1. The angle between the lines $\vec{r} = \left(2\hat{i} - 3\hat{j} + \hat{k}\right) + \lambda\left(\hat{i} + 4\hat{j} + 3\hat{k}\right)$ and $\vec{r} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\left(\hat{i} + 2\hat{j} - 3\hat{k}\right)$ is

(1) $\frac{\pi}{2}$
(2) $\cos^{-1}\left(\frac{9}{\sqrt{91}}\right)$
(3) $\cos^{-1}\left(\frac{7}{\sqrt{84}}\right)$
(4) $\frac{\pi}{3}$

2. If line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-\lambda}{2} = \frac{z}{1}$ intersect each other, then $\lambda = \ldots\ldots$

(1) $\frac{7}{2}$
(2) $\frac{3}{2}$
(3) $\frac{9}{2}$
(4) $\frac{5}{2}$

3. Two lines $\frac{x-3}{1} = \frac{y+1}{3} = \frac{z-6}{-1}$ and $\frac{x+5}{7} = \frac{y-2}{-6} = \frac{z-3}{4}$ intersects at the point R. The reflection of R in the xy -plane has coordinates

(1) $(2, -4, -7)$
(2) $(2, -4, 7)$
(3) $(2, 4, 7)$
(4) $(-2, 4, 7)$

4. The point on the line $\frac{x-2}{1} = \frac{y+3}{-2} = \frac{z+5}{-2}$ at a distance of 6 from the point $(2, -3, -5)$ is

(1) $(3, -5, -3)$
(2) $(4, -7, -9)$
(3) $(0, 2, -1)$
(4) $(-3, 5, 3)$

5. If the foot of the perpendicular drawn from the point $(1, 0, 3)$, on a line passing through $(\alpha, 7, 1)$, is $\left(\frac{5}{3}, \frac{7}{3}, \frac{17}{3}\right)$, then α, is equal to.

6. Foot of perpendicular drawn from the point $P(2, 3, 4)$ to the straight line $\frac{x-1}{2} = \frac{y-3}{3} = \frac{z-3}{6}$ is

(1) $(2, 6, 18)$
(2) $\left(-\frac{27}{49}, -\frac{16}{49}, \frac{17}{49}\right)$
(3) $\left(\frac{71}{49}, \frac{131}{49}, \frac{213}{49}\right)$
(4) $\left(\frac{71}{343}, \frac{131}{343}, \frac{213}{343}\right)$

7. The image of the point $(1, 2, 3)$ in lie $\frac{x}{2} = \frac{y-1}{3} = \frac{z-1}{3}$ is

(1) $\left(1, \frac{5}{2}, \frac{5}{2}\right)$
(2) $\left(1, \frac{9}{4}, \frac{11}{4}\right)$
(3) $(1, 3, 2)$
(4) $(3, 1, 2)$

8. The shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ is

(1) $\sqrt{30}$
(2) $2\sqrt{30}$
(3) $5\sqrt{30}$
(4) $3\sqrt{30}$

9. A line is drawn from the point $P(1, 1, 1)$ and perpendicular to a line with direction ratios $1, 1, 1$ to intersect the plane $x + 2y + 3z = 4$ at Q. The locus of point Q is

(1) $\frac{x}{1} = \frac{y-5}{-2} = \frac{z+2}{1}$
(2) $x - 2 = y - 51 = z + 21$
(3) $x = y = z$
(4) None of these

10. Let the equation of a line is $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-4}{3}$. An insect starts flying from $P(1, 3, 2)$ in a straight line meeting the given line at a point $R(a, b, c)$ and then goes to the point $Q(6, 7, 5)$ in a straight line such that PR is perpendicular to RQ. Then, the least value of $7(a + b + c)$ is equal to

(1) 105
(2) 45
(3) 10
(4) 7