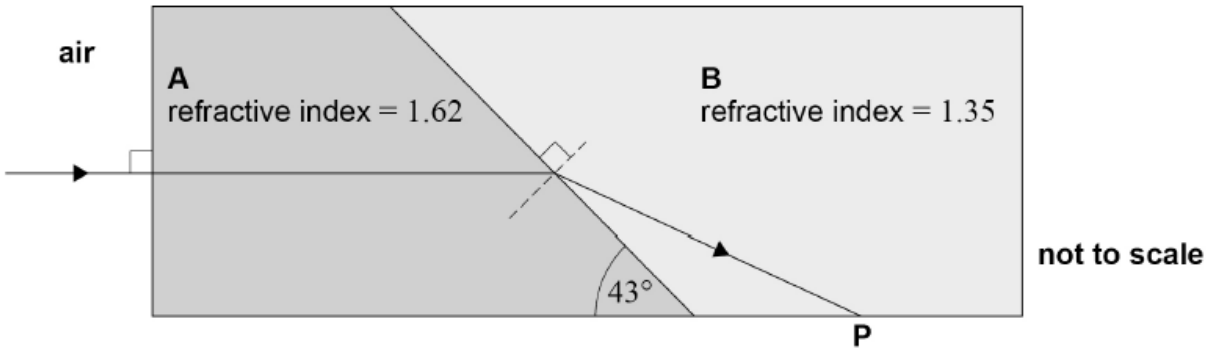
Waves – A2 Physics P1 2022

1. June /2022/Paper_ 7408/1/No.6

0 6 Two transparent prisms **A** and **B** of different refractive indices are placed in contact to produce a rectangular block.
Figure 12 shows the path of a ray, incident normally on **A**, refracting as it crosses the boundary between the prisms.

Figure 12



0 6 . 1 Explain how the path of the ray shows that the refractive index of **A** is greater than the refractive index of **B**.

[1 mark]

0 6 . 2 Show that the angle of refraction of the ray in **B** is about 60°.

[2 marks]

0 6 . 3 Draw, on **Figure 12**, the path of the ray immediately after it reaches **P**.
Justify your answer with calculations.

[3 marks]

2. June /2022/Paper_ 7408/1/No.18

A longitudinal wave of frequency 660 Hz travels through a medium.
The wave speed is 330 m s^{-1}.

Which statement describes the motion of a particle in the wave?

[1 mark]

A It is travelling at a speed of 330 m s^{-1}. ⬭

B It moves in phase with a particle in the wave 25 cm away. ⬭

C It oscillates with a time period of 1.5 ms. ⬭

D It changes direction 660 times every second. ⬭

3. June /2022/Paper_ 7408/1/No.19

The frequency of the first harmonic of a standing wave on a string is f.
The tension in the string is T.
The tension is increased to $4T$ without changing the length or mass of the string.

Which harmonic has a frequency $2f$ after this change?

[1 mark]

A first ⬭

B second ⬭

C third ⬭

D fourth ⬭

4. June /2022/Paper_ 7408/1/No.20

Light of wavelength 5.2×10^{-7} m is used in a Young's double-slit experiment.
The distance from the slits to the screen is 1.5 m.
The width of ten fringes is 3.5 cm.

What is the separation of the two slits?

[1 mark]

A 2.2×10^{-5} m ⬭

B 9.9×10^{-5} m ⬭

C 1.1×10^{-4} m ⬭

D 2.2×10^{-4} m ⬭

5. June /2022/Paper_ 7408/1/No.21

Monochromatic light of wavelength 5.8×10^{-7} m is incident normally on a plane transmission diffraction grating that has a slit separation of 2.5×10^{-6} m.

How many maxima are produced by the grating?

[1 mark]

A 4 ⬭

B 5 ⬭

C 8 ⬭

D 9 ⬭