

Name of the Student: \_\_\_\_\_

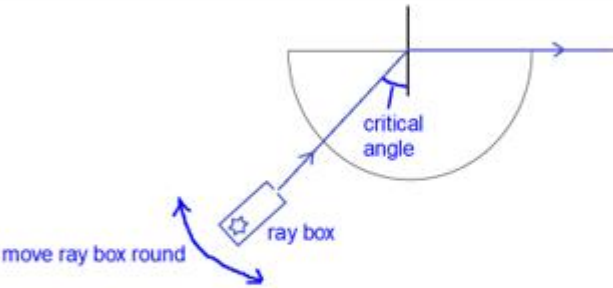
Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

Question Number	Answer	Additional guidance	Mark									
	a description including:  UVA <b>mostly</b> transmitted OR <b>some</b> absorbed (1)  UVB <b>some</b> transmitted OR <b>mostly</b> absorbed (1)  UVC <b>not</b> transmitted OR <b>mostly</b> absorbed OR <b>some</b> reflected (1)  correct relationship of absorption/ transmission to wavelength / $\square$ (1)	UVA <b>mostly</b> travels through  accept <b>less</b> transmitted than UVA  <b>more</b> absorbed than UVA or UVB  wavelength decreasing (with) absorption increasing OR longer wavelengths transmit more  <table border="1"> <tr> <td><math>\square</math></td> <td>abs</td> <td>trans</td> </tr> <tr> <td>inc</td> <td>dec</td> <td>inc</td> </tr> <tr> <td>dec</td> <td>inc</td> <td>dec</td> </tr> </table>	$\square$	abs	trans	inc	dec	inc	dec	inc	dec	(4)
$\square$	abs	trans										
inc	dec	inc										
dec	inc	dec										

Question Number	Answer	Additional guidance	Mark
	<p>a description to include any <b>four</b> from:</p> <p>shine a ray (of light) into the block (1)</p> <p>into block through the curved face along a radius (1)</p> <p>{change angle / move ray(box)} until {the angle of refraction is <math>90^\circ</math> / TIR just occurs} (1)</p> <p><b>measure</b> angle of incidence {when refracted angle is <math>90^\circ</math> / when TIR just occurs} (1)</p> <p>repeat measurement of critical angle (1)</p>	 <p>The diagram shows a semi-circular block with a flat horizontal top surface and a curved bottom surface. A vertical line represents the normal to the flat surface. A ray box, labeled 'ray box', is positioned to the left of the block. A ray of light is shown entering the curved surface of the block along a radius. The ray travels through the block and reaches the flat surface. At the point where the ray meets the flat surface, a right-angled symbol is drawn between the ray and the normal, and this angle is labeled 'critical angle'. A curved arrow points to the ray box with the text 'move ray box round'.</p> <p>credit marking points in the diagram if they are clear</p> <p>allow 'calculate' for 'measure'</p> <p>plot angle <math>i</math> against angle <math>r</math></p> <p>if light only enters block at straight edge, maximum 1 mark (for MP1)</p>	<b>(4)</b>

Question number	Answer	Additional guidance	Marks
	<p>An answer that that combines the following to provide a logical description of the method</p> <ul style="list-style-type: none"> <li>• measure angle of incidence (1)</li> <li>• measure angle of refraction (1)</li> <li>• measure angle(s) to the <b>normal</b> (1)</li> <li>• repeat for different angle(s) (of incidence) (1)</li> </ul>	<p>Responses may be seen on diagram.</p> <p>allow 'calculate' for 'measure' in context ('measure angles' insufficient – must be specified)</p> <p>measure angle from incident ray</p> <p>measure angle from refracted ray</p> <p>accept (reference to drawing path of) refracted ray (inside block) / emergent ray / ray under or leaving block</p> <p>allow to 'dotted line' for normal</p>	<p><b>(4)</b></p>

Q4.

<b>Question number</b>	<b>Answer</b>	<b>Additional guidance</b>	<b>Mark</b>
	<p>An answer that combines the following points of understanding to provide a logical description:</p> <ul style="list-style-type: none"><li>• radio waves will not reach the satellites (from Earth) / be received (on Earth) from the satellites (1)</li><li>• because they are reflected by the atmosphere (1)</li></ul>	<p>ORA for microwaves reflected by ionosphere / before reaching satellite</p>	<p><b>(2)</b></p>

Question Number	Answer	Additional guidance	Mark
(i)	substitution (1) $\frac{18.0 \pm 1}{7.0 \pm 1}$ <b>OR</b> $\frac{3.5 \pm 0.2}{1.4 \pm 0.2}$ evaluation (1) $2.6 \pm 0.5$	award full marks for correct answer without working	(2) AO2

Question Number	Answer	Additional guidance	Mark
(ii)	a description to including one pair of: use different lens/replace lens (1) {higher power / shorter focal length / fatter / thicker / more curved / greater refractive index / more convex} lens (1) <b>OR</b> change the distance / move the lens / move the object (1) further away (from the object/lens) (1)	accept stronger curvature of lens increased (2) increase distance between object and lens (2)	(2) AO3