

PENANG SANGAM HIGH SCHOOL
YEAR 12 PHYSICS
WEEK 22-24

Strand	Light
Sub Strand	Reflection and refraction
Content Learning Outcome	At the end of the lesson students should be able to Study and use Snell's law to solve a range of problems involving refractions

LIGHT

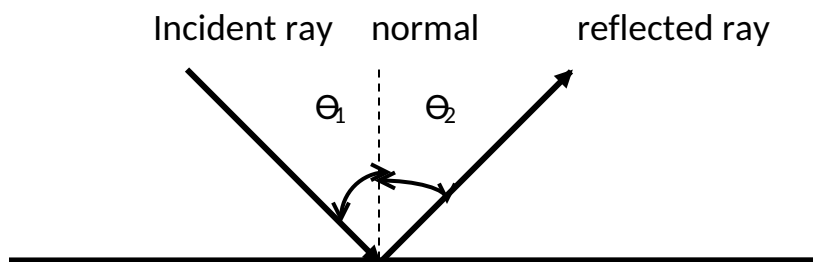
Light is a type of electromagnetic radiation. It is a form of energy.

Light can be seen both as a particle and a wave. This is called the dual nature of light.

Light travels in straight lines (rectilinear property) and its velocity is $3 \times 10^8 \text{ m/s}$.

Reflection

Reflection is the bouncing back of light in the same medium.

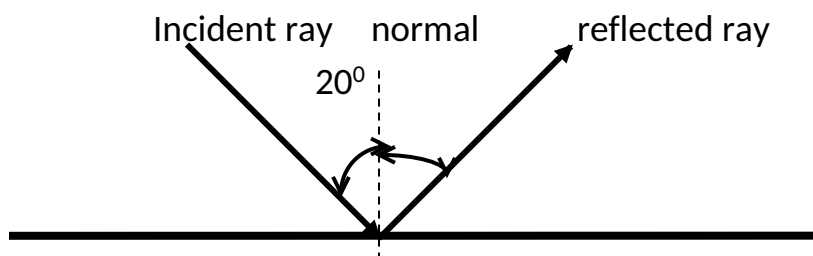


θ_1 is the angle of incidence, θ_2 is the angle of reflection and always measured from the normal.

Law of reflection

$$\theta_1 = \theta_2$$

1.

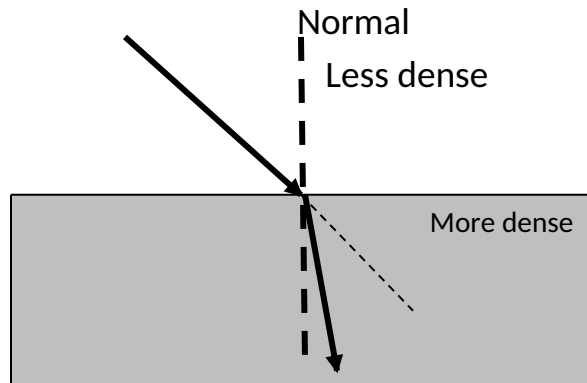


- Find the angle of reflection
- Find angle between the incident ray and the reflected ray

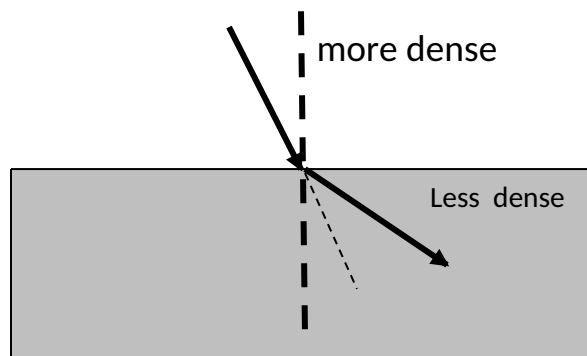
Refraction of light

Refraction is the bending of light as it passes through another medium. This is because the velocity of light changes when it goes in the second medium.

- Less dense to more dense it bends towards the normal

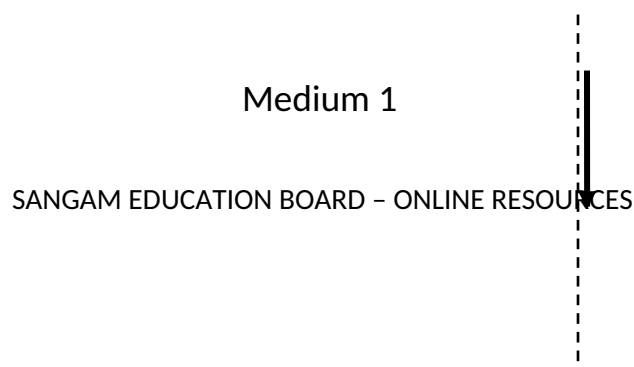


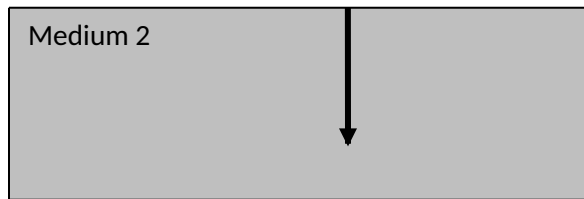
- More dense to less dense it bends away from the normal



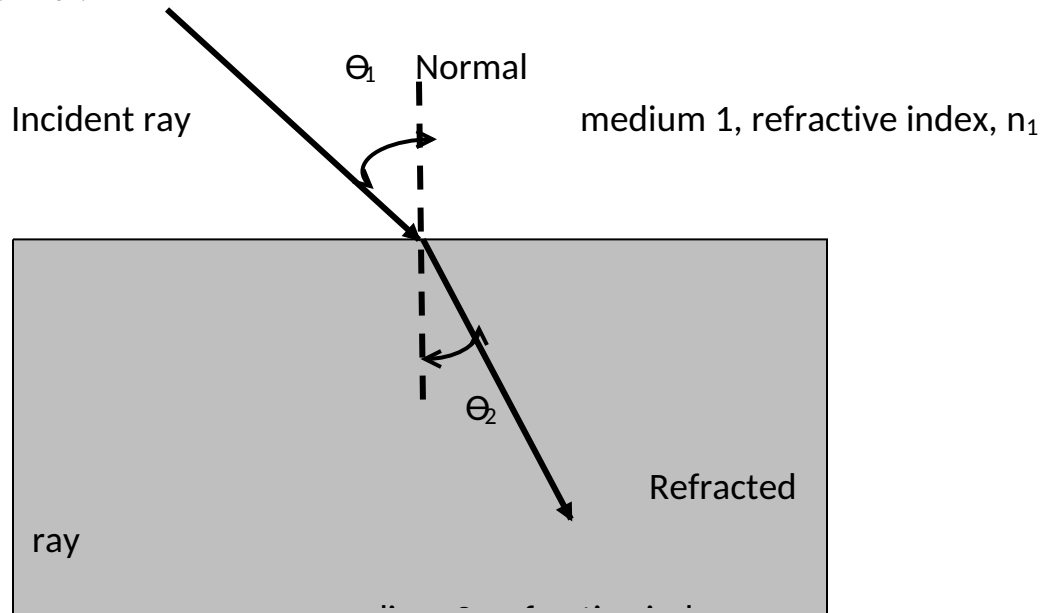
Note

If light goes in the direction of the normal then it goes straight without bending.





To calculate the angle in refraction we can use snells law. All angles must be taken from the normal.

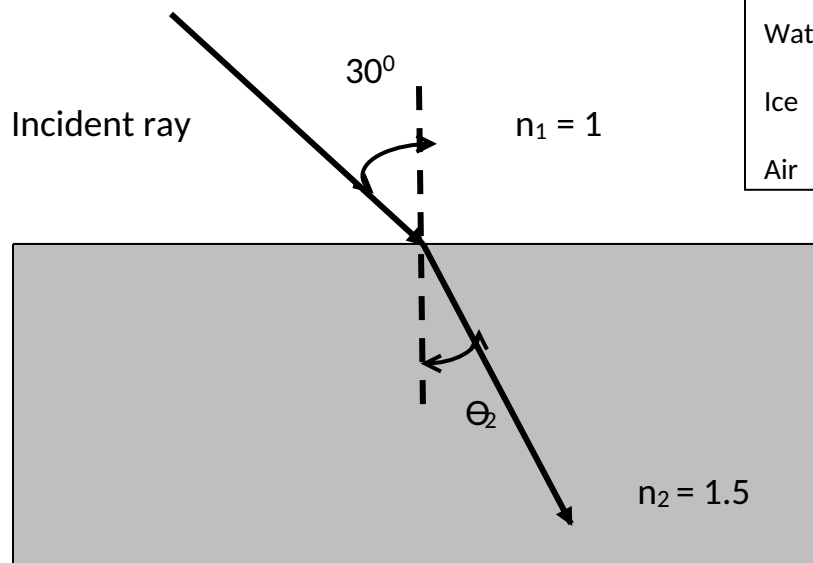


θ_1 is the angle of incidence, θ_2 is the angle of refraction

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

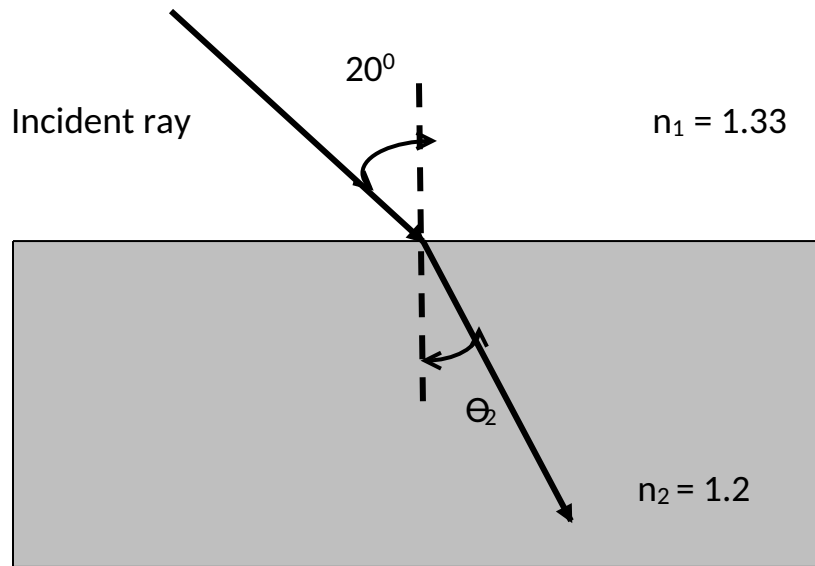
Find the marked angles.

1.

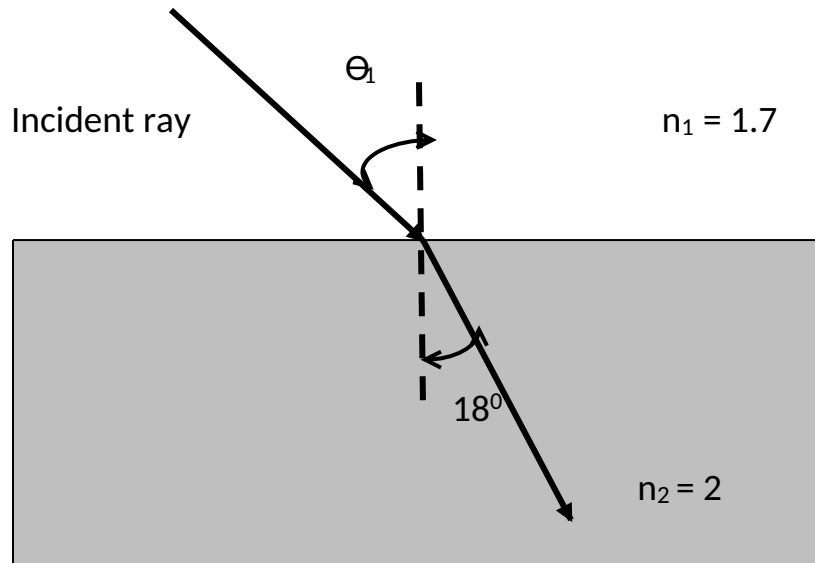


Material	refractive index
Diamond	2.4
Glass	1.5
Oil	1.44
Water	1.33
Ice	1.31
Air	1

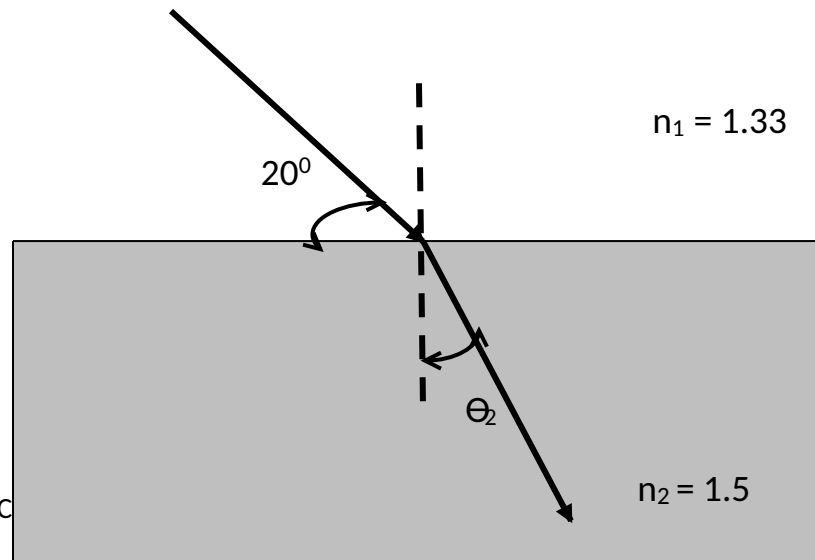
2.



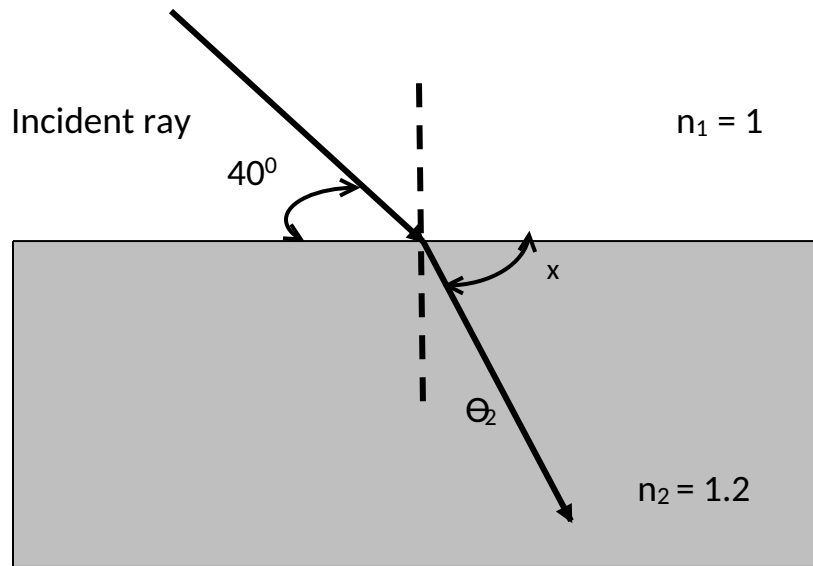
3.



4.



5.



Note : the refractive index of air is 1. It might not be given with the question in the paper so you must know this value.

CRITICAL ANGLE

When light goes from a more dense medium to a less dense medium it bends away from the normal.

The angle of incidence that gives angle of refraction as 90° IS CALLED THE CRITICAL ANGLE.

The formula to find critical angle is

1. Light goes from glass $n = 1.5$ to air $n = 1$. Find the critical angle.
2. Light goes from glass $n = 1.5$ to water $n = 1.33$. find the critical angle.

Nature of light

Light can be seen **both as a particle and as a wave**. This is called the dual nature of light.