Washington State Math Championship

Potpourri – 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:** Today's math competition is happening on Saturday, March 22nd. On what day of the month did the first Wednesday of this month occur?

2. **2 points:** If the repeating decimal $1.\overline{45}$ is written as a simplified improper fraction $\frac{A}{B}$, what is the sum of A and B?

3. **2 points:** What is the ones digit in the product of 7^{2014} and 3^{2014}?

4. **3 points:** What is the sum of the next two terms in the following sequence:

$$3, 7, 14, 24, 37, 53, \_\_\_, \_\_\_?$$

5. **3 points:** How many positive three-digit integers contain exactly two identical digits?

6. **3 points:** What is the positive difference, in base-10, between the largest 3-digit number in base-4 and the largest 3-digit number in base-9?

7. **3 points:** How many perfect squares are factors of at least one positive three-digit square number?

8. **4 points:** If each child in a family has at least 3 brothers and 2 sisters, what is the fewest number of children that could be in the family?

9. **4 points:** During a campaign for Math Team President, three candidates – Willy, Sally, and Millie – decided to advertise themselves using the following strategies in a hall of 200 lockers:

   - Willy went to every 2nd locker and put up his campaign poster.
   - Sally went to every 3rd locker and put up her campaign poster.
   - Millie went to every 6th locker and put up her campaign poster.

   Callie then went through and counted how many of the lockers had at least one campaign poster on it. How many lockers did Callie count?

10. **4 points:** A 4-unit by 4-unit square is broken into sixteen 1-unit by 1-unit squares. If each of the unit squares can only share a side with a maximum of one other shaded square, what is the greatest number of unit squares that could be shaded?

Washington State Math Championship

$\sqrt{2014}$

Ferndale Refinery

Blaine School District

Potpourri – 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:** What is the sum of the next two terms in the following sequence:

   $$3, 7, 14, 24, 37, 53, \_\_\_, \_\_\_?$$

2. **2 points:** How many positive three-digit integers contain exactly two identical digits?

3. **2 points:** What is the positive difference, in base-10, between the largest 3-digit number in base-4 and the largest 3-digit number in base-9?

4. **3 points:** How many perfect squares are factors of at least one positive three-digit square number?

5. **3 points:** If each child in a family has at least 3 brothers and 2 sisters, what is the fewest number of children that could be in the family?

6. **3 points:** During a campaign for Math Team President, three candidates – Willy, Sally, and Millie – decided to advertise themselves using the following strategies in a hall of 200 lockers:

   - Willy went to every 2nd locker and put up his campaign poster.
   - Sally went to every 3rd locker and put up her campaign poster.
   - Millie went to every 6th locker and put up her campaign poster.

   Callie then went through and counted how many of the lockers had at least one campaign poster on it. How many lockers did Callie count?

7. **3 points:** A 4-unit by 4-unit square is broken into sixteen 1-unit by 1-unit squares. If each of the unit squares can only share a side with a maximum of one other shaded square, what is the greatest number of unit squares that could be shaded?

8. **4 points:** A "snowball prime" is a prime number that remains a prime number each time a digit is removed from the right hand side of the number. For example, 233 $(233, 23, 2)$ and 239 $(239, 23, 2)$ are snowball primes. What is the next snowball prime after 239?

9. **4 points:** What is the smallest three-digit positive integer that, when halved four consecutive times, will be greater than 10?

10. **4 points:** How many subsets contain at least two elements from the set $\{2, 3, 5, 6, 10\}$ and satisfy the property that every element in a subset is either a factor or a multiple of every other element in that subset?

Washington State Math Championship

$\sqrt{2014}$

Ferndale Refinery

Blaine School District

Potpourri – 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:** How many perfect squares are factors of at least one positive three-digit square number?

2. **2 points:** If each child in a family has at least 3 brothers and 2 sisters, what is the fewest number of children that could be in the family?

3. **2 points:** During a campaign for Math Team President, three candidates – Willy, Sally, and Millie – decided to advertise themselves using the following strategies in a hall of 200 lockers:

   - Willy went to every 2nd locker and put up his campaign poster.
   - Sally went to every 3rd locker and put up her campaign poster.
   - Millie went to every 6th locker and put up her campaign poster.

   Callie then went through and counted how many of the lockers had at least one campaign poster on it. How many lockers did Callie count?

4. **3 points:** A 4-unit by 4-unit square is broken into sixteen 1-unit by 1-unit squares. If each of the unit squares can only share a side with a maximum of one other shaded square, what is the greatest number of unit squares that could be shaded?

5. **3 points:** A "snowball prime" is a prime number that remains a prime number each time a digit is removed from the right hand side of the number. For example, 233 $(233, 23, 2)$ and 239 $(239, 23, 2)$ are snowball primes. What is the next snowball prime after 239?

6. **3 points:** What is the smallest three-digit positive integer that, when halved four consecutive times, will be greater than 10?

7. **3 points:** How many subsets contain at least two elements from the set $\{2, 3, 5, 6, 10\}$ and satisfy the property that every element in a subset is either a factor or a multiple of every other element in that subset?

8. **4 points:** How many positive three-digit numbers with distinct digits have their digits in increasing order? For example, 234 has its digits in increasing order because $2 < 3 < 4$.

9. **4 points:** What is the smallest possible positive difference between two five-digit palindromes?

10. **4 points:** In a geometric sequence, the first term is 4 and the fourth term is 108. What is the sum of the second and third terms?

Washington State Math Championship

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Ferndale Refinery

Blaine School District

Potpourri – 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:** A 4-unit by 4-unit square is broken into sixteen 1-unit by 1-unit squares. If each of the unit squares can only share a side with a maximum of one other shaded square, what is the greatest number of unit squares that could be shaded?

2. **2 points:** A "snowball prime" is a prime number that remains a prime number each time a digit is removed from the right hand side of the number. For example, 233 $(233, 23, 2)$ and 239 $(239, 23, 2)$ are snowball primes. What is the next snowball prime after 239?

3. **2 points:** What is the smallest three-digit positive integer that, when halved four consecutive times, will be greater than 10?

4. **3 points:** How many subsets contain at least two elements from the set $\{2, 3, 5, 6, 10\}$ and satisfy the property that every element in a subset is either a factor or a multiple of every other element in that subset?

5. **3 points:** How many positive three-digit numbers with distinct digits have their digits in increasing order? For example, 234 has its digits in increasing order because $2 < 3 < 4$.

6. **3 points:** What is the smallest possible positive difference between two five-digit palindromes?

7. **3 points:** In a geometric sequence, the first term is 4 and the fourth term is 108. What is the sum of the second and third terms?

8. **4 points:** A friend shows you 9 marbles, one of which is a fake that is heavier than the rest. You cannot touch them, but you can have your friend place any number of the marbles on either side of a balance. What is the fewest number of weighings that you would need to have your friend do in order to know which marble is the fake?

9. **4 points:** Define a "prime triplet" to be a set of three positive integers that are all prime, and the sum of two of the integers is equal to the third. If all three integers must be less than 50, how many such prime triplets exist?

10. **4 points:** How many positive factors does 17,710 have?