

**GCSE Physics A (Gateway)**

**J249/02 Physics A P5-P8 and P9 (Foundation Tier)**

**Question Set 27**

Multiple Choice Questions

P5: Waves in Matter

1 Which electromagnetic waves have the highest frequency?

- A Gamma rays
- B Microwaves
- C Radio waves
- D Ultra-violet rays

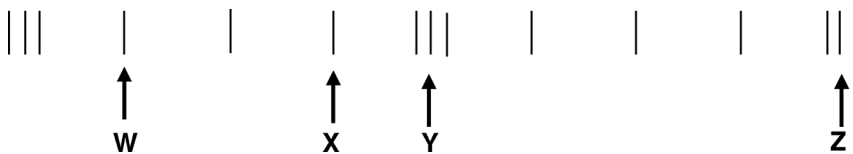
Your answer

A

[1]

2 A longitudinal wave passes through a slinky spring.  
The coils of the spring vibrate backwards and forwards.

The diagram shows a snapshot of the position of the coils as the wave passes along the spring.



Which pair of coils are one wavelength apart?

- A W and X
- B W and Z
- C X and Y
- D Y and Z

Your answer

D

[1]

3 Which statement is **not** true of all electromagnetic waves?

- A They have the same wavelength.
- B They are transverse waves.
- C They can travel through a vacuum.
- D They travel at 300 000 000 m/s.

Your answer

A

[1]

4 Which wave travels as a **longitudinal** wave?

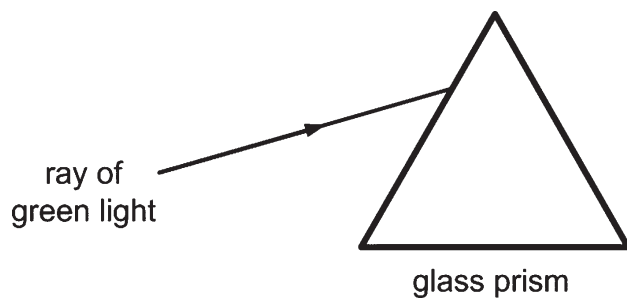
- A Light from a torch
- B Ripples from a stone dropped in water
- C Sound from a loudspeaker
- D Ultra-violet from the Sun

Your answer

C

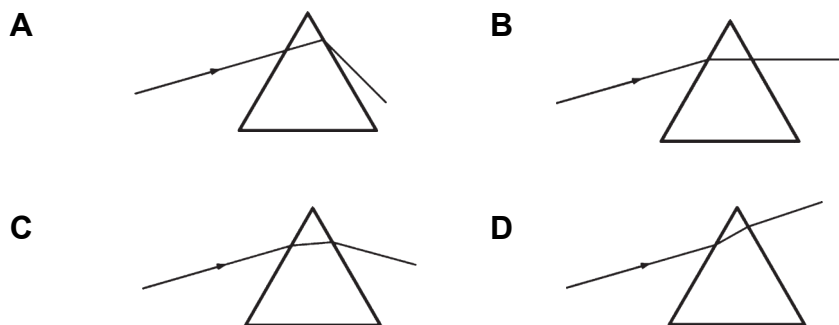
[1]

5 A ray of **green** light shines through a glass prism.



The ray travels through the prism and out of the other side.

Which diagram shows the correct path of the ray?



Your answer

C

[1]

6 Some electromagnetic waves are used to scan a person in hospital.

Which statement is true about a scan that uses **electromagnetic** waves?

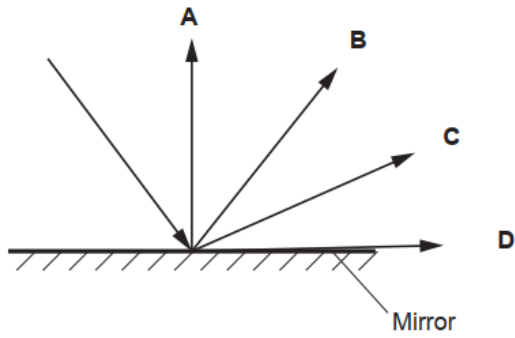
- A Micro-waves are used to scan skin.
- B Ultrasound waves are used to scan an unborn baby.
- C Ultra-violet is used to scan for cancer.
- D X-rays are used to scan for broken bones.

Your answer

D

[1]

7 Which light ray shows the correct reflection from the plane (flat) mirror?



Your answer

B

[1]

8 Which row **A**, **B**, **C** or **D**, is true for electromagnetic waves?

	Transmission	Type	Movement in space
<b>A</b>	Transmit energy from absorber to source	Longitudinal	Travel through space at different velocities
<b>B</b>	Transmit energy from absorber to source	Transverse	Travel through space at different velocities
<b>C</b>	Transmit energy from source to absorber	Longitudinal	Travel through space where all have the same velocity
<b>D</b>	Transmit energy from source to absorber	Transverse	Travel through space where all have the same velocity

Your answer

D

[1]

9 A student measures the time it takes for the sound from a firework to reach the observer.

She takes 3 measurements of the time taken for four different distances, **A**, **B**, **C** and **D**.

Distance	Time taken (s)		
	1st measurement	2nd measurement	3rd measurement
<b>A</b>	2.16	2.19	2.17
<b>B</b>	1.99	2.02	1.97
<b>C</b>	1.80	1.81	1.89
<b>D</b>	1.69	1.68	1.71

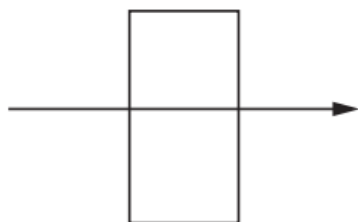
Which distance **A**, **B**, **C** or **D**, has the largest range of values?

Your answer

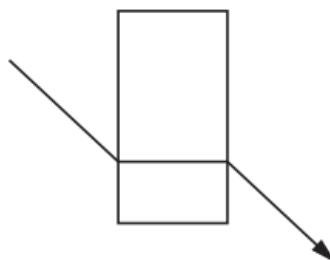
C

[1]

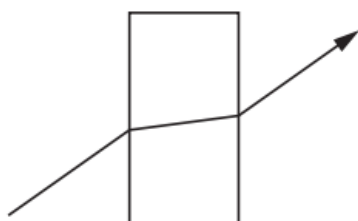
10 Look at the diagrams of a light ray as it passes from air through a glass block.



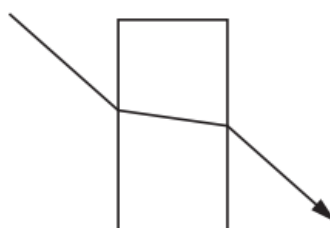
**A**



**B**



**C**



**D**

Which diagram shows an **incorrect** refraction?

Your answer

B

[1]

11 A radio wave has a wavelength of 100 m. It has a speed of  $3 \times 10^8$  m/s.

Use the equation: Wave speed = Frequency  $\times$  Wavelength

Calculate the frequency of the wave.

$$v = f\lambda$$

- A 3 MHz
- B 30 MHz
- C 300 MHz
- D 3000 MHz

$$\frac{v}{\lambda} = f = \frac{3 \times 10^8}{100} = 3 \times 10^6 = 3 \text{ MHz}$$

Your answer

A

[1]

12 A teacher measures the speed of water waves in a ripple tank.

What apparatus should she use?

- A Ammeter and stopwatch
- B Newton-meter and ruler
- C Ruler and protractor
- D Ruler and stopwatch

Your answer

D

[1]

13 What type of wave is light?

- A A longitudinal electromagnetic wave
- B A longitudinal P wave
- C A transverse S wave
- D A transverse electromagnetic wave

Your answer

D

[1]

14 Which statement is **true** for electromagnetic waves?

- A High frequency electromagnetic waves have a long wavelength.
- B High frequency electromagnetic waves have no wavelength.
- C Low frequency electromagnetic waves have a long wavelength.
- D Low frequency electromagnetic waves have a short wavelength.

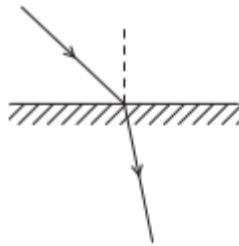
Your answer

C

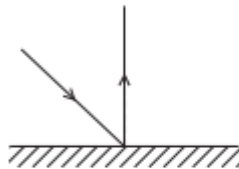
[1]

15 Which diagram shows reflection of a light ray using a plane mirror?

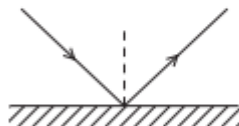
A



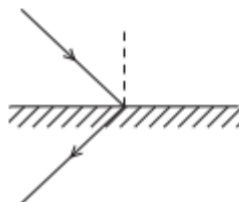
B



C



D



Your answer

C

[1]



16 Which row in the table is correct?

	<b>Electromagnetic wave</b>	<b>Use</b>
<b>A</b>	Radio	Killing bacteria
<b>B</b>	Microwaves	Mobile phones
<b>C</b>	X-rays	Optical fibres
<b>D</b>	Gamma rays	Tanning beds

Your answer

B

[1]

17 A sound wave travels in air and enters water.

What happens to the sound wave as it enters the water?

	<b>Speed</b>	<b>Frequency</b>	<b>Wavelength</b>
<b>A</b>	decreases	decreases	decreases
<b>B</b>	decreases	stays the same	decreases
<b>C</b>	increases	increases	increases
<b>D</b>	increases	stays the same	increases

Your answer

B

[1]

18 An electromagnetic wave transfers energy.

Which row in the table is correct?

	<b>Electromagnetic wave</b>	<b>Energy transfer</b>
<b>A</b>	Infra-red	From a heating element of a toaster to the bread inside
<b>B</b>	Radio	From a radio to a transmitter
<b>C</b>	Gamma rays	From a high voltage supply to heating water in food
<b>D</b>	X-rays	From bones in the body to an X-ray machine

Your answer

A

[1]

**Total Marks for Question Set 27: 18**

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