$\frac{l}{a} = \frac{m}{b} = \frac{n}{c} = \pm\frac{\sqrt{l^2 + m^2 + n^2}}{\sqrt{a^2 + b^2 + c^2}} = \pm\frac{1}{\sqrt{a^2 + b^2 + c^2}}$

(13) $l = \pm\frac{a}{\sqrt{a^2+b^2+c^2}}; m = \pm\frac{b}{\sqrt{a^2+b^2+c^2}}; n = \pm\frac{c}{\sqrt{a^2+b^2+c^2}}$.

(14) $The\ direction\ cosines\ of\ the\ join\ of\ the\ two\ points\ P(x_1, y_1, z_1)\ and\ Q(x_2, y_2, z_2)\ are$ $\frac{x_2-x_1}{PQ}, \frac{y_2-y_1}{PQ}, \frac{z_2-z_1}{PQ}$.

(15) $The\ direction\ ratios\ of\ the\ line\ joining\ two\ points\ P(x_1, y_1, z_1)\ and\ Q(x_2, y_2, z_2)\ are$ $x_2 - x_1, y_2 - y_1, z_2 - z_1$.

(16) $If\ \theta\ be\ the\ angle\ between\ two\ lines, then$

$\cos\theta = \frac{\sum a_1 a_2}{\sqrt{\sum a_1{}^2}\sqrt{\sum a_2{}^2}}$. $[where, a_1 = l_1, m_1, n_1;\ a_2 = l_2, m_2, n_2]$.

$\cos\theta = l_1 l_2 + m_1 m_2 + n_1 n_2;\ sin\theta = \sqrt{\sum (m_1 n_2 - m_2 n_1)^2}$

(17) $Two\ lines\ with\ direction\ cosines\ l_1, m_1, n_1\ \&\ l_2, m_2, n_2\ will\ be\ parallel\ if$ $\frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}$.

(18) $Two\ lines\ with\ direction\ cosines\ l_1, m_1, n_1\ \&\ l_2, m_2, n_2\ will\ be\ perpendicular\ if$ $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$.

(19) $If\ \vec{r} = a\hat{\imath} + b\hat{\jmath} + c\hat{k}, then\ direction\ ratios\ of\ r\ are\ a, b, c$.

(20) $The\ projection\ of\ line\ segment\ joining\ P(x_1, y_1, z_1)\ and\ Q(x_2, y_2, z_2)\ on\ a\ line\ whose\ direction\ cosines\ are\ l, m, n\ is\ given\ by$ $l(x_2 - x_1) + m(y_2 - y_1) + n(z_2 - z_1)$.

Straight Line in Space

(1) $If\ a\ line\ passes\ through\ a\ point\ with\ position\ vector\ \vec{r_1}\ and\ it\ is\ parallel\ to\ \vec{m}\ then\ its\ vector\ equation\ is\ \ \vec{r} = \vec{r_1} + \lambda\vec{m}$

(2) $If\ a\ line\ passes\ through\ a\ point\ A(x_1, y_1, z_1)\ and\ it\ has\ d.r.'s\ \ a, b, c\ then\ its\ cartesian\ equations\ are$

$$\frac{x - x_1}{a} = \frac{y - y_1}{b} = \frac{z - z_1}{c}$$

(3) $If\ a\ line\ passes\ through\ two\ points\ having\ p.v.'s\ \vec{r_1}\ and\ \vec{r_2}, then\ its\ vector\ equation\ is$

$$\vec{r} = \vec{r_1} + \lambda(\vec{r_2} - \vec{r_1})$$

(4) $If\ a\ line\ passes\ through\ two\ points\ \ A(x_1, y_1, z_1)\ and\ B(x_2, y_2, z_2)\ then\ its\ cartesian\ equations\ are$

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1} = \frac{z - z_1}{z_2 - z_1}$$