

Modelling total internal reflection within a fibre optic cable using plain mirrors

(Ireland)

Background

Along a reflective surface (e.g. mirrors) the incident angle is equal to the reflected angle.

When passing information along a fibre optic cable it undergoes total internal reflection. The fibre optic cable has external cladding (coating e.g. plastic) to minimise light scattering thus prevent the loss of information.

You will need:

- ✓ Plane mirrors
- ✓ Bulldog clips
- ✓ Retort stand
- ✓ Obstacles (pencil cases, water bottles, boxes, etc.)
- ✓ Laser pointer
- ✓ Fibre optic cable (optional)
- ✓ Object to act as a target (this can be anything you wish)

Follow these steps:

1. Leave a laser pointer turned on - using the clamp in a retort stand.
2. Place an object to act as a target on the wall at the same height as the laser pointer.
3. Set up obstacles along the table in between the target and the laser pointer.
4. Students are to move the mirrors and guide the laser pointer to the target.

So what happened?

The mirror arrangement reflects the laser to the target.

What next?

- Introduce a fibre optic cable, remove the mirrors and repeat the experiment.
- The light reflects down the cable due to total internal reflection.

