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

Mark Schemes

Q1.

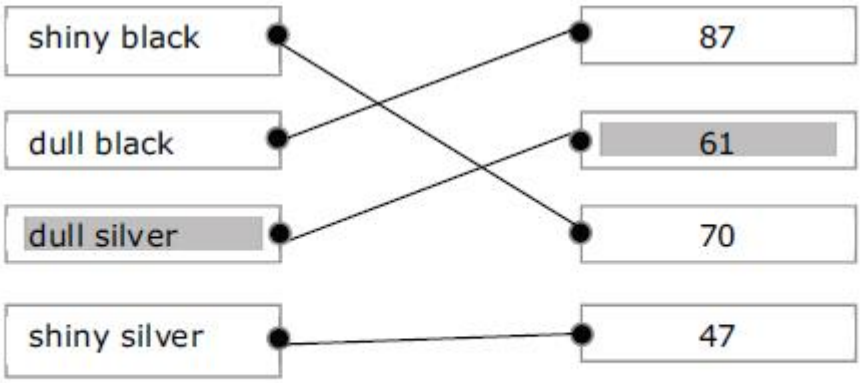
Question number	Answer	Additional guidance	Marks
	An answer that combines the following to provide a logical description of the method	Responses may be seen on diagram. allow 'calculate' for 'measure' in context ('measure angles' insufficient – must be specified)	**(4)**
	• measure angle of incidence (1)	measure angle from incident ray	
	• measure angle of refraction (1)	measure angle from refracted ray accept (reference to drawing path of) refracted ray (inside block) / emergent ray / ray under or leaving block	
	• measure angle(s) to the **normal** (1)	allow to 'dotted line' for normal	
	• repeat for different angle(s) (of incidence) (1)		

Q2.

Question number	Answer	Additional guidance	Mark
(a)	An answer that combines the following points of understanding to provide a logical description: • shine the light along a radius (1) • by marking it on the paper before putting the block down (1)	allow shine the ray at the centre of the straight edge before putting the block down	(2)

Question number	Answer	Mark
(b)	An answer that provides a description by making reference to: • (all) light reflected (1) • back inside block (1)	(2)

Q3.

Question number	Answer	Mark
(i)	All three correct (2) One or two correct (1)  	(2)

Question number	Answer	Additional guidance	Mark
(ii)	Different surfaces emit (thermal) radiation at different rates	allow reference to surfaces in question	(1)

Q4.

Question number	Answer	Additional guidance	Mark
(i)	line shown on graph from intersection of two curves (1) answer in range 11 – 13 (minutes) inclusive (1)	 award full marks for the correct answer without working	(2)

Question number	Answer	Mark
(ii)	☒ **C** 10 °C	(1)

Question number	Answer	Additional guidance	Mark
(iii)	an explanation linking: the gradient for **P** is greater/steeper than the gradient for **Q** (1) (because) **P**/black is a better emitter (of radiation) (than **Q**/white) (1)	 **P** cools quicker than **Q** **P** loses thermal energy/heat quicker than **Q** allow reverse arguments credit answers in terms of absorption in this context	(2)

Q5.

Question number	Answer	Additional guidance	Mark
	A comment that makes reference to the following points: • Diagram F shows a virtual image (1) • Not all lenses are convex (1) and therefore the student's conclusion is wrong (1)	Last marking point can only be achieved if at least one of the other two marks id awarded	**(3)**