

44th Lee Webb Math Field Day

California State University, Bakersfield
Department of Mathematics

March 14, 2015

Varsity Math Bowl

Varsity Math Bowl Round 1 Sample Question

What is the integer that is a perfect square and is closest to 314?

Varsity Math Bowl Round 1 Question 1

What is the smallest natural number that has 8 distinct positive factors?

Varsity Math Bowl Round 1 Question 2

What is the largest prime factor of 2323?

Varsity Math Bowl Round 1 Question 3

What is x-coordinate of the point of intersection of the lines

$$3x + 1y = 4$$

$$1x + 5y = 9$$

Varsity Math Bowl Round 1 Question 4

How many different numbers are the sum of two of

$$\{1, 3, 5, 7, 9, 11, 13\}$$

Varsity Math Bowl Round 1 Question 5

How many 9 digit numbers containing the digits 1,2,3,4,5,6,7,8,9, each once, have odd and even digits alternating?

Varsity Math Bowl Round 1 Question 6

How many odd composite numbers are less than 50?

Varsity Math Bowl Round 1 Question 7

Six cards are lying on a table. Each card has a letter on one side and a number on the other. The sides of the cards that you can see are **E 11 F 12 G 13**. How many of these must be turned over in order to verify the statement: If one side of a card does not show a prime number then the other side does not show a vowel?

Varsity Math Bowl Round 1 Question 8

Let $x = [100000\pi]$ and y be the integer obtained by reversing the digits of x .

Calculate

$$y - x$$

Varsity Math Bowl Round 1 Question 9

What is the 314th positive odd integer?

Varsity Math Bowl Round 1 Question 10

If a pair of standard dice is rolled 3 times, what is the probability that a sum of 7 is not obtained on any of the rolls?

Round 2

Varsity Math Bowl Round 2 Sample Question

What is the integer that is a perfect cube and is closest to 314?

Varsity Math Bowl Round 2 Question 1

Each month Suzanne walks 1 mile on the 2nd day of the month, 3 miles on the 4th day of the month, 5 miles on the 6th day, etc. How many miles will she walk this month?

Varsity Math Bowl Round 2 Question 2

Simplify

$$|1 - |2 + 2|3 - 3|4 + 4|5 - 5|6|||$$

Varsity Math Bowl Round 2 Question 3

There are positive integers a and b such that

$$\tan 15^\circ = a - \sqrt{b}.$$

What is the sum $a + b$?

Varsity Math Bowl Round 2 Question 4

On a circuit board there are one hundred wires and k electrical terminals. Each wire connects two terminals. Each terminal has 5 wires connected to it. What is the value of k ?

Varsity Math Bowl Round 2 Question 5

The roots of $x^2 - 24x + k$ are both powers of 2.

What is the value of $\frac{\ln k}{\ln 2}$?

Varsity Math Bowl Round 2 Question 6

Squares R, S, and T have side-lengths of 6, 7, and 8. the union of the areas enclosed has area 100. The area that R and S have in common is 10; the area that S and T have in common is 20; the area that T and R have in common is 30. What is the area that all three squares have in common?

Varsity Math Bowl Round 2 Question 7

Thirty players organize a rugby scrimmage. The players each wear a jersey with a different number from 1 to 30. If they are divided randomly into two teams of fifteen players each, what is the probability that the sums of the jersey numbers on one team will equal the sum for the other team?

Varsity Math Bowl Round 2 Question 8

What is the units digit of

$$\frac{20 \cdot 21 \cdot 22 \cdot 23 \cdot 24 \cdot 25}{1000}?$$

Varsity Math Bowl Round 2 Question 9

What is the greatest common divisor of 700,000 and $17!$?

Varsity Math Bowl Round 2 Question 10

The sequence of odd numbers is arranged in a triangle: 1 in the first row; 3 and 5 in the second row; 7, 9, and 11 in the third row, etc. What is the sum of the numbers in the 20th row?

Round 3

Varsity Math Bowl Round 3 Sample Question

A sequence starts 3, 31,
and continues with each term having one
more digit of π . What is the first number
in this sequence that is a multiple of 9?

Varsity Math Bowl Round 3 Question 1

How many primes less than 100 have 1 as their units digit?

Varsity Math Bowl Round 3 Question 2

Find the maximum integer a , such that $17! + 19!$ is divisible by 7^a .

Varsity Math Bowl Round 3 Question 3

How many three digit numbers that end in 5 are divisible by 15?

Varsity Math Bowl Round 3 Question 4

Suppose that for differentiable functions f, g, h it is known that $f(1) = 4, f'(1) = 6, f(2) = 3, f'(2) = 2, g(2) = -1, g'(2) = 1, h(2) = 2, h'(2) = 3$. What is the value of the derivative at $x = 2$ of

$$f(g(x) + h(x))?$$

Varsity Math Bowl Round 3 Question 5

How many three digit numbers contain a 3 but have no 5?

Varsity Math Bowl Round 3 Question 6

A line meets the parabola $y = x^2$ at the point $(2, 4)$ orthogonally. What is x -intercept of this line?

Varsity Math Bowl Round 3 Question 7

What is the smallest 3 digit number that leaves a remainder of 3 when divided by 14 and a remainder of 2 when divided by 3?

Varsity Math Bowl Round 3 Question 8

What is largest integer x such that

$$\frac{x^2 + 2x + 5}{x + 3}$$

is an integer?

Varsity Math Bowl Round 3 Question 9

A parallelogram has sides with lengths 5 and 6. One diagonal also has length 6. What is the square of the length of the other diagonal?

Varsity Math Bowl Round 3 Question 10

How many six digit numbers are there such that the last digit is the average of the first five digits?

Round 4

Varsity Math Bowl Round 4 Sample Question

Write

$$3 + \frac{1}{7 + \frac{1}{15}}$$

as a fraction a/b in lowest terms.

Varsity Math Bowl Round 4 Question 1

How many ordered pairs of integers satisfy

$$x^2 + y^2 \leq 5$$

Varsity Math Bowl Round 4 Question 2

Solve for n :

$$3!5!n! = 10!$$

Varsity Math Bowl Round 4 Question 3

A triangle with integer side-lengths has perimeter $= 8$. What is the square of its area?

Varsity Math Bowl Round 4 Question 4

How many primes between 30 and 65 leave a prime remainder when divided by 10?

Varsity Math Bowl Round 4 Question 5

How many divisors of $8!$ are larger than $7!$?

Varsity Math Bowl Round 4 Question 6

Point A is on a circle of radius 6. The segment PA has length 24 and contains the center of the circle. Chord BC has length 8 and is parallel to PA . What is the area of triangle BCP ?

Varsity Math Bowl Round 4 Question 7

What is the largest number less than 1000 with only odd digits that is a multiple of 11?

Varsity Math Bowl Round 4 Question 8

A math teacher writes a monic quadratic polynomial on the board. Joe miscopies the constant term and gets 7 and 3 as solutions. Mary miscopies the linear term and gets -8 and -2 as solutions. What is the positive difference of the roots of the actual equation?

Varsity Math Bowl Round 4 Question 9

What is the largest number less than 10000 with only even digits that is a multiple of 9?

Varsity Math Bowl Round 4 Question 10

A function $f(x)$ has y -intercept 7 and is equal to 4 times its derivative. What is $f(\ln 2)$?

The End

Please be patient while we calculate the scores.

Closing Ceremony to commence shortly