

Edexcel Physics GCSE

Topic 5.9: Light and the Electromagnetic Spectrum Practical notes

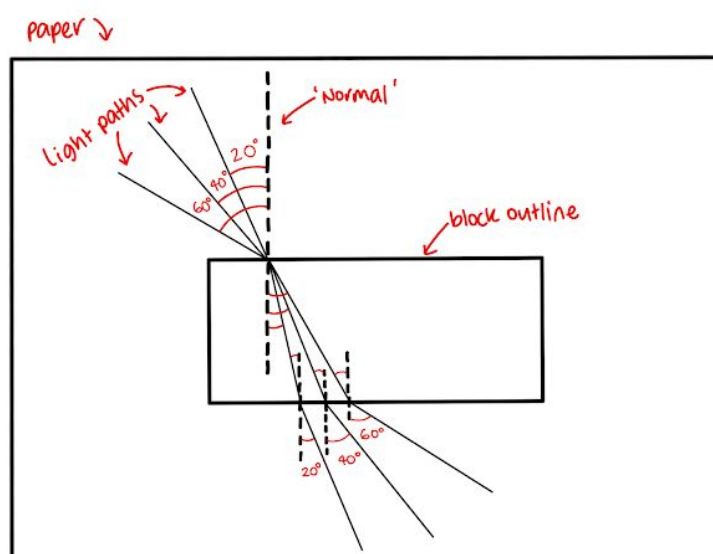


Core Practical 3: Investigate refraction in rectangular glass blocks in terms of the interaction of electromagnetic waves with matter

Equipment

- Ray box and single slit grating to create a narrow beam
- Glass block
- Paper
- Pen/pencil
- Ruler
- Protractor

Diagram



Method

1. Set up the equipment as shown above in a darkened room.
2. Place the glass block on the paper and draw around it to ensure that the block will always be in the same place even if you remove it and replace it.
3. Using the protractor, draw a line that is 90° to the surface of the glass block (this is the 'normal').
 - It may be easier to move the block and work from the outline on the paper for this part since you need to continue the line into the glass block outline.
4. Draw three lines as guides for the angles of incidence you will produce (you will shine light along these lines into the block).
 - These will hit the block at the point where you drew the normal
 - Example angles are 20° , 40° and 60°
5. Direct the light along each of these lines in turn and, for each one, make markings where the light leaves the block on the other side.
 - This can be done by drawing dots or Xs and joining them together with a ruler once you have moved the block out of the way



6. Connect the point of incidence to the point where the light leaves the block for each angle, which should leave you with something like the diagram above.
 - Ensure that there is a normal line (90° to the surface of the glass as before) at each point where the light leaves the block
7. Use the protractor to measure all the angles of **incidence** and **refraction** and mark these on the paper.
 - The angle of incidence where the light initially hits the block should be equal to (or very close to) the angle where the light is leaving the block
 - Always measure angles relative to the normal
8. Compare the angles of incidence and the angles of refraction for glass into air and air into glass for each angle.
 - For air into glass, the angle of refraction **should always be smaller** than the angle of incidence as light slows down when entering a more dense medium
 - For glass into air, the angle of refraction **should always be greater** than the angle of incidence as light speeds up when entering a less dense medium
9. Plot these results on a graph of angle of refraction against angle of incidence with one line showing glass into air and another showing air into glass.

Safety Precautions

- Do not touch the ray box when it is in use or just after it has been used – it gets hot and could cause a burn if not left to cool first.
- Take care in a darkened room – there may be trip hazards that are less visible when the lights are dimmed.

