Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Electricity

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Name of the Student:_____
Max. Marks : 19 Marks **Time :** 19 **Minutes**

Q1.

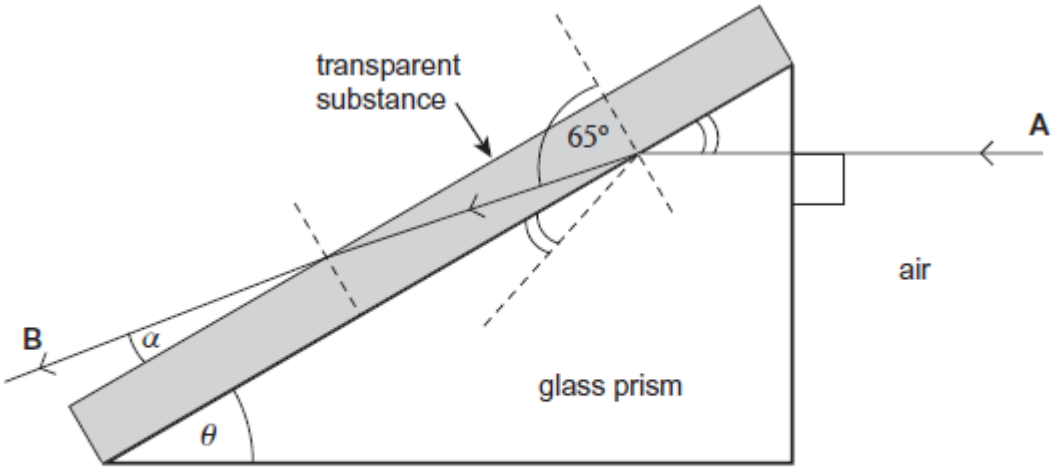
(a) Tick (✓) the appropriate boxes in the table to indicate how the wavelength, frequency and speed of light are affected when a ray of light travels from air into glass.

	Wavelength	**Frequency**	**Speed**
increases			
stays the same			
decreases			

(2)

(b) **Figure 1** shows a right-angled glass prism in contact with a transparent substance on one of the faces. One of the other angles of the prism is θ.

Figure 1



refractive index of glass prism = 1.70

refractive index of transparent substance = 1.09

angles are not shown to scale

(i) A ray **A** enters perpendicularly to one face of the prism. It is partially refracted and partially reflected at the interface between the glass and the transparent substance. The angle of refraction is 65.0°. The ray eventually leaves at an angle α to the surface of the transparent substance.

Determine the angle α.

angle α = _____ degree

(2)

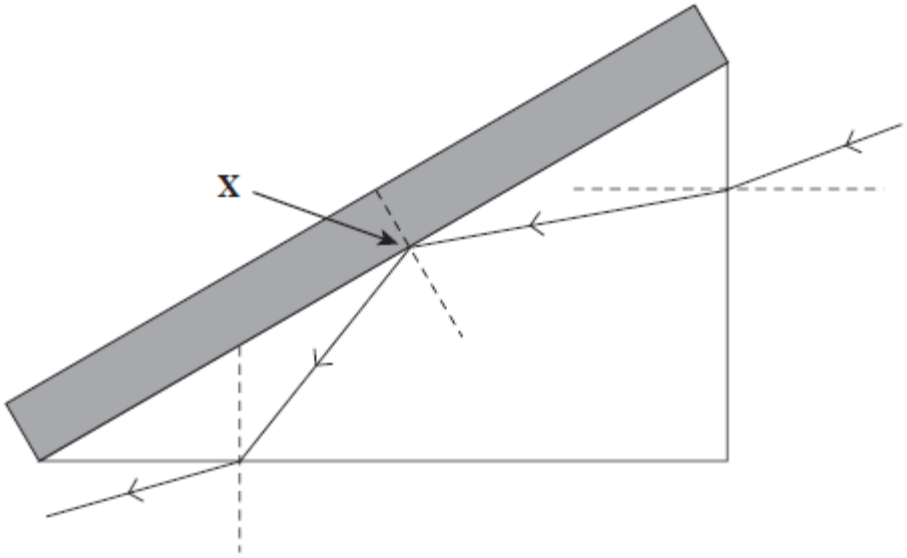
(ii) Determine the angle θ in **Figure 1**.

angle θ = _____ degree

(2)

(c) **Figure 2** shows another ray entering the prism.

Figure 2



(i) Identify the effect that takes place at **X** in **Figure 2**.

_____

(1)

(ii) Explain, with a diagram, how the effect that occurs at **X** is used to transmit information along an optic fibre.

(3)
(Total 10 marks)

Q2.

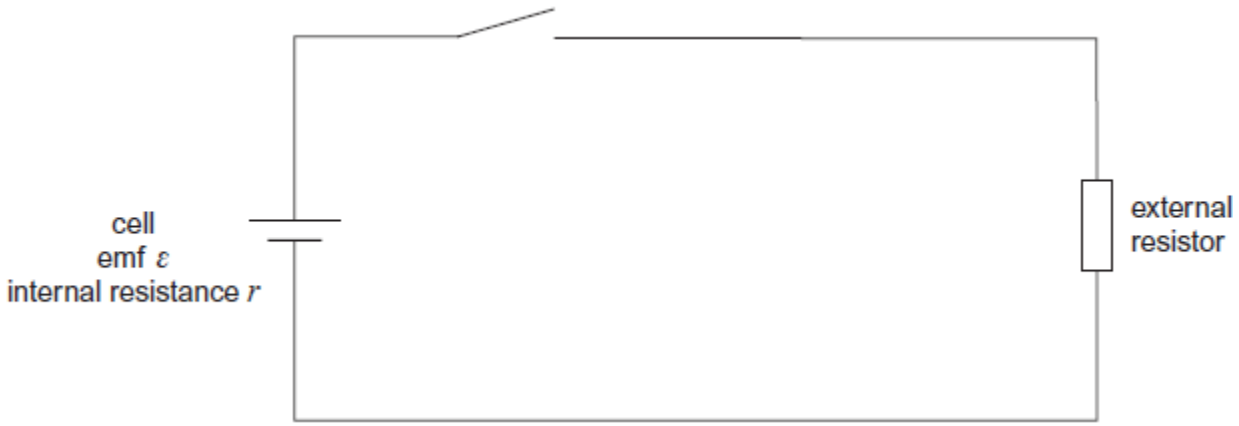
(a) (i) Describe how you would make a direct measurement of the emf ε of a cell, stating the type of meter you would use.

(1)

(ii) Explain why this meter must have a very high resistance.

(1)

(b) A student is provided with the circuit shown in the diagram below.



The student wishes to determine the efficiency of this circuit.

In this circuit, useful power is dissipated in the external resistor. The total power input is the power produced by the battery.

$$\text{Efficiency} = \frac{\text{useful power output}}{\text{total power input}}$$

The efficiency can be determined using two readings from a voltmeter.

(i) Show that the efficiency = $\frac{V}{\varepsilon}$ where ε is the emf of the cell

and V is the potential difference across the external resistor.

(1)

(ii) Add a voltmeter to the diagram and explain how you would use this new circuit to take readings of ε and V.

_____

_____

_____

(2)

(c) Describe how you would obtain a set of readings to investigate the relationship between efficiency and the resistance of the external resistor. State any precautions you would take to ensure your readings were reliable.

_____

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_____

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_____

_____

_____

(2)

(d) State and explain how you would expect the efficiency to vary as the value of R is increased.

_____

_____

_____

_____

_____

(2)
(Total 9 marks)