Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **Refraction** • Angle of incidence marked • Angle of refraction marked • Angles are measured from the normal • Angle of refraction is bigger than the angle of incidence • Rays of light travel in straight lines • Refraction occurs at a boundary between two materials of different (optical) density • The angle of incidence is less than the angle of refraction when light passes into a less dense medium (glass into air) • Refraction is a change in direction of a light ray. • Refracted rays bend away from the normal when light passes into a less dense medium (glass into air) • The ray in the more dense medium (glass) travels more slowly ORA **Total Internal Reflection** • Possible critical angle marked • Light stays inside the glass • Only occurs when the incident light is in the more dense medium • Only occurs when the incident angle is equal to greater than the critical angle • Critical angle for glass is about 42° • Angle of incidence is equal to the angle of reflection	**(6)** **AO1**

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Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3–4	Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5–6	Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

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Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance isolated fact(s) about refraction or total internal reflection(TIR)	Possible candidate responses naming of any rays of light or any angles in text or on diagrams light changes direction/bends TIR ray stays inside the glass / does not go into air refracted ray goes through glass and air
Level 2	3–4	Additional guidance simple description of refraction and TIR or facts about one and more detail of the other	Possible candidate responses Angle or ray identified For refraction light changes direction from glass into air or TIR angles are equal inside the glass
Level 3	5–6	Additional guidance detailed description of refraction and TIR	Possible candidate responses For refraction light changes direction from glass into air AND TIR angles are equal inside the glass

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Q2.

	Answer	Acceptable answers	Mark
(i)	D		**(1)**
(ii)	moons (1) heliocentric (1)	must be in correct order	**(2)**
(iii)	A description including two of the following points Reflecting telescope has mirror(s) (1) Galilean telescope has only lenses (1) Reflecting telescope can gather more light / can have a larger objective (1) Image viewed from the side of reflecting telescope (1) Image viewed from end of Galilean telescope. (1)	refracting telescope reverse argument	**(2)**

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Q3.

	Answer	Acceptable answers	Mark
	18 (°C) (1) Ignore any unit given by candidate.		**(1)**

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Q4.

Question number	Answer	Mark
	B	(1)

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Q5.

Question number	Answer	Mark
	B	(1)

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Q6.

Question Number	Answer	Mark
(i)	 ☒ B **The only correct answer is B** **A** is not correct because it has a smaller power than B **C** is not correct because it is a diverging lens **D** is not correct because it is a diverging lens	(1)

Question Number	Answer	Additional guidance	Mark
(ii)	rearrangement and substitution (1) $\frac{1}{5}$ unit conversion and evaluation (1) 20 (cm)	award full marks for the correct answer without working accept 0.2 for one mark only	(2)

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