

Ratio Point Quest

Locate the point that splits a segment in a given ratio.

HIGH SCHOOL • HSG-GPE.B.6

CCSS.Math.Content.HSG-GPE.B.6 "Find the point on a directed line segment between two given points that partitions the segment in a given ratio."

NAME _____

DATE _____

SPLIT IT BY RATIO

If P divides directed segment AB in the ratio $AP:PB = m:n$, start at A and move $m/(m+n)$ of the way toward B. Use $P = A + m/(m+n)(B - A)$, and calculate the x-coordinate and y-coordinate separately.

WORKED EXAMPLE

Points A(-37,43) and B(23,-47) form a directed segment. Point P partitions AB so that $AP:PB = 11:19$. Find P.

1. Add the ratio parts: $11 + 19 = 30$.
2. Find the change from A to B: $(23 - (-37), -47 - 43) = (60, -90)$.
3. Move $11/30$ of that change: $P = (-37, 43) + (11/30)(60, -90)$.
4. Simplify: $P = (-15, 10)$.

Answer: P(-15,10)

PRACTICE 6 problems

- 1** Point P partitions directed segment AB in the ratio $AP:PB = 3:4$. Find P if A(0,0) and B(18,12).

ANSWER _____

- 2** Point P partitions directed segment AB in the ratio $AP:PB = 1:3$. Find P if A(-8,16) and B(20,-12).

ANSWER _____

- 3** Point P partitions directed segment AB in the ratio $AP:PB = 2:1$. Find P if A(6,-12) and B(24,12).

ANSWER _____

- 4** Point P partitions directed segment AB in the ratio $AP:PB = 7:8$. Find P if A(-18,-6) and B(9,24).

ANSWER _____

- 5** Point P partitions directed segment AB in the ratio $AP:PB = 5:1$. Find P if A(6,22) and B(-18,-8).

ANSWER _____

- 6** Point P partitions directed segment AB in the ratio $AP:PB = 8:5$. Find P if A(12,-4) and B(-14,32).

ANSWER _____

APPLY IT Show your work

- 1** A gaming club is placing a checkpoint on a coordinate-map route from a starting portal at A(-24,18) to a final portal at B(36,-12). The checkpoint P must divide the route so that $AP:PB = 2:3$. What are the coordinates of P?

WORK SPACE

ANSWER _____

- 2** A student council is planning a campus festival and needs a water station between booth A(-28,-12) and booth B(22,38) on a coordinate map. The water station P must divide the segment so that $AP:PB = 3:2$. What are the coordinates of P?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Point P(0,0) lies on directed segment AB, where A(-16,8) and B(26,-13). Find $AP:PB$. Explain how the coordinate changes show the ratio.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Point P partitions directed segment AB in the ratio AP:PB = 3:4. Find P if A(0,0) and B(18,12).	P(54/7,36/7)
2	Point P partitions directed segment AB in the ratio AP:PB = 1:3. Find P if A(-8,16) and B(20,-12).	P(-1,9)
3	Point P partitions directed segment AB in the ratio AP:PB = 2:1. Find P if A(6,-12) and B(24,12).	P(18,4)
4	Point P partitions directed segment AB in the ratio AP:PB = 7:8. Find P if A(-18,-6) and B(9,24).	P(-27/5,8)
5	Point P partitions directed segment AB in the ratio AP:PB = 5:1. Find P if A(6,22) and B(-18,-8).	P(-14,-3)
6	Point P partitions directed segment AB in the ratio AP:PB = 8:5. Find P if A(12,-4) and B(-14,32).	P(-4,236/13)

PART 2 • APPLY IT

1. **P(0,6)** Use $P = A + \frac{2}{5}(B - A)$. The change from A to B is (60,-30), so $\frac{2}{5}$ of the change is (24,-12).
2. **P(2,18)** Use $P = A + \frac{3}{5}(B - A)$. The change from A to B is (50,50), and moving $\frac{3}{5}$ of that change from A gives (2,18).

CHALLENGE

AP:PB = 8:13. From A to P, the change is (16,-8). From P to B, the change is (26,-13), and $16:26 = 8:13$ and $8:13 = 8:13$.

Accept equivalent coordinate forms, such as decimals only when they are exact terminating equivalents. For the challenge, accept the equivalent ratio 16:26 as well as the simplified ratio 8:13.