

Physics: Light

Whole unit overview

Learning Outcomes		Suggested Teaching Activities	Resources
3.2 (a)	<p>Describe the formation, and give the characteristics, of an optical image by a plane mirror.</p> <p>Use the law angle of incidence = angle of reflection.</p>	<p>Use simple experiments with optical pins to find the position of the image in a plane mirror. Use ray box experiments to investigate angle of incidence = angle of reflection.</p>	<p>How to make a simple periscope.</p> <p>http://www-2.cs.cmu.edu/~rapidproto/students/waynec/project3/periscope.html</p>
	<p>Perform simple constructions, measurements and calculations.</p>	<p>Extend to draw simple ray diagrams.</p>	
3.2 (b)	<p>Describe an experimental demonstration of the refraction of light.</p> <p>Use the terminology for the angle of incidence i and angle of refraction r and describe the passage of light through parallel-sided transparent material give the meaning of critical angle.</p> <p>Describe internal and total internal reflection.</p>	<p>Use rectangular transparent blocks (Perspex or glass) with optical pins or ray boxes to investigate refraction.</p> <p>Develop this to experiments with a semicircular transparent block to investigate critical angle and total internal reflection.</p>	<p>Instructions for a demonstration of total internal reflection</p> <p>http://www.learn.co.uk/learnthings</p> <p>click on enter, then KS4 science foundation, then light and colour, then total internal reflection.</p> <p>More details on further experiments related to total internal reflection and much more</p> <p>http://www.phys.virginia.edu/Education/outreach</p> <p>click on 8thgrade Physical Science Sol Activities then PS.9 to find total internal reflection</p>

	<p>Recall and use definition of refractive index n in terms of speed.</p> <p>Recall and use the equation $\sin i/\sin r = n$.</p> <p>Describe the action of optical fibres.</p>	<p>Extend the refraction work with the rectangular block to include quantitative use of $\sin i/\sin r$. Encourage deeper thought with able candidates by discussing refractive index in terms of the speed of light in different materials.</p> <p>Use inexpensive 'novelty' light items to demonstrate optical fibres.</p>	
3.2 (c)	<p>Describe the action of a thin converging lens on a beam of light.</p> <p>Use the terms principal focus and focal length.</p> <p>Draw ray diagrams to illustrate the formation of a real image by a single lens.</p>	<p>Investigate converging lenses by:</p> <p>forming an image of a distant object (e.g. a tree or building seen from the laboratory window), bringing parallel rays from a ray box to a focus through a cylindrical lens, drawing ray diagrams to scale to show the formation of a real image.</p>	<p>There is a large amount of information and teaching on this site</p> <p>http://www.physicsclassroom.com/Class/refrn/U14L5a.html</p>
	<p>Draw ray diagrams to illustrate the formation of a virtual image by a single lens.</p> <p>Use and describe the use of a single lens as a magnifying glass.</p>	<p>Extend the ray diagram work to include the formation of a virtual image and use a magnifying glass.</p>	

3.2 (d)	Give a qualitative account of the dispersion of light as illustrated by the action on light of a glass prism.	Use a simple experiment, or demonstration, to show that white light from a ray box or slide projector is dispersed by a prism. A single slit can be cut from a piece of stiff card and inserted in the slide carrier of the projector to produce a ray that can be shone through the prism on to a screen. Although not part of the syllabus, students will find it interesting to learn a little about mixing coloured lights at this stage.	<p>Interactive colour mixing (no need for a colour mixing kit or blackout) http://www.phy.ntnu.edu.tw/java/shadow/shadow.html</p> <p>For prism work: http://www.learn.co.uk/learnthings Go to Key Stage 4 Science foundation Go to light and colour, then dispersion</p> <p></TBODY></p>
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