LESSON MAKER PRO

Balance Point Quest

Use weights to locate a point on a line.

HIGH SCHOOL · MA.912.GR.3.1

MA.912.GR.3.1 "Determine the weighted average of two or more points on a line."

NAME _____ DATE _____

FINDING A BALANCE POINT

Multiply each coordinate by its weight, add the weighted coordinates, and divide by the total weight. Find the x coordinate and y coordinate separately. A point with a larger weight pulls the answer closer to itself.

WORKED EXAMPLE

Find the weighted average of A(2, 6) with weight 3 and B(16, 20) with weight 4.

1. Total weight: 3 + 4 = 7.
2. x coordinate: (3(2) + 4(16)) / 7 = 70/7 = 10.
3. y coordinate: (3(6) + 4(20)) / 7 = 98/7 = 14.

Answer: (10, 14)

PRACTICE 6 problems

1 Find the weighted average of A(0, 0) with weight 1 and B(10, 10) with weight 1.

ANSWER _____

2 Find the weighted average of A(-7, 1) with weight 1 and B(9, 9) with weight 7.

ANSWER _____

3 Find the weighted average of P(9, -7) with weight 5 and Q(15, 5) with weight 1.

ANSWER _____

4 Find the weighted average of P(-9, 7) with weight 1 and Q(7, -9) with weight 7.

ANSWER _____

5 Points A(1, 11), B(5, 15), and C(9, 19) lie on one line. Their weights are 1, 5, and 7. Find their weighted average.

ANSWER _____

6 Points A(-11, 13), B(0, 13), and C(17, 13) lie on one line. Their weights are 5, 7, and 1. Find their weighted average.

ANSWER _____

APPLY IT Show your work

1 On a game map, checkpoints A(-11, 9) and B(13, -3) are on a straight route. A game designer gives checkpoint A a weight of 5 and checkpoint B a weight of 1 when choosing a respawn point. What are the coordinates of the respawn point?

WORK SPACE

ANSWER _____

2 A student council is choosing a snack truck stop on a straight campus walkway. The east entrance is at coordinate -15 and has weight 5. The gym is at coordinate 10 and has weight 8. What coordinate is the weighted average stop?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Points A(-9, 0), B(1, 10), and C(5, 14) lie on one line. Their weights are 1, x, and 5. If their weighted average is (21/11, 120/11), find x.

WORK SPACE AND ANSWER

ANSWER KEY # Balance Point Quest

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the weighted average of A(0, 0) with weight 1 and B(10, 10) with weight 1.	**(5, 5)**
2	Find the weighted average of A(-7, 1) with weight 1 and B(9, 9) with weight 7.	**(7, 8)**
3	Find the weighted average of P(9, -7) with weight 5 and Q(15, 5) with weight 1.	**(10, -5)**
4	Find the weighted average of P(-9, 7) with weight 1 and Q(7, -9) with weight 7.	**(5, -7)**
5	Points A(1, 11), B(5, 15), and C(9, 19) lie on one line. Their weights are 1, 5, and 7. Find their weighted average.	**(89/13, 219/13)**
6	Points A(-11, 13), B(0, 13), and C(17, 13) lie on one line. Their weights are 5, 7, and 1. Find their weighted average.	**(-38/13, 13)**

PART 2 · APPLY IT

1. **(-7, 7)** Use total weight 6. The weighted x coordinate is (-11(5) + 13(1)) / 6, and the weighted y coordinate is (9(5) + (-3)(1)) / 6.
2. **5/13** Multiply each location by its weight and divide by the total weight. The calculation is (-15(5) + 10(8)) / (5 + 8) = 5/13.

CHALLENGE

x=5

Accept equivalent ordered pairs with simplified or unsimplified fractional coordinates. For the challenge, accept x = 5 when the student uses either coordinate calculation correctly.