Problem of the Week
Problem B and Solution
Trivia Night Treats

Problem

Mr. Mcbride is hosting a Grade 5 and 6 trivia night. The students will be divided into teams of equal size. He has 90 individually-wrapped candies to distribute to the winning team.

(a) What reasonable team sizes between 4 and 20 could Mr. Mcbride allow to ensure that all members of the winning team get an equal number of candies and there are no candies leftover?

(b) After the trivia night a winning team is declared! Each student on the winning team gets an equal number of candies, with no candies leftover. They then each eat $\frac{2}{3}$ of their share, leaving exactly 5 candies per student. How many students were on the winning team?

(c) The students on the winning team put all their remaining candies together, give $\frac{2}{5}$ to a friend on another team, then give the rest back to Mr. Mcbride to say thank you for hosting the trivia night. What fraction of his original 90 candies did Mr. Mcbride receive as a thank you? Give your answer in the simplest form.



Solution

(a) For all members of the winning team to get an equal number of candies, the team size must be a factor of 90 between 4 and 20. We can write the factor pairs of 90: 1×90, 2×45, 3×30, 5×18, 6×15, and 9×10. So the possible team sizes are 5, 6, 9, 10, 15, or 18. Reasonable team sizes for trivia would be 5 or 6 (or possibly 9 or 10) for easy communication.

(b) If the members of the winning team have each eaten $\frac{2}{3}$ of their share of candies and have 5 left, those 5 represent $\frac{1}{3}$ of their share. Thus each person on the winning team must have received $5 \times 3 = 15$ candies. Since there were 90 candies given to the winning team in total, there must be $90 \div 15 = 6$ students on the winning team.

(c) The total number of candies remaining is $5 \times 6 = 30$. Thus, the number of candies the students give to their friend is $\frac{2}{5} \times 30 = 12$. So Mr. McBride's thank you was $30 - 12 = 18$ candies, which is $\frac{18}{90} = \frac{1}{5}$ of his original 90 candies.