Washington State Math Championship 2012

ConocoPhillips Ferndale Refinery

Blaine School District

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:** If $n = \frac{1}{2}$, what is the value of $n^2 + \frac{2}{n} + 3 \times (2 + n)$? **Express your answer as an improper fraction.**

2. **2 points:** The sum of the ages of Angelica, Christopher, and Stefan is 63. They are too shy to say their exact ages, but they tell you that Christopher is twice Angelica's age, and Stefan is twice Christopher's age. How many years old is Christopher?

3. **2 points:** A box of Goldfish crackers says that 52 Goldfish contains exactly 160 calories. The average man is recommended to consume 2,000 calories per day. How many Goldfish would you have to eat to have consumed 2,000 calories?

4. **3 points:** Suppose that a used car will lose 7% of its value each year. If you bought a used car for $15,000, in how many years will the car first be worth less than half of what it originally cost? **Express your answer to the nearest year.**

5. **3 points:** It is the final day of school, and Harvey wants to match or beat Gretta's impressive winning percentage on Hangman. Gretta, who is absent on the last day of school, had previously won 237 out of her 322 games. Harvey has played a total of 270 games so far and will be playing 20 more games today. If he has won 194 out of his 270 games so far, how many games out of the 20 that he plays today will he have to win in order to match or beat Gretta's winning percentage?

6. **3 points:** What is the sum of the terms in the sequence: $1, -2, 3, -4, 5, -6, \ldots, -248, 249$?

7. **3 points:** If a never-resting bunny that happened to run on never-ending batteries were to move at the rate of 1.5 inches per second, how many miles would it move over the course of an entire 365-day year? **Express your answer to the nearest mile.**

8. **4 points:** Three friends – Aaron, Betty, and Carmen – are at a carnival. In pairs, they take turns stepping onto a scale. Aaron and Betty weigh 156 pounds together, Betty and Carmen weigh 164 pounds together, and Aaron and Carmen weigh 152 pounds together. How many pounds do the three friends weigh in total?

9. **4 points:** Last year, a retail store had an item on sale for 30% off its original price. The item, now with a new original price, went on sale for 40% off, which brought it to the same price as when it was on sale the year before. By what percent did the item's original price increase between last year and this year? **Express your answer to the nearest percent.**

10. **4 points:** Suppose that a rental car has a base cost plus a fee per mile the car is driven. At the beginning of the day, Brian and Betty both rented the same car for the same base cost and the same mileage fee. Brian wanted to show off his car, so he drove 240 miles and ended up paying $166. Betty was worried she would damage the car, so she only drove 50 miles, and ended up paying $90. How much was the base cost of the car in dollars?

Washington State Math Championship 2012

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Blaine School District

Algebra – 6th 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:** Suppose that a used car will lose 7% of its value each year. If you bought a used car for $15,000, in how many years will the car first be worth less than half of what it originally cost? **Express your answer to the nearest year.**

2. **2 points:** It is the final day of school, and Harvey wants to match or beat Gretta's impressive winning percentage on Hangman. Gretta, who is absent on the last day of school, had previously won 237 out of her 322 games. Harvey has played a total of 270 games so far and will be playing 20 more games today. If he has won 194 out of his 270 games so far, how many games out of the 20 that he plays today will he have to win in order to match or beat Gretta's winning percentage?

3. **2 points:** What is the sum of the terms in the sequence: $1, -2, 3, -4, 5, -6, \ldots, -248, 249$?

4. **3 points:** If a never-resting bunny that happened to run on never-ending batteries were to move at the rate of 1.5 inches per second, how many miles would it move over the course of an entire 365-day year? **Express your answer to the nearest mile.**

5. **3 points:** Three friends – Aaron, Betty, and Carmen – are at a carnival. In pairs, they take turns stepping onto a scale. Aaron and Betty weigh 156 pounds together, Betty and Carmen weigh 164 pounds together, and Aaron and Carmen weigh 152 pounds together. How many pounds do the three friends weigh in total?

6. **3 points:** Last year, a retail store had an item on sale for 30% off its original price. The item, now with a new original price, went on sale for 40% off, which brought it to the same price as when it was on sale the year before. By what percent did the item's original price increase between last year and this year? **Express your answer to the nearest percent.**

7. **3 points:** Suppose that a rental car has a base cost plus a fee per mile the car is driven. At the beginning of the day, Brian and Betty both rented the same car for the same base cost and the same mileage fee. Brian wanted to show off his car, so he drove 240 miles and ended up paying $166. Betty was worried she would damage the car, so she only drove 50 miles, and ended up paying $90. How much was the base cost of the car in dollars?

8. **4 points:** What value of x satisfies the following equation: $3(3x+2)-2(4-x) = \frac{1}{2}(2x+12)$? **Express your answer as a decimal.**

9. **4 points:** What is the sum of m and b if the line passing through the points listed in the table below is written in the form $y = mx + b$?

x	2	-5	-1.5	$-\frac{3}{5}$
y	52	-88	-18	0

10. **4 points:** Suppose that the Pi-Mobile had to drive 90 miles at 60 miles per hour to the first school in its trip to drop off pies around the Circular School District. It then drove 30 miles at 40 miles per hour to the next school. What was the Pi-Mobile's average speed? **Express your answer to the nearest mile per hour.**

Washington State Math Championship 2012

ConocoPhillips Ferndale Refinery

Blaine School District

Algebra – 7th 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:** If a never-resting bunny that happened to run on never-ending batteries were to move at the rate of 1.5 inches per second, how many miles would it move over the course of an entire 365-day year? **Express your answer to the nearest mile.**

2. **2 points:** Three friends – Aaron, Betty, and Carmen – are at a carnival. In pairs, they take turns stepping onto a scale. Aaron and Betty weigh 156 pounds together, Betty and Carmen weigh 164 pounds together, and Aaron and Carmen weigh 152 pounds together. How many pounds do the three friends weigh in total?

3. **2 points:** Last year, a retail store had an item on sale for 30% off its original price. The item, now with a new original price, went on sale for 40% off, which brought it to the same price as when it was on sale the year before. By what percent did the item's original price increase between last year and this year? **Express your answer to the nearest percent.**

4. **3 points:** Suppose that a rental car has a base cost plus a fee per mile the car is driven. At the beginning of the day, Brian and Betty both rented the same car for the same base cost and the same mileage fee. Brian wanted to show off his car, so he drove 240 miles and ended up paying \$166. Betty was worried she would damage the car, so she only drove 50 miles, and ended up paying \$90. How much was the base cost of the car in dollars?

5. **3 points:** What value of x satisfies the following equation: $3(3x+2)-2(4-x)=\frac{1}{2}(2x+12)$? **Express your answer as a decimal.**

6. **3 points:** What is the sum of m and b if the line passing through the points listed in the table below is written in the form $y = mx + b$?

x	2	-5	-1.5	$-\frac{3}{5}$
y	52	-88	-18	0

7. **3 points:** Suppose that the Pi-Mobile had to drive 90 miles at 60 miles per hour to the first school in its trip to drop off pies around the Circular School District. It then drove 30 miles at 40 miles per hour to the next school. What was the Pi-Mobile's average speed? **Express your answer to the nearest mile per hour.**

8. **4 points:** Xavier, Yolanda, and Zane are each wonderful spring cleaners. For an average job, Xavier can complete the job in 4 hours, Yolanda can complete the job in 12 hours, and Zane can complete the job in 6 hours. Suppose that the three friends take an average job, but Yolanda is stuck working by herself for the first 2 hours. If the three work together when Xavier and Zane show up, how long will it take for them to complete the job as a group of three? **Express your answer as a number of *minutes*.**

9. **4 points:** For what positive value k will exactly one solution exist for the equation $9x^2 + kx + 25 = 0$?

10. **4 points:** Due to a flu epidemic, $\frac{2}{3}$ of the girls in a college class were absent one day, accounting for $\frac{1}{4}$ of the class. If there are 95 boys enrolled in the class, how many girls are enrolled in the class?

Washington State Math Championship 2012

ConocoPhillips Ferndale Refinery

Blaine School District

Algebra – 8th 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:** Suppose that a rental car has a base cost plus a fee per mile the car is driven. At the beginning of the day, Brian and Betty both rented the same car for the same base cost and the same mileage fee. Brian wanted to show off his car, so he drove 240 miles and ended up paying $166. Betty was worried she would damage the car, so she only drove 50 miles, and ended up paying $90. How much was the base cost of the car in dollars?

2. **2 points:** What value of x satisfies the following equation: $3(3x+2)-2(4-x) = \frac{1}{2}(2x+12)$? **Express your answer as a decimal.**

3. **2 points:** What is the sum of m and b if the line passing through the points listed in the table below is written in the form $y = mx + b$?

x	2	-5	-1.5	$-\frac{3}{5}$
y	52	-88	-18	0

4. **3 points:** Suppose that the Pi-Mobile had to drive 90 miles at 60 miles per hour to the first school in its trip to drop off pies around the Circular School District. It then drove 30 miles at 40 miles per hour to the next school. What was the Pi-Mobile's average speed? **Express your answer to the nearest mile per hour.**

5. **3 points:** Xavier, Yolanda, and Zane are each wonderful spring cleaners. For an average job, Xavier can complete the job in 4 hours, Yolanda can complete the job in 12 hours, and Zane can complete the job in 6 hours. Suppose that the three friends take an average job, but Yolanda is stuck working by herself for the first 2 hours. If the three work together when Xavier and Zane show up, how long will it take for them to complete the job as a group of three? **Express your answer as a number of *minutes*.**

6. **3 points:** For what positive value k will exactly one solution exist for the equation $9x^2 + kx + 25 = 0$?

7. **3 points:** Due to a flu epidemic, $\frac{2}{3}$ of the girls in a college class were absent one day, accounting for $\frac{1}{4}$ of the class. If there are 95 boys enrolled in the class, how many girls are enrolled in the class?

8. **4 points:** A very unhappy bird was shot from a slingshot and traveled in a parabolic path through the first quadrant of the Cartesian plane. During this delightful trip, the bird passed through the points with coordinates $(2, 72), (4, 66)$, and $(7, 42)$. Assuming the x-axis is considered to be the ground, what is the x-coordinate of the point where the bird will hit the ground?

9. **4 points:** Suppose that $3^{n-2} = 2$. What is the value of 81^{2-n}? **Express your answer as a reduced fraction.**

10. **4 points:** How many points (x, y) with integral coordinates satisfy the three inequalities listed below?

$$\begin{aligned} 7x &\leq 1 - y \\ 4x &\geq 2y - 10 \\ y &> -2 \end{aligned}$$