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Q1.
Refractive index.
Q2.
Refractive index = sine of the angle of incidence/sine of the angle of refraction.

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Q3.
Refractive index has no units.
Q4.
Glass has higher refractive index.
Q5.
Carbon disulphide is more denser than the ethyl alcohol.
Q6.
This means that the ratio of the speed of light in air to the speed of light in diamond is equal to 2.42.
Q7.

$$_{diamond}n_{air} = 2.42$$

$$_{air}n_{diamond} = \frac{1}{2.42} = 0.41$$

Q8

$$\text{Refractive index of a material} = \frac{\text{Speed of light in vacuum}}{\text{speed of light in the material}}$$

Q9.
Refractive index.
Q10.
Three examples of materials that refract light rays are water, glass and diamond. When light rays (travelling in air) enter these materials, their speed decreases.
Q11.

Snell's law: According to the Snell's law of refraction, the ratio of sine of angle of incidence to the sine of angle of refraction is constant for a given pair of media.

$$\text{Refractive index} = \frac{\text{sine of the angle of incidence}}{\text{sine of the angle of refraction}}$$

Given: Angle of incidence=60^{o}
Angle of refraction=32.4^{o}

$$\text{Refractive index} = \frac{\text{sine of the angle of incidence}}{\text{sine of the angle of refraction}}$$

$$\text{Refractive index} = \frac{\sin 60^{\circ}}{\sin 32.4^{\circ}}$$

$$\text{Refractive index} = \frac{0.866}{0.540} = 1.603$$

Q12.

(a) $n_{flint} = \frac{\text{speed of light in vacuum}}{\text{speed of light in flint glass}} = \frac{3\times10^8}{1.86\times10^8} = 1.61$

$n_{crown} = \frac{\text{speed of light in vacuum}}{\text{speed of light in crown glass}} = \frac{3\times10^8}{1.97\times10^8} = 1.52$

(b) ${}_{crown}n_{flint} = \frac{\text{speed of light in crown glass}}{\text{speed of light in flint glass}} = \frac{1.97\times10^8}{1.86\times10^8} = 1.059$

Q13.

Given:

Speed of light in air=$3.0\text{x}10^8$m/s

Speed of light in medium X=$2.0\text{x}10^8$m/s

Speed of light in medium Y=$2.50\text{x}10^8$m/s

(a) ${}_{air}n_X$=?

$${}_{air}n_x = \frac{\text{speed of light in air}}{\text{speed of light in medium X}}$$

$${}_{air}n_x = \frac{3.0\text{x}10^8\text{m/s}}{2.0\text{x}10^8\text{m/s}}$$

$$= 1.5$$

(b) ${}_{air}n_y$=?

$${}_{air}n_y = \frac{\text{speed of light in air}}{\text{speed of light in medium y}}$$

$${}_{air}n_y = \frac{3.0\text{x}10^8\text{m/s}}{2.50\text{x}10^8\text{m/s}}$$

$$= 1.2$$

(c) ${}_{x}n_y$=?

$${}_{x}n_y = \frac{\text{speed of light in medium X}}{\text{speed of light in medium Y}}$$

$${}_{x}n_y = \frac{2.0\text{x}10^8\text{m/s}}{2.50\text{x}10^8\text{m/s}}$$

$$= 0.8$$

Q14.

Refractive index of medium=6/5=1.2

Speed of light in air=3,00,000km/s

We know that

$$\text{Refractive index of the medium} = \frac{\text{Speed of light in air}}{\text{Speed of light in medium}}$$

$$1.2 = \frac{300000}{\text{Speed of light in medium}}$$

Speed of light in medium=250000km/s

Q15.

Given:-
Refractive index of glass=1.5
Speed of light in air=3.0x10^8m/s
We know that

$$\text{Refractive index of glass} = \frac{\text{Speed of light in air}}{\text{Speed of light in glass}}$$

$$1.5 = \frac{3 \times 10^8}{\text{Speed of light in glass}}$$

$$\text{Speed of light in glass} = 2 \times 10^8 \text{ m/s}$$

Q16.

Speed of light in vacuum=3.0x10^8m/s
Speed of light in water=2.25 x10^8m/s

Refractive index of water=?
We know that

$$\text{Refractive index of water} = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in water}}$$

$$\text{Refractive index of water} = \frac{3 \times 10^8}{2.25 \times 10^8} = 1.33$$

Q17.

Given:-
Refractive index of diamond=2.42
Speed of light in air=3.0x10^8m/s
We know that

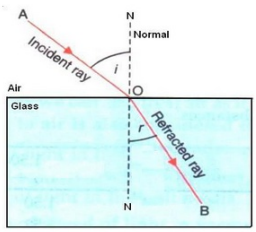
$$\text{Refractive index of diamond} = \frac{\text{Speed of light in air}}{\text{Speed of light in diamond}}$$

$$2.42 = \frac{3 \times 10^8}{\text{Speed of light in diamond}}$$

$$\text{Speed of light in diamond} = 1.239 \times 10^8 \text{ m/s}$$

Q18.

(a) Laws of refraction:



First law: According to the first law of refraction, the incident ray, the refracted ray and the normal at the point of incidence, all lie in the same plane.

Second law: According to the second law of refraction, the ratio of the sine of angle of incidence to the sine of angle of refraction is constant for a given pair of media.

(b) Refractive index of substance: The ratio of speed of light in vacuum to the speed of light in a medium, is called the refractive index of that medium.

(c) Speed of light in air =300milion m/sec

Speed of light in water=225milion m/sec

We know that

$$\text{Refractive index of water} = \frac{\text{Speed of light in air}}{\text{Speed of light in water}}$$

$$\text{Refractive index of water} = \frac{300 \text{ million m/s}}{225 \text{ million m/s}} = 1.33$$

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Q29.
(i) Crown glass to water.
(ii) Water to diamond.
Q30.

(i) A (It has least refractive index).
(ii) D (It has highest refractive index).

********** END **********