49th Lee Webb Math Field Day

California State University, Bakersfield
Department of Mathematics

March 26, 2022

Round 1

Junior Varsity Math Bowl Round 1 Sample Question

Simplify

$$(20 + ((20 * 20) - 20))/20$$

Junior Varsity Math Bowl Round 1 Question 1

Two consecutive squares are 21 apart. What is the square root of the smaller square?

Junior Varsity Math Bowl Round 1 Question 2

How many distinct prime factors does 729 have?

Junior Varsity Math Bowl Round 1 Question 3

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Junior Varsity Math Bowl Round 1 Question 4

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Junior Varsity Math Bowl Round 1 Question 5

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Junior Varsity Math Bowl Round 1 Question 6

Simplify

$$4^5 - 5^4$$

Junior Varsity Math Bowl Round 1 Question 7

The diagonal of a square has length 2. What is the area of the square?

Junior Varsity Math Bowl Round 1 Question 8

According to the rational root theorem, what is the largest possible rational root of

$$f(x) = 18x^9 + 20x^8 + \cdots + 17x + 30.$$

Junior Varsity Math Bowl Round 1 Question 9

Norwood bought 77 widgets. The last digit of the price on the receipt, before tax, is smudged so that we can only see \$1817_. What is the missing last digit?

Junior Varsity Math Bowl Round 1 Question 10

Five coins are on a table, all showing heads. One by one Alice, Harry, Chloe, and Sam enter the room and randomly flip over 2 of the coins. After Sam leaves what is the probability that all the coins are showing tails?

Round 2

Junior Varsity Math Bowl Round 2 Sample Question

What is the smallest prime number that does not divide 2020?

Junior Varsity Math Bowl Round 2 Question 1

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Junior Varsity Math Bowl Round 2 Question 2

What positive number satisfies

$$(x+2)(x-4)=7?$$

Junior Varsity Math Bowl Round 2 Question 3

Suppose

$$81^{3x} = 27^{3y}.$$

What is $\frac{x}{y}$?

Junior Varsity Math Bowl Round 2 Question 4

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Junior Varsity Math Bowl Round 2 Question 5

What is the 1000th positive odd number?

Junior Varsity Math Bowl Round 2 Question 6

A line segment is divided into two subsegments whose lengths have a ratio of 5:7. The longer segment has length 21. What is the total length of the segment. Simplify:

Junior Varsity Math Bowl Round 2 Question 7

After 5 years on the road the value of a car decreases by 50%. After 10 more years, it has become a classic and the price has gone up 50% (from the 5 year old price). If the original price was 16000, what is the value of the car when it is 15 years old?

Junior Varsity Math Bowl Round 2 Question 8

The exterior angles of a regular heptagon sum to what value (in degrees)?

Junior Varsity Math Bowl Round 2 Question 9

A designer wants to have a rectangular array of 50 stars. She wants to have more than 2 rows and more than 2 columns. How many array sizes are possible?

Junior Varsity Math Bowl Round 2 Question 10

This term, so far, Randall has averaged 86 points on each of the 5 quizzes. What does he need to average on the next two quizzes to bring his average up to 91?

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 semicircle of diameter 28. What is the length of the arc of C, divided by π ?

Junior Varsity Math Bowl Round 3 Question 2

What is the largest 5 digit palindromic number that uses at least 3 different digits? (A palindromic number is one that reads the same forward and backward.)

Junior Varsity Math Bowl Round 3 Question 3

How many positive odd numbers are less than 2020?

Junior Varsity Math Bowl Round 3 Question 4

Simplify

$$|||3-4|+5|-6|*7$$

Junior Varsity Math Bowl Round 3 Question 5

Anne's sock drawer has one pair of matching socks and 8 socks that don't match any of the others. Anne pulls out two socks. What is the probability that they do not match?

Junior Varsity Math Bowl Round 3 Question 6

Calculate the sum of the numbers in the following matrix:

$$\begin{bmatrix} 6 & 5 & 2 & 0 & 2 \\ 3 & 5 & 2 & 1 & 8 \\ 1 & 0 & 6 & 9 & 4 \end{bmatrix}$$

Junior Varsity Math Bowl Round 3 Question 7

What is the sum of the first 10 positive integers that are not multiples of 3?

Junior Varsity Math Bowl Round 3 Question 8

Points A and B are the endpoints of a diameter of a semicircle. Point C is on the semicircle so that AC and BC have lengths 23 and 29 respectively. In degrees, what is the measure of angle ACB?

Junior Varsity Math Bowl Round 3 Question 9

What is the sum of the real numbers that satisfy

$$(x+2)(x-4)=20?$$

Junior Varsity Math Bowl Round 3 Question 10

$AB = 3$, $BC = 4$, $CA = 5$. D is the midpoint of BC. What is the square of the length of AD?

Round 4

Junior Varsity Math Bowl Round 4 Sample Question

We are now in the year 2020, which is divisible by 2 and 5. What is the next year that will be divisible by 2 and 5 AND 3?

Junior Varsity Math Bowl Round 4 Question 1

Last year's Math Field Day was held on the 23rd. What is the first prime number after 23 that is composed of 2 consecutive digits?

Junior Varsity Math Bowl Round 4 Question 2

In the Cartesian plane, 4 lines with slope 2 and 4 lines with slope 3 are drawn. These lines divide the plane into how many non-overlapping regions?

Junior Varsity Math Bowl Round 4 Question 3

Suppose we have a sequence a_n with $a_0 = 1$ and

$$a_n = 5n - a_{n-1}.$$

What is a_5?

Junior Varsity Math Bowl Round 4 Question 4

The fifth term of a geometric sequence is 7. The ninth term is 42. What is the next number in the sequence that is an integer?

Junior Varsity Math Bowl Round 4 Question 5

What is the sum of the numbers in the set

$$\{4, 7, 10, 13, 16, 19, 22, 25, 28, 31\}$$

Junior Varsity Math Bowl Round 4 Question 6

At her studio, Jolene offers ballet, hip-hop, and square dance classses. All together she has 50 students. Twenty students study ballet. Eighteen students take the hip-hop class. Sixteen students are in the square dance class. No one takes all three classes. There are 2 square dance students in each of the other classes. How many students take ballet

Junior Varsity Math Bowl Round 4 Question 7

In triangle ABC, D lies on BC so that AD bisects angle BAC. We have AB=40, BD= 10, BC = 25. What is the length of AC?

Junior Varsity Math Bowl Round 4 Question 8

Solve for x:

$$\frac{10x^2 + 3x - 18}{2x + 3} = \frac{2x^2 - 5x - 63}{x - 7}$$

Junior Varsity Math Bowl Round 4 Question 9

Let $[x]$ denote the greatest integer that is less than or equal to x. Suppose none of x, y, z are integers. What is

$$-([-x]+[x]+[-y]+[y]+[-z]+[z])?$$

Junior Varsity Math Bowl Round 4 Question 10

Simplify down to a regular reduced fraction

$$\frac{2}{3+\frac{4}{5+\frac{6}{9}}}$$

See you this afternoon
Varsity Math Bowl
2:15