



Math Olympiad and Problem Solving Programs

F130 - Advanced Problem Solving

Problem Set 5.3 - For a Good Cause

Name:

Date:

1. $\boxed{1005}$

The key here is manipulating the numbers into something we can count. The negative sign outside the second parenthesis distributes to give us:

$$2009 + 2007 + 2005 + \dots + 3 + 1 - 2008 - 2006 - 2004 - \dots - 2 - 0 = ?$$

Notice:

$$2009 - 2008 = 1, 2007 - 2006 = 1, 2005 - 2004 = 1, \dots, 3 - 2 = 1, 1 - 0 = 1$$

So we're really just adding a bunch of ones. The question now is how many ones are we adding? We are subtracting two numbers to get each one so we have half as many ones as we do numbers in the original equation. This means we only need to count the odd numbers in the equation to get our answer. When we count, every other number is odd so if we look at the numbers from 1 to 2008 (2008 numbers), $2008 \div 2 = 1004$ numbers are odd. Now we include 2009 as an odd number so we have $\boxed{1005}$ odd numbers.

2. $\boxed{19}$

3. Since Anita ate 2 boxes, she has **22 boxes** left. To make back her money, she needs to sell her cookies for $360 \div 22$ dollars. However, when you divide you get $\$16.\overline{36}$ so you have to charge at least $\boxed{\$16.37}$ to get back your $\$360$.

4. We can say Ethan sells x worksheets at $\$5$ each and the rest, $(60 - x)$ worksheets in packs of 5 for $\$20$. Then $5x + 20\left(\frac{60-x}{5}\right) = 265$. We solve for $x = 25$, which leaves 35 worksheets leftover so he sells $35 \div 5 = \boxed{7}$ worksheets.

5. This problem did not have enough information for the students to solve. Everyone was given free credit for it.

6. $\boxed{\$80}$

7. $\boxed{1 \text{ hr}}$

8. $\boxed{\$20.80}$

9. Richard answers 30 questions so if he got x correct, he got $30 - x$ incorrect. $3x - 5(30 - x) = 50$
 $x = \boxed{25}$

10. The wording is confusing in this problem so there are **two possible solutions**:

If they worked a total of 15 hours for the past 10 days, then they make $495 \div 15 = 33$ cards per hour. Then for the next 10 hours, they will make $10 \times 33 = 330$ cards for a total of $495 + 330 = \boxed{825 \text{ cards}}$.

-OR-

If they worked for 15 hours each of 10 days, they worked $15 \times 10 = 150$ hours total to make 495 cards. They make $495 \div 150 = 3.3$ cards per hour. If they work for another 10 hours, they would make $3.3 \times 10 = 33$ more cards, a total of $33 + 495 = \boxed{528 \text{ cards}}$.