46th Lee Webb Math Field Day

California State University, Bakersfield
Department of Mathematics

March 4, 2017

Round 1

Junior Varsity Math Bowl Round 1 Sample Question

Simplify

$$\frac{7}{1} + \frac{0}{2}$$

Junior Varsity Math Bowl Round 1 Question 1

Solve for z:

$$3x - 7y + 3z - 4 = 3x - 7y + 4z + 7$$

Junior Varsity Math Bowl Round 1 Question 2

How many ordered pairs of positive integers (x,y) are there such that $x + y = 2017$?

Junior Varsity Math Bowl Round 1 Question 3

What is the y-intercept of the function $f(x) = 2x^4 + 4x^3 + 3x^2 + 23$?

Junior Varsity Math Bowl Round 1 Question 4

How many of the factors of 2017 are even?

Junior Varsity Math Bowl Round 1 Question 5

What is the next number in the sequence:

$$8.5, 10, 13, 19, 31, \ldots$$

Junior Varsity Math Bowl Round 1 Question 6

Simplify

$$(7 + 10 + 23 + 37) - (6 + 9 + 22 + 36)$$

Junior Varsity Math Bowl Round 1 Question 7

Let
$f(x) = (x-1)(x-2)(x-3)(x-4)(x-5)$.
Evaluate $f(6)$

Junior Varsity Math Bowl Round 1 Question 8

Jesse needs 40 minutes to paint a fence. Karry needs 30 minutes to paint the same fence. How many minutes would it take them to paint 7 similar fences, if they work together? Answer as a fraction in simplified form.

Junior Varsity Math Bowl Round 1 Question 9

A line goes through the point (5, 3) with slope 3/5. What is the sum of the x and y-intercepts of this line?

Junior Varsity Math Bowl Round 1 Question 10

What is the sum of these numbers:

111

222

333

444

Round 2

Junior Varsity Math Bowl Round 2 Sample Question

If the diameter of a circle is $\frac{7}{2}$, then the circumference is approximately equal to what integer?

Junior Varsity Math Bowl Round 2 Question 1

There are 28 students in Mrs. Mako's class. Eighteen students did not turn in the geometry problem assignment. Nineteen students did not do their algebra homework. What is the maximum number of students who could have done both sets of problems?

Junior Varsity Math Bowl Round 2 Question 2

Simplify:

$$\frac{2 + \frac{1}{3}}{4 - \frac{1}{3}}$$

Junior Varsity Math Bowl Round 2 Question 3

How many ways can the digits 2, 0, 1, 7, using each digit exactly once, be arranged to form a number that is divisible by 3?

Junior Varsity Math Bowl Round 2 Question 4

Solve for x:

$$(16)^3 = (8)^x$$

Junior Varsity Math Bowl Round 2 Question 5

Rodrigo needs to make a short, two letter codeword. He decides that the first letter will come from the first half of the alphabet and the second letter will come from the second half of the alphabet. How many possible codes words can he choose from?

Junior Varsity Math Bowl Round 2 Question 6

A class of 30 students has an average height of 5 feet 2 inches. A different class of 20 students has an average of 6 feet. When the classes are combined, what is the average height of the students, in inches?

Junior Varsity Math Bowl Round 2 Question 7

As coach, you must choose a team of 5 from a squad of 8. How many teams could you choose?

Junior Varsity Math Bowl Round 2 Question 8

Suppose $x^2 - y^2 = 100$ and $x + y = 20$.
What is $(x - y)^2$?

Junior Varsity Math Bowl Round 2 Question 9

What is the sum of the $x-$ and $y-$ intercepts for the graph of

$$\frac{x}{5} + \frac{y}{3} = 1?$$

Junior Varsity Math Bowl Round 2 Question 10

Simplify

$$1! \cdot 2! \cdot 3! \cdot 4!$$

Round 3

Junior Varsity Math Bowl Round 3 Sample Question

What is the largest 4 digit number that is divisible by 11 ?

Junior Varsity Math Bowl Round 3 Question 1

Suppose $\frac{(x^2y^{-1}z^3)^2}{x^3y^2z^{10}} = x^a y^b z^c$.

What is $a + b + c$?

Junior Varsity Math Bowl Round 3 Question 2

A $4 \times 4 \times 4$ cube is cut into $1 \times 1 \times 1$ cubes. What is surface area of all the resulting smaller cubes?

Junior Varsity Math Bowl Round 3 Question 3

Using the digits in 2017, how many two digit numbers can be made that are divisible by 3?

Junior Varsity Math Bowl Round 3 Question 4

How many ordered pairs of integers (x, y) satisfy

$$0 \leq x \leq y^2 \leq 6?$$

Junior Varsity Math Bowl Round 3 Question 5

A and B are the endpoints of a diameter of a circle. C is on the circle such that AC has length 7 and BC has length 11. What is the measure, in degrees, of angle ACB?

Junior Varsity Math Bowl Round 3 Question 6

Let $f(x) = \frac{x-15}{x-7}$. What is the sum of all the numbers a that have the property that $f(a) = a$?

Junior Varsity Math Bowl Round 3 Question 7

What is the value of
$3 + 3 \cdot 3 + 3 \cdot 3 \cdot 3 + 3 \cdot 3 \cdot 3 \cdot 3$?

Junior Varsity Math Bowl Round 3 Question 8

How many 4" by 6" tiles can be placed on a 4' by 6' floor, with no overlap?

Junior Varsity Math Bowl Round 3 Question 9

Points A, B, C, D are on a circle, in this order. Angle ABC measures 75 degrees. What is the measure, in degrees of arc CDA?

Junior Varsity Math Bowl Round 3 Question 10

In rectangle ABCD, AB=12, BC = 8. E is on side AB, such that AE= 5. What is the area of triangle CDE?

Round 4

Junior Varsity Math Bowl Round 4 Sample Question

Simplify

$$\sqrt{25^2 - 24^2}$$

Junior Varsity Math Bowl Round 4 Question 1

How many positive factors of 2017 are less than 17?

Junior Varsity Math Bowl Round 4 Question 2

What is the smallest positive number that leaves a remainder of 5 when divided by 7 but leaves a remainder of only 4 when divided by 8?

Junior Varsity Math Bowl Round 4 Question 3

Solve:

$$\log_3 x = \log_5 125$$

Junior Varsity Math Bowl Round 4 Question 4

Solve for x:

$$y^5 + 2x = 1$$

$$3x = 19 + y^5$$

Junior Varsity Math Bowl Round 4 Question 5

There are two numbers smaller than 100 that both leave a remainder of 6 when divided by 7 but leave a remainder of only 4 when divided by 8? What is the sum of these numbers?

Junior Varsity Math Bowl Round 4 Question 6

The kids at Erdos Elementary school went on a field trip to a dairy farm. At the end of the tour each child was given a cup with two scoops of ice cream made from cream from the farm's cows. Every child ordered a different combination of the 12 flavors that were available. What is the maximum possible number of children on the field trip?

Junior Varsity Math Bowl Round 4 Question 7

What is the smallest 4 digit number that leaves a remainder of 7 when divided by either 9 or 23?

Junior Varsity Math Bowl Round 4 Question 8

A square has side length x. Its inscribed circle has radius r and its circumbscribed circle has radius R. What is R^2/r^2?

Junior Varsity Math Bowl Round 4 Question 9

Simplify

$$\frac{2^{3^2}}{(2^3)^2}$$

Junior Varsity Math Bowl Round 4 Question 10

Simplify

$$\frac{8^3 - 5^3}{8 - 5}$$

See you this afternoon
Varsity Math Bowl
2:15