side of the lens as the object	smaller than the object

21 Which diagram shows what happens when a ray of white light passes through a prism?



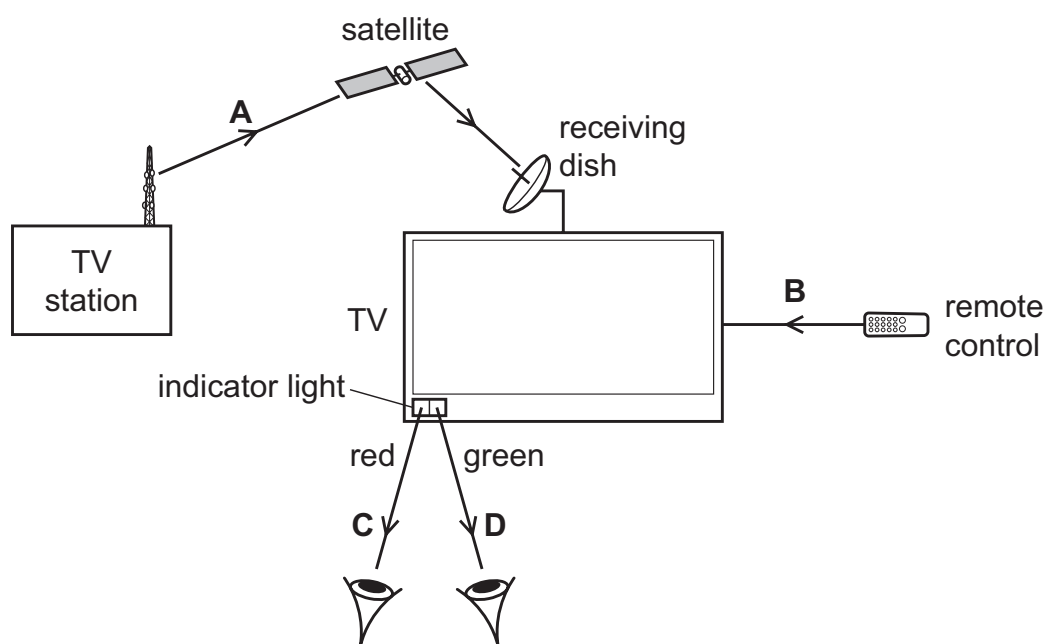
321. Question | 0625 Feb-March 2023 P2 V2 Q22

22 A television (TV) station transmits a signal to a television receiving dish.

The television has an on/off indicator light.

The television is switched on by a remote control which changes the indicator light from red to green.

Which electromagnetic wave used in these actions has the longest wavelength?



322. Question | 0625 Feb-March 2023 P2 V2 Q23

23 A student makes a list of some applications of waves.

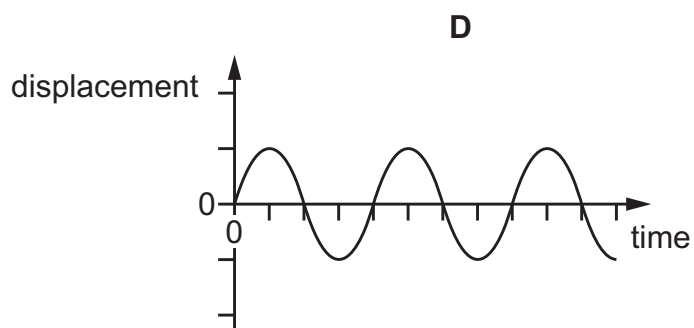
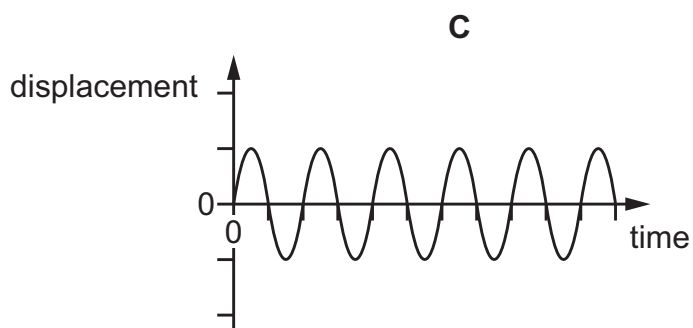
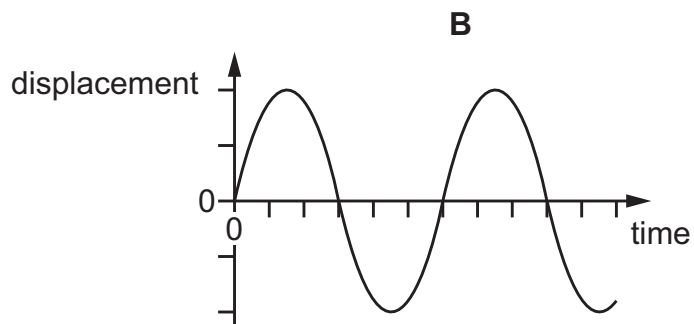
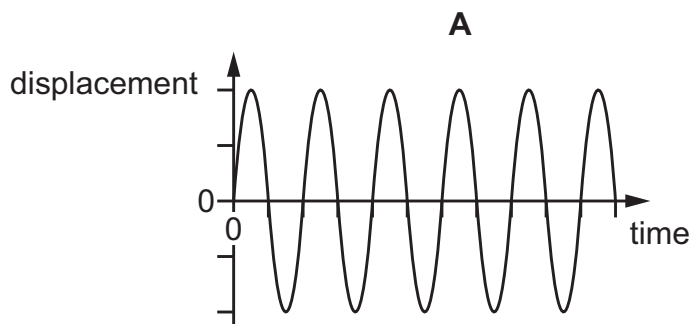
- 1 medical scanning of soft tissue
- 2 sterilising water
- 3 using sonar to calculate ocean depths

Which applications use ultrasound waves?

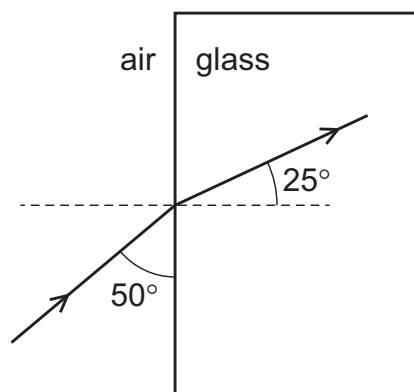
- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

- 17** The diagrams show graphs of displacement against time for four waves. All the graphs are drawn to the same scale.

Which wave has the largest amplitude and the highest frequency?



18 The diagram shows a ray of light entering a glass block.



Which calculation gives the refractive index of the glass?

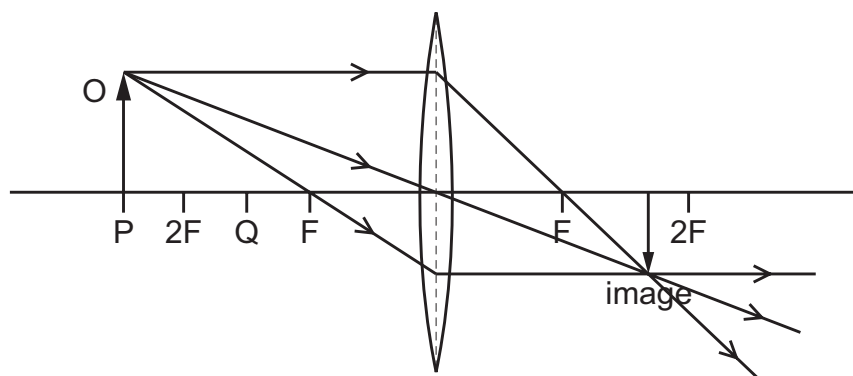
A $\frac{\sin 40^\circ}{\sin 25^\circ}$

B $\frac{\sin 40^\circ}{\sin 65^\circ}$

C $\frac{\sin 50^\circ}{\sin 25^\circ}$

D $\frac{\sin 50^\circ}{\sin 65^\circ}$

- 19** An object O is placed at point P near to a thin converging lens. The diagram shows three rays from the top of O passing through the lens. Each point F is one focal length from the centre of the lens. Each point $2F$ is two focal lengths from the centre of the lens.



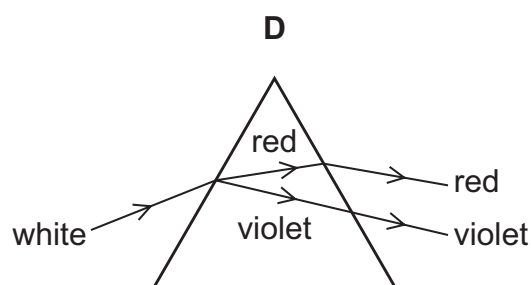
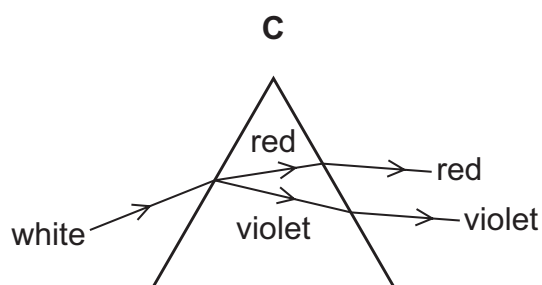
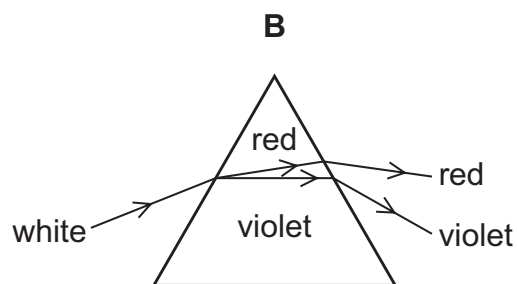
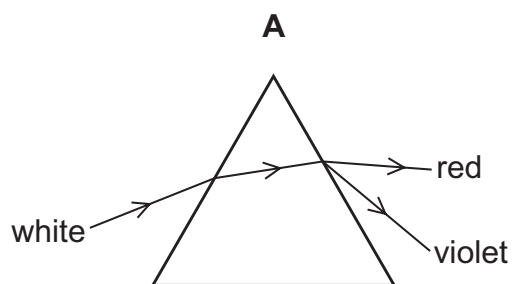
The object O is moved to point Q on the diagram.

Which type of image is produced when the object O is at point Q ?

- A** inverted and the same size as the object
- B** inverted and enlarged
- C** upright and the same size as the object
- D** upright and enlarged

326. Question | 0625 May-June 2023 P2 V1 Q20

20 Which diagram shows the dispersion of white light by a glass prism?



327. Question | 0625 May-June 2023 P2 V1 Q21

21 Visible light has wavelengths in the range $4.0 \times 10^{-7} \text{ m}$ to $7.0 \times 10^{-7} \text{ m}$.

What is the range of the frequencies of visible light?

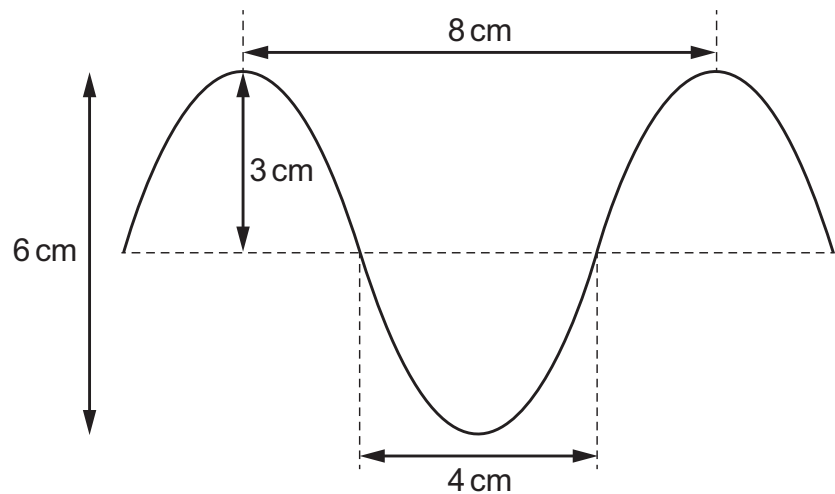
- A** 0.12 Hz to 0.21 Hz
- B** 120 Hz to 210 Hz
- C** $4.3 \times 10^{11} \text{ Hz}$ to $7.5 \times 10^{11} \text{ Hz}$
- D** $4.3 \times 10^{14} \text{ Hz}$ to $7.5 \times 10^{14} \text{ Hz}$

328. Question | 0625 May-June 2023 P2 V1 Q22

- 22** Student X fires a starting pistol which produces smoke and sound. Student Y is standing 100 m away and sees the smoke the instant it is produced. The speed of sound in air is 340 m/s.
- What is the time delay between student Y seeing the smoke and hearing the sound?
- A** 0.29 s **B** 0.59 s **C** 1.7 s **D** 3.4 s

329. Question | 0625 May-June 2023 P2 V2 Q17

- 17** The diagram shows a wave.



What are the amplitude and the wavelength of this wave?

	amplitude / cm	wavelength / cm
A	3	4
B	3	8
C	6	4
D	6	8

18 Optical fibres are used to transmit digital signals using infrared radiation.

The average refractive index of the fibres is 1.50.

Which row describes a digital signal and gives the speed of infrared radiation in the fibres?

	digital signal	<u>speed of infrared radiation in the fibres</u> m/s
A	a signal that consists of only two values	2.0×10^8
B	a signal that consists of only two values	4.5×10^8
C	a signal that consists of a continuous range of values	2.0×10^8
D	a signal that consists of a continuous range of values	4.5×10^8

19 Which statement describes monochromatic light?

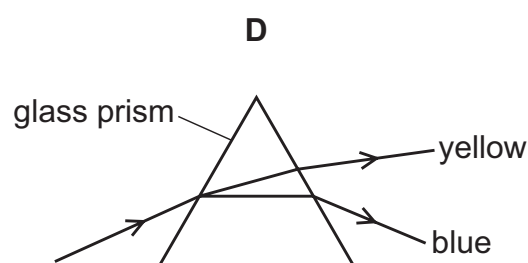
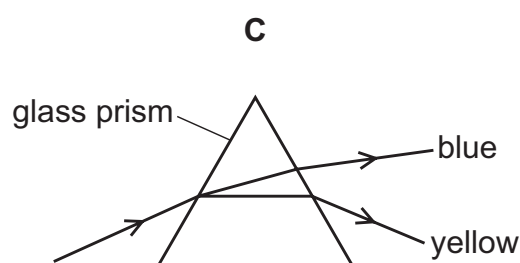
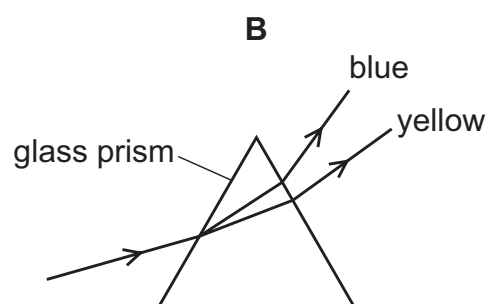
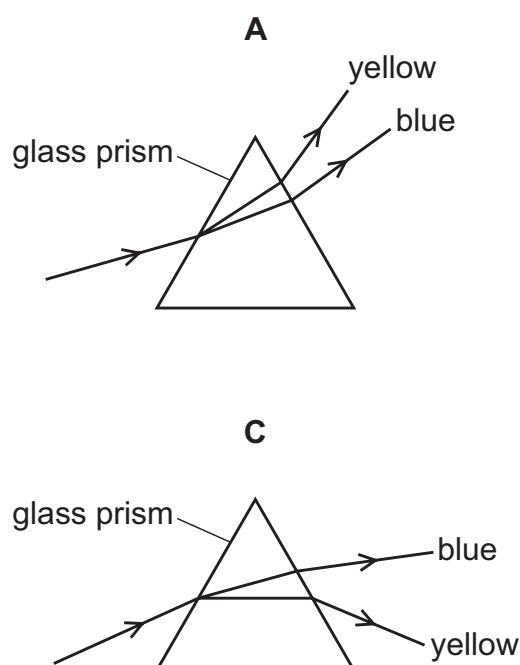
- A** light of a single frequency
- B** light transmitted by a transparent prism
- C** visible light
- D** white light

332. Question | 0625 May-June 2023 P2 V2 Q20

20 A beam of light consists of yellow and blue light.

The beam of light is incident on a glass prism.

Which diagram is correct?



333. Question | 0625 May-June 2023 P2 V2 Q21

21 A radio station broadcasts a signal with a frequency of 89 MHz.

What is the wavelength of this signal?

- A** $3.7 \mu\text{m}$ **B** 3.4 m **C** 3.7 km **D** 3.4 Mm

334. Question | 0625 May-June 2023 P2 V2 Q22

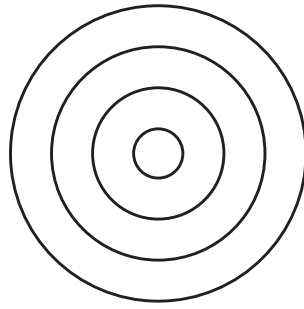
22 A boy shouts and hears the echo from a tall building 2.2 s later.

The speed of sound in air is 330 m/s.

How far away from the boy is the building?

- A** 150 m **B** 300 m **C** 360 m **D** 730 m

- 17** A drop of water from a tap falls onto the surface of some water of constant depth.



view from above

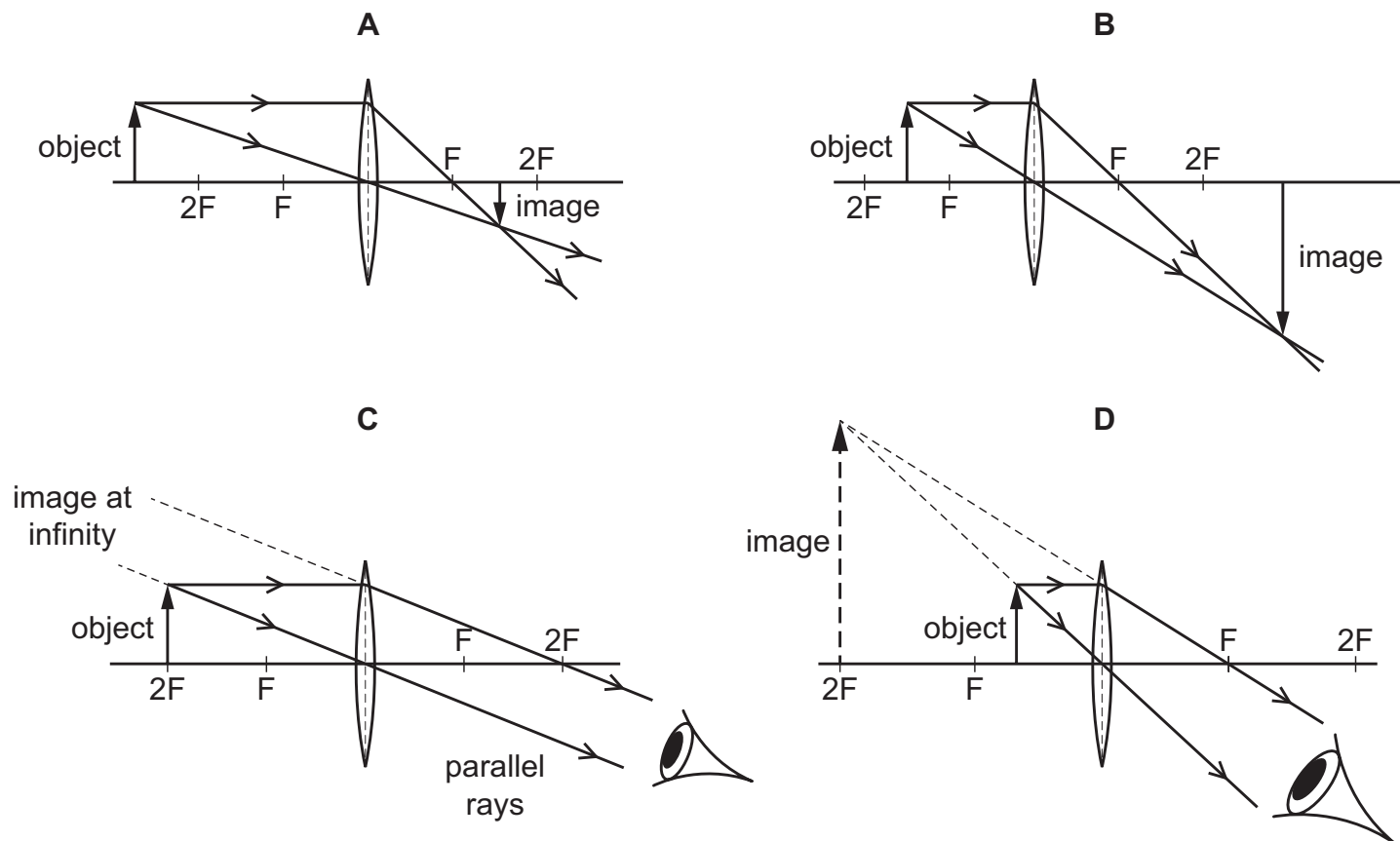
Water waves spread out on the surface of the water.

Which statement is correct?

- A** The waves are longitudinal and travel at the same speed in all directions.
- B** The waves are longitudinal and travel more quickly in one direction than in others.
- C** The waves are transverse and travel at the same speed in all directions.
- D** The waves are transverse and travel more quickly in one direction than in others.

- 18** Each point F is one focal length from the centre of the lens. Each point $2F$ is two focal lengths from the centre of the lens.

Which diagram shows a converging lens being used as a magnifying glass?

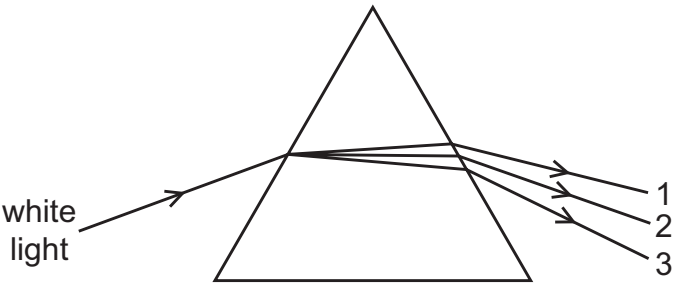


337. Question | 0625 May-June 2023 P2 V3 Q19

- 19** A monochromatic ray of green light in air enters a block of glass.
- Which property of the ray of light always remains the same as it moves from air to glass?
- A** wavelength
 - B** speed
 - C** frequency
 - D** direction

338. Question | 0625 May-June 2023 P2 V3 Q20

- 20** A narrow beam of white light passes through a prism and is dispersed into a spectrum.



Which row is correct?

	colour 1	colour 2	colour 3
A	blue	yellow	red
B	red	blue	yellow
C	red	yellow	blue
D	yellow	blue	red

339. Question | 0625 May-June 2023 P2 V3 Q21

- 21** A student writes four statements matching a communication system to the region of the electromagnetic spectrum that it uses to transmit signals.

Which statement is correct?

- A** Wireless internet uses visible wavelengths.
- B** Mobile phones use X-rays.
- C** Cable television uses infrared wavelengths.
- D** Bluetooth uses ultraviolet wavelengths.

340. Question | 0625 May-June 2023 P2 V3 Q22

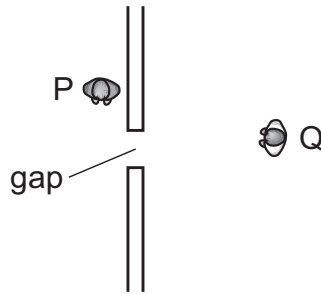
- 22** A ship sounds its horn when it is 790 m from a cliff. A passenger on the ship hears the echo 4.8 s later.

What is the speed of the sound?

- A** 165 m/s **B** 330 m/s **C** 340 m/s **D** 1896 m/s

341. Question | 0625 Oct-Nov 2023 P2 V1 Q17

- 17** Two men, P and Q, stand close to a gap in a wall, as shown. Man P cannot see man Q but man P can hear man Q speaking.



Which statement explains this?

- A** Light waves do not diffract at all because they are electromagnetic waves.
- B** Light waves have a range of frequencies but sound has just one frequency.
- C** Sound waves are of a higher frequency than light waves.
- D** Sound waves diffract a lot because their wavelength is a similar size to the width of the gap.

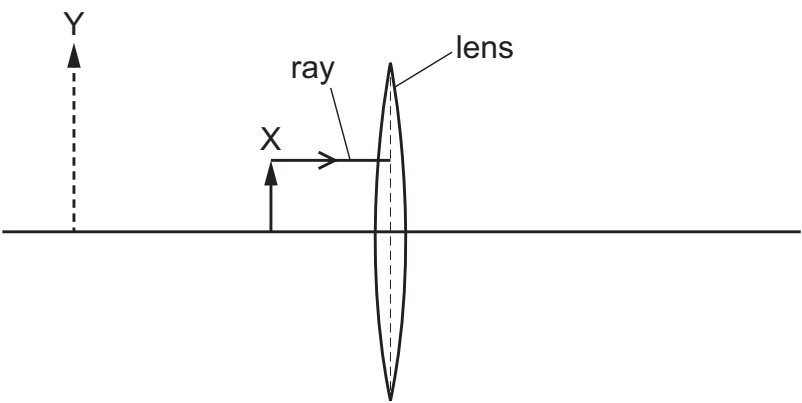
342. Question | 0625 Oct-Nov 2023 P2 V1 Q18

- 18** Which quantities relating to a wave on the surface of water can **both** be measured in metres?

- A** amplitude and frequency
- B** amplitude and wavelength
- C** amplitude and wave speed
- D** frequency and wavelength

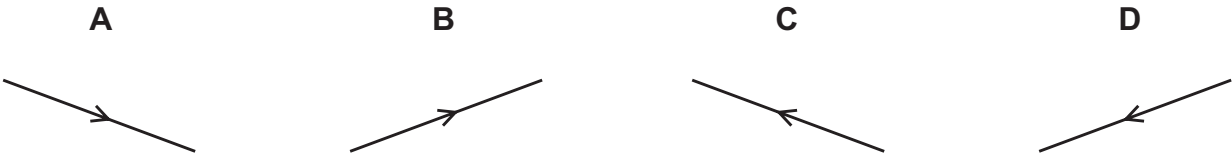
343. Question | 0625 Oct-Nov 2023 P2 V1 Q19

19 The diagram shows part of a ray diagram that demonstrates the formation of a virtual image Y of object X by a converging lens.



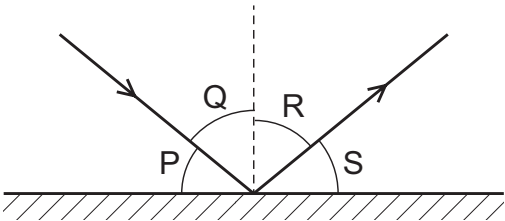
One ray of light from X is shown approaching the lens.

Which arrow shows the direction of this ray as it leaves the lens?



344. Question | 0625 Oct-Nov 2023 P2 V1 Q20

20 A ray of light is reflected by a plane mirror.



Which row shows the angle of incidence and the angle of reflection?

	angle of incidence	angle of reflection
A	P	Q
B	P	S
C	Q	R
D	R	S

345. Question | 0625 Oct-Nov 2023 P2 V1 Q21

21 A thin converging lens is used to produce a real image of an object.

Which statement about the real image is always correct?

- A** It is nearer to the lens than the object.
- B** It is on the opposite side of the lens to the object.
- C** It is the same size as the object.
- D** It is upright.

346. Question | 0625 Oct-Nov 2023 P2 V1 Q22

22 A radio transmitter broadcasts at a frequency of 200 kHz.

What is the wavelength of these radio waves?

- A** $6.7 \times 10^{-4} \text{ m}$
- B** 1.5 m
- C** $1.5 \times 10^3 \text{ m}$
- D** $1.5 \times 10^6 \text{ m}$

347. Question | 0625 Oct-Nov 2023 P2 V1 Q23

23 The element mercury exists as a solid, a liquid or a gas.

Which row gives a possible set of values of the speeds of sound through mercury?

	speed of sound in frozen mercury m/s	speed of sound in liquid mercury m/s	speed of sound in mercury vapour m/s
A	250	1500	2500
B	250	2500	1500
C	1500	250	2500
D	2500	1500	250

348. Question | 0625 Oct-Nov 2023 P2 V2 Q17

17 A student writes down some facts about two transverse waves.

Wave 1 has a frequency f and a velocity v .

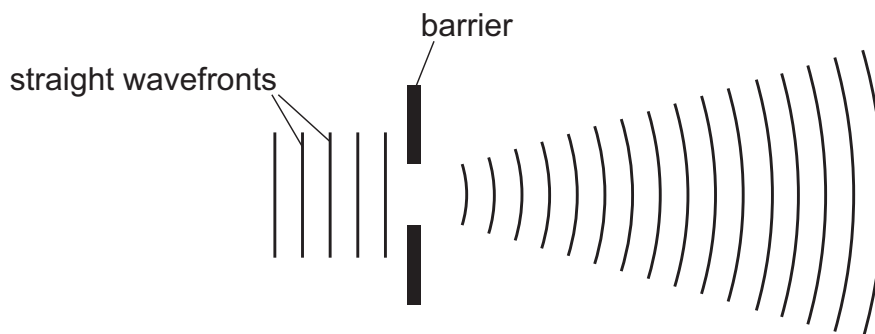
Wave 2 has four times the frequency of wave 1 and is travelling at a velocity of $2v$.

What is the wavelength of wave 2 in terms of f and v ?

- A** $\frac{2f}{v}$
- B** $8fv$
- C** $\frac{2v}{f}$
- D** $\frac{v}{2f}$

349. Question | 0625 Oct-Nov 2023 P2 V2 Q18

- 18** Straight wavefronts on the surface of a ripple tank approach a gap in a barrier. The diagram shows how the wavefronts change shape as they pass through the gap.



What is the name of this effect?

- A** diffraction
- B** propagation
- C** reflection
- D** refraction

350. Question | 0625 Oct-Nov 2023 P2 V2 Q19

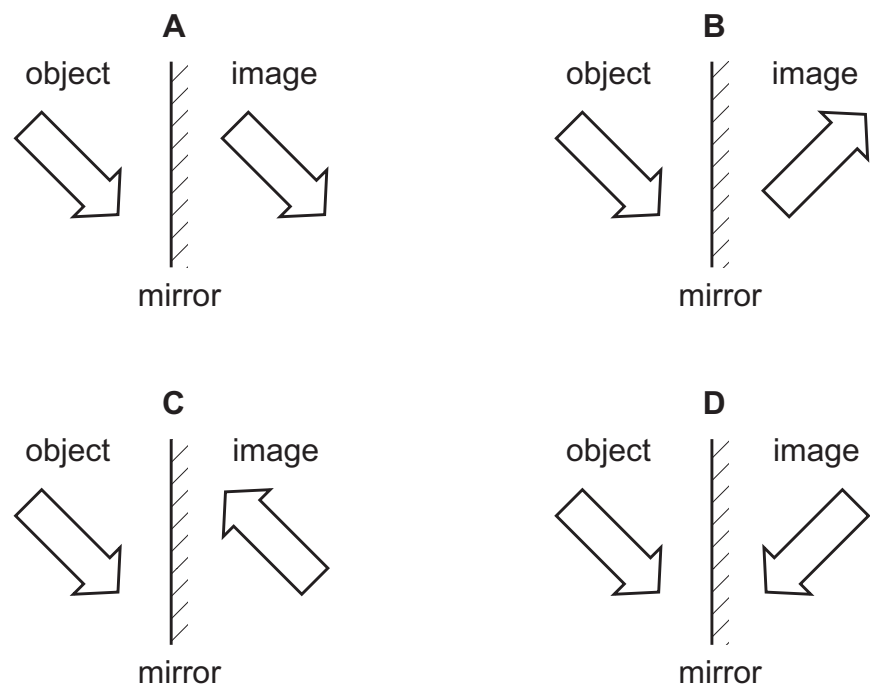
- 19** Light travels from air into glass.

What is the relationship between the refractive index n of the glass, the angle of incidence i and the angle of refraction r ?

- A** $n = \frac{i}{r}$ **B** $n = \frac{r}{i}$ **C** $n = \frac{\sin i}{\sin r}$ **D** $n = \frac{\sin r}{\sin i}$

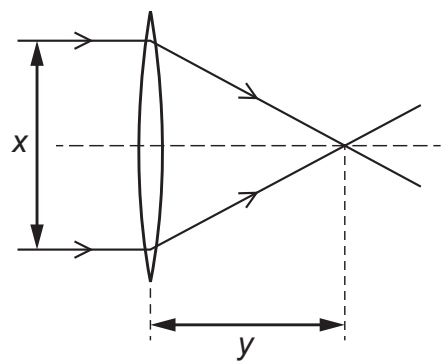
351. Question | 0625 Oct-Nov 2023 P2 V2 Q20

20 Which diagram shows the image correctly formed by reflection?



352. Question | 0625 Oct-Nov 2023 P2 V2 Q21

21 A student passes parallel rays of light through four different converging lenses. He measures the distance x and the distance y for each experiment.



Which lens has the longest focal length?

	x/cm	y/cm
A	4.6	2.0
B	5.1	3.1
C	5.9	2.3
D	6.1	2.4

353. Question | 0625 Oct-Nov 2023 P2 V2 Q22

22 The frequency of the microwaves used in a microwave oven is 2400 MHz.

What is the wavelength of these microwaves?

- A** 0.125 m **B** 8.00 m **C** 125 m **D** 7200 m

354. Question | 0625 Oct-Nov 2023 P2 V2 Q23

23 Which row gives typical values for the speed of sound in a solid and in a gas?

	<u>speed of sound in a solid</u> m/s	<u>speed of sound in a gas</u> m/s
A	3	30
B	30	3
C	300	3000
D	3000	300

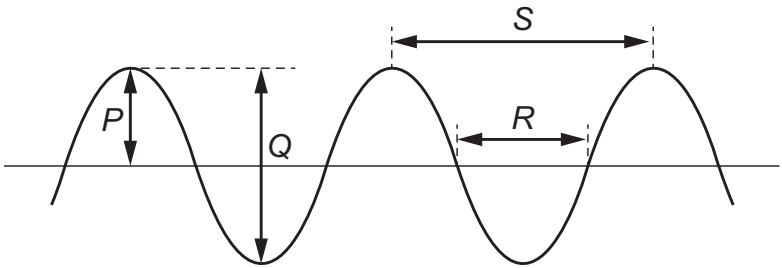
355. Question | 0625 Oct-Nov 2023 P2 V3 Q17

17 Light diffracts when it enters a telescope. This causes the image to blur slightly. The amount of diffraction depends on the diameter of the hole through which the light enters the telescope and the wavelength of the light.

Which combination for diameter and wavelength will result in the sharpest image (least blurring)?

	diameter	wavelength
A	large	long
B	large	short
C	small	long
D	small	short

18 The diagram shows a transverse wave.

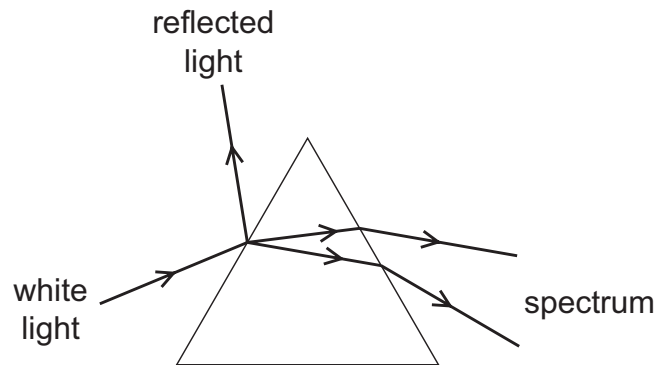


Which row identifies the amplitude and the wavelength of the wave?

	amplitude	wavelength
A	<i>P</i>	<i>R</i>
B	<i>P</i>	<i>S</i>
C	<i>Q</i>	<i>R</i>
D	<i>Q</i>	<i>S</i>

19 The diagram shows the effect of a prism on white light.

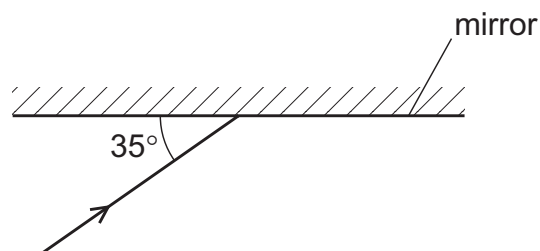
Some light is reflected on striking the prism and some is refracted and dispersed to form a spectrum.



What happens if monochromatic light is used instead of white light?

- A** The light changes colour as it passes through the prism.
- B** The light forms a brighter spectrum.
- C** There is no reflected light.
- D** There is no dispersion of the emerging light.

- 20** The diagram shows a ray of light incident on a plane mirror.



The angle between the ray and the mirror is 35° .

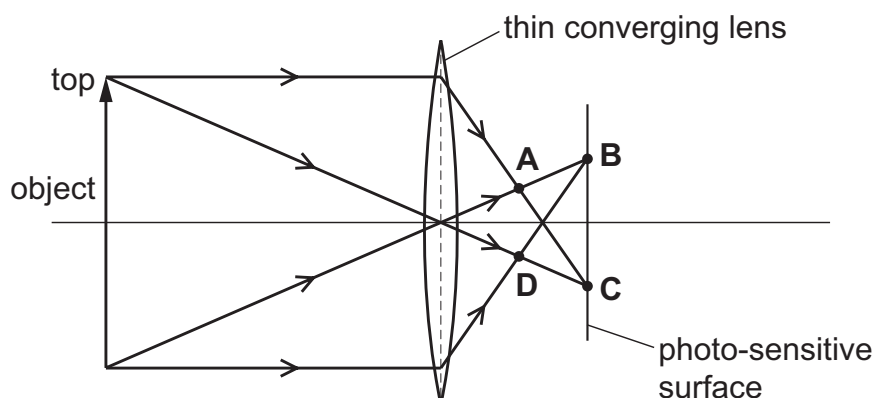
The ray is reflected by the mirror.

What is the angle of reflection?

- A** 35° **B** 55° **C** 70° **D** 110°

- 21** A thin converging lens in a camera produces a real image on a photo-sensitive surface, as shown.

At which position is the image of the top of the object formed?



360. Question | 0625 Oct-Nov 2023 P2 V3 Q22

- 22** Light is travelling through air. It strikes a glass block at an angle of incidence of 45° . The glass has a refractive index of 1.4.

What is the angle of refraction of the light as it enters the glass?

- A** 29° **B** 30° **C** 32° **D** 82°

361. Question | 0625 Oct-Nov 2023 P2 V3 Q23

- 23** Which row gives approximate values for the speed of sound in copper, water and air?

	<u>speed of sound in copper</u> m/s	<u>speed of sound in water</u> m/s	<u>speed of sound in air</u> m/s
A	4500	1500	350
B	350	4500	1500
C	1500	4500	350
D	4500	350	1500

362. Question | 0625 Specimen 2023 P2 Q19

- 19** Light travels at a speed of 2.0×10^8 m/s in a glass block.

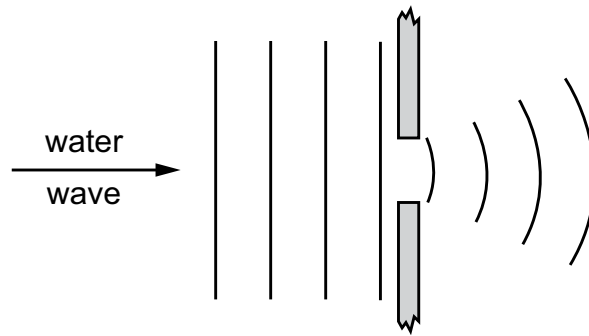
In the glass, the wavelength of the light is 4.0×10^{-7} m.

What is the frequency of the light?

- A** 2.0×10^{-15} Hz
B 1.3×10^{-2} Hz
C 80 Hz
D 5.0×10^{14} Hz

363. Question | 0625 Specimen 2023 P2 Q20

- 20** In a shallow tank, a water wave moves through a barrier with a narrow gap. The diagram shows the waves on the left-hand side and the right-hand side of the barrier.



Which term describes the effect shown?

- A** reflection
- B** dispersion
- C** refraction
- D** diffraction

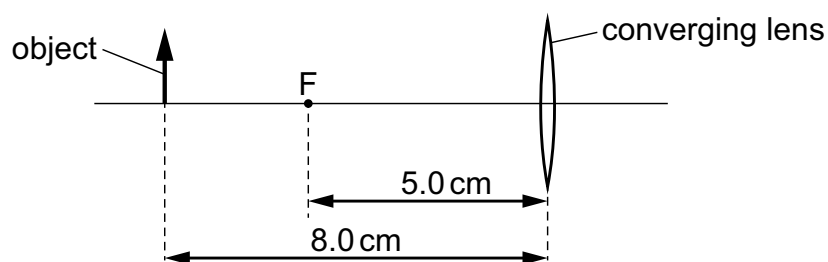
364. Question | 0625 Specimen 2023 P2 Q21

- 21** Which statement describes monochromatic light?

- A** light that never diffracts
- B** light that has a single frequency
- C** light that spreads out when shone through a glass prism
- D** light that travels at the same speed in all materials

365. Question | 0625 Specimen 2023 P2 Q22

- 22** An object is placed 8.0 cm from a thin converging lens of focal length 5.0 cm.

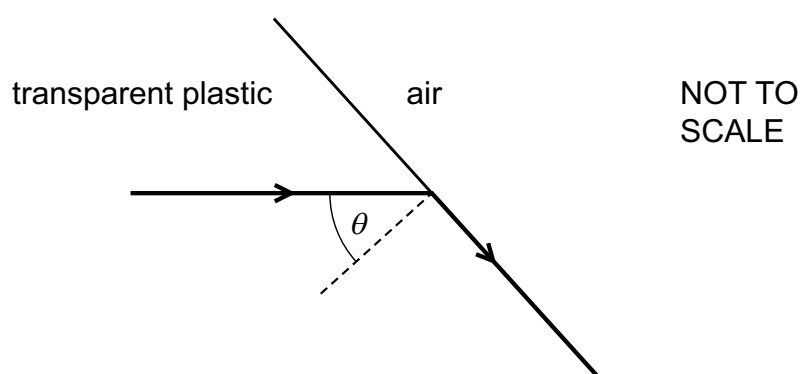


Which statement about the image formed by the lens is correct?

- A** The image is real and inverted.
- B** The image is real and upright.
- C** The image is virtual and inverted.
- D** The image is virtual and upright.

366. Question | 0625 Specimen 2023 P2 Q23

- 23** A ray of light travels through transparent plastic to air.



The ray of light enters the air travelling parallel to the surface of the plastic.

The refractive index of the plastic is 1.25.

What is angle θ ?

- A** 37°
- B** 39°
- C** 51°
- D** 53°

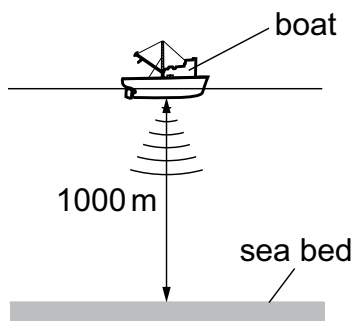
367. Question | 0625 Specimen 2023 P2 Q24

24 What is the speed of electromagnetic waves in a vacuum?

- A** $3.0 \times 10^4 \text{ cm/s}$
- B** $3.0 \times 10^5 \text{ km/s}$
- C** $3.0 \times 10^6 \text{ cm/s}$
- D** $3.0 \times 10^{11} \text{ km/s}$

368. Question | 0625 Specimen 2023 P2 Q25

25 A pulse of sound is produced at the bottom of a boat. The sound travels through the water and is reflected from the sea bed. The sound reaches the boat again after 1.3s. The sea bed is 1000m below the boat.



Using this information, what is the speed of sound in the water?

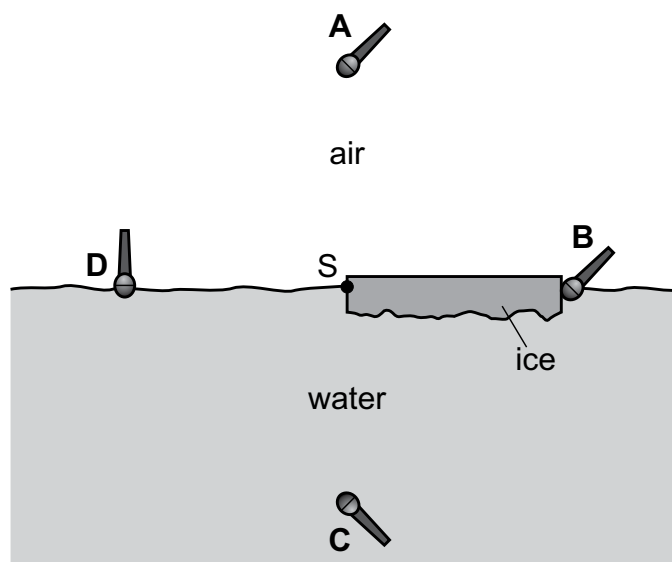
- A** 770m/s
- B** 1300m/s
- C** 1500m/s
- D** 2600m/s

369. Question | 0625 Specimen 2023 P2 Q26

26 A sheet of ice floats on water. A source of sound S is positioned at the edge of the ice sheet.

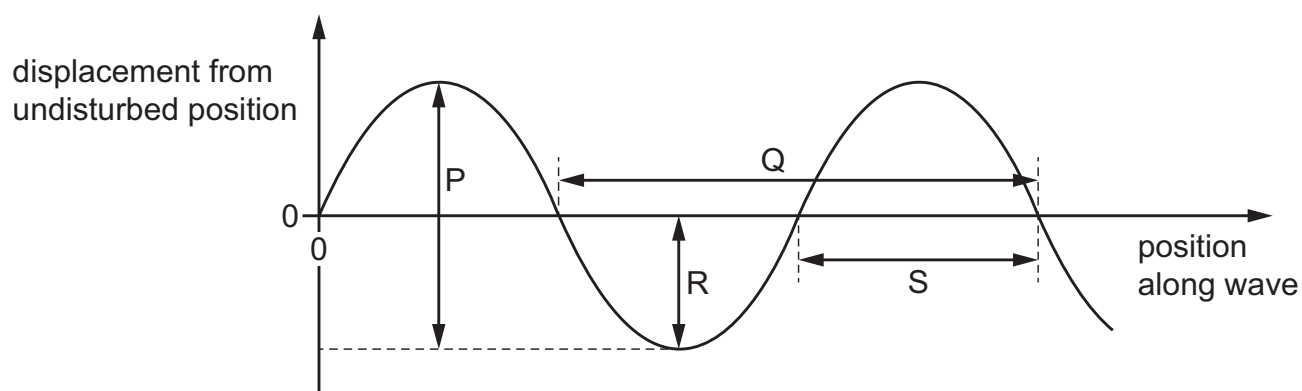
Four microphones are placed equal distances from S .

Which microphone detects the sound from S first?



370. Question | 0625 Feb-March 2024 P2 V2 Q16

16 The diagram shows a wave.



Which dimensions describe the properties of the wave?

- A** P = amplitude, S = speed
- B** P = speed, Q = wavelength
- C** R = amplitude, Q = wavelength
- D** R = amplitude, S = wavelength

17 Which row describes some characteristics of an image formed in a plane mirror?

	image type	image size
A	real	diminished
B	real	same size as the object
C	virtual	diminished
D	virtual	same size as the object

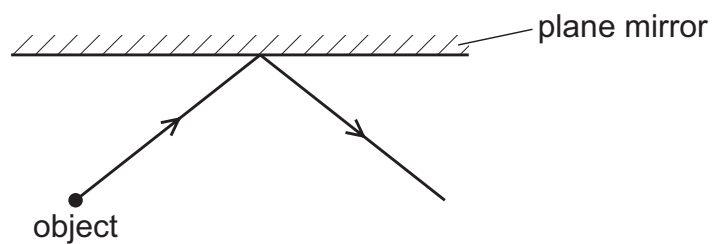
- 18** The range of audible frequencies for elephants is 10 Hz to 12 000 Hz, and for horses is 55 Hz to 33 000 Hz.

Which statement about the range of audible frequencies for a healthy human ear is correct?

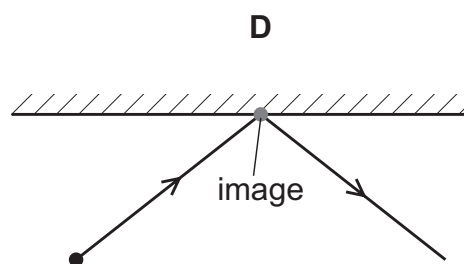
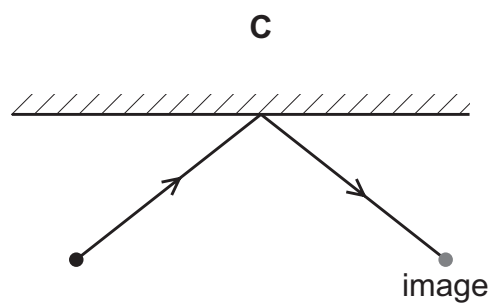
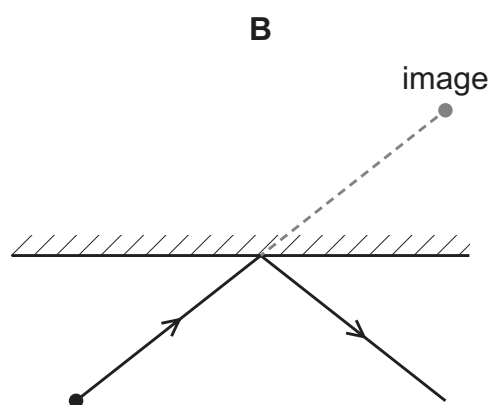
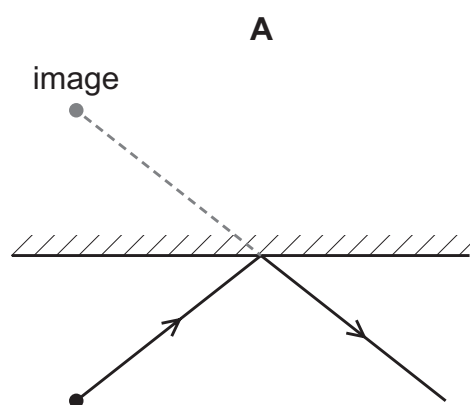
- A** The human ear can hear all sounds heard by both elephants and horses.
- B** The human ear can hear all sounds heard by elephants but not all those heard by horses.
- C** The human ear can hear all sounds heard by horses but not all those heard by elephants.
- D** The human ear cannot hear all sounds heard by elephants nor those heard by horses.

19 An object is placed in front of a plane mirror.

The ray diagram shows the reflection of one ray of light from the object by the mirror.

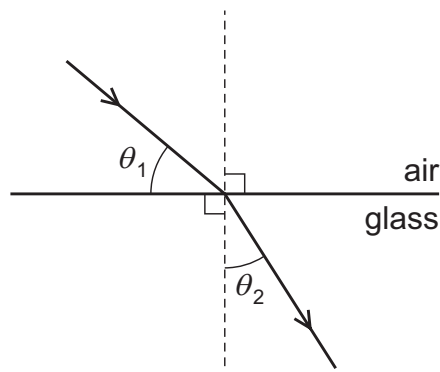


Where does the mirror form an image of the object?



374. Question | 0625 Feb-March 2024 P2 V2 Q20

20 Light refracts as it enters glass from air, as shown.



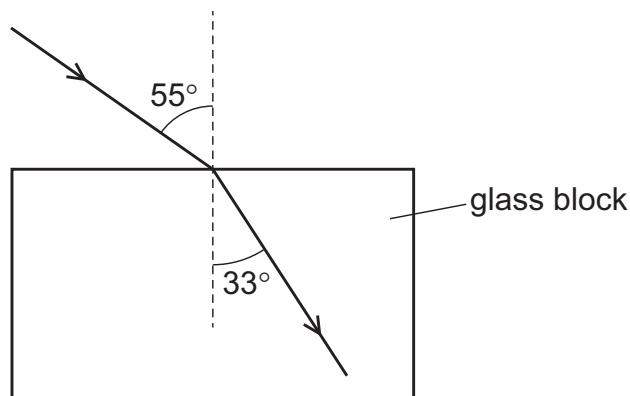
Which expression is equal to the refractive index of glass?

- A** $\frac{\sin \theta_1}{\sin \theta_2}$
 B $\frac{\sin \theta_1}{\sin(90^\circ - \theta_2)}$
 C $\frac{\sin(90^\circ - \theta_1)}{\sin \theta_2}$
 D $\frac{\sin(90^\circ - \theta_1)}{\sin(90^\circ - \theta_2)}$

375. Question | 0625 Feb-March 2024 P2 V2 Q21

21 Light travelling at a speed of $3.0 \times 10^8 \text{ m/s}$ strikes the surface of a glass block and undergoes refraction as it enters the block.

The diagram shows a ray of this light before and after it enters the block.



What is the speed of light in the glass?

- A** $1.8 \times 10^8 \text{ m/s}$
B $2.0 \times 10^8 \text{ m/s}$
C $4.5 \times 10^8 \text{ m/s}$
D $5.0 \times 10^8 \text{ m/s}$

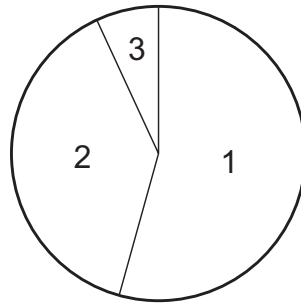
22 Which row about converging lenses and diverging lenses is correct?

	converging lenses	diverging lenses
A	always produce inverted images	can focus a parallel beam of light
B	can be used as magnifying glasses	do not have a principal focus
C	can be used to correct short-sightedness	are usually thinner than converging lenses
D	can produce real and virtual images	can be used to correct short-sightedness

377. Question | 0625 Feb-March 2024 P2 V2 Q37

37 The Sun radiates most of its energy in three regions of the electromagnetic spectrum.

In the pie chart, region 1 is infrared radiation and region 2 is visible radiation.



What is region 3?

- A** microwave
- B** radio
- C** ultraviolet
- D** X-ray

378. Question | 0625 May-June 2024 P2 V1 Q16

16 Which statement about waves is correct?

- A** Waves do not transfer either energy or matter.
- B** Waves transfer both energy and matter.
- C** Waves transfer energy without transferring matter.
- D** Waves transfer matter without transferring energy.

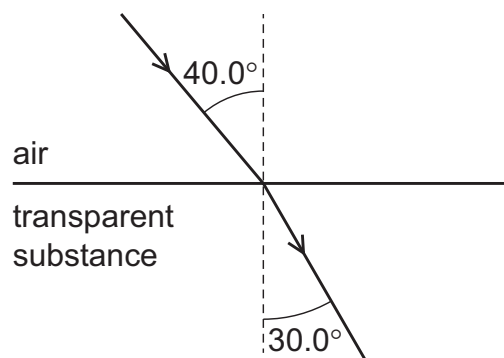
379. Question | 0625 May-June 2024 P2 V1 Q17

17 The angle of incidence of a ray of light incident on a plane mirror is gradually increased.

To the nearest degree, what is the maximum possible angle between the incident and reflected rays?

- A** 0°
- B** 45°
- C** 90°
- D** 180°

	incident light	angle of incidence
A	is in the less dense medium	less than the critical angle
B	is in the less dense medium	greater than the critical angle
C	is in the more dense medium	less than the critical angle
D	is in the more dense medium	greater than the critical angle



What is the refractive index of the transparent substance?

- A** 1.33 **B** 1.29 **C** 0.778 **D** 0.750

382. Question | 0625 May-June 2024 P2 V1 Q20

20 The diagram shows a ray of light in an optical fibre.



Which statement correctly explains the condition for the maximum transmission of light by the optical fibre?

- A** The glass must slow the light as little as possible to make the critical angle for the fibre as large as possible.
- B** The glass must slow the light as little as possible to make the critical angle for the fibre as small as possible.
- C** The glass must slow the light as much as possible to make the critical angle for the fibre as large as possible.
- D** The glass must slow the light as much as possible to make the critical angle for the fibre as small as possible.

383. Question | 0625 May-June 2024 P2 V1 Q21

21 Which region of the electromagnetic spectrum is used for detecting fake bank notes?

- A** radio
- B** microwaves
- C** ultraviolet
- D** X-rays

384. Question | 0625 May-June 2024 P2 V1 Q22

22 A sound wave travels at 330 m/s. The distance between the centre of a compression and the centre of the nearest rarefaction in the sound wave is 2.5 cm.

What is the frequency of the sound wave?

- A** 66 Hz
- B** 130 Hz
- C** 6600 Hz
- D** 13 000 Hz

385. Question | 0625 May-June 2024 P2 V1 Q23

23 Which waves are used in the medical scanning of soft tissue?

- A** gamma rays
- B** infrared
- C** microwaves
- D** ultrasound

386. Question | 0625 May-June 2024 P2 V2 Q17

17 In which type of wave is the direction of vibration parallel to the direction of travel?

- A** electromagnetic waves
- B** seismic P-waves
- C** seismic S-waves
- D** water waves

387. Question | 0625 May-June 2024 P2 V2 Q18

18 Waves in a ripple tank are diffracted as they pass through a narrow gap.

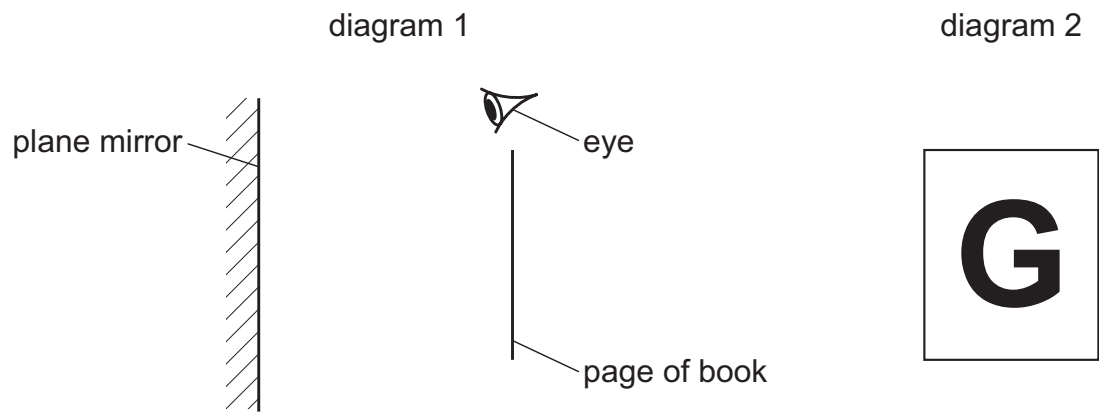
What can be done to make the spreading due to diffraction greater?

- A** Decrease the frequency of the waves and keep the speed constant.
- B** Decrease the speed of the waves and keep the frequency constant.
- C** Increase the frequency of the waves and keep the speed constant.
- D** Increase the frequency of the waves and decrease the speed.

19 Diagram 1 shows the page of a book in front of a plane mirror.

An eye is looking at the image of the page.

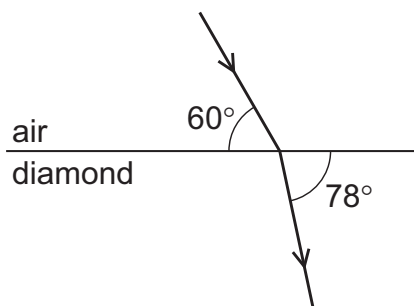
Diagram 2 shows a large letter G on the page facing the mirror.



What is the appearance of the image of G seen by the eye?



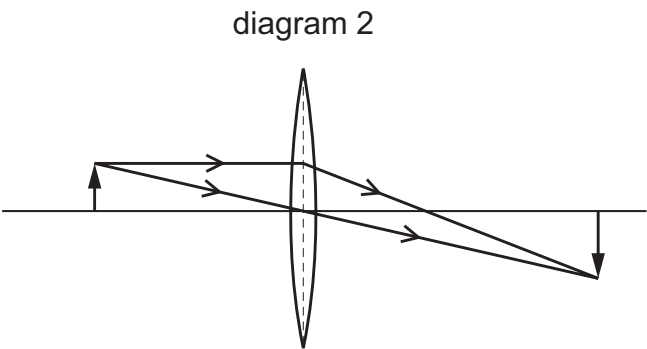
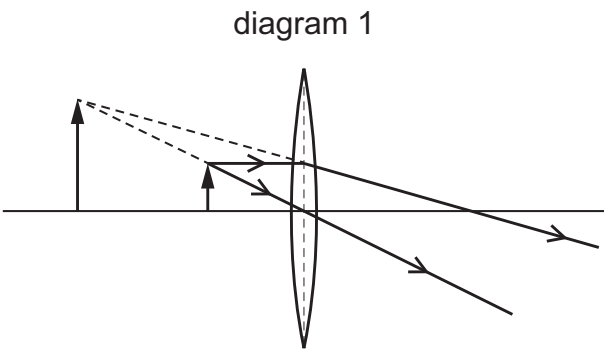
20 The diagram shows a ray of light passing from air into diamond.



What is the refractive index of the diamond?

- A** 0.89 **B** 1.1 **C** 2.4 **D** 2.5

21 The ray diagrams show the formation of an image by two different converging lenses.

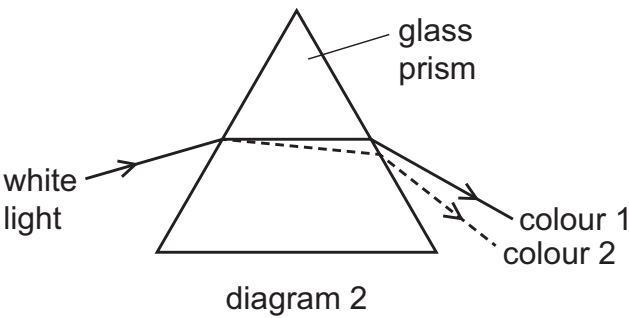
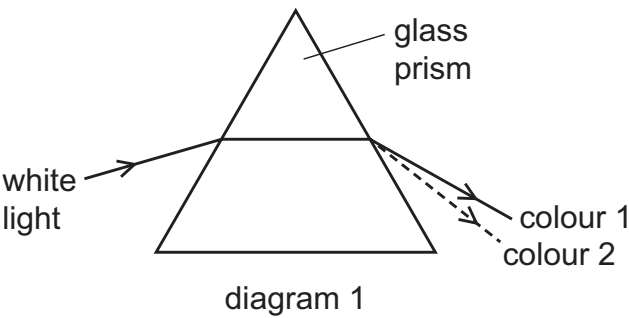


Which row describes the images produced?

	diagram 1	diagram 2
A	real	real
B	real	virtual
C	virtual	real
D	virtual	virtual

391. Question | 0625 May-June 2024 P2 V2 Q22

22 White light enters a glass prism. The light leaving the other side of the prism is separated into colours.



Which row correctly describes what happens?

	path taken by the light	colour 1	colour 2
A	diagram 1	red	violet
B	diagram 1	violet	red
C	diagram 2	red	violet
D	diagram 2	violet	red

392. Question | 0625 May-June 2024 P2 V2 Q23

23 Thermal radiation is part of the electromagnetic spectrum.

What is the name of this region of the spectrum?

- A** gamma rays
- B** infrared
- C** ultraviolet
- D** visible light

393. Question | 0625 May-June 2024 P2 V2 Q24

- 24** A remote-controlled vehicle is travelling on the surface of a planet. The vehicle senses an obstacle ahead. It sends a radio message to the control room from where it is being controlled. The control room is 2.4×10^6 km away from the vehicle. The control room sends a message back to the vehicle telling it to stop.
- What is the minimum time that elapses between the vehicle sensing the obstacle and receiving the message back from the control room?
- A** 8.0 ms **B** 16 ms **C** 8.0 s **D** 16 s

394. Question | 0625 May-June 2024 P2 V3 Q17

- 17** A seismic wave has a frequency of 5.0 Hz and a speed of 10 km/s.
- What is the wavelength of the wave?
- A** 0.20 km **B** 0.50 km **C** 2.0 km **D** 50 km

395. Question | 0625 May-June 2024 P2 V3 Q18

- 18** Sound waves will diffract when going through a gap or passing the edge of a barrier.
- Which size of wavelength gives the most diffraction in each case?

	passing through a gap	passing the edge of a barrier
A	small wavelength	small wavelength
B	small wavelength	large wavelength
C	wavelength similar to gap size	small wavelength
D	wavelength similar to gap size	large wavelength

396. Question | 0625 May-June 2024 P2 V3 Q19

- 19** A boy is having his eyes tested. A letter is printed on a card placed over his head. He sees the card in a plane mirror placed in front of him.

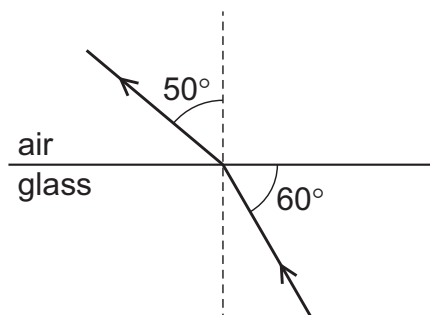
He sees the letter 'R' in the mirror.

How is it printed on the card?



397. Question | 0625 May-June 2024 P2 V3 Q20

- 20** A ray of light is refracted as it enters air from glass, as shown.



What is the speed of light in the glass?

- A** $2.0 \times 10^8 \text{ m/s}$
- B** $2.2 \times 10^8 \text{ m/s}$
- C** $2.3 \times 10^8 \text{ m/s}$
- D** $2.7 \times 10^8 \text{ m/s}$

398. Question | 0625 May-June 2024 P2 V3 Q21

- 21** A converging lens is being used as a magnifying glass.

Which statement is correct?

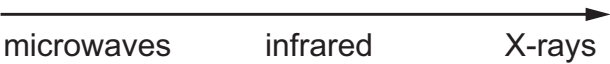
- A** The image is further away from the lens than the object is.
- B** The image is inverted.
- C** The image is real.
- D** The object must be placed at the principal focus of the lens.

399. Question | 0625 May-June 2024 P2 V3 Q22

- 22 Which colours of visible light are in the correct order of increasing wavelength?
- A red → yellow → blue
 - B orange → green → violet
 - C indigo → green → red
 - D blue → green → violet

400. Question | 0625 May-June 2024 P2 V3 Q23

- 23 The diagram shows three types of electromagnetic radiation listed in a particular order. The electromagnetic radiation is travelling in a vacuum.



Which quantities increase in magnitude going from left to right across the list?

- A both speed and frequency
- B frequency only
- C speed only
- D neither speed nor frequency

401. Question | 0625 May-June 2024 P2 V3 Q24

- 24 Which row gives the typical values of the speed of sound at room temperature in the materials stated?

	<u>speed of sound</u>		
	m/s		
	air	water	iron
A	340	1500	5100
B	340	5100	1500
C	5100	1500	340
D	3.0×10^8	3.0×10^8	3.0×10^8

402. Question | 0625 Oct-Nov 2024 P2 V1 Q17

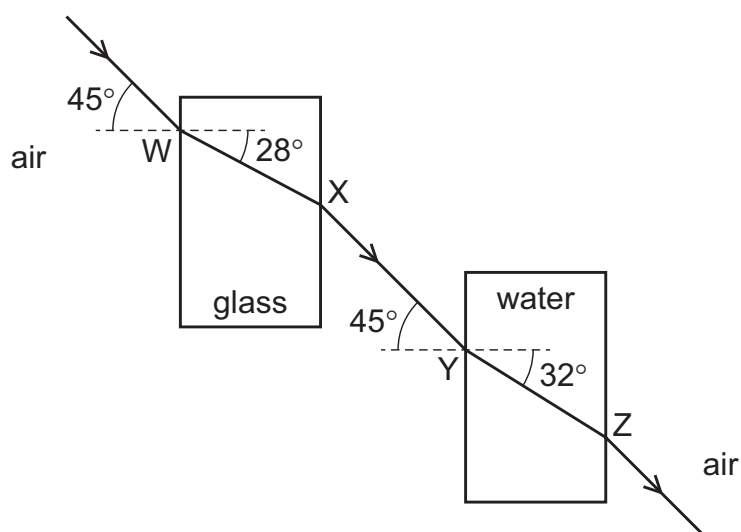
17 Water waves are reflected at a plane surface.

Which property of the waves is changed by the reflection?

- A** direction of propagation
- B** frequency
- C** speed
- D** wavelength

403. Question | 0625 Oct-Nov 2024 P2 V1 Q18

18 A light ray is passed through air, glass and water.

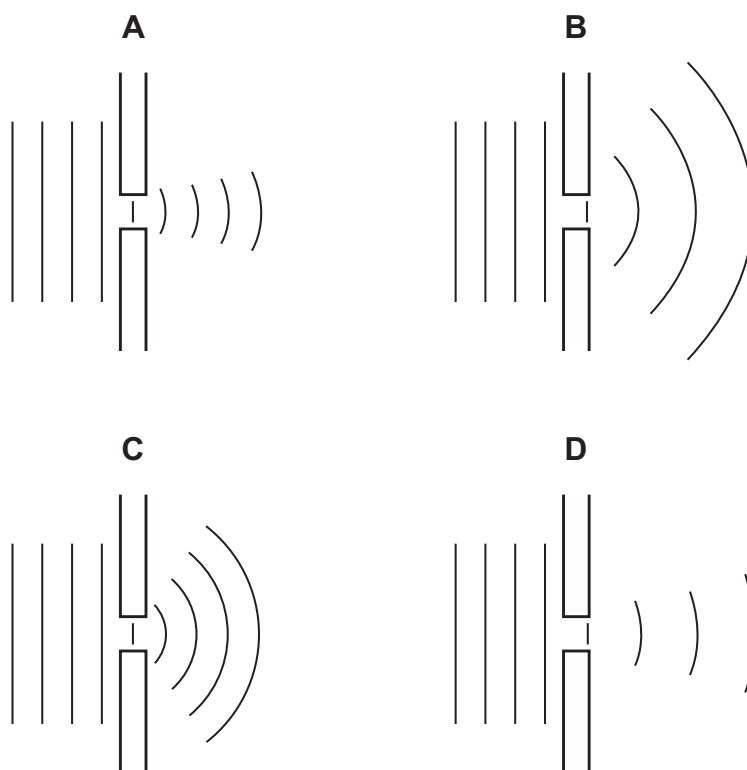


At which points does the light speed decrease?

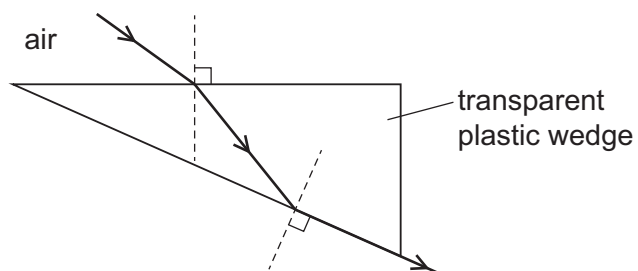
- A** W and X
- B** W and Y
- C** X and Z
- D** Y and Z

19 Plane water waves approach a narrow gap in a barrier.

Which diagram shows the diffraction pattern that would occur?

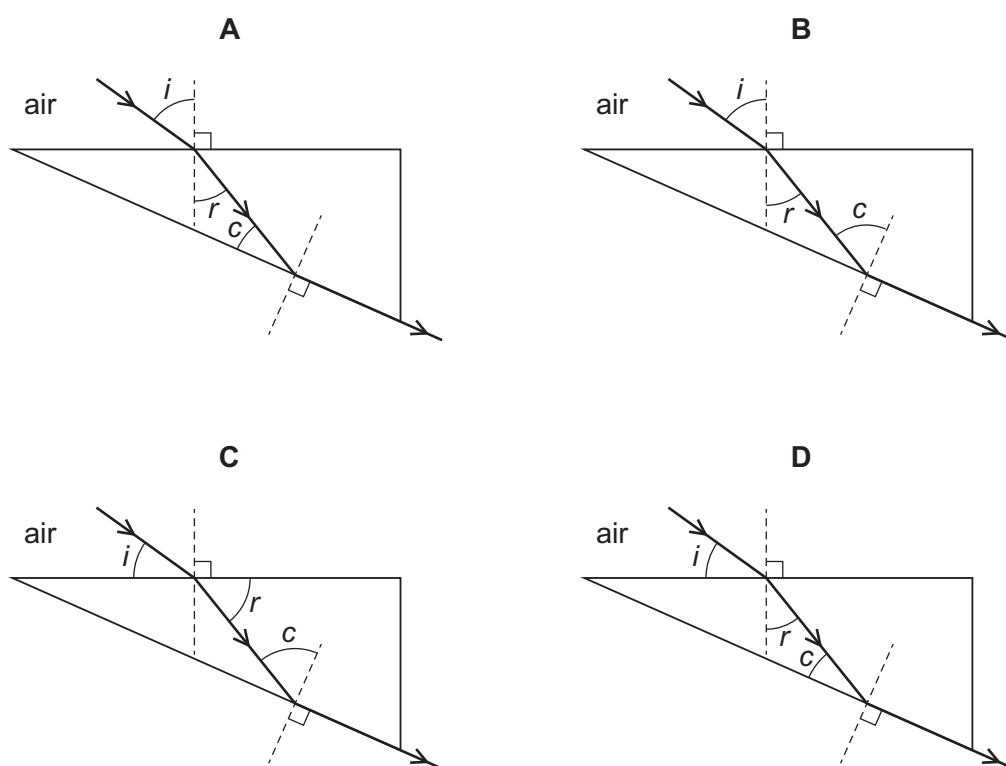


- 20** A ray of light enters a transparent plastic wedge from air and is incident on the lower surface at the critical angle, as shown.

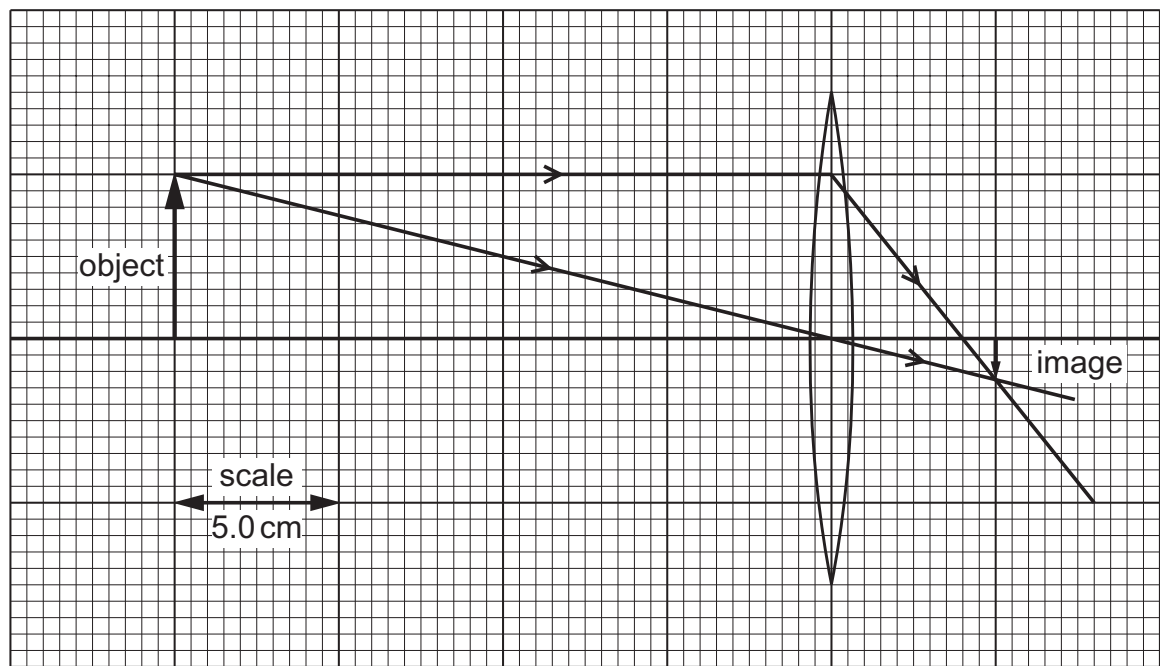


The angle of incidence is i , the angle of refraction is r , and the critical angle is c .

In which ray diagram are the angles labelled correctly?



21 An object is placed 20 cm in front of a thin converging lens. The scale diagram shows how the lens forms a real, inverted image.



Which row gives the focal length of the lens and the distance of the image from the lens?

	focal length of lens / cm	distance of image from lens / cm
A	4.0	5.0
B	5.0	4.0
C	8.0	10.0
D	10.0	8.0

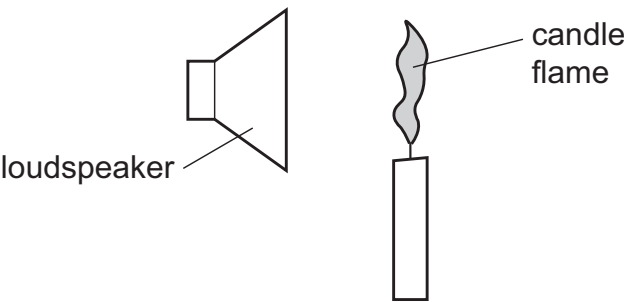
22 Radio waves are electromagnetic waves.

What is the wavelength of a radio wave of frequency $2.0 \times 10^5 \text{ Hz}$?

- A** 0.00067 m **B** 0.0015 m **C** 670 m **D** 1500 m

23 A candle flame is placed in front of a loudspeaker.

The loudspeaker produces a sound wave that causes air particles to vibrate. The vibrating air particles make the candle flame vibrate in the same direction as the air particles.



Which row shows the direction of vibration of the candle flame and the nature of sound waves?

	direction of vibration	nature of sound waves
A		longitudinal
B		transverse
C		longitudinal
D		transverse

409. Question | 0625 Oct-Nov 2024 P2 V2 Q17

- 17** What is the number of wavefronts per second that pass a fixed point?
- A** the amplitude of the wave
 - B** the frequency of the wave
 - C** the speed of the wave
 - D** the wavelength of the wave

410. Question | 0625 Oct-Nov 2024 P2 V2 Q18

- 18** An earthquake under the ocean can produce a dangerous water wave called a tsunami.
- The table gives typical data for a tsunami.

<u>ocean depth</u> m	<u>velocity</u> km / h	<u>wavelength</u> km
7000	948	285
2000	504	151

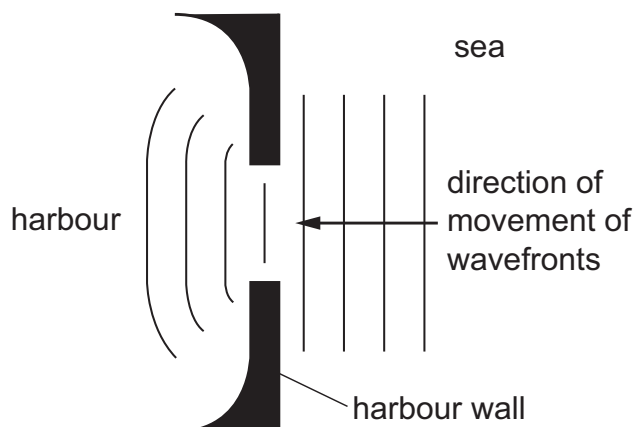
A student suggests three conclusions about the data.

- 1 The deeper the ocean, the faster the wave.
- 2 The longer the wavelength, the faster the wave.
- 3 The faster the wave, the higher the frequency.

Which conclusions are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

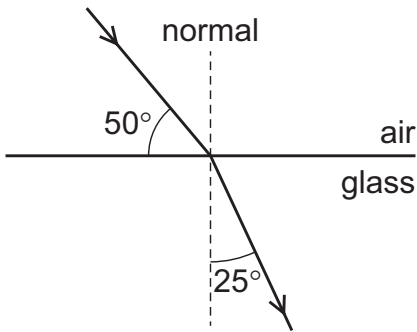
19 The diagram shows what happens to wavefronts at sea when they enter a harbour.



What causes the change in the shape of the wavefronts?

- A** diffraction
- B** dispersion
- C** reflection
- D** refraction

20 A ray of light passes from air into glass.



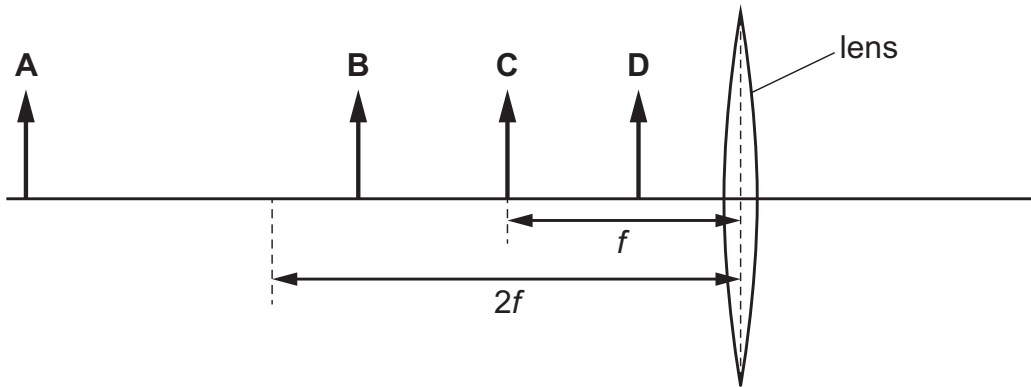
What are the angles of incidence and refraction of the ray?

	angle of incidence / °	angle of refraction / °
A	40	25
B	40	65
C	50	25
D	50	65

21 An object is placed in front of a converging lens. The lens has a focal length f .

The lens produces a real, enlarged image of the object.

In which labelled position is the object placed?



414. Question | 0625 Oct-Nov 2024 P2 V2 Q22

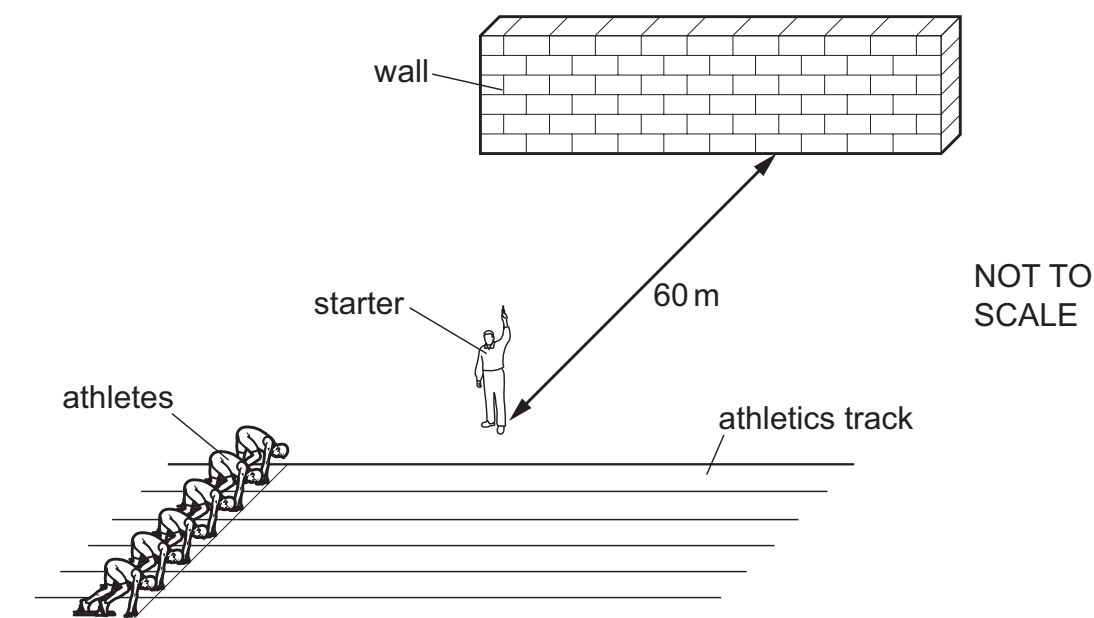
22 What is the speed of electromagnetic waves in a vacuum?

- A** 300 m/s
- B** 300 km/s
- C** 300 000 km/s
- D** 300 000 000 km/s

415. Question | 0625 Oct-Nov 2024 P2 V2 Q23

23 The starter in an athletics race fires the starting pistol. There is a wall 60 m from the starter.

Take the speed of sound as 330 m/s.

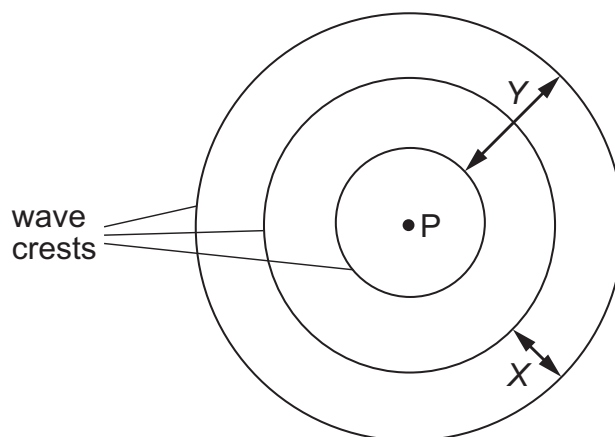


How long after firing the pistol does the starter hear the echo of the sound from the wall?

- A** 0.18 s
- B** 0.36 s
- C** 2.8 s
- D** 5.5 s

17 A vertical stick is dipped up and down in water at P.

In two seconds, three wave crests spread out on the surface of the water.



Which statement is correct?

- A** Distance X is the amplitude of the waves.
- B** Distance Y is the wavelength of the waves.
- C** Each circle represents a wavefront.
- D** The frequency of the waves is 3 Hz.

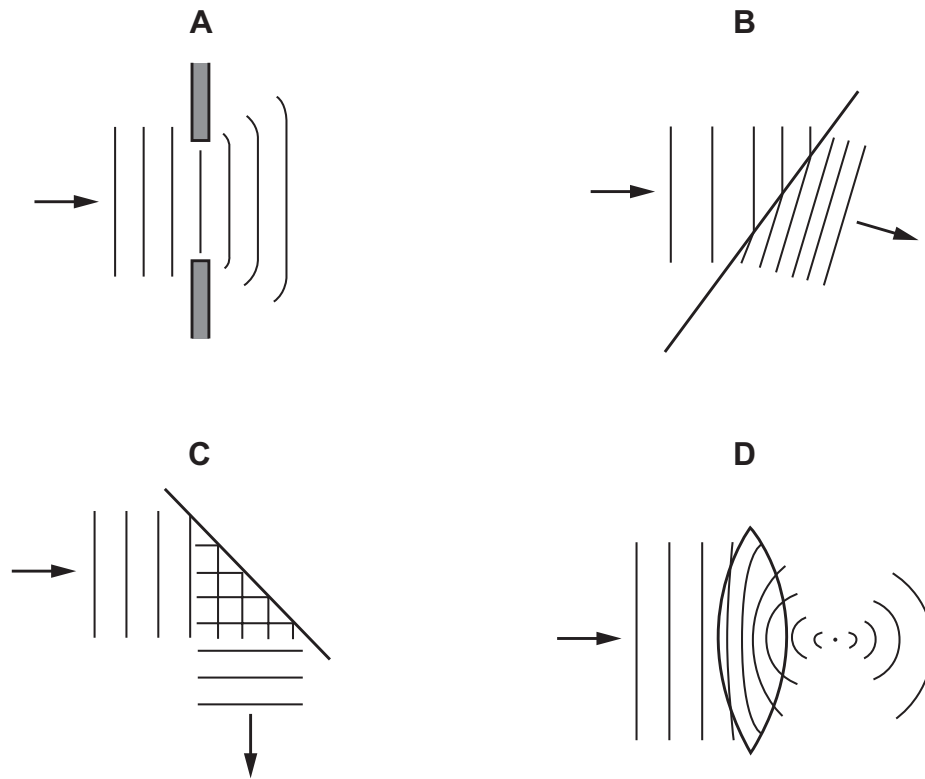
417. Question | 0625 Oct-Nov 2024 P2 V3 Q18

- 18** Seismic waves from the epicentre of an earthquake take 100 s to reach a point 300 km away. When they arrive, they cause the ground to vibrate with a frequency of 2.0 Hz.

What is the wavelength of these seismic waves?

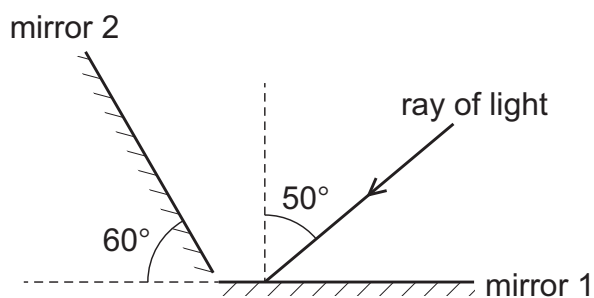
- A** 0.67 km **B** 1.5 km **C** 3.0 km **D** 6.0 km

19 Which diagram illustrates diffraction of water waves?



20 A single ray of light is reflected by two mirrors.

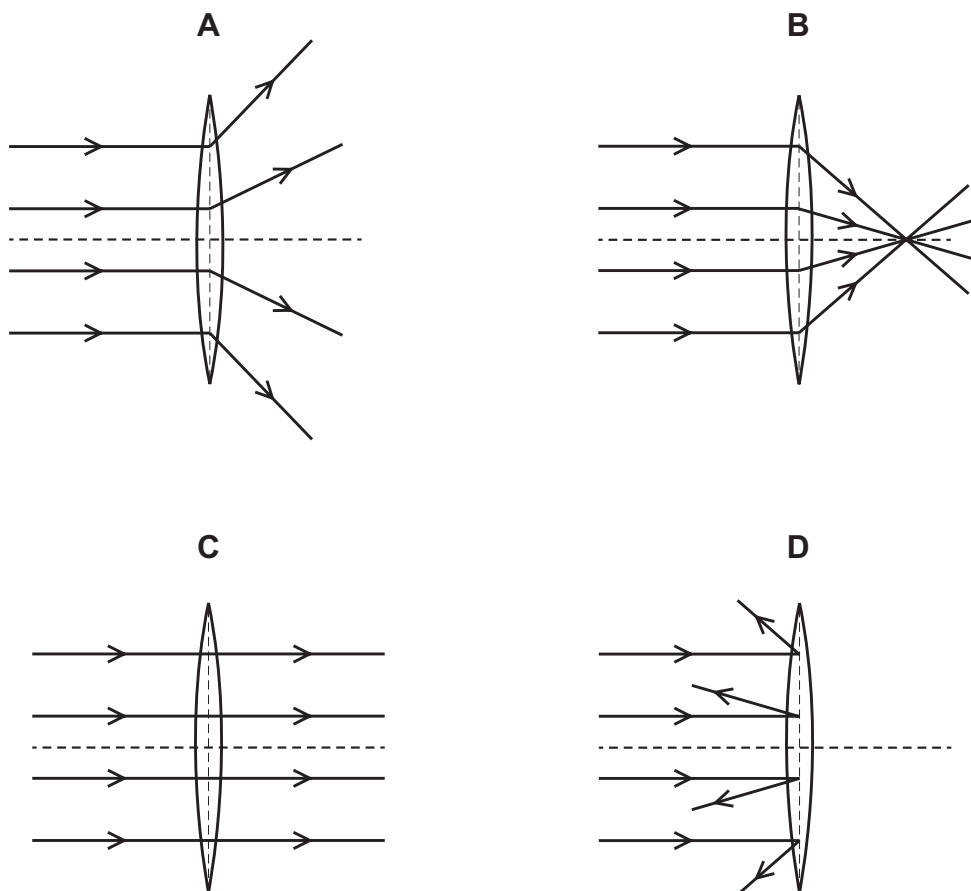
The diagram shows the ray of light incident on mirror 1.



What is the angle of reflection in mirror 2?

- A** 50° **B** 60° **C** 70° **D** 80°

21 Which diagram shows the effect of a converging lens on a parallel beam of light?



22 Which three regions of the electromagnetic spectrum are used in the applications listed?

- sterilising water
- optical fibres
- satellite television signals
- mobile (cell) phones

- A** radio, infrared, visible
B ultraviolet, infrared, microwaves
C visible, radio, ultraviolet
D X-rays, visible, infrared

422. Question | 0625 Oct-Nov 2024 P2 V3 Q23

- 23** A man stands 110m from a high wall. He makes a short, sharp sound and then hears an echo from the wall.

The speed of sound in air is 330 m/s.

How long after making the sound does the man hear the echo?

- A** 0.33 s **B** 0.67 s **C** 1.5 s **D** 3.0 s

423. Question | 0625 Feb-March 2025 P2 V2 Q19

- 19** The frequency of a wave is doubled. The speed of the wave does **not** change.

What happens to the wavelength of the wave?

- A** It becomes four times as large.
B It does **not** change.
C It doubles.
D It halves.

424. Question | 0625 Feb-March 2025 P2 V2 Q20

- 20** Which statement about ultrasound is correct?

- A** It has a higher frequency than audible sound and it is a longitudinal wave.
B It has a higher frequency than audible sound and it is a transverse wave.
C It has a lower frequency than audible sound and it is a longitudinal wave.
D It has a lower frequency than audible sound and it is a transverse wave.

425. Question | 0625 Feb-March 2025 P2 V2 Q21

- 21** Which statement about the image produced by a plane mirror is **not** correct?

- A** The image is real.
B The image is upright.
C The image is the same size as the object.
D The distance from the image to the mirror is the same as the distance from the object to the mirror.

426. Question | 0625 Feb-March 2025 P2 V2 Q22

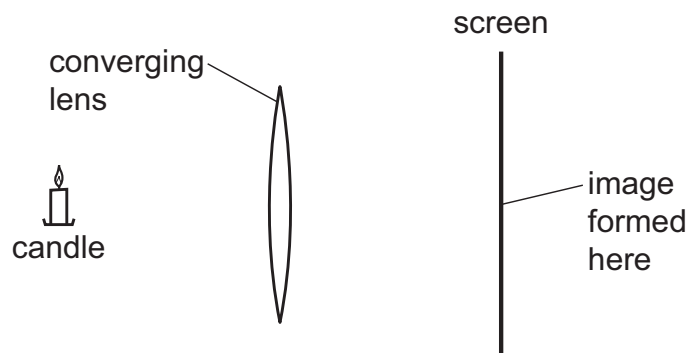
22 A ray of light is incident on a boundary between air and water.

Under which conditions is the ray of light totally internally reflected?

- A** The ray, initially in the air, is incident on the air–water boundary at any angle of incidence.
- B** The ray, initially in the air, is incident on the air–water boundary at an angle of incidence greater than the critical angle.
- C** The ray, initially in the water, is incident on the water–air boundary at any angle of incidence.
- D** The ray, initially in the water, is incident on the water–air boundary at an angle of incidence greater than the critical angle.

427. Question | 0625 Feb-March 2025 P2 V2 Q23

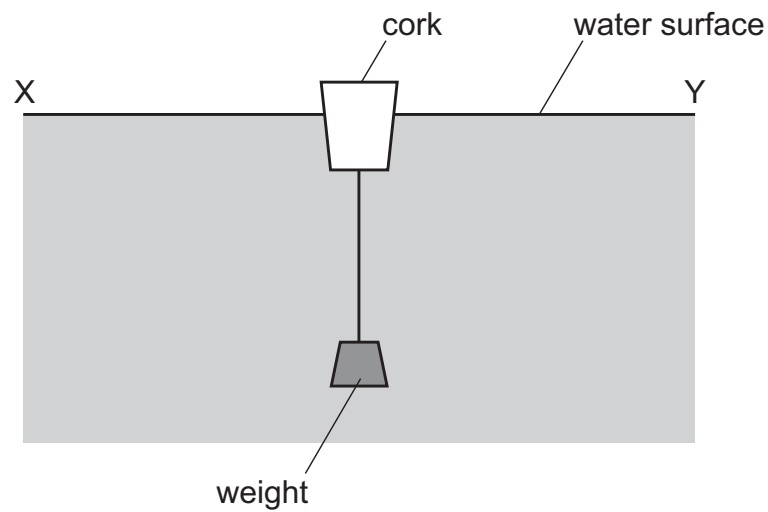
23 A converging lens is used to make an image on a screen.



Which type of image is formed on the screen?

- A** real and inverted
- B** real and upright
- C** virtual and inverted
- D** virtual and upright

- 17** The diagram shows a cork with a weight attached so that the cork floats upright in water.



Transverse waves travel across the water from X to Y.

In which direction do the waves make the cork move?

- A** → ← right and left
- B** ↑↓ up and down
- C** → only to the right
- D** ← only to the left

18 A thin converging lens is used as a magnifying glass.

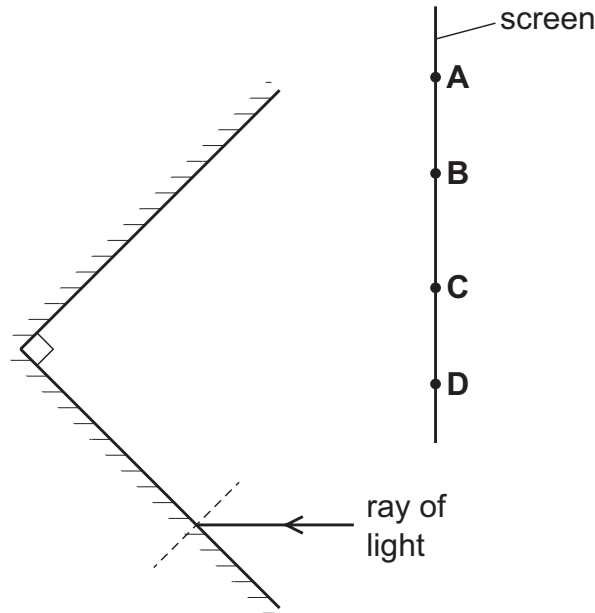
How does the image compare with the object?

- A** real and inverted
- B** real and upright
- C** virtual and inverted
- D** virtual and upright

430. Question | 0625 May-June 2025 P2 V1 Q19

- 19** The diagram shows two plane mirrors at 90° to each other. A ray of light is incident on one of the mirrors. The ray reflects off both mirrors before reaching a screen.

At which labelled point does the ray reach the screen?



431. Question | 0625 May-June 2025 P2 V1 Q20

- 20** The speed of light in a material is 50% of the speed of light in air.

What is the refractive index of the material?

- A** 0.5 **B** 2.0 **C** 6.0×10^8 **D** 1.5×10^8

432. Question | 0625 May-June 2025 P2 V1 Q21

- 21** A beam of white light is split into a spectrum of seven colours.

Which name is given to this process?

- A** diffraction
B dispersion
C reflection
D refraction

433. Question | 0625 May-June 2025 P2 V1 Q22

22 Satellites are sometimes used to receive and re-transmit television signals.

Which row shows the type of satellite and the electromagnetic waves used?

	type of satellite	electromagnetic waves used
A	low orbit	infrared
B	low orbit	microwaves
C	geostationary	infrared
D	geostationary	microwaves

434. Question | 0625 May-June 2025 P2 V1 Q23

23 A sound wave travels through the air and strikes a solid block of steel.

Some of the sound is reflected from the steel, and some is transmitted through the steel.

How does the speed and the wavelength of the sound in steel compare to the speed and the wavelength of the sound in air?

	speed in steel	wavelength in steel
A	less than in air	less than in air
B	less than in air	greater than in air
C	greater than in air	less than in air
D	greater than in air	greater than in air

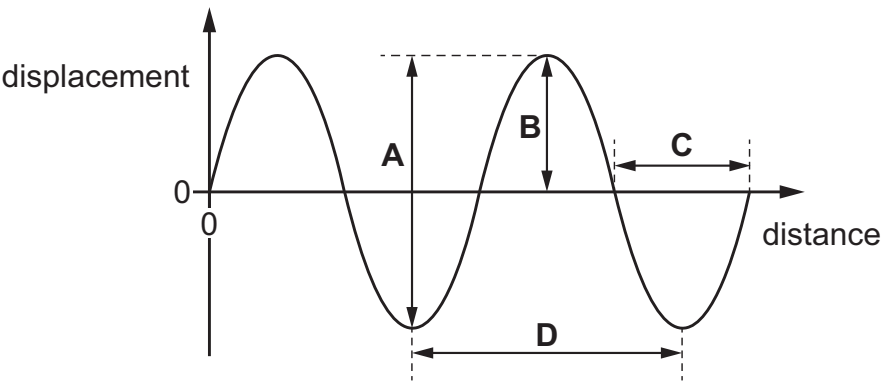
435. Question | 0625 May-June 2025 P2 V2 Q17

17 Which wave will diffract the most when passing through a gap that is 0.85 m wide?

	$\frac{\text{wave speed}}{\text{m/s}}$	wave frequency / Hz
A	300	280
B	300	400
C	350	280
D	350	400

436. Question | 0625 May-June 2025 P2 V2 Q18

18 Which arrow on the graph shows the amplitude of the wave?



437. Question | 0625 May-June 2025 P2 V2 Q19

19 Which row describes a seismic S-wave?

	type of wave	direction of vibration
A	longitudinal	parallel to the direction of travel of the wavefront
B	longitudinal	perpendicular to the direction of travel of the wavefront
C	transverse	parallel to the direction of travel of the wavefront
D	transverse	perpendicular to the direction of travel of the wavefront

438. Question | 0625 May-June 2025 P2 V2 Q20

20 The image of an object is formed by a plane mirror.

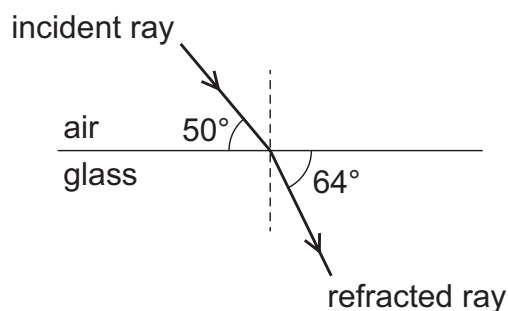
Which row gives the correct properties of the image?

	real or virtual	distance of the image from the mirror
A	real	closer to the mirror than the object
B	real	the same distance from the mirror as the object
C	virtual	closer to the mirror than the object
D	virtual	the same distance from the mirror as the object

439. Question | 0625 May-June 2025 P2 V2 Q21

21 A ray of light, travelling in air, is incident on an air–glass boundary.

The angles between the incident ray, the refracted ray and the boundary are shown.

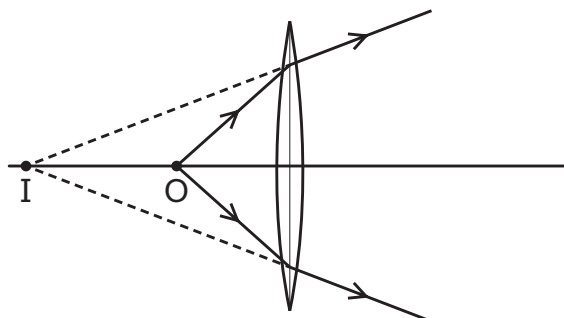


Which equation is used to calculate the refractive index n of the glass?

- A** $n = \frac{\sin 40^\circ}{\sin 26^\circ}$ **B** $n = \frac{\sin 40^\circ}{\sin 64^\circ}$ **C** $n = \frac{\sin 50^\circ}{\sin 26^\circ}$ **D** $n = \frac{\sin 50^\circ}{\sin 64^\circ}$

440. Question | 0625 May-June 2025 P2 V2 Q22

22 A small object O is placed near a converging lens, as shown. The lens forms an image I.



Which statement is correct?

- A** The image I is diminished.
B The image I is inverted.
C The image I is real.
D The object O is closer to the lens than its principal focus.

441. Question | 0625 May-June 2025 P2 V2 Q23

23 What is the approximate speed of light in air?

- A** 300 m/s
- B** 300 km/s
- C** 3.0×10^8 m/s
- D** 3.0×10^8 km/s

442. Question | 0625 May-June 2025 P2 V2 Q24

24 A ship sends an ultrasound pulse to the seabed to measure the depth of the sea.

The speed of ultrasound waves in sea water is 1500 m/s.

The pulse takes 4.6 seconds to travel to the seabed and back to the ship.

What is the depth of the sea?

- A** 330 m
- B** 650 m
- C** 3500 m
- D** 6900 m

443. Question | 0625 May-June 2025 P2 V2 Q25

25 A dolphin has a range of audible frequencies of 150 Hz–150 kHz.

Which range of frequencies can be heard both by humans with good hearing and by dolphins?

- A** 20 Hz–150 Hz
- B** 20 Hz–150 kHz
- C** 20 kHz–150 kHz
- D** 150 Hz–20 kHz

444. Question | 0625 May-June 2025 P2 V3 Q17

17 Which row correctly describes light waves?

	wave type	direction of vibration
A	longitudinal	parallel to direction of wave travel
B	longitudinal	perpendicular to direction of wave travel
C	transverse	parallel to direction of wave travel
D	transverse	perpendicular to direction of wave travel

445. Question | 0625 May-June 2025 P2 V3 Q18

18 A narrow beam of light consists of two waves of different wavelengths.

The beam of light hits a sharp edge.

Which effect will be seen beyond the sharp edge?

- A** Both waves continue along the same straight line as before.
- B** Both waves bend sharply and continue along a new straight line.
- C** The wave of longer wavelength bends round the sharp edge more than the wave of shorter wavelength.
- D** The wave of shorter wavelength bends round the sharp edge more than the wave of longer wavelength.

446. Question | 0625 May-June 2025 P2 V3 Q19

19 An object is placed 30 cm in front of a plane mirror.

Which statement describes the image of the object?

- A** The image is the same size as the object and 30 cm from the object.
- B** The image is the same size as the object and 60 cm from the object.
- C** The image is smaller than the object and 30 cm from the object.
- D** The image is smaller than the object and 60 cm from the object.

447. Question | 0625 May-June 2025 P2 V3 Q20

20 Which statement about total internal reflection at a glass–air boundary is correct?

- A** The angle of incidence inside the glass must be equal to the critical angle.
- B** The angle of incidence inside the glass must be less than the critical angle.
- C** The critical angle is proportional to the refractive index of the glass.
- D** The speed of light in glass must be less than the speed of light in air.

448. Question | 0625 May-June 2025 P2 V3 Q21

21 What is the speed of radio waves in a vacuum and what is the speed of gamma rays in a vacuum?

	speed of radio waves	speed of gamma rays
A	less than $3.0 \times 10^8 \text{ m/s}$	less than $3.0 \times 10^8 \text{ m/s}$
B	less than $3.0 \times 10^8 \text{ m/s}$	more than $3.0 \times 10^8 \text{ m/s}$
C	$3.0 \times 10^8 \text{ m/s}$	$3.0 \times 10^8 \text{ m/s}$
D	more than $3.0 \times 10^8 \text{ m/s}$	more than $3.0 \times 10^8 \text{ m/s}$

449. Question | 0625 May-June 2025 P2 V3 Q22

22 A student makes a sound in front of a large wall.

She hears an echo at time t after making the sound.

The speed of sound in air is v .

Which expression is used to calculate the distance between the student and the wall?

- A** $v \times t$
- B** $v \div t$
- C** $(v \times t) \div 2$
- D** $(v \div t) \div 2$

450. Question | 0625 May-June 2025 P2 V3 Q23

23 What is a compression?

- A** a point in a longitudinal wave where the particles of the medium are close together
- B** a point in a longitudinal wave where the particles of the medium are far apart
- C** a point in a transverse wave where the particles of the medium are close together
- D** a point in a transverse wave where the particles of the medium are far apart

451. Question | 0625 Oct-Nov 2025 P2 V1 Q17

17 A ray of light reflects from a plane mirror.

The angle between the incident ray and the surface of the mirror is 35° .

Which statement is correct?

- A** The angle of incidence is 35° .
- B** The angle of incidence is 55° .
- C** The angle of reflection is 70° .
- D** The angle of reflection is 110° .

18 Parallel waves in a ripple tank are diffracted as they pass through a gap in a barrier.

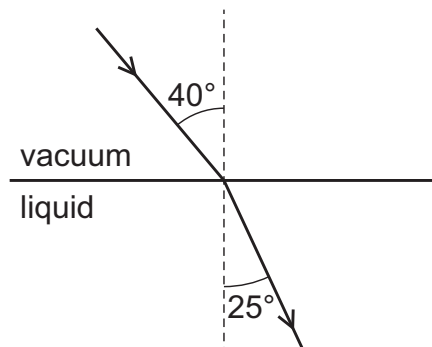
Three changes that can be made to this arrangement are listed.

- 1 Decrease the wavelength of the waves.
- 2 Increase the amplitude of the waves.
- 3 Decrease the size of the gap.

Which changes will cause the shape of the diffracted waves to be less curved?

- A** 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 and 3 only

- 19** A beam of light passes through a vacuum and then enters a transparent liquid. The diagram shows the path it takes.



The light travels through the vacuum at a speed of $3.0 \times 10^8 \text{ m/s}$.

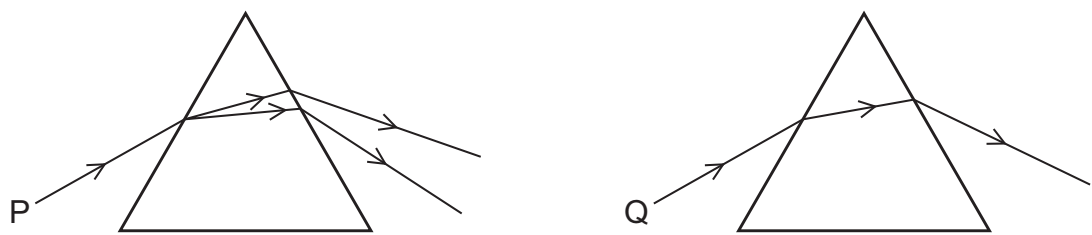
What is the speed of light in the liquid?

- A** $1.9 \times 10^8 \text{ m/s}$
- B** $2.0 \times 10^8 \text{ m/s}$
- C** $4.6 \times 10^8 \text{ m/s}$
- D** $4.8 \times 10^8 \text{ m/s}$

20 Which statement about a thin converging lens is correct?

- A** All rays of light refracted by the lens pass through the principal focus.
- B** All rays initially parallel to the principal axis of the lens are refracted through the principal focus.
- C** The focal length of the lens is the distance between the image and the principal focus.
- D** The focal length of the lens is the distance between the object and the image.

21 The diagram shows two narrow beams of light, P and then Q, passing through the same prism. Beams P and Q are both incident on the same point on the prism and at the same angle.



Which row correctly compares beams P and Q?

	dispersion	nature of light
A	only Q is dispersed	P is monochromatic and Q is white light
B	only Q is dispersed	P is white light and Q is monochromatic
C	only P is dispersed	P is monochromatic and Q is white light
D	only P is dispersed	P is white light and Q is monochromatic

22 Ultraviolet radiation and infrared radiation are both parts of the electromagnetic spectrum.

However, they differ in wavelength and frequency.

Which row describes how they differ?

	ultraviolet	infrared
A	longer wavelength than infrared	higher frequency than ultraviolet
B	longer wavelength than infrared	lower frequency than ultraviolet
C	shorter wavelength than infrared	higher frequency than ultraviolet
D	shorter wavelength than infrared	lower frequency than ultraviolet

23 A police car with its siren sounding is stationary in heavy traffic. A pedestrian notices that, although the loudness of the sound produced does **not** change, the pitch varies.

Which row describes the amplitude and the frequency of the sound?

	amplitude	frequency
A	constant	constant
B	constant	varying
C	varying	constant
D	varying	varying

458. Question | 0625 Oct-Nov 2025 P2 V2 Q17

17 An earthquake-monitoring station records the arrival of 16 complete wavelengths of an earthquake wave in a time of 20 s.

The speed of the earthquake wave is 6.0 km/s.

What is the wavelength of the earthquake wave?

- A** $1.3 \times 10^{-4} \text{ m}$ **B** $2.1 \times 10^{-4} \text{ m}$ **C** $4.8 \times 10^3 \text{ m}$ **D** $7.5 \times 10^3 \text{ m}$

459. Question | 0625 Oct-Nov 2025 P2 V2 Q18

18 Which statement is correct?

- A** Seismic S-waves are longitudinal.
B Sound waves are longitudinal.
C The amplitude is always greater than the wavelength in a longitudinal wave.
D The vibration is at right-angles to the direction of propagation in a longitudinal wave.

460. Question | 0625 Oct-Nov 2025 P2 V2 Q19

19 A water droplet is falling towards a horizontal plane mirror.

At one moment, the droplet is a distance of 1.5 m above the mirror and falling at a speed of 2.0 m/s.

What is the distance between the droplet and its image and what is the speed of the image at this moment?

	distance between water droplet and its image / m	<u>speed of image</u> m/s
A	1.5	2.0
B	1.5	4.0
C	3.0	2.0
D	3.0	4.0

20 Total internal reflection may occur when light reaches an air–glass boundary.

Under which conditions is light totally internally reflected?

	medium in which light travels towards the boundary	angle of incidence
A	air	greater than the critical angle
B	air	less than the critical angle
C	glass	greater than the critical angle
D	glass	less than the critical angle

21 A long-sighted person **cannot** see objects clearly that are a short distance away because the image is blurred.

Where is the image formed relative to the retina and which type of lens is used to correct long-sightedness?

	position of image	lens used for correction
A	behind retina	converging
B	behind retina	diverging
C	in front of retina	converging
D	in front of retina	diverging

463. Question | 0625 Oct-Nov 2025 P2 V2 Q22

22 What is the speed of infrared radiation in glass with a refractive index of 1.5?

- A** 340 m/s
- B** 2.0×10^8 m/s
- C** 3.0×10^8 m/s
- D** 4.5×10^8 m/s

464. Question | 0625 Oct-Nov 2025 P2 V2 Q23

23 Sound travels through air as a series of compressions and rarefactions.

Which statement correctly compares a compression with a rarefaction?

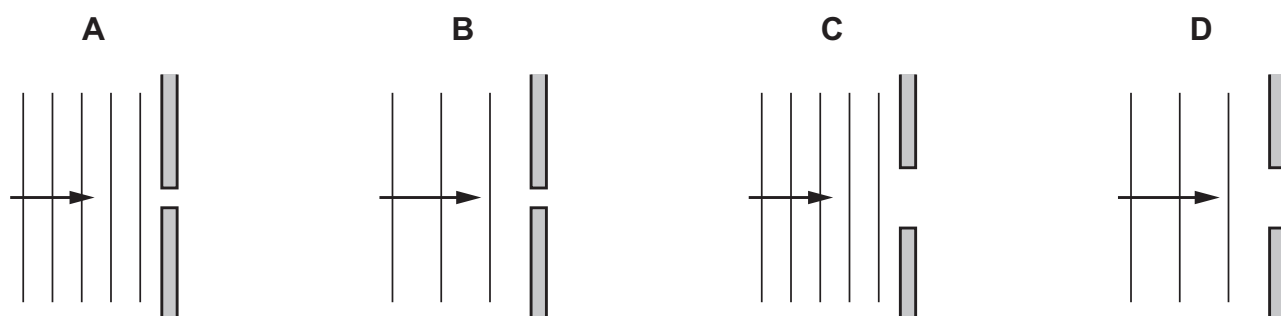
- A** In a compression, the wavelength is longer than in a rarefaction.
- B** In a compression, the wavelength is shorter than in a rarefaction.
- C** In a compression, the density of the air is greater than in a rarefaction.
- D** In a compression, the density of the air is lower than in a rarefaction.

465. Question | 0625 Oct-Nov 2025 P2 V3 Q18

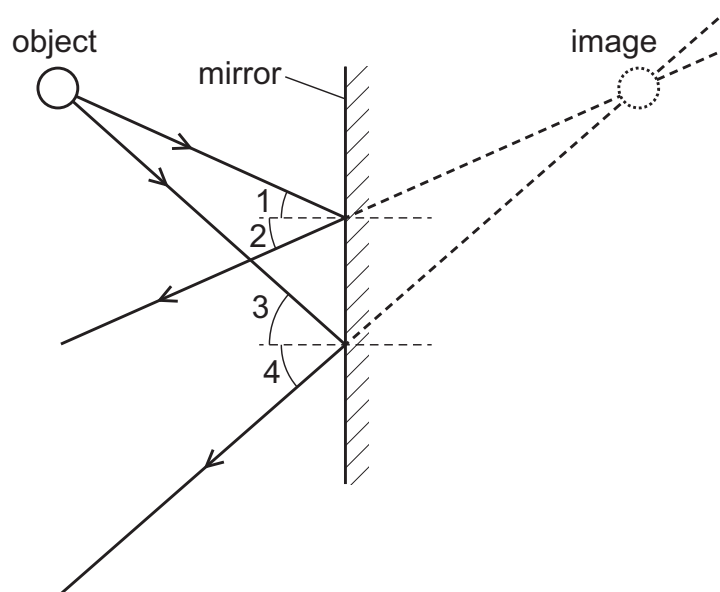
18 When water waves pass through a gap, they diffract.

The diagrams show wavefronts approaching a gap.

In which diagram will the diffraction be least?



- 19** The diagram shows a scale drawing of the formation of an image by the reflection of light from a plane mirror.



What are the relationships between the labelled angles?

- A** angle 1 = angle 2, and angle 3 = angle 4
- B** angle 1 = angle 3, and angle 2 = angle 4
- C** angle 1 = angle 4, and angle 3 = angle 2
- D** angle 1 = angle 2 = angle 3 = angle 4

20 The speed of light in a vacuum is $3.0 \times 10^8 \text{ m/s}$.

The speed of light in glass is $2.2 \times 10^8 \text{ m/s}$.

A light ray in a vacuum enters glass with an angle of incidence of 40° .

What is the angle of refraction within the glass?

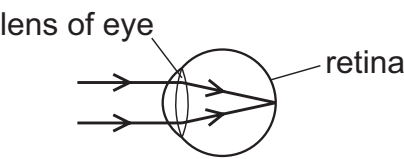
A 28°

B 29°

C 55°

D 61°

21 The diagram shows a human eye that correctly focuses the light on the retina.



Which row shows a short-sighted eye and use of the correct lens to focus the image?

	ray diagram for short-sighted eye	corrected vision
A		
B		
C		
D		

469. Question | 0625 Oct-Nov 2025 P2 V3 Q22

22 Visible light, X-rays and microwaves are all components of the electromagnetic spectrum.

Which statement about the waves is correct?

- A** In a vacuum, microwaves travel faster than visible light and have a shorter wavelength than visible light.
- B** In a vacuum, microwaves travel at the same speed as visible light and have a shorter wavelength than visible light.
- C** In a vacuum, X-rays travel faster than visible light and have a shorter wavelength than visible light.
- D** In a vacuum, X-rays travel at the same speed as visible light and have a shorter wavelength than visible light.

470. Question | 0625 Oct-Nov 2025 P2 V3 Q23

23 Both the amplitude and the frequency of a sound wave decrease.

What happens to the sound that is heard?

- A** The sound is louder and has a higher pitch.
- B** The sound is louder and has a lower pitch.
- C** The sound is quieter and has a higher pitch.
- D** The sound is quieter and has a lower pitch.