Algebra – 8th Grade

1. **2 points:** If $\frac{1}{4}(-2 + 4 - 6 + 8 - 10 + \ldots - m + n) = 30$, what is the value of $m + n$?

2. **2 points:** In an arithmetic sequence, the sum of the first six terms is 312. If the first term of the sequence is 12, what is the sixth term?

3. **2 points:** Pearl and Jam each head to the music store with a certain amount of money in their wallets. While at the music store, Pearl spends 20% of her money and Jam spends 50% of her money. Initially, Pearl has \$40 less than Jam. After having spent money, Jam has \$4 less than Pearl. How much money, in dollars, did they begin with altogether?

4. **3 points:** A car has traveled at an average 60 miles per hour for 3 consecutive hours. For how many **minutes** must that car travel at 20 miles per hour in order to achieve an overall average of 35 miles per hour?

5. **3 points:** Biker A was given a 20 mile head start ahead of Biker B. However, because Biker B was able to maintain an average speed 20% greater than that of Biker A, Biker B finished 20 miles ahead of Biker A. Biker B biked for a total of 10 hours. What was Biker B's original speed as a number of miles per hour?

6. **3 points:** Aaron, Bob, and Carol, working together at equal paces, are able to mow 15 lawns in 20 hours. If Bob was sick the following day, how many lawns would Aaron and Carol mow together in 12 hours?

7. **3 points:** When the fourth power of a positive integer is decreased by one, the result is equal to thirty-five times the value of one more than its square. What is the integer?

8. **4 points:** A parabola passes through the points with coordinates $(-2, 16)$, $(3, 71)$, and $\left(-\frac{1}{2}, \frac{25}{4}\right)$. If the equation that describes the parabola is written in the form $y = Ax^2 + Bx + C$, what is the value of $A + B + C$?

9. **4 points:** What is the sum of all the integral values of N that satisfy the inequality

$$-\frac{1}{2}|4 - 3N| \geq -100?$$

10. **4 points:** What is the area of the region formed by the inequalities $y \leq x$, $y \leq -2x + 4$, and $y \geq -\frac{3}{2}x + \frac{5}{2}$? **Express your answer as a reduced fraction.**