TOTAL INTERNAL REFLECTION (TIR) Name: ______________________________

Aim: to observe what happens to a light beam moving from a substance with a high refractive index (in this case, perspex) towards a substance with a lower refractive index (in this case, air).

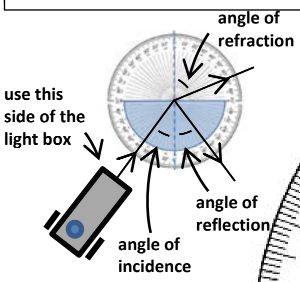
Apparatus: Light box, single-ray-forming plate, 12 V power supply, semi-circular Perspex prism.

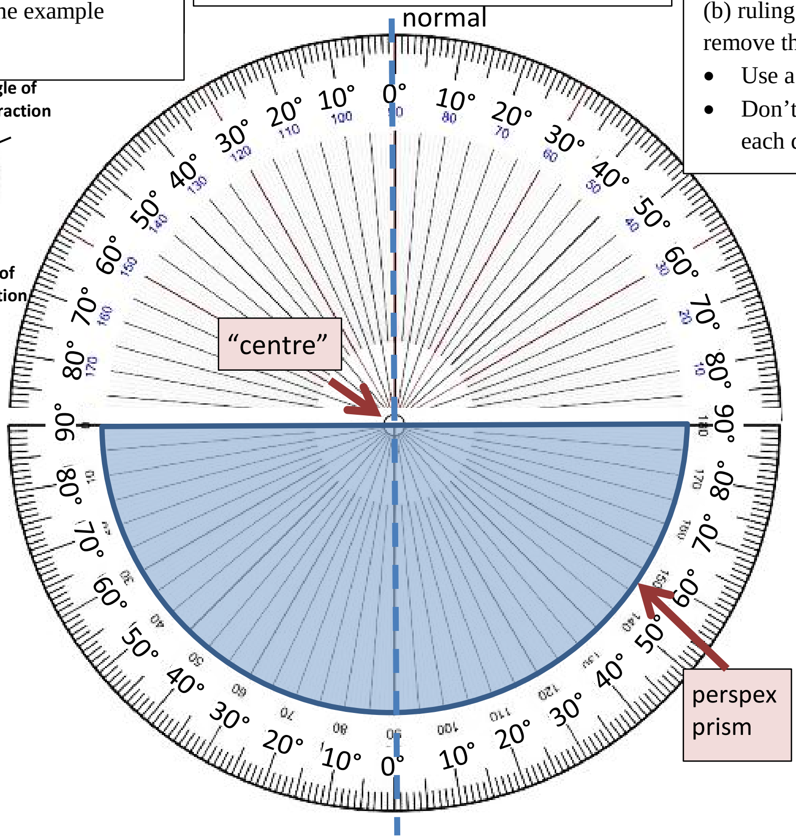
Method:

1. From the curved side, **direct a single ray** of light towards the "centre" of the semi-circular perspex prism (at the angles **shown in the table** below). The angle of incidence in the example shown is 36°.

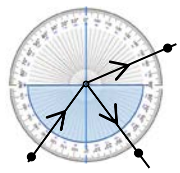
2. **Record** the angle of refraction and the angle of reflection for each incident ray **in the table**. Describe the intensity of the refracted and reflected rays in the table.

3. **Mark in the complete path** of the rays by
(a) placing dots on the incident ray, the refracted ray and the reflected ray.
(b) ruling lines to connect the dots after you remove the perspex prism.
- Use a colour code!
- Don't forget that each line will connect each dot to the "centre".





Note: The ray **entering** the perspex prism should not refract because it should enter at an angle of incidence of 0°.



4. By gradually moving the light box from 0° around towards 90°, determine the incident angle at which the angle of refraction equals 90°. (In other words, find the **critical angle.**)

$\mathbf{n_{perspex} = 1.49}$
$\mathbf{n_{air} = 1.00}$

Angle of Incidence (in perspex)	Angle of Refraction	Angle of Reflection	Intensity of Refracted Ray	Intensity of Reflected Ray
20°				
40°				
60°				

1. Having followed Step 4, we found that the critical angle for light moving from perspex to air is ___________ .

2. What happens when the incident angle is greater than the critical angle?

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3. Describe what happens as the angle of incidence in the perspex increases from 0° to 90°.

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