MATHCOUNTS® Problem of the Week Archive

Holiday Giving – December 18, 2023

Problems & Solutions

A local charity is wrapping holiday gifts for local needy families. When 8 volunteers work together, they can get all of the gifts wrapped and distributed in 6 hours. How many hours would it have taken if there had been 12 volunteers, each working at the same rate?

*Since 8 volunteers take 6 hours to complete the wrapping and present distribution, a total of 8(6) = 48 "man-hours" were used. Knowing that 48 man-hours were required to complete the tasks, if 12 volunteers had been available, the tasks would have only taken 48/12 = **4** hours to complete.*

Trent's class wants to "adopt a family" from the local "angel tree." The family they decide to adopt has asked for canned foods and a stuffed animal for their young daughter. If each student in the class each donates $5.00, they will have enough to buy 2 crates of canned food and will have exactly $1.00 left over. If each student brings in $8.00, they will have exactly enough to buy 3 crates of canned food and a stuffed animal that costs $11.50. How many students are in Trent's class?

Let's call the number of students in Trent's class c and the cost of the crates of food f. Now, we can set up the following equations:

2f + 1.00 = 5c

3f + 11.50 = 8c

Notice we have 2 equations and 2 variables. So, we can solve the system of equations. Here, we'll use the elimination method:

2(3f + 11.50 = 8c) → 6f + 23.00 = 16c

3(2f + 1.00 = 5c) → 6f + 3.00 = 15c

Now,

6f + 23.00 = 16c

- (6f + 3.00 = 15c)

20 = c

*So, there must be **20** students in Trent's class.*

Greta and Marge are collecting money for a local charity by taking donations outside of busy local businesses. Hoping to collect the most money today, Greta gets to her collection spot and begins collections at 8 a.m. Marge wanted to sleep in, so she didn't start collections at her spot until 11 a.m., by which time Greta had already collected $45.00. If Greta continues to collect money at a rate of $15 per hour, Marge collects money at a rate of $20 per hour and they each take a 1-hour break at 2 p.m., at what time will Greta and Marge have collected the same amount of money?

Let's call the number of hours Greta and Marge are both collecting x. Now, we can set up the following equation:

$45 + 15x = 20x$

Now, solve for x:

$45 = 5x$ *(by subtracting 15x from both sides of the equation)*

$9 = x$ *(by dividing by 9 on both sides of the equation)*

*So, once Marge starts collecting, they would have to continue for 9 hours to have collected the same amount that day – 9 hours after 11 a.m. is 8 p.m. However, since the two girls took an hour break at 2 p.m., that means they would have to collect until **9 p.m.***

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