1. The direction cosines of the line $\frac{3x+1}{-3} = \frac{3y+2}{6} = \frac{z}{-1}$ are

(1) $\left(\frac{1}{3}, \frac{2}{3}, 0\right)$
(2) $\left(-1, \frac{2}{3}, 1\right)$
(3) $\left(-\frac{1}{2}, 1, -\frac{1}{2}\right)$
(4) $\left(-\frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}, -\frac{1}{\sqrt{6}}\right)$

2. If direction cosines of two lines are proportional to $(2, 3, -6)$ and $(3, -4, 5)$, then the acute angle between them is

(1) $\cos^{-1}\left(\frac{49}{36}\right)$
(2) $\cos^{-1}\left(\frac{18\sqrt{2}}{35}\right)$
(3) 96°
(4) $\cos^{-1}\left(\frac{18}{35}\right)$

3. L and M are two points with position vectors $2\vec{a} - \vec{b}$ and $\vec{a} + 2\vec{b}$ respectively. The position vector of the point N which divides the line segment LM in the ratio $2 : 1$ externally is

(1) $3\vec{b}$
(2) $4\vec{b}$
(3) $5\vec{b}$
(4) $3\vec{a} + 4\vec{b}$

4. Let $A(3, 0, -1)$, $B(2, 10, 6)$ and $C(1, 2, 1)$ be the vertices of a triangle and M be the mid-point of AC. If G divides BM in the ratio, $2 : 1$, then $\cos(\angle GOA)$ (O being the origin) is equal to

(1) $\frac{1}{\sqrt{30}}$
(2) $\frac{1}{6\sqrt{10}}$
(3) $\frac{1}{\sqrt{15}}$
(4) $\frac{1}{2\sqrt{15}}$

5. The projection of the line joining the points (3, 4, 5) and (4, 6, 3) on the line joining the points $(-1, 2\ 4)$ and (1, 0, 5) is

(1) 4/3
(2) 2/3
(3) $-4/3$
(4) 1/2

6. If $P(6,10,10), Q(1,0,-5), R(6,-10,\lambda)$ are vertices of a triangle right angled at Q, then value of λ is ....

(1) 0
(2) 1
(3) 3
(4) 2

7. The sum of coordinates of a point lying in YZ-plane is 3. If its distance from XZ-plane is twice its distance from XY-plane, then its coordinates may be

(1) $(0, 1, 2)$
(2) $(0, 2, 1)$
(3) $(0, -1, -2)$
(4) $(0, 5, -3)$

8. If the direction ratio of two lines are given by $3lm - 4ln + mn = 0$ and $l + 2m + 3n = 0$, then the angle between the line is

(1) $\frac{\pi}{6}$
(2) $\frac{\pi}{4}$
(3) $\frac{\pi}{3}$
(4) $\frac{\pi}{2}$

9. Let ABC be a triangle whose circumcenter is at Q. If the position vectors of A, B, C and Q are $\vec{a}$, $\vec{b}$, $\vec{c}$ and $\frac{\vec{a}+\vec{b}+\vec{c}}{4}$ respectively, then the position vector of the orthocentre of this triangle, is :

(1) $-\left(\frac{\vec{a}+\vec{b}+\vec{c}}{2}\right)$
(2) $\vec{a} + \vec{b} + \vec{c}$
(3) $\frac{\left(\vec{a}+\vec{b}+\vec{c}\right)}{2}$
(4) $\vec{0}$

10. The direction cosines of the projection of the line $\frac{1}{2}(x-1) = -y = z+2$ on the plane $2x + y - 3z = 4$ are equal to

(1) $\left(\frac{2}{\sqrt{6}}, \frac{-1}{\sqrt{6}}, \frac{1}{\sqrt{6}}\right)$
(2) $\left(\frac{-2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}\right)$
(3) $\left(\frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}\right)$
(4) $\left(\frac{-2}{\sqrt{6}}, \frac{-1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}\right)$