Answer on Question #46834 – Math – Analytic Geometry

Problem.

Let R be the point which divides the line segment joining P(2,1,0) and Q(-1,3,4) in the ratio 1:2 such that PR<PQ. Find the =n of the line passing through R and parallel to the line x/2=y/1=z/3

Solution:

Let R has coordinates (a, b, c). Then $2\overrightarrow{PR} = \overrightarrow{RQ}$. $\overrightarrow{PR} = (a-2, b-1, c)$ and $\overrightarrow{RQ} = (-1-a, 3-b, 4-c)$. Hence $2(a-2, b-1, c) = (-1-a, 3-b, 4-c)$. Therefore $2a-4 = -1-a$, $2b-2 = 3-b$, $2c = 4-c$. Hence $a = 1$, $b = \frac{1}{3}$, $c = \frac{4}{3}$, $R\left(1, \frac{1}{3}, \frac{4}{3}\right)$. The line, that passes through $R\left(1, \frac{1}{3}, \frac{4}{3}\right)$ and is parallel to the line x/2=y/1=z/3, has equation

$$\frac{x-1}{2} = \frac{y-\frac{1}{3}}{1} = \frac{z-\frac{4}{3}}{3}$$

or

$$\frac{x-1}{2} = \frac{3y-1}{3} = \frac{3z-4}{9}.$$

Answer: $\frac{x-1}{2} = \frac{3y-1}{3} = \frac{3z-4}{9}$.