



Math Olympiad and Problem Solving Programs

F130 - Advanced Problem Solving

Problem Set 20.2 - Average Challenge

Name: _____

Date: _____

Important formulas:

$$total \div number = average \quad average \times number = total$$

Note: even though this sheet was called "Average Challenge," it was much easier than the other worksheet, 20.1 Average.

1. $\boxed{\$9.50}$

2. Let's use the second formula on the top of the page. The total of the frogs in the first five ponds is $total = average \times number = 17 \times 5 = 85$. The total of the frogs in the other 4 ponds is $total = average \times number = 24 \times 4 = 96$. So there are 85 frogs in the first five ponds, and 96 frogs in the last four ponds. So altogether in all nine ponds, there are $85 + 96 = \boxed{181}$

3. Let's find the total score of all 10 students using the second formula:

$total = average \times number = 87 \times 10 = 870$. The total score of all 10 students is 870, and the total score of 4 of those students is 306. Thus, the other 6 students got a total score of $870 - 306 = 564$.

The average of those 6 students is $average = \frac{total}{number} = \frac{564}{6} = \boxed{94}$

4. If 14 cheese wheels have an average of 4.6 pounds, then their total weight is $total = number \times average = 14 \times 4.6 = 64.4$ pounds. If 9 of the cheese wheels have an average of 5.1 pounds, their total weight is $total = number \times average = 9 \times 5.1 = 45.9$ pounds. So the total weight of the remaining 5 cheese wheels is $64.4 - 45.9 = \boxed{18.5}$

5. 1. find the total height of all 8 people. $total = average \times number = 5.2 \times 8 = 41.6$ feet

2. find the total height of the first 4 people with average height 4.7. $total = average \times number = 4.7 \times 4 = 18.8$ feet

3. find the total height of the last 4 people. $41.6 - 18.8 = \boxed{22.8}$

6. 1. find the total number of books of all 37 students. $total = average \times number = 14 \times 37 = 518$

2. find the total number of books of the first 21 students with average 18. $total = average \times number = 18 \times 21 = 378$

3. find the total of the last . $518 - 378 = \boxed{140}$

7. $average\ profit = \frac{all\ the\ profit}{number\ of\ flowers}$

Yvonne spent \$20 per bouquet, and she bought 20 bouquets, so she spent $\$20 \times 20 = \400 on the flowers.

She bought 20 bouquets with 25 flowers in each bouquet, so she bought $20 \times 25 = 500$ flowers. She sold $\frac{3}{4}$ of them (which is $\frac{3}{4} \times 500 = 375$ of them) at \$3.00 apiece, so she made $375 \times \$3.00 = \$1,125$ on those flowers. She sold the rest (which is $500 - 375 = 125$ of them) at \$2.00 apiece, so she made $125 \times \$2.00 = \250 on them. So she made a total of $1,125 + 250 = \$1,375$ from the flowers.



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Now her TOTAL PROFIT is how much she made – how much she spent, so $\$1,375 - \$400 = \$975$.

$$\text{Now we'll find her average: } \textit{average} = \frac{\textit{profit}}{\textit{flowers}} = \frac{\$975}{500} = \boxed{\$1.95}$$

8. Since the average of A, B, and C is \$24, the sum of money in all three boxes is $\$24 \times 3 = \72 . Since A and B have an average of \$19, the sum of money in the two boxes is $\$19 \times 2 = \38 . Since B and C contain an average of \$28, the sum of money in the two boxes is $\$28 \times 2 = \56 .

To summarize what we found above,

$$A + B + C = \$72$$

$$A + B = \$38$$

$$B + C = \$56$$

What would it mean if we added $\$38 + \56 ? That would mean $A + B + B + C = \$38 + \$56 = \$94$. Look at this equation and the first equation above. One is $A + B + C$, the other is $A + B + B + C$. Their only difference is B is added twice. Therefore, the difference in amounts of $A + B + C$ and $A + B + B + C$ is the amount contained in B . So $B = \$94 - \$72 = \$22$. Now we can find out what A and C are. Since $A + B = \$38$ and $B = \$22$, $A = \$16$, and since $B + C = \$56$, $C = \$34$.

$$\text{Finally, we can find the average of } A \text{ and } C. \textit{average} = \frac{\$16 + \$34}{2} = \frac{\$50}{2} = \boxed{\$25}.$$

9. 1. Find Kenny's total sale. He made total profit of \$800 and spent \$1400 total on the shirts. So he must have earned $\$1400 + \$800 = \$2200$ total.
2. Find Kenny's total sale from the 240 shirts. If $\textit{average} = 8$ and $\textit{number} = 240$, then $\textit{total} = \textit{number} \times \textit{average} = 240 \times \$8 = \$1920$.
3. Find Kenny's remaining sale. He earned \$2200 total. He earned \$1920 from the first set of shirts, so he must have earned $\$2200 - \$1920 = \$280$ from the rest of the shirts.
4. Find Kenny's average for the remaining shirts. He got a total of \$280 for the rest of the shirts. He had $280 - 240 = 40$ shirts left so sell. So the average he must have sold them for is $\$280 \div 40 = \boxed{\$7}$.
10. 1. find the total number of lemons fruit stands L, M, and N have. $\textit{total} = \textit{average} \times \textit{number} = 53 \times 3 = 159$
2. find the total number of lemons the other 5 fruit stands have. $\textit{total} = \textit{average} \times \textit{number} = 64 \times 5 = 320$
3. find the number of lemons stand L has. Since the total of L, M, and N is 159, and M and N have a total of 119, L has $159 - 119 = 40$
4. find the total number of lemons L + the other five stands have: $40 + 320 = 360$.
5. find the average number of lemons these 6 stands have: $\textit{average} = \frac{360}{6} = \boxed{60}$