47th Lee Webb Math Field Day

California State University, Bakersfield
Department of Mathematics

February 24, 2018

Round 1

Junior Varsity Math Bowl Round 1 Sample Question

Simplify

$$\frac{8}{1} + \frac{0}{2}$$

Junior Varsity Math Bowl Round 1 Question 1

A number x, is doubled twice and the result is 30 more than half of x. What is the value of x?

Junior Varsity Math Bowl Round 1 Question 2

a and b are consecutive squares. The larger is 4 times as large as the smaller. What is $a + b$?

Junior Varsity Math Bowl Round 1 Question 3

What is the next number in this sequence:

$$1, 16, 81, 256, \ldots$$

Junior Varsity Math Bowl Round 1 Question 4

In the last election 2 out of every 7 voters were in favor of ballot measure Z. There were 35000 voters. What is the maximum number of "NO" votes possible?

Junior Varsity Math Bowl Round 1 Question 5

The digits of this year, 2018, add up to a prime number. What is the next year with this property?

Junior Varsity Math Bowl Round 1 Question 6

A set of three positive integers, a,b,c, having the property that $a^2 + b^2 = c^2$ is called a Pythagorean Triple. An example is 15, 36, 39. If the three numbers have no common factor the triple is called primitive. What is the greatest common factor of the given example?

Junior Varsity Math Bowl Round 1 Question 7

Evaluate

$$53^2 - 47^2$$

Junior Varsity Math Bowl Round 1 Question 8

James has \$6 in dimes and quarters. If he has 4 fewer quarters than he does dimes, then how many coins does he have?

Junior Varsity Math Bowl Round 1 Question 9

What digit should d be in order for the number

$$1234d6789$$

to be divisible by 11?

Junior Varsity Math Bowl Round 1 Question 10

Megan says that Charlie ate the last cookie. Charlie says that Alison ate the last cookie. Alison and Darshan and Sayali say they don't know who ate it. The child who ate it, ate it knowingly. Only this child is not telling the truth. Who ate the cookie? 1. Megan; 2. Charlie; 3. Alison; 4. Darshan; 5. Sayali

Round 2

Junior Varsity Math Bowl Round 2 Sample Question

How many positive even numbers are less than 1000?

Junior Varsity Math Bowl Round 2 Question 1

Two numbers are in a ratio of 3:5 and their sum is 160. What is the difference between the two numbers?

Junior Varsity Math Bowl Round 2 Question 2

On a standard piano, there are 52 white keys. The far left key is labeled A, and subsequent keys are B,C,D,E,F,G, and then they repeat. How many "F" keys are there?

Junior Varsity Math Bowl Round 2 Question 3

This year, 2018, is the product of two prime numbers. What is the smaller of these two numbers?

Junior Varsity Math Bowl Round 2 Question 4

The floor of a square room, 20 by 20 feet, is covered with sheets of linoleum, each 2 feet by 4 feet. How many sheets are required?

Junior Varsity Math Bowl Round 2 Question 5

The digits of this year, 2018, add up to a prime number. What was the last year with this property?

Junior Varsity Math Bowl Round 2 Question 6

How many teams of 5 can be made from a squad of 8?

Junior Varsity Math Bowl Round 2 Question 7

A box manufacturer sells a rectangular box with volume 2000 cubic inches. Another one of their boxes has each side lengthened by 10 percent. What is the volume of this second box?

Junior Varsity Math Bowl Round 2 Question 8

The expression

$$5\sqrt{24} - \sqrt{108} + \sqrt{96} - 3\sqrt{27}$$

can be reduced to an expression of the form

$$a\sqrt{b} - c\sqrt{d},$$

where a, b, c, d are positive integers and b and d are square-free. What is $a + b + c + d$?

Junior Varsity Math Bowl Round 2 Question 9

A triangle with side lengths having ratios 3:4:5 is inscribed in a circle with radius 10. What is the area of the triangle?

Junior Varsity Math Bowl Round 2 Question 10

Miss Speling gave a test to her class, 90% of whom were sophomores. The sophomores averaged a score of 82, but the class average score was 85. What was the average score of the freshmen, who made up the remainder of the class?

Round 3

Junior Varsity Math Bowl Round 3 Sample Question

What is half of a third of a fourth of 96?

Junior Varsity Math Bowl Round 3 Question 1

Let C be a circle of area 4.81. In decimal form, to the nearest hundredth, what is the ratio of the circumference of C to the diameter of C?

Junior Varsity Math Bowl Round 3 Question 2

What is the largest 3 digit multiple of 7?

Junior Varsity Math Bowl Round 3 Question 3

A regular hexagon with an area of 10 has an inscribed equilateral triangle such that they share 3 vertices. What is the area inside the hexagon but outside the triangle?

Junior Varsity Math Bowl Round 3 Question 4

The polynomial $9x^3 + 10x^2 + 11x$ has how many real roots?

Junior Varsity Math Bowl Round 3 Question 5

A sock drawer has hundreds each of red socks, green socks, and blue socks. One day Anne pulls out 40 socks randomly and gets the maximum number of pairs of matching socks. The same morning Bob pulls out 40 socks and gets the minimum possible number of matching pairs. How much is the difference in their numbers of matching pairs?

Junior Varsity Math Bowl Round 3 Question 6

The tricks performed by Halfpipe Hannah are often referred to by how many degrees she spins in the air. A trick with three and a half spins would have what number?

Junior Varsity Math Bowl Round 3 Question 7

Calculate: 997×1003

Junior Varsity Math Bowl Round 3 Question 8

The angles in a regular polygon each measure 171 degrees. How many sides does the polygon have?

Junior Varsity Math Bowl Round 3 Question 9

Let $f(x) = x^2$ and $g(x) = x + 2$.
Solve for x:

$$f(g(x)) = g(f(x)).$$

Junior Varsity Math Bowl Round 3 Question 10

Three X's and three O's are arranged randomly in a line. What is the probability that the arrangement is XOXOXO ?

Round 4

Junior Varsity Math Bowl Round 4 Sample Question

Today is Saturday, Feb. 24, 2018. What proportion of the days last January were Saturdays. Answer as a reduced fraction.

Junior Varsity Math Bowl Round 4 Question 1

How many positive perfect squares are less than 1000?

Junior Varsity Math Bowl Round 4 Question 2

A pyramid with a rectangular base has a volume of 72. If the top part is sliced off (parallel to the base) and discarded and the remaining solid has half the height of the original, then what is the volume of the remaining solid?

Junior Varsity Math Bowl Round 4 Question 3

Using each of the digits 1, 2, 3, 4, 5, 6, 7, and 9, form four two-digit primes. What is their sum?

Junior Varsity Math Bowl Round 4 Question 4

$a_1, a_2, \ldots$ form a geometric sequence.
$a_4 = 4$ and $a_9 = 9$.
After 9, what is the subscript of the next term that is rational?

Junior Varsity Math Bowl Round 4 Question 5

Let $[x]$ denote the greatest integer that is less than or equal to x. Simplify:

$$[\sqrt{1}] + [\sqrt{2}] + [\sqrt{3}] + \cdots + [\sqrt{25}]$$

Junior Varsity Math Bowl Round 4 Question 6

What is the sum of all the two-digit odd numbers?

Junior Varsity Math Bowl Round 4 Question 7

What digit does the "x" represent:

$$2018 \cdot 99 = 19x782$$

Junior Varsity Math Bowl Round 4 Question 8

Solve for z:

$$x + y - z = 2$$

$$x - y + z = 0$$

$$-x + y + z = 1$$

Junior Varsity Math Bowl Round 4 Question 9

What is the distance between the points $(2, 4, -3)$ and $(4, -2, -6)$

Junior Varsity Math Bowl Round 4 Question 10

What is the product of all the real numbers that are not in the domain of the function

$$f(x) = \frac{4}{x + \frac{5}{x+6}}$$

See you this afternoon
Varsity Math Bowl
2:15