LESSON MAKER PRO

Fair Share Math

Use proportional shares and Hamilton's method.

HIGH SCHOOL · MA.912.LT.3.4

MA.912.LT.3.4 "Solve problems using fair division and apportionment techniques."

NAME _____ DATE _____

SHARE IT FAIRLY

For a proportional fair division, multiply the whole amount by each person's share of the total contributions. For Hamilton's method, find each quota, give each group its lower quota, then give leftover seats to the largest fractional remainders.

WORKED EXAMPLE

Use Hamilton's method to apportion 11 seats among A: 330 people, B: 275 people, and C: 220 people.

1. Total population: 330 + 275 + 220 = 825.
2. Standard divisor: 825 / 11 = 75.
3. Quotas: A = 4.4, B = 3 2/3, C = 2 14/15.
4. The lower quotas use 9 seats. Remainders: A = 2/5, B = 2/3, C = 14/15. Give the 2 leftover seats to C, then B.

Answer: A: 4 seats, B: 4 seats, C: 3 seats

PRACTICE 5 problems

1 Split $420 in the ratio 2:5.

ANSWER _____

2 A population of 560 is represented by 8 seats. Find the standard divisor.

ANSWER _____

3 A group's population is 168 and the standard divisor is 48. Find its quota.

ANSWER _____

4 What is the lower quota of 6.7?

ANSWER _____

5 Use Hamilton's method to apportion 13 seats among Red: 252, Green: 198, and Blue: 150.

ANSWER _____

APPLY IT Show your work

1 A student media council has 8 delegate seats. Student survey responses came from Video: 144, Podcast: 96, and News: 80. Use Hamilton's method to assign the seats.

WORK SPACE

ANSWER _____

2 Three students earn $540 from a video project. They worked 4 hours, 5 hours, and 6 hours. Divide the money fairly in proportion to their hours.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Using Hamilton's method, three groups have populations A: 5, B: 3, and C: 1. Apportion first 4 seats, then 5 seats. Does any group lose a seat when the total number of seats increases? Explain.

WORK SPACE AND ANSWER

ANSWER KEY # Fair Share Math

HIGH SCHOOL · MA.912.LT.3.4

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Split $420 in the ratio 2:5.	**$120 and $300**
2	A population of 560 is represented by 8 seats. Find the standard divisor.	**70**
3	A group's population is 168 and the standard divisor is 48. Find its quota.	**3.5**
4	What is the lower quota of 6.7?	**6**
5	Use Hamilton's method to apportion 13 seats among Red: 252, Green: 198, and Blue: 150.	**Red: 6 seats, Green: 4 seats, Blue: 3 seats**

PART 2 · APPLY IT

1. **Video: 4 seats, Podcast: 2 seats, News: 2 seats** The standard divisor is 320 / 8 = 40. The quotas are 3.6, 2.4, and 2, so Video receives the one leftover seat.
2. **4-hour student: $144, 5-hour student: $180, 6-hour student: $216** There are 15 total hours. Multiply $540 by 4/15, 5/15, and 6/15.

CHALLENGE

With 4 seats: A = 2, B = 1, C = 1. With 5 seats: A = 3, B = 2, C = 0. Yes, C loses 1 seat when the total rises from 4 to 5.

Accept equivalent fractional or decimal quota forms. For proportional money shares, accept dollar notation with or without trailing zeros.