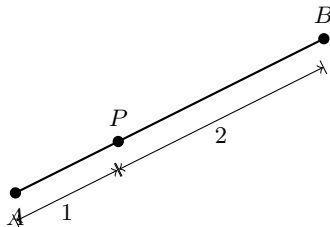


Question 3

Point P divides the segment from $A = (-5, 2, 7)$ to $B = (4, -4, 1)$ internally in the ratio $AP : PB = 1 : 2$. Find P , then verify the ratio using distances.

Question 3 – Solution

Strategy Moving one-third of the way from A to B produces the required $1 : 2$ division.



Section formula Since $B - A = \langle 9, -6, -6 \rangle$,

$$P = A + \frac{1}{3}(B - A) = (-5, 2, 7) + (3, -2, -2) = \boxed{(-2, 0, 5)}.$$

Distance check We have $P - A = \langle 3, -2, -2 \rangle$ and $B - P = \langle 6, -4, -4 \rangle = 2(P - A)$. Therefore $AP = \sqrt{17}$ and $PB = 2\sqrt{17}$, giving $AP : PB = 1 : 2$.

Key idea An internal ratio determines an affine weighted average; the distance check also confirms that P lies between the endpoints.