Question 1: Perpendiculars are drawn from points on the line (x+2)/2 = (y+1)/-1 = z/3 to the plane x+y+z = 3. The feet of perpendiculars lie on the line is

(a) x/5 = (y-1)/8 = (z-2)/-13

(b) x/2 = (y-1)/3 = (z-2)/-5

(c) x/4 = (y-1)/3 = (z-2)/-7

(d) x/2 = (y-1)/-7 = (z-2)/5

Solution:

Given that the equation of the line is (x+2)/2 = (y+1)/-1 = z/3 = λ

So any point P on the line is x = 2λ-2, y = -λ-1, z = 3λ ..(i)

It lies on the plane x+y+z = 3

=> (2λ-2) + (-λ-1) + 3λ = 3

=> 4λ – 6 = 0

=> λ = 3/2

Substitute λ in (i) and get P

So P = (1, -5/2, 9/2) ..(ii)

We can observe that (-2, -1, 0) is a point on the line.

Let (x, y, z) be the foot of the perpendicular from point (-2, -1, 0) on the plane x+y+z = 3.

=> (x+2)/1 = (y+1)/1 = (z-0)/1

= $-(1(-2) + 1(-1) + 0(1) - 3)/(1^2+1^2+1^2)$

=> Q(x, y, z) = (0, 1, 2) ..(iii)

Direction ratios of PQ = (1, -7/2, 5/2) (from (ii) and (iii))

= (2, -7, 5) ..(iv)

From (iii) and (iv), equation of required line is x/2 = (y-1)/-7 = (z-2)/5

Hence option d is the answer.