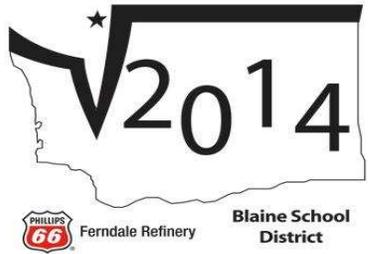# Algebra – 5th Grade

Bubble in your answers on the answer sheet. Be sure to erase all mistakes completely. You do not need to bubble in leading zeros – the answer of "7" does not need to be answered as "007". If your answer is a fraction like $\frac{3}{16}$, bubble in 316.

1. **2 points:** Joey has three kids, two of whom are twins. If the total of ages of the three kids is 23, and the age of the oldest kid is 9, what is the age of one of the twins?

2. **2 points:** In the first week of their bake sale, Chip earned \$63 and Brownie earned \$27. After Brownie improved her advertisements, Chip earned \$5 each day and Brownie earned \$9 each day. At the point when they have earned the exact same amount of money, how many dollars will they have earned combined over the entire bake sale?

3. **2 points:** Suppose that the difference between two numbers is 12. The sum of the same two numbers is 56. What is the smaller of the two numbers?

4. **3 points:** The Whiffles lost their first 12 baseball games of the year. What is the fewest number of consecutive games they would have to win in order to raise the percentage of games they have won to 75%?

5. **3 points:** Suppose that the top 20% of income earners earn 80% of the money earned in total in Moneysville. On average, how many more times as much money does the average top-20% person earn than the average bottom-80% person?

6. **3 points:** In basketball, either 2 or 3 points are scored each time a basket is made. If 92 points were scored and 30% of the shots were worth 3 points, how many 2-point shots were made?

7. **3 points:** Suppose that it costs \$2.50 to make the newest pi-shaped pillow and that they are sold for \$3.25 each. For the math competition, a certain number of pillows were made. Unfortunately, 10 were defective and had to be tossed in the garbage. After the remaining pillows were sold, Mr. Dahl noticed that they had made only \$5.00 in profit. How many non-defective pillows were made for the competition?

8. **4 points:** In a bag of chocolates, the ratio of blue to white chocolates is 2 : 1. If 16 more white chocolates are added, the ratio of blue to white chocolates becomes 4 : 3. How many chocolates were in the bag initially?
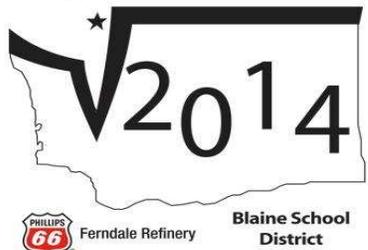
9. **4 points:** An investment of \$5,000 that appreciated annually at the same rate was worth \$5,850 four years later. What percentage interest did the investment earn each year? **Express your answer to the nearest percent.**

10. **4 points:** If the expression $4(0.5x + 2)^2 - 4(x - 3) + x(3 - x) + (2 - 4x)^2$ is simplified into the form $ax^2 + bx + c$, what is the sum of a, b, and c?

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8. **4 points:** The distance from Lance's home to his beach house is 80 miles. When biking back from his beach house to his home, his average speed was 20% slower than his average speed biking from his home to his beach house. If the roundtrip time was 9 hours, what was his average speed, in miles per hour, from the beach house to his home?

9. **4 points:** Suppose that 25% of a pure 100% lemon juice solution is removed and replaced with an equal amount of water. After being mixed together, 25% of the new mixture is removed and again replaced with an equal amount of water. To the nearest tenth of a percent, what percentage of the mixture is now lemon juice?

10. **4 points:** If $x^2 + 3x + 4 = 15$, what is the value of $5x^2 + 15x + 13$?

Algebra – 7th Grade

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8. **4 points:** The parabolas $y = 2x^2 + 14$ and $y = x^2 - 4x + 11$ intersect at the points (a, b) and (c, d). What is the value of $a + b + c + d$?

9. **4 points:** Starting with 1, Zephyr found the sum of the first n positive integers, but accidentally forgot to add one of the numbers, thus getting a sum of 643. What is the value of n?

10. **4 points:** The sum of eight times the reciprocal of two less than a number and two times the reciprocal of ten less than two times that number is 3. What is the sum of all of the possible numbers?

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8. **4 points:** What is the value of x in the equation: $8^x + 4^{6x} = 18$? **Express your answer as a reduced fraction.**

9. **4 points:** Xavier, Yolanda, and Zane each have a certain number of pennies in their pockets. If Xavier were to triple the number of pennies he has, he would have 2 fewer than Yolanda and Zane together. The three of them combined have 2 fewer pennies than triple how many Yolanda has. Altogether, they have 34 pennies. How many pennies does Zane have?

10. **4 points:** When $(x + y)^{30}$ is expanded and simplified, what is the coefficient of $x^{28}y^2$?