

1 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

2 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.

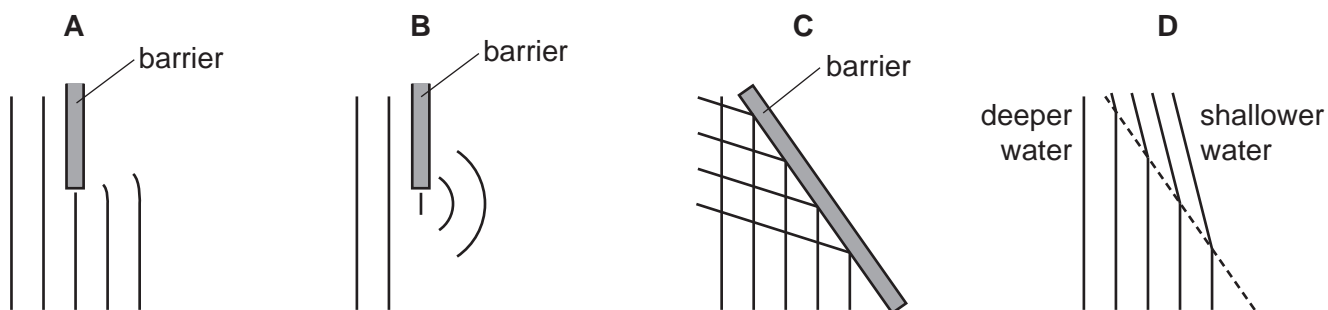
The frequency of N is 5.0×10^{15} Hz.

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

3 The diagrams represent water waves in a tank.

Which diagram represents a wave that changes speed?



4 The diagram represents the electromagnetic spectrum.

Some regions have been labelled, and some labels are missing.

Which region should be labelled as infra-red waves?

radio waves	A	B	visible light	C	D	γ -rays
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5 Which group contains only electromagnetic waves?

- A light waves, radio waves, γ -rays
- B light waves, radio waves, sound waves
- C light waves, sound waves, γ -rays
- D radio waves, sound waves, γ -rays

6 The diagram shows the electromagnetic spectrum.

γ -rays	X-rays	ultraviolet	visible light	infra-red	microwaves	radio waves
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increasing 

A word is missing from the label below the spectrum.

Which word is missing?

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

- 7 How do infra-red waves differ from ultraviolet waves?
- A** Infra-red waves are longitudinal.
 - B** Infra-red waves have a lower speed *in vacuo* (in a vacuum).
 - C** Infra-red waves have lower frequencies.
 - D** Infra-red waves have smaller wavelengths.
- 8 Which list shows electromagnetic waves in order of increasing frequency?
- A** visible light, X-rays, γ -rays
 - B** visible light, γ -rays, X-rays
 - C** X-rays, γ -rays, visible light
 - D** γ -rays, X-rays, visible light
- 9 Which statement about ultraviolet 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 radio waves.
- 10 Which type of electromagnetic wave is used in airport security scanners?
- A** infra-red
 - B** microwaves
 - C** radio waves
 - D** X-rays

- 11 An intruder alarm sensor detects that a human is warmer than his surroundings.

Which type of electromagnetic wave does the sensor detect?

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

- 12 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: Ultra-violet waves are used for intruder alarms.

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

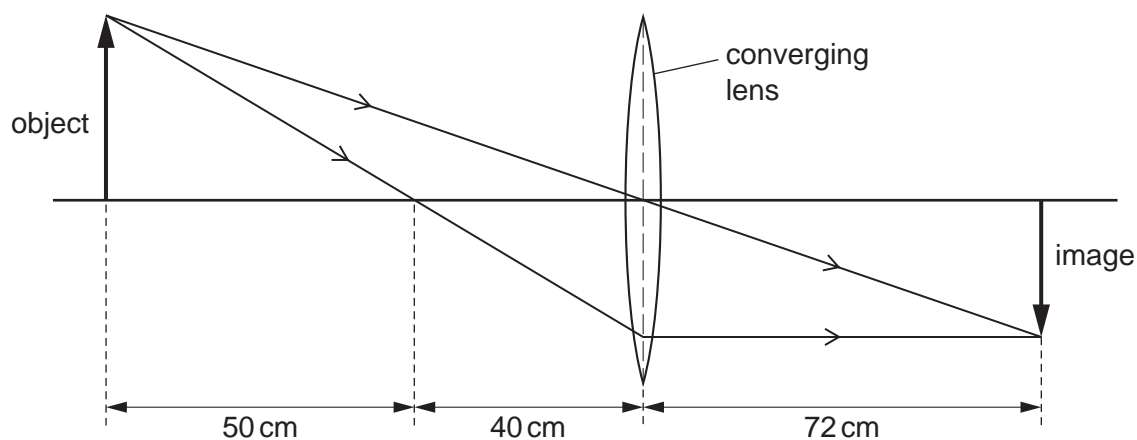
Which statements are correct?

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

- 13 Which group of electromagnetic radiations is arranged in order of increasing frequency?

- A** infra-red, visible light, ultraviolet
- B** γ -rays, X-rays, infra-red
- C** ultra-violet, visible light, radio waves
- D** X-rays, radio waves, γ -rays

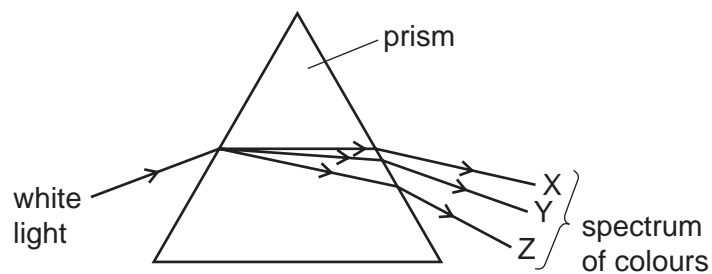
- 1 The ray diagram shows the image of an object formed by a converging lens.



What is the focal length of the lens?

- A** 40 cm **B** 50 cm **C** 72 cm **D** 90 cm

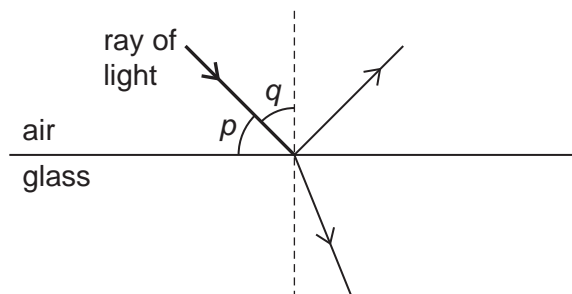
- 2 The diagram shows the dispersion of white light by a prism.



Which row could be correct for the colours seen at X, at Y and at Z?

	colour at X	colour at Y	colour at Z
A	red	violet	yellow
B	red	yellow	violet
C	violet	yellow	red
D	yellow	red	violet

- 3 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.

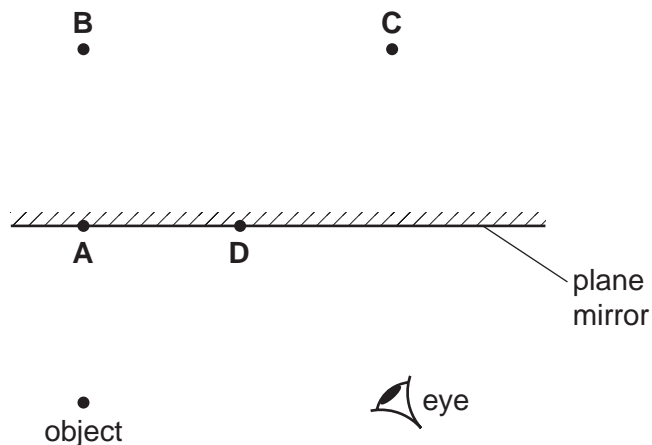


Which row gives the angle of incidence and shows whether the ray undergoes total internal reflection?

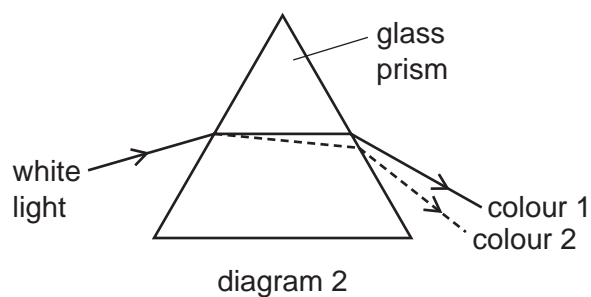
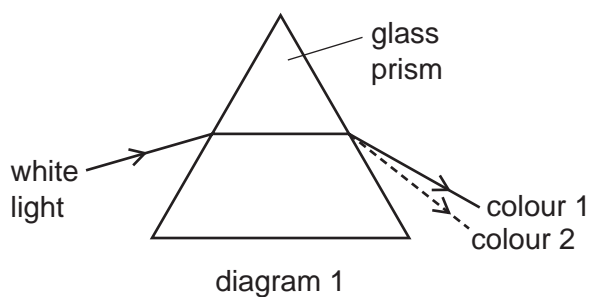
	angle of incidence	total internal reflection
A	p	no
B	p	yes
C	q	no
D	q	yes

- 4 The diagram shows an object in front of a plane mirror.

At which labelled position is the image of the object formed?



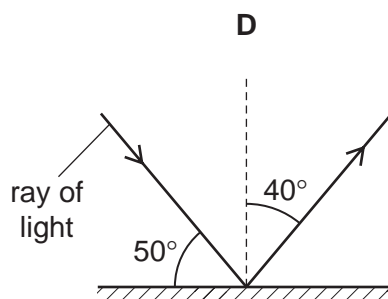
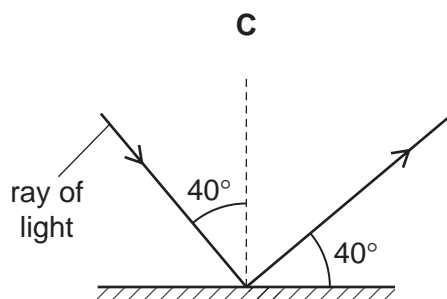
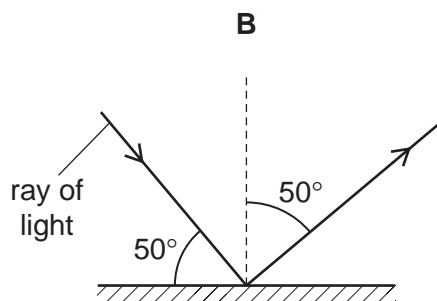
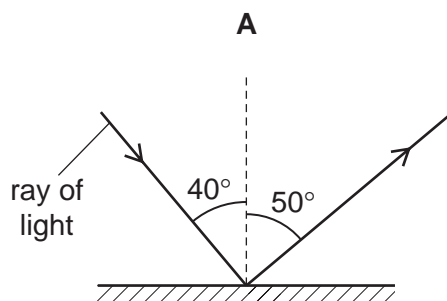
- 5 White light enters a glass prism. The light leaving the other side of the prism is separated into colours.



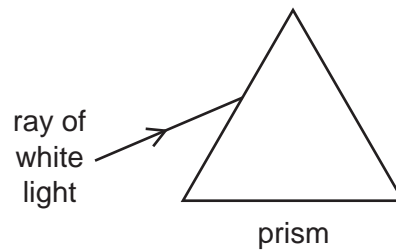
Which row correctly describes what happens?

	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

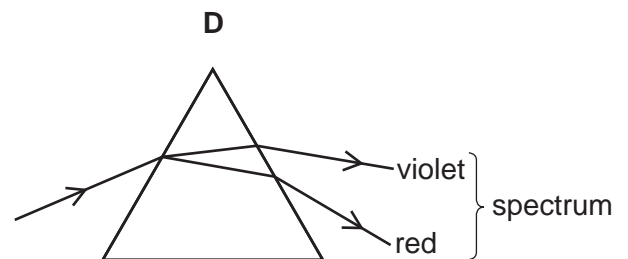
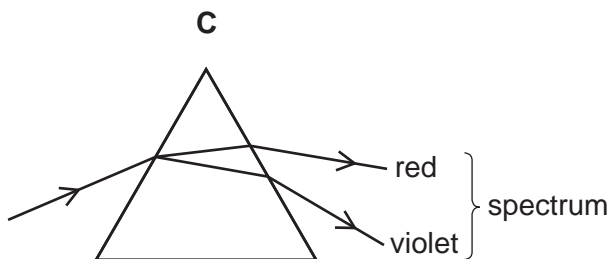
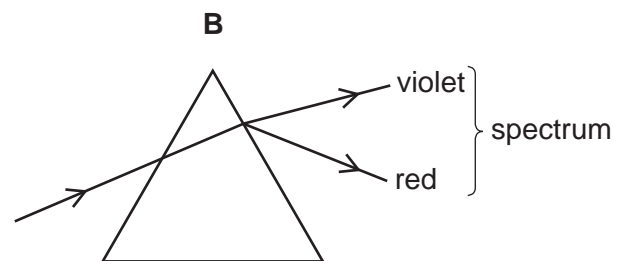
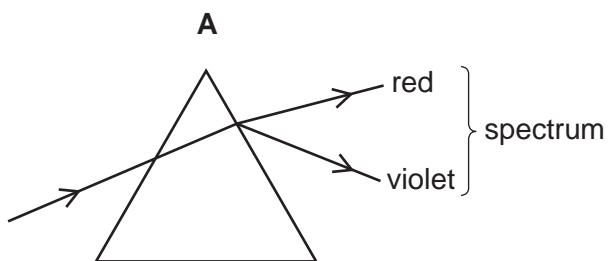
- 6 Which diagram correctly shows a ray of light reflected by a plane mirror?



- 7 A ray of white light is incident on a glass prism.

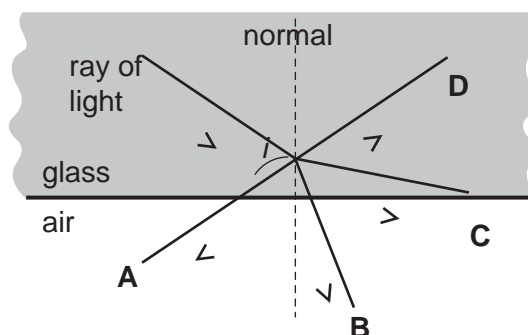


Which ray diagram shows the ray as it passes through the prism and emerges from the opposite side?



- 8 The diagram shows a ray of light incident on the edge of a piece of glass. The angle i is greater than the critical angle.

Which arrow shows the direction of the ray after it leaves the edge of the glass?



1 Why can ultrasound **not** be heard by humans?

- A** The amplitude is too great.
- B** The frequency is too great.
- C** The speed is too great.
- D** The wavelength is too great.

2 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.

3 What is the approximate range of hearing of a healthy human ear?

- A** 2.0 Hz to 2.0 kHz
- B** 2.0 Hz to 20 kHz
- C** 20 Hz to 2.0 kHz
- D** 20 Hz to 20 kHz

4 A singer sings two notes. The first note is louder and lower in pitch than the second note.

Which statement about the two notes is correct?

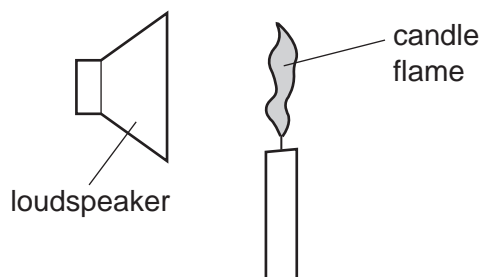
- A** The first note has a larger amplitude and a larger frequency than the second note.
- B** The first note has a larger amplitude and a smaller frequency than the second note.
- C** The first note has a smaller amplitude and a larger frequency than the second note.
- D** The first note has a smaller amplitude and a smaller frequency than the second note.

5 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

6 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

- 7 A sound wave travels from a point X to another point Y.



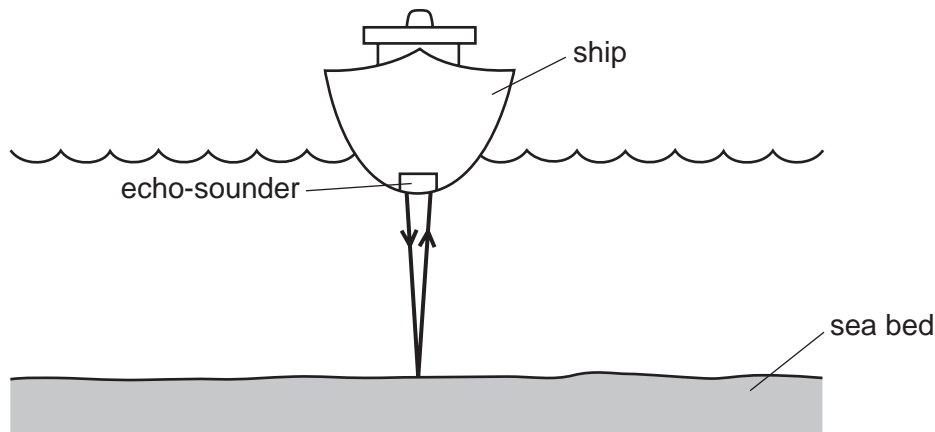
Which diagram represents the movement of the air molecules, due to the sound wave, in the region between X and Y?



- 8 Sound wave P has a greater amplitude and a larger wavelength in air than sound wave Q.

How do the loudness and pitch of P compare with the loudness and pitch of Q?

- A** P is louder and higher in pitch than Q.
 - B** P is louder and lower in pitch than Q.
 - C** P is quieter and higher in pitch than Q.
 - D** P is quieter and lower in pitch than Q.
- 9 An echo-sounder on a ship produces a pulse of sound. The echo is received by the echo-sounder after two seconds.



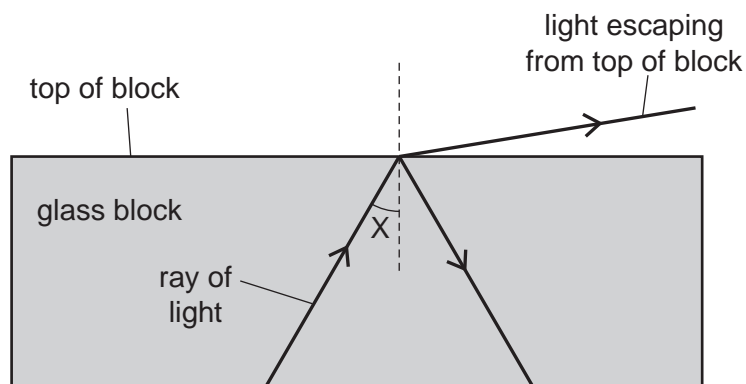
The speed of sound in sea-water is 1500 m/s.

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

- A** 750 m **B** 1500 m **C** 3000 m **D** 6000 m
- 10 Which frequency produces a sound that can be heard by a person?
- A** 2 Hz **B** 10 Hz **C** 2 kHz **D** 30 kHz

- 11 A scientist tries to direct a ray of light in a glass block so that no light escapes from the top of the block.

However, some light does escape.



The scientist changes angle X and stops the light escaping from the top.

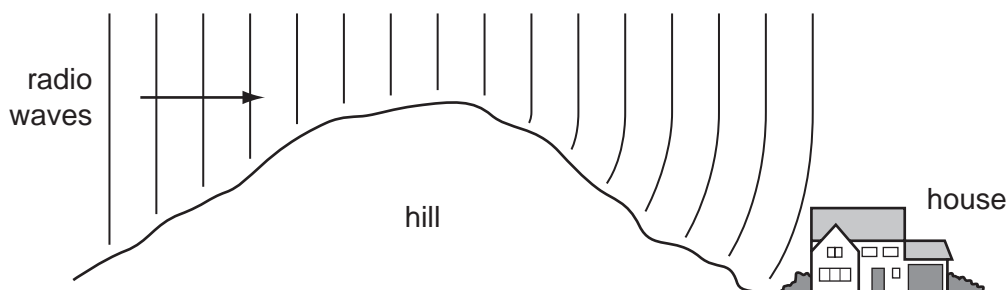
Which row in the table describes the change to angle X and the name of the effect produced?

	change to angle X	name of effect produced
A	decrease	total internal reflection
B	decrease	total internal refraction
C	increase	total internal reflection
D	increase	total internal refraction

- 12 Which row states two properties of sound waves?

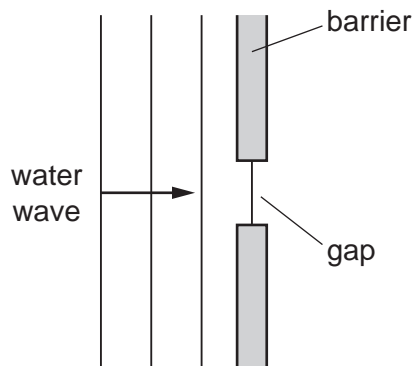
	can travel through	type of wave
A	a vacuum	longitudinal
B	a vacuum	transverse
C	water	longitudinal
D	water	transverse

- 1 Radio waves are received at a house at the bottom of a hill.



The waves reach the house because the hill has caused them to be

- A** diffracted.
 - B** radiated.
 - C** reflected.
 - D** refracted.
- 2 A water wave in a shallow tank passes through a gap in a barrier.



What happens to the speed and what happens to the wavelength of the wave as it passes through the gap?

	speed	wavelength
A	decreases	decreases
B	decreases	remains constant
C	remains constant	decreases
D	remains constant	remains constant

3 Which is a unit of wavelength?

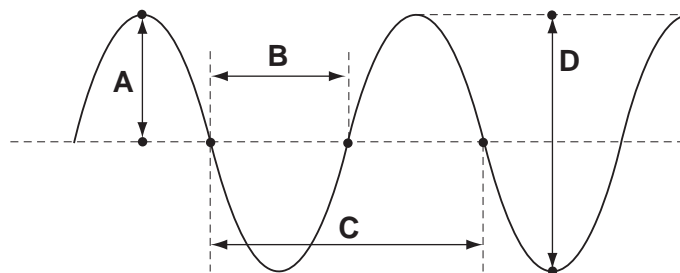
- A** hertz
- B** metre
- C** metre per second
- D** second

4 Which list contains only transverse waves?

- A** infra-red waves, light waves, sound waves
- B** infra-red waves, light waves, ultraviolet waves
- C** infra-red waves, sound waves, ultraviolet waves
- D** light waves, sound waves, ultraviolet waves

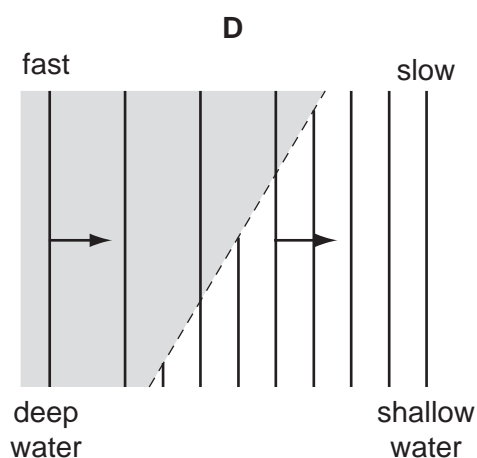
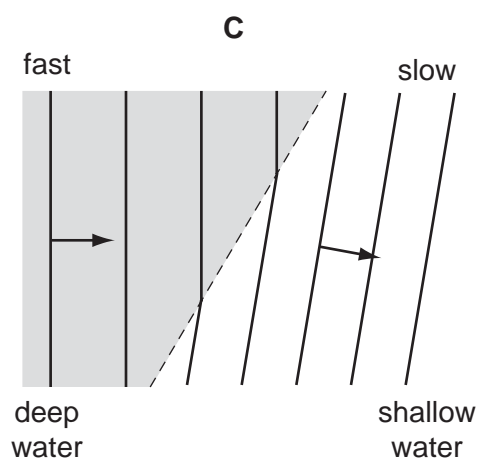
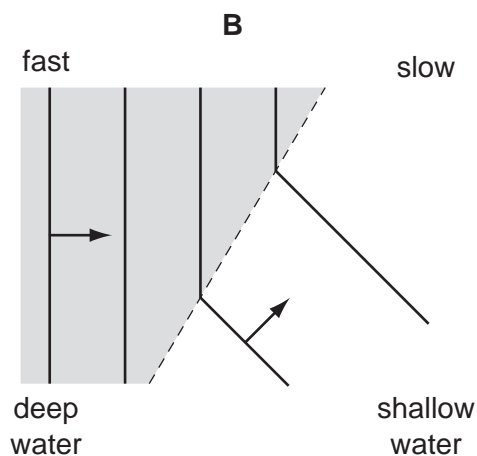
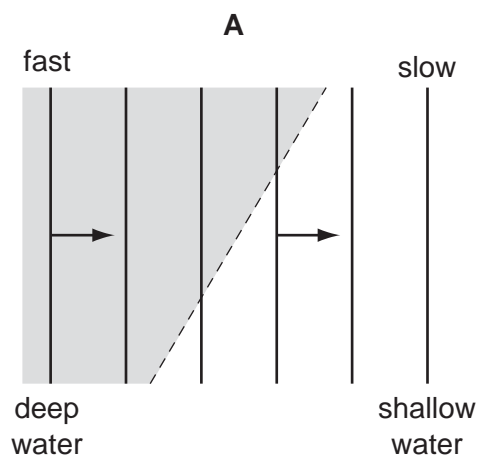
5 The diagram shows a wave.

Which labelled distance is the wavelength?



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

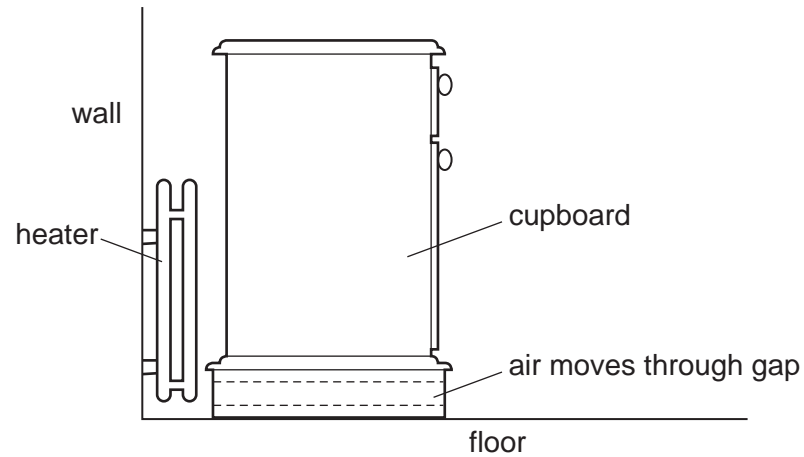
Which diagram shows what happens to the waves?



7 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

- 8 A cupboard is placed in front of a heater. Air can move through a gap under the cupboard.



Which row describes the temperature, and the direction of movement, of the air in the gap?

	air temperature	air direction
A	cool	away from the heater
B	cool	towards the heater
C	warm	away from the heater
D	warm	towards the heater

- 9 The diagram shows a water wave in a ripple tank.

Which line represents a wavefront?

