

The speed of light is vacuum and in two different glasses in the table below

medium	Speed of light
Vacuum	$3.00 \times 10^8 \text{ m/s}$
Flint glass	$1.85 \times 10^8 \text{ m/s}$
Crown glass	$1.97 \times 10^8 \text{ m/s}$

9) calculate the absolute refractive index of flint glass and crown glass

$$\begin{aligned} \text{Absolute refractive index of flint glass} \\ = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in flint glass}} \end{aligned}$$

$$\left( \frac{3.00 \times 10^8}{1.85 \times 10^8} \right)$$

$$1.61$$

$$\begin{aligned} \text{Absolute refractive index of crown glass} \\ = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in crown glass}} \end{aligned}$$

$$\left( \frac{3.00 \times 10^8}{1.97 \times 10^8} \right)$$

Relative refractive index for light going from ~~medium~~ crown glass to flint glass

(Speed of light in crown glass)

(Speed of light in flint glass)

$$= \frac{(1.97 \times 10^8)}{(1.87 \times 10^8)} = 1.059$$

(13) Speed of light in air =  $3.0 \times 10^8$  m/s

Speed of light in medium x =  $2.0 \times 10^8$  m/s

Speed of light in medium y =  $2.50 \times 10^8$  m/s

$a n^x = \frac{\text{Speed of light in air}}{\text{Speed of light in medium x}}$

$a n^x = \frac{3.0 \times 10^8 \text{ m/s}}{2.0 \times 10^8 \text{ m/s}}$

$$a n^x = \frac{3.0 \times 10^8 \text{ m/s}}{2.0 \times 10^8 \text{ m/s}}$$

$$= 1.5$$

$$= 1.5$$

(14)  $a n^y = \frac{\text{Speed of light in air}}{\text{Speed of light in medium y}}$

$a n^y = \frac{3.0 \times 10^8 \text{ m/s}}{2.50 \times 10^8 \text{ m/s}}$

$$= \frac{3.0 \times 10^8 \text{ m/s}}{2.50 \times 10^8 \text{ m/s}} = 1.2$$

$$= 1.2$$

$$\begin{aligned}
 n_{xy} &= \frac{\text{Speed of light in medium } x}{\text{Speed of light in medium } y} \\
 &= \frac{2.0 \times 10^8 \text{ m/s}}{2.50 \times 10^8 \text{ m/s}} \\
 &= 0.8
 \end{aligned}$$

(14) Refractive index of medium =  $6/5 = 1.2$   
 Speed of light in air =  $3,00,000 \text{ km/s}$

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 =  $250000 \text{ km/s}$

5) Refractive index of glass =  $1.5$   
 Speed of light in air =  $3.0 \times 10^8 \text{ m/s}$

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

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

Speed of light in vacuum =  $3.0 \times 10^8 \text{ m/s}$   
 Speed of light in water =  $2.25 \times 10^8 \text{ m/s}$   
 Refractive index of water =

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

$$= \frac{3 \times 10^8}{2.25 \times 10^8} = 1.33$$

(17) Refractive index of diamond = 2.42  
 Speed of light in air =  $3.0 \times 10^8 \text{ m/s}$   
 Refractive index of diamond =  $\frac{\text{Speed of light in air}}{\text{Speed of light in diamond}}$

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

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

(14) The refractive indices of four substances are given below. Match them with the corresponding colors of light.

- (19) (d)
- (20) (c)
- (21) (b)
- (22) (a)

- (23) (a)
- (24) (d)
- (25) (b)
- (26) (c)

- (27) (d)
- (28) (a)