Refraction

TOPIC QUESTIONS

Level	A Level
Subject	Physics
Exam Board	AQA
Paper Type	Multiple Choice

Time Allowed : 30min

1. A progressive wave in a stretched string has a speed of 20 m s^{-1} and a frequency of 100 Hz. What is the phase difference between two points 25 mm apart?

A zero

B $\frac{\pi}{4}$ rad

C $\frac{\pi}{2}$ rad

D π rad

2. Which one of the following statements about stationary waves is true?

A Particles between adjacent nodes all have the same amplitude.

B Particles between adjacent nodes are out of phase with each other.

C Particles immediately on either side of a node are moving in opposite directions.

D There is a minimum disturbance of the medium at an antinode.

3. Which one of the following types of wave **cannot** be polarised?

A radio

B ultrasonic

C microwave

D ultraviolet

4. The least distance between two points of a progressive transverse wave which have a phase difference of $\frac{\pi}{3}$ rad is 0.050 m. If the frequency of the wave is 500 Hz, what is the speed of thewave?

A 25 m s^{-1}

B 75 m s^{-1}

C 150 m s^{-1}

D 1666 m s^{1}

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6. In a Young's double slits interference arrangement the fringe separation is s when the wavelength of the radiation is λ, the slit separation w and the distance between the slits and the plane of the observed fringes D. In which one of the following cases would the fringe separation also be s?

	wavelength	slit separation	distance between slits and fringes
A	2λ	$2w$	$2D$
B	2λ	$4w$	$2D$
C	2λ	$2w$	$4D$
D	4λ	$2w$	$2D$

7. Figures 1 and 2 each show a ray of light incident on a water-air boundary. A, B, C and D showray directions at the interface.

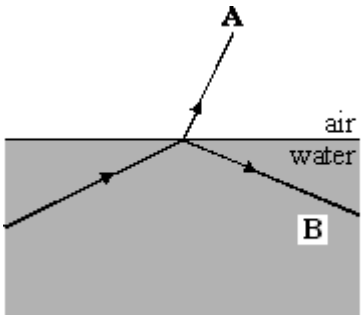


Figure 1

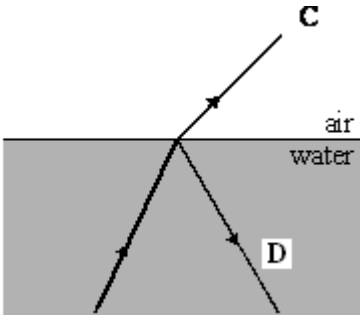


Figure 2

(a) Circle the letter below that corresponds to a direction in which a ray **cannot** occur.

A B C D

(b) Circle the letter below that corresponds to the direction of the faintest ray.

A B C D

8. Young's two slit interference pattern with red light of wavelength 7.0×10^{-7} m gives a fringe separation of 2.0 mm.

   What separation, in mm, would be observed at the same place using blue light of wavelength45×10^{-7} m?

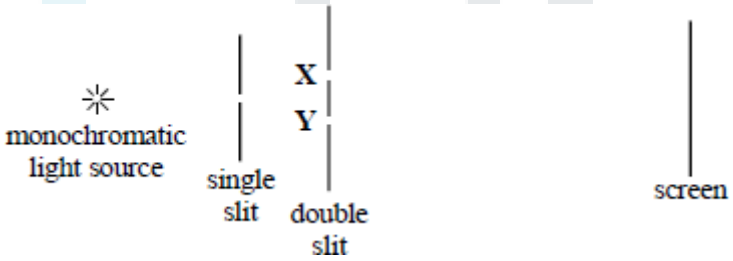
   A 0.65

   B 1.3

   C 2.6

   D 3.1

9. The diagram represents the experimental arrangement used to produce interference fringes in Young's double slit experiment.



   The spacing of the fringes on the screen will increase if

   A the width of the single slit is increased

   B the distance **XY** between the two slits is increased

   C a light source of lower frequency is used

   D the distance between the single and double slits is decreased

10. The audible range of a girl's hearing is 30 Hz to 16 500 Hz. If the speed of sound in air is 330 m s^{-1}, what is the shortest wavelength of sound in air which the girl can hear?

    A $\frac{30}{330}$ m

    B $\frac{16500}{330}$ m

    C $\frac{330}{16500}$ m

D $\frac{330}{30}$ m

11. Which one of the following types of wave **cannot** be polarised?

A radio

B ultraviolet

C microwave

D ultrasonic

12. A uniform wire fixed at both ends is vibrating in its fundamental mode. Which one of the following statements is **not** correct for all the vibrating particles?

A They vibrate in phase.

B They vibrate with the same amplitude.

C They vibrate with the same frequency.

D They vibrate at right angles to the wire.

13. A wave motion has period T, frequency f, wavelength λ and speed v. Which one of the following equations is **incorrect**?

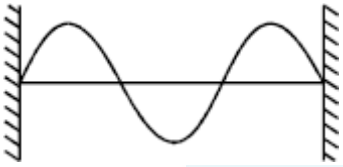
A $1 = Tf$

B $T = \frac{v}{\lambda}$

C $\lambda = \frac{v}{f}$

D $Tv = \lambda$

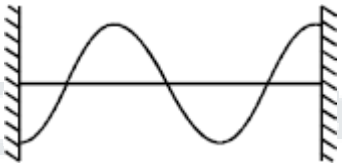
14.



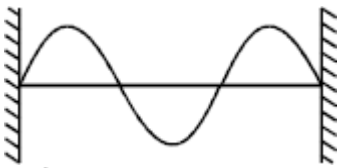
frequency of vibration = 50 Hz

The diagram above shows a stationary wave on a stretched string at a time $t = 0$. Which one ofthe diagrams, **A** to **D**, correctly shows the position of the string at a time $t = 0.010$ s?

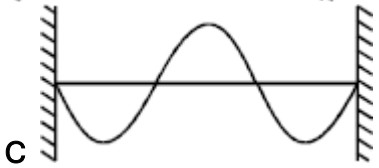
A

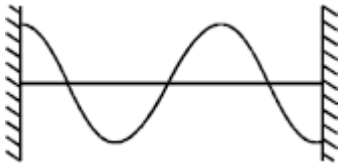


B



C

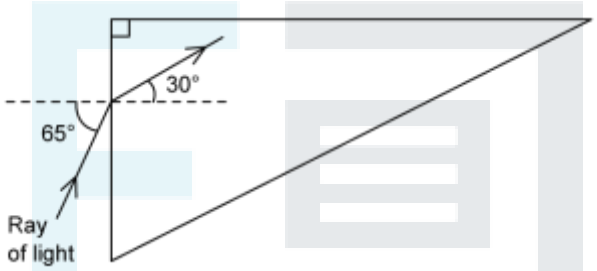


D 

15. Light passing from a vacuum into air undergoes negligible refraction.
Which response explaining this statement is not correct?

A. Air has a refractive index very close to 1
B. The optical density of air and a vacuum are almost identical
C. Refraction occurs at the boundaries of media with different densities
D. Refraction does not happen when light passes into air

16. A ray of light is incident on a triangular glass block as shown in the diagram below:



What is the refractive index of the glass?

A. 1.8
B. 0.55
C. 0.45
D. 1.4

17. The following are statements about total internal reflection.

1. **The critical angle is the angle of incidence when the angle of refraction is 90^{o}**
2. **Total internal reflection happens when light passes from a less dense medium into a more dense one**
3. **For total internal reflection to occur, the angle of incidence must be greater than the critical angle**
4. **In total internal reflection the angle of incidence equals the angle of reflection**

Which of the statements 1, 2, 3 and 4 are correct?

A. 1, 2 and 3
B. 1, 2 and 4

C. 1, 3 and 4

D. 2, 3 and 4

18. A ray of light is incident on the inside of a glass block at an angle of 65^{o} and reflects internally. Which statement is correct?

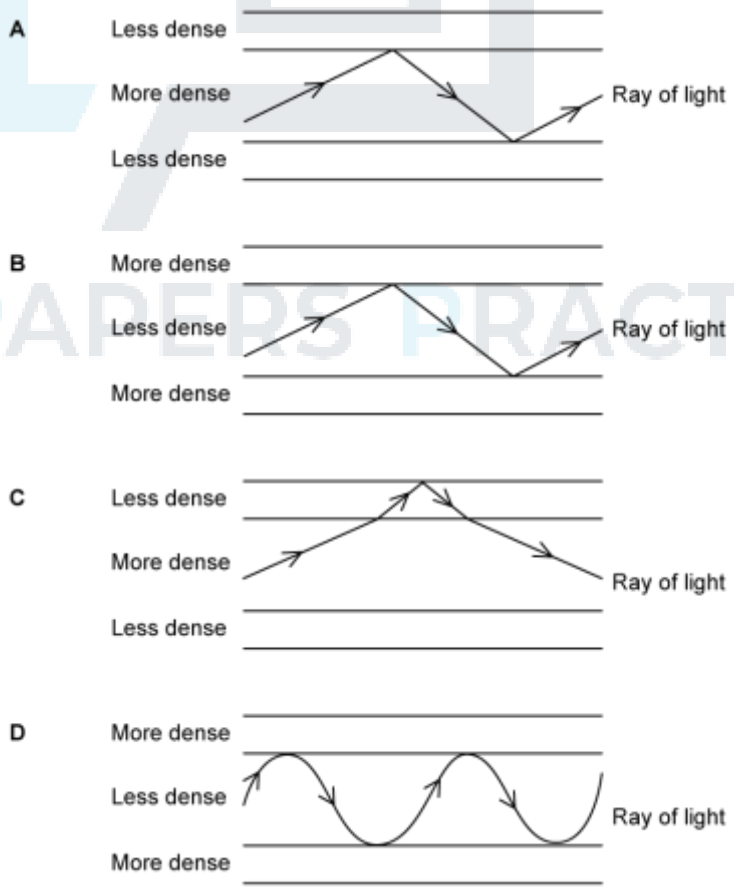
A. **The critical angle for the glass is less than 65^{o}**

B. **The angle of incidence is less than the critical angle**

C. **The angle of reflection is 25^{o}**

D. **The glass block has a refractive index of 1.06**

19. Diagrams A, B, C and D show four possible fibre optic cables with their cladding. Which is the only correct diagram?



20. What materials are the core of fibre optic cables made from?

A. **Copper wires**

B. **Glass or plastic**

C. **Very thin aluminium wire**
Tungsten