

Edexcel IGCSE Physics

Chapter 3 - Waves

Practical Flashcards

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1. Investigate the refraction of light using rectangular blocks, semi circular blocks and triangular prisms



What is refraction?



What is refraction?

Refraction is the change in **speed** of a wave as it reaches a boundary between two media, usually resulting in a change in direction (if it enters at an angle).



Describe a method to investigate refraction



Describe a method to investigate refraction

- Place the prism on a piece of paper. Trace around the prism.
- Shine a light through the prism, tracing the angle of incidence and refraction.
- Remove the block and use a ruler to draw normals to the lines. Use a protractor to measure the angles.
 - Replace the prism
 - Repeat for every 10°
 - Plot a graph of $\sin(i)$ against $\sin(r)$



How should the experiment be set up?



How should the experiment be set up?

In a darkened room, so the rays can clearly be viewed.



What is the independent variable?



What is the independent variable?

The angle of incidence.



What is the dependent variable?



What is the dependent variable?

The angle of refraction.



How are the angles of incidence and refraction measured?



How are the angles of incidence and refraction measured?

They are measured using a protractor. All angles are measured relative to the normal.

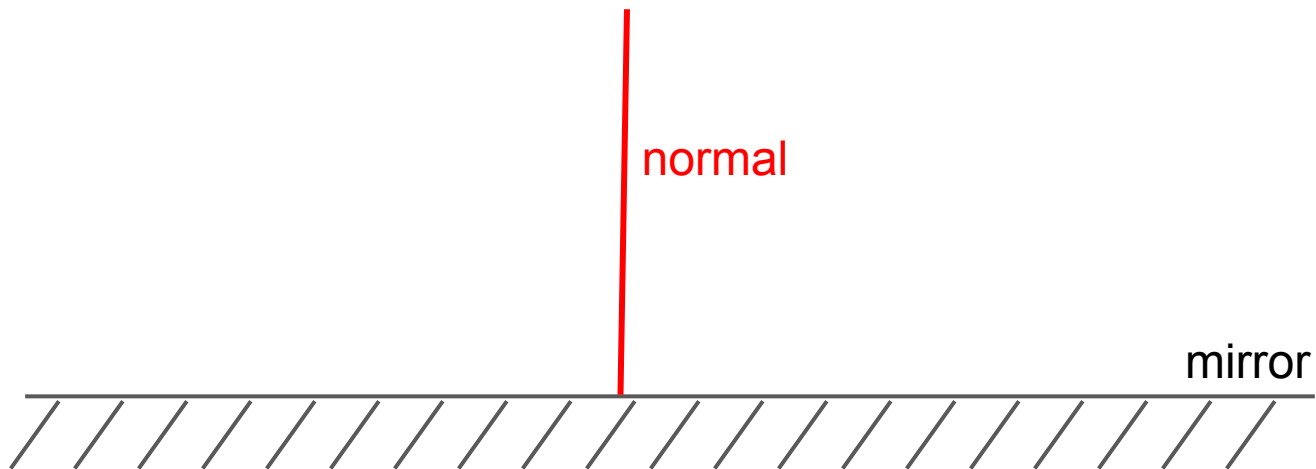


What is the normal?



What is the normal?

Any line perpendicular to the surface of the mirror.



How should the angles of incidence and refraction compare?



How should the angles of incidence and refraction compare? Why?

The angle of incidence should be larger than the angle of refraction.

This is because glass is more dense than air, so the light bends towards the normal.



What is refractive index?



What is refractive index?

The ratio of the speed of light in a given medium to the speed of light in a vacuum.



How is the refractive index calculated?



How is the refractive index calculated?

$$n = \frac{\sin(i)}{\sin(r)}$$



What graph should be drawn using the data?



What graph should be drawn using the data?

A graph of $\sin(i)$ over $\sin(r)$.



How can the refractive index be worked out using a graph?



How can the refractive index be worked out using a graph?

Using a graph of $\sin(i)$ over $\sin(r)$, the refractive index is equal to the gradient of the graph.



What safety precautions should be taken?



What safety precautions should be taken?

- The ray box will heat up, so avoid touching it immediately after use
- Take care of trip hazards in a darkened room - keep bags under desks etc



2. Investigate the speed of sound in air



What equipment is required?



What equipment is required?

- Two blocks of wood
- A large open space
 - A stopwatch
 - 2 people



Outline the method



Outline the method

1. Place two markers as far apart as possible, and measure the distance between them.
2. The two people should each stand at different markers, one holding the wooden blocks and the other the stopwatch.
3. The blocks should be clapped by person 1.
4. The stopwatch should be started when person 2 sees the blocks touch, and stopped then they hear the sound.
5. Repeat 10 times and calculate an average.
6. Calculate speed using $v=d/t$



Why should repeat readings be taken?



Why should repeat readings be taken?

To improve accuracy; anomalies can be identified and discarded and an average can be calculated.



Why should the distance be as large as possible?



Why should the distance be as large as possible?

The larger the distance, the more accurate the measurement.

This is because it increases the time measured, so the error created by human reaction time is a smaller percentage error.



What should the calculated speed be?



What should the calculated speed be?

It should be approximately 330 m/s (but is not likely to be very accurate).

