

# Whatcom County Math Championship – 2013

## Algebra – 4<sup>th</sup> Grade

1. What value of ☺ will make the following equation true:  $2 + \text{☺} + 3 + \text{☺} + 4 + \text{☺} + 5 = \text{☺} + 20$
2. What is the sum of all of the counting numbers less than 40?
3. If the sum of three consecutive numbers is 456, what is the middle number of the three?
4. In a Lucas sequence of numbers, each number is the sum of the previous two numbers in the sequence; for example: 3, 4, 7, 11, 18, 29.... What is the **first** missing term in this Lucas sequence: 6, \_\_\_\_\_, \_\_\_\_\_, 22
5. What is the value of  $23 \times 24 + 12 \times 24 + 65 \times 24$ ?
6. For any number, let ♥(x) be the sum  $x + x^2$ . What is ♥(♥(3))?
7. In the Martian economy, 7 blorps equal a snorp, and 3 snorps equal 4 knorps. If Marvin has 24 knorps, how many blorps does he have?
8. If I start with 5 and count by 3's, I get the sequence 5, 8, 11, 14, ... , 101, where 5 is the first number, 8 is the second number, and so on. If 101 is the Nth number, what is N?
9. Find the sum of all the counting numbers less than 50 that have exactly 3 proper factors (including the number itself).
10. A string of pearls is a necklace with the biggest pearl in the center, a smaller pearl on either side of the center, a smaller pearl on either side of those, and so on. Sam's string had 13 pearls on it, and the smallest pearls (at each end) cost \$1 each, the next biggest cost \$2, the next biggest cost \$3, and so on. How much did Sam's necklace cost altogether?

# Whatcom County Math Championship – 2013

## Algebra – 5<sup>th</sup> Grade

1. In a Lucas sequence of numbers, each number is the sum of the previous two numbers in the sequence; for example: 3, 4, 7, 11, 18, 29.... What is the **first** missing term in this Lucas sequence: 6, \_\_\_\_\_, \_\_\_\_\_, 22
2. What is the value of  $23 \times 24 + 12 \times 24 + 65 \times 24$ ?
3. For any number, let  $\heartsuit(x)$  be the sum  $x + x^2$ . What is  $\heartsuit(\heartsuit(3))$ ?
4. In the Martian economy, 7 blorps equal a snorp, and 3 snorps equal 4 knorps. If Marvin has 24 knorps, how many blorps does he have?
5. If I start with 5 and count by 3's, I get the sequence 5, 8, 11, 14, ... , 101, where 5 is the first number, 8 is the second number , and so on. If 101 is the Nth number, what is N?
6. Find the sum of all the counting numbers less than 50 that have exactly 3 proper factors (including the number itself).
7. A string of pearls is a necklace with the biggest pearl in the center, a smaller pearl on either side of the center, a smaller pearl on either side of those, and so on. Sam's string had 13 pearls on it, and the smallest pearls (at each end) cost \$1 each, the next biggest cost \$2, the next biggest cost \$3, and so on. How much did Sam's necklace cost altogether?
8. If you place sets of parentheses in the expression  $2 \times 4 + 6 \times 8$ , how many different answers can you get?
9. If the pattern below continues, how many diamonds will there be in Figure 20?

Figure 1



Figure 2



Figure 3



10. Express 1234 (base 10) in base 5.

# Whatcom County Math Championship – 2013

## Algebra – 6<sup>th</sup> Grade

1. In the Martian economy, 7 blorps equal a snorp, and 3 snorps equal 4 knorps. If Marvin has 24 knorps, how many blorps does he have?
2. If I start with 5 and count by 3's, I get the sequence 5, 8, 11, 14, ... , 101, where 5 is the first number, 8 is the second number , and so on. If 101 is the Nth number, what is N?
3. Find the sum of all the counting numbers less than 50 that have exactly 3 proper factors (including the number itself).
4. A string of pearls is a necklace with the biggest pearl in the center, a smaller pearl on either side of the center, a smaller pearl on either side of those, and so on. Sam's string had 13 pearls on it, and the smallest pearls (at each end) cost \$1 each, the next biggest cost \$2, the next biggest cost \$3, and so on. How much did Sam's necklace cost altogether?
5. If you place sets of parentheses in the expression  $2 \times 4 + 6 \times 8$ , how many different answers can you get?

6. If the pattern below continues, how many diamonds will there be in Figure 20?

Figure 1



Figure 2



Figure 3



7. Express 1234 (base 10) in base 5.
8. What is the equation of the line that goes through these two points (3, 16) and (-15, -8)? **Write your answer in slope-intercept form ( $y = mx + b$ ).**
9. In a Lucas sequence of numbers, each number is the sum of the previous two numbers in the sequence; for example: 3, 4, 7, 11, 18, 29.... What is the **first** missing term in this Lucas sequence:  
6, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 63
10. There was an old woman who lived in a shoe with so many children and cats that she didn't know what to do. So she counted their legs (128) and she counted their heads (40), fed them all supper and sent them to bed. How many children lived in the shoe?

# Whatcom County Math Championship – 2013

## Algebra – 7<sup>th</sup> + 8<sup>th</sup> Grade

1. A string of pearls is a necklace with the biggest pearl in the center, a smaller pearl on either side of the center, a smaller pearl on either side of those, and so on. Sam's string had 13 pearls on it, and the smallest pearls (at each end) cost \$1 each, the next biggest cost \$2, the next biggest cost \$3, and so on. How much did Sam's necklace cost altogether?
2. If you place sets of parentheses in the expression  $2 \times 4 + 6 \times 8$ , how many different answers can you get?
3. If the pattern below continues, how many diamonds will there be in Figure 20?

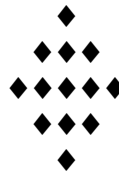
Figure 1



Figure 2



Figure 3



4. Express 1234 (base 10) in base 5.
5. What is the equation of the line that goes through these two points (3, 16) and (-15, -8)? **Write your answer in slope-intercept form ( $y = mx + b$ ).**
6. In a Lucas sequence of numbers, each number is the sum of the previous two numbers in the sequence; for example: 3, 4, 7, 11, 18, 29.... What is the **first** missing term in this Lucas sequence:  
6, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 63
7. There was an old woman who lived in a shoe with so many children and cats that she didn't know what to do. So she counted their legs (128) and she counted their heads (40), fed them all supper and sent them to bed. How many children lived in the shoe?
8. A lattice point is a point on a coordinate grid ( $\mathbf{a}$ ,  $\mathbf{b}$ ) where  $\mathbf{a}$  and  $\mathbf{b}$  are integers. How many lattice points are that satisfy the inequalities  $y < -(x - 1)(x - 7)$  and  $y > 0$ ?
9. If  $x^2 - 5x - 24 = 0$ , what is the sum of all values of  $x$  that make the equation true?
10. Alice and the Dodo start at the same place, running in opposite directions around a circular track that is 1 kilometer around. Alice runs at a rate of 6 meters per second, while the Dodo runs 5 meters per second. After 1 hour, how many times have they passed each other?