Chapter 2: Geometrical Optics

Def: Light is a form of energy that travels away from the source producing it at a speed of 3 x 10^8 m s^{-1}

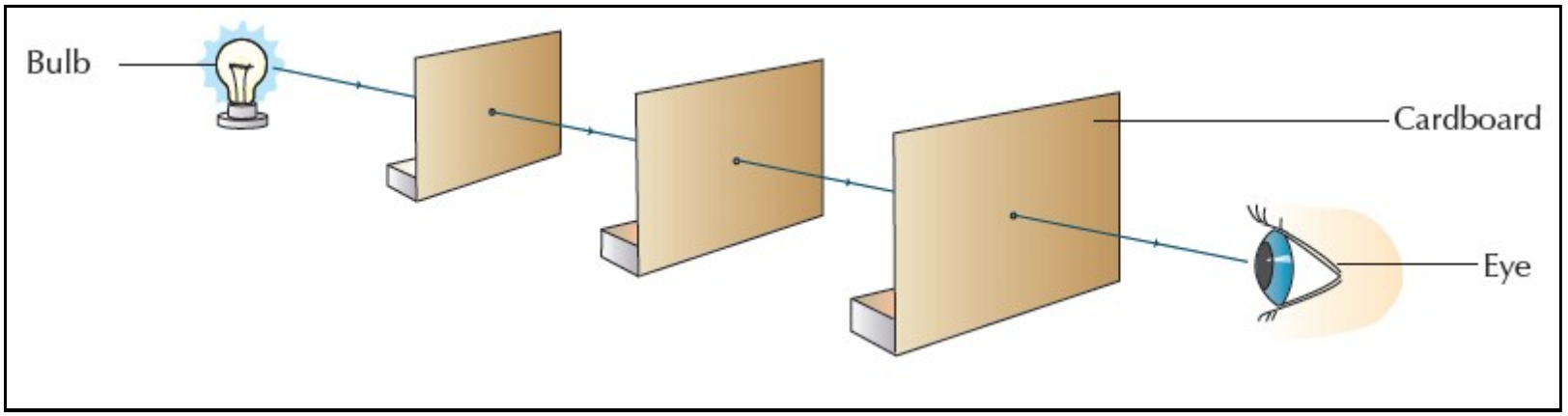
Light travels by electromagnetic waves called rays. They undergo all five of the phenomena of waves: reflection, refraction, diffraction, interference and polarisation.

We see objects because light from the Sun or another source bounces of the object and is reflected into our eyes.

Self-luminous objects are objects that give out light. E.g. Include the Sun, stars, fire, bulbs.

A **non-luminous** object is one which does not give out light.

Light usually travels in straight lines. This was seen in junior cert with the experiment below.



Also, light that comes from a torch may spread out, this is called **diverging beam**.

Light that is getting narrower from the torch is called a **converging beam**.

And light that remains the same width is called a **parallel beam**.

Reflection.

Def: Reflection of light is the way in which light bounces off surfaces.

There are 2 types: diffuse reflection and regular reflection.

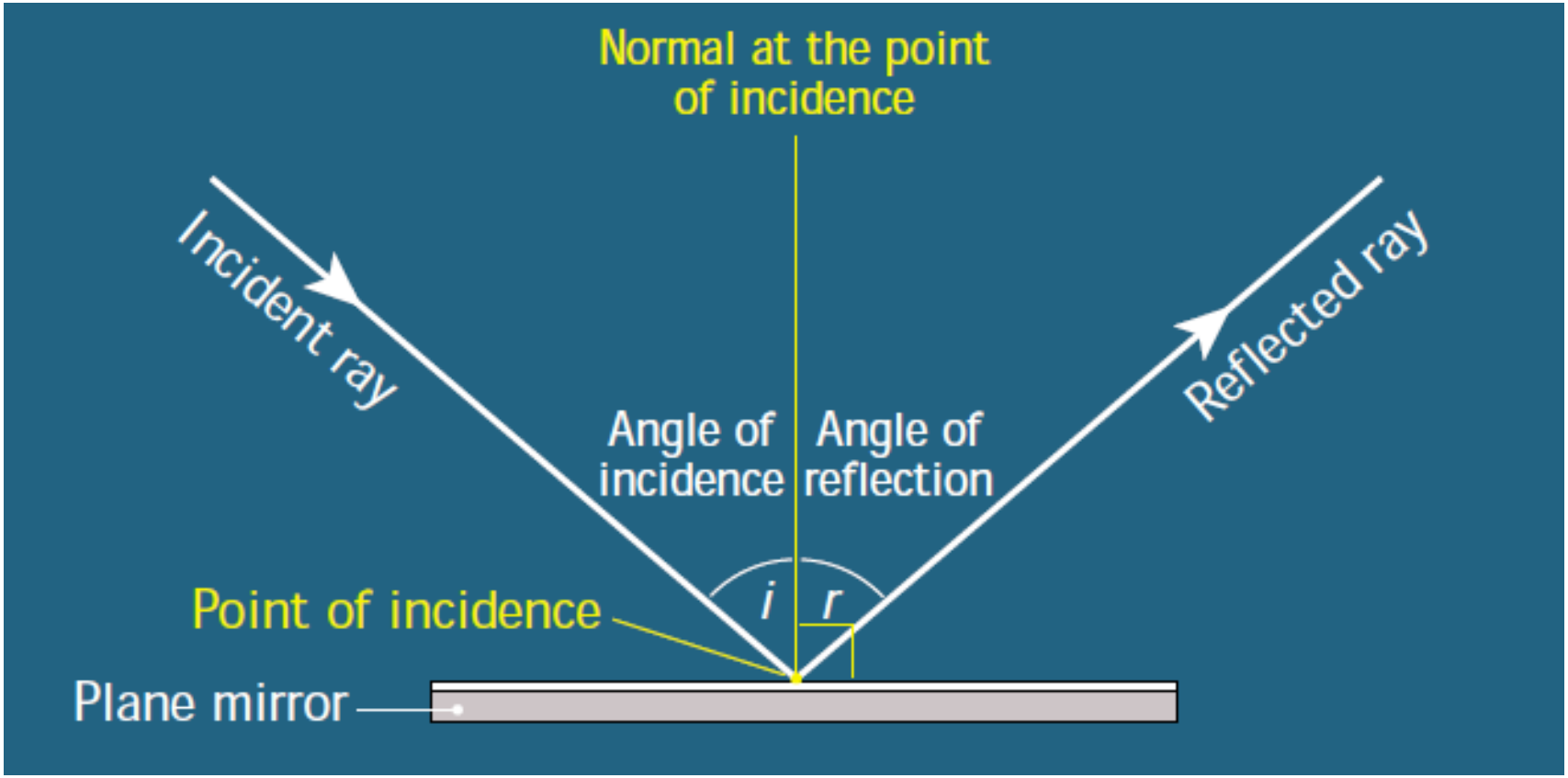
Diffuse Reflection

Diffuse reflection is the way in which light is reflected off an object that one would not normally consider reflective, e.g. A table, chair.
This is rough surface and the light scatters in all directions and allows us to see the objects in front of us.

Regular Reflection

Regular reflection is the way in which light reflects off smooth or polished surfaces like mirrors.
Here the light is not scattered in all direction.

Regular Reflection



Important Terms.

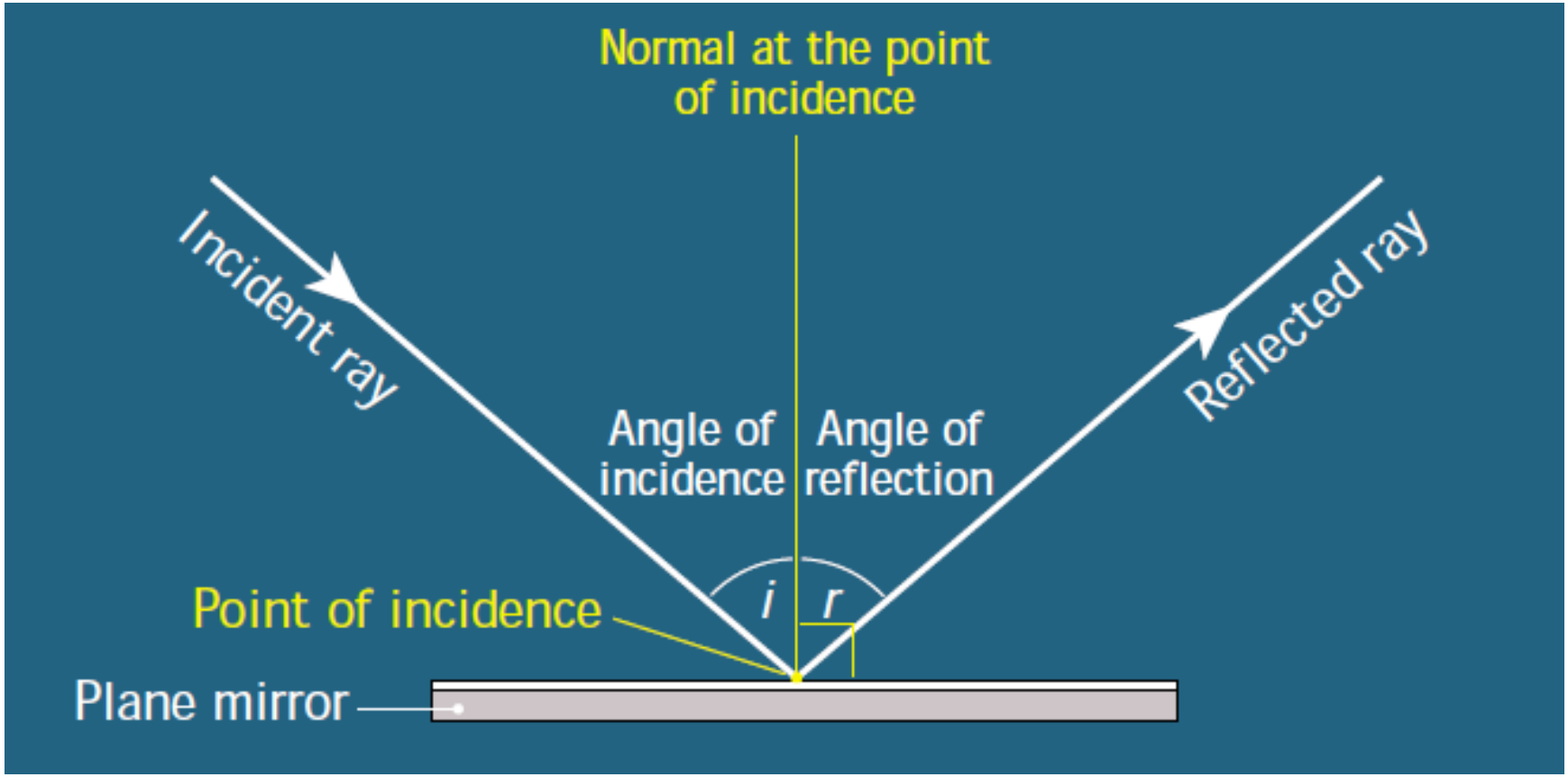
An **incident ray** is the ray of light falling onto the mirror (from an object or a light)

A **normal** at the point of incidence is an imaginary line radiating perpendicularly from the mirror at the point where the incident ray strikes the mirror.

A **reflected ray** is the ray of light bouncing off the mirror.

An **angle of incidence (i)** is the angle between the normal and the incidence ray.

An **angle of reflection (r)** is the angle between the normal and the reflected ray.



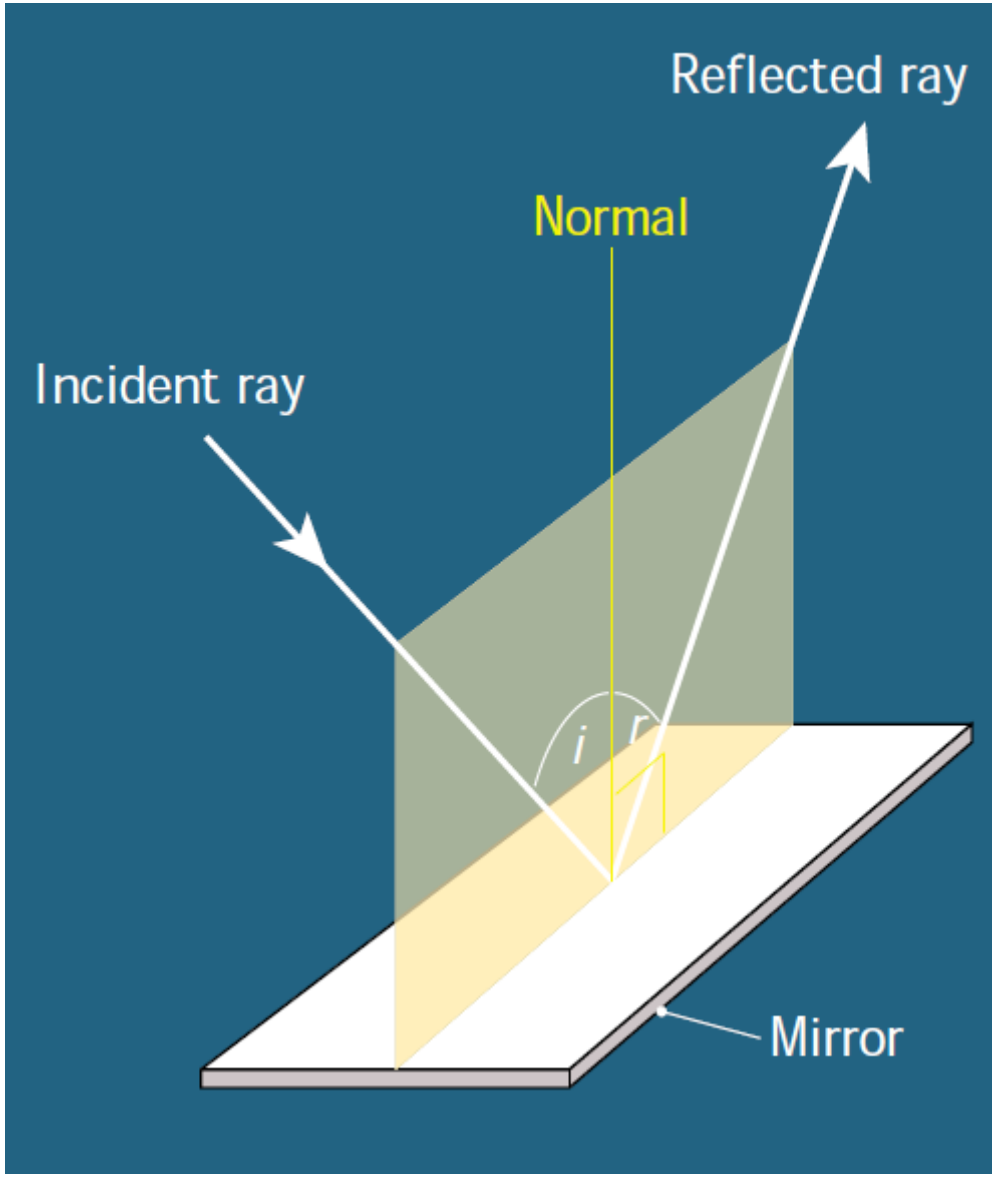
The Laws of Reflection of Light.

Law 1: The incident ray, normal and the reflected ray are all in the same plane

Law 2: The angle of reflection (r) is equal to the angle of incidence (i).

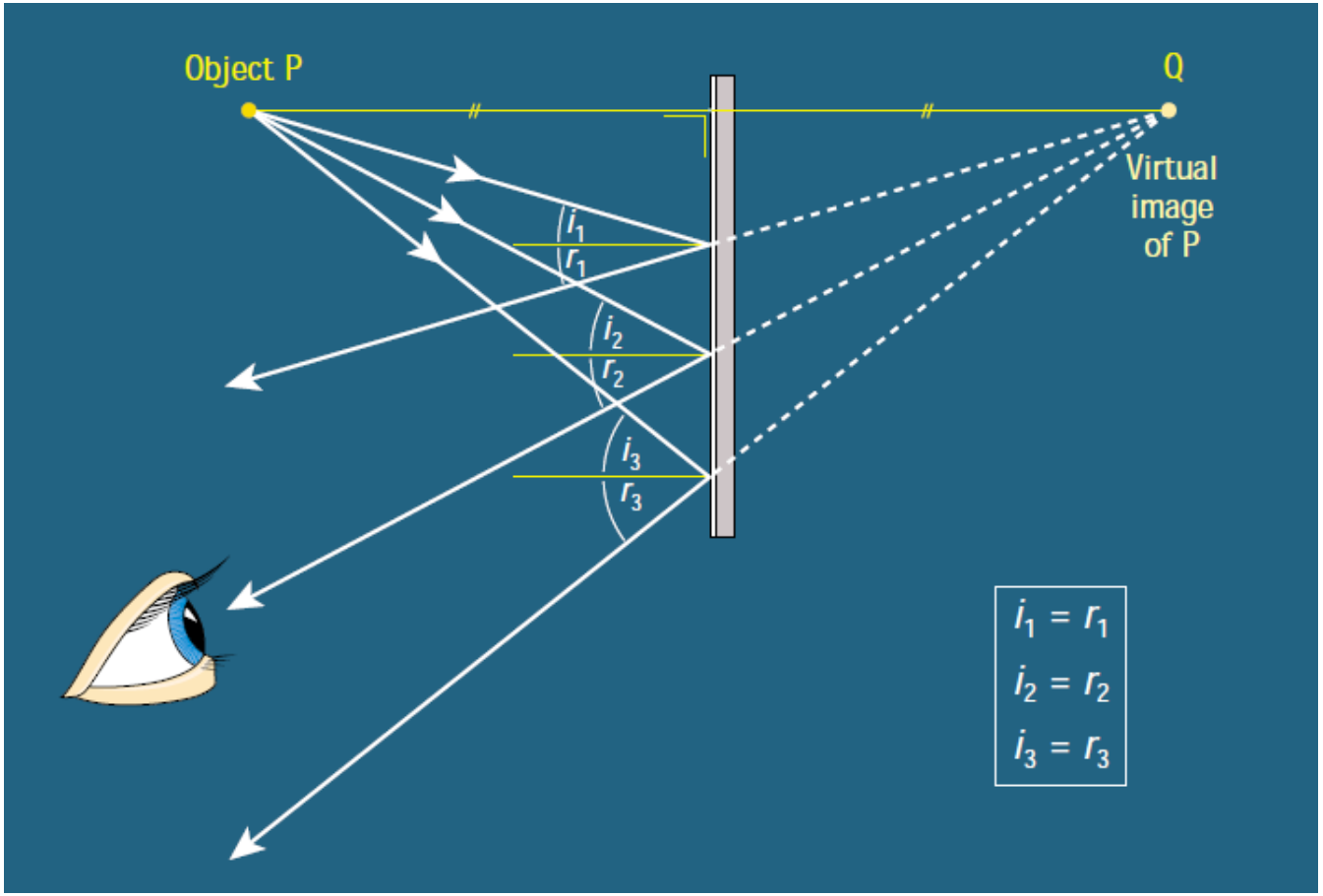
$$i = r$$

Law 1:



How is an image formed in a plane mirror?

The image we see in a plane mirror is caused by the reflection from the back of the mirror. The rays entering the eye seem to come from behind the mirror so that is where the image is seen.



Real Image

A **real image** is the actual intersection of light rays.

- It can be formed on a screen.

Virtual Image

A **virtual image** is the apparent intersection of light rays.

- It is perpendicular from the object to the mirror.
- It is the same distance behind the mirror as the object is in front of the mirror.

Uses of plane mirrors.

- Plane mirrors are used to see yourself.
- Periscope, to see over objects, e.g. In a submarine.

Parallax

Parallax is the relative movement of two objects due to the movement of the observer.

The object that is further away appears to move with the observer.

See page 11

Do questions 1-4, 6, 7, 11, 12