6.RP Voting for Three, Variation 2

Alignments to Content Standards: 6.RP.A.3

Task

John, Marie, and Will all ran for 6th grade class president. Of the 36 students voting, the ratio of votes for John to votes for Will was two to one. Marie got exactly the average number of votes for the three of them. How many more votes did John get than Marie?
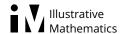
IM Commentary

This is the sixth problem in a series of seven that use the context of a classroom election. While it still deals with simple ratios and easily managed numbers, the mathematics surrounding the ratios are increasingly complex. In this problem, the total number of votes in the election and the number of votes for individual candidates is not provided.

The problem provides the ratio of John's votes to Will's votes and enough information to compute the number of votes for Marie. The added complication with Marie's votes is that they are provided in a different form. She gets the average number of votes.

Solutions

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Solution: Computing votes

There are 36 votes and 3 people running, so given that Marie received the average number of votes:

$36 \div 3 = 12$ votes for Marie

$36 - 12 = 24$ votes remain for John and Will

Given that John and Will share votes in a 2 to 1 ratio, respectively,

$24 \times \frac{2}{3} = 16$ votes for John.

$16 - 12 = 4$ more votes for John than Marie

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Solution: Applying fractions

There is an alternative way to work this problem with fewer steps, but may not be as easy to see.

Marie gets $\frac{1}{3}$ of the votes. $\frac{2}{3}$ of the votes remain and John receives $\frac{2}{3}$ of those votes. So, John gets:

$\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$ of the votes

It follows that the difference between the fraction of votes John gets and the fraction that Marie gets is:

$\frac{4}{9} - \frac{1}{3} = \frac{1}{9}$

$\frac{4}{9} - \frac{3}{9} = \frac{1}{9}$

Since there are 36 votes, John gets:

$\frac{1}{9} \times 36 = 4$ votes more than Marie.

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Solution: Equivalent Ratios

As in earlier variations, students may still use the basic solution method of creating a series of equivalent ratios after identifying the meaning behind the average number of votes. In this case, students will be looking for a 2 to 1 ratio such that the sum of the numerators and the denominators is 24.

$36 \div 3 = 12$ votes for Marie

$36 - 12 = 24$ votes remaining for John and Will

Given that John and Will share votes in a 2 to 1 ratio, respectively,

$$\frac{2}{1} = \frac{4}{2} = \frac{6}{3} = \frac{8}{4} = \frac{10}{5} = \frac{12}{6} = \frac{14}{7} = \frac{16}{8}$$

Then $16 - 12 = 4$ more votes for John than Marie.