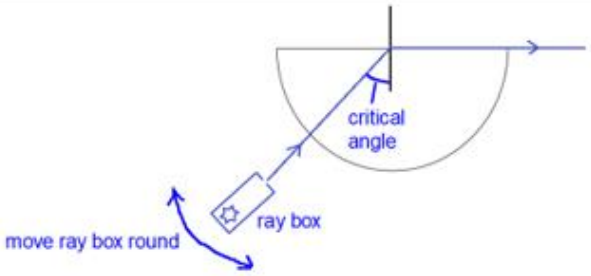
Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

Question Number	Answer	Additional guidance	Mark
	a description to include any **four** from: shine a ray (of light) into the block (1) into the block through the curved surface along a radius (1) {change angle / move ray(box)} until the angle of refraction is 90° / TIR just occurs (1) **measure** angle of incidence {when refracted angle is 90° / when TIR just occurs} (1) repeat measurement of critical angle (1)	 credit marking points in the diagram if they are clear allow 'calculate' for 'measure' plot angle i against angle r if light only enters block at straight edge, maximum 1 mark (for MP1)	(4)

Q2.

Question number	Answer	Mark
	An answer that combines points of interpretation/evaluation to provide a logical description: • as temperature increases, intensity increases (1) • as temperature increases, maximum intensity occurs at a shorter wavelength (1)	(2)

Q3.

Question Number	Answer	Additional guidance	Mark
	a description including any two from (at low wavelength) intensity increases (as wavelength increases) (1) after peak/at long wavelengths intensity decreases (as the wavelength increase)(1) intensity peaks between 7 and 10(μm) or between 1.0 and 1.2 ($\mu W/m^2$) (1)	allow use of data from the graph to indicate the peak	**(2)** **AO3**

Q4.

Question number	Answer	Additional guidance	Mark
	a description to include two of the following: increases (at first) (1) reaches a peak (1) (then) decreases (1)	 is brightest at **410** (nm)	**(2)**

Q5.

Question Number	Answer	Additional guidance	Mark
	a description including any two from window/light (from outside), lens and paper in correct order (1) move lens/paper (1) to focus (image) / to get a clear image (1)	accept lens in front/behind window and paper in front/behind lens	(2) AO2

Q6.

Question Number	Answer	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. **AO targeting: 6 marks AO1 strand 2 (6 marks)** • uses a thermometer • inserted into the can • uses a stopwatch / timer • uses a measuring cylinder / beaker with markings • sets up apparatus with lamp a fixed distance from each can • that distance is the same for each can • the measured volume is the same for each can • a starting temperature is measured • (aiming) to get the same start temperature • each, in turn, is heated for the same time • as measured on a stopwatch • a final (maximum) temperature is read • OR takes a series of temperature readings with time • and plots a graph of temperature(s) against time • the one heating up the most is the best absorber N.B. fully credit any of these in a diagram e.g. bullet points 1-8 may all be seen in a diagram	**(6)**

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)

Summary for guidance

Level	Mark	Additional Guidance	General additional guidance – the decision within levels Eg - 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 statement about apparatus or procedure or the science involved	Possible candidate responses (diag?) uses/puts a thermometer in the can/water OR measures a temperature OR uses heater to heat the cans Or puts water in the cans
Level 2	3–4	Additional guidance some procedure detail but with omissions	Possible candidate responses (diag?) uses a thermometer to measure the temperature rise in the cans OR uses the heater to heat the cans for a fixed time Or uses the same amount of water in each can
Level 3	5–6	Additional guidance more detailed and structured procedure	Possible candidate responses (diag?) uses a thermometer to measure the temperature rise in the cans AND uses the heater to heat the cans for a fixed time Or uses the same amount of water in each can