44th Lee Webb Math Field Day

California State University, Bakersfield
Department of Mathematics

March 14, 2015

Round 1

Junior Varsity Math Bowl Round 1 Sample Question

Simplify

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

Junior Varsity Math Bowl Round 1 Question 1

Solve for x:

$$x^2 + y^2 + 3x - 5 = x^2 + 2x + 7 + y^2$$

Junior Varsity Math Bowl Round 1 Question 2

The two roots of $x^2 - 12x + k$ are both prime numbers. What is the value of k?

Junior Varsity Math Bowl Round 1 Question 3

Suzanne walks 4 miles every third day. What is the most number of miles she could walk this month?

Junior Varsity Math Bowl Round 1 Question 4

Lines m and n are perpendicular and meet at $(3, 14)$. The equation for m is $8x - y = 10$.
What is the slope of n?

Junior Varsity Math Bowl Round 1 Question 5

How may 4 digit numbers are there whose digits alternate between odd and even?

Junior Varsity Math Bowl Round 1 Question 6

Simplify

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

Junior Varsity Math Bowl Round 1 Question 7

Find x:

$$9^9 + 9^9 + 9^9 = 3^x$$

Junior Varsity Math Bowl Round 1 Question 8

Trevor goes up the ski hill at 5 mph and comes back down at 15 mph. What is his overall average?

Junior Varsity Math Bowl Round 1 Question 9

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

Junior Varsity Math Bowl Round 1 Question 10

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 has a prime number then the other side has a vowel?

Round 2

Junior Varsity Math Bowl Round 2 Sample Question

If the diameter of a circle is $\frac{21}{22}$, then the circumference is approximately equal to what integer?

Junior Varsity Math Bowl Round 2 Question 1

What is the 100th positive odd integer?

Junior Varsity Math Bowl Round 2 Question 2

A rectangle with side-lengths 5 and 12 is inscribed in a circle. What is the diameter of the circle?

Junior Varsity Math Bowl Round 2 Question 3

In regular pentagon ABCDE, what is the degree measure of angle CAD ?

Junior Varsity Math Bowl Round 2 Question 4

What is the greatest common divisor of 385 and 715?

Junior Varsity Math Bowl Round 2 Question 5

What is the smallest two digit number that has exactly 4 distinct positive factors?

Junior Varsity Math Bowl Round 2 Question 6

Joey can do all the weeding in his family's garden in 5 hours. Younger brother Josh takes 7 hours to do the same job. If they work together, how many minutes will it take them?

Junior Varsity Math Bowl Round 2 Question 7

A number n is chosen randomly among the first 60 positive integers. What is the probability that n is prime and that n is a multiple of 13?

Junior Varsity Math Bowl Round 2 Question 8

What is the smallest integer value of n that satisfies the inequality

$$2^{-n} < \frac{1}{1000}$$

Junior Varsity Math Bowl Round 2 Question 9

What is the sum of the x- and y-intercepts of the line

$$\frac{x}{17} + \frac{y}{23} = 1$$

Junior Varsity Math Bowl Round 2 Question 10

If $(x-1)(x^2-1)(x^3-1)(x^4-1)$ is multiplied out, what is the coefficient on the x^2 term?

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

After shuffling a standard deck of cards (no jokers), what is the probability that the top two cards are both clubs?

Junior Varsity Math Bowl Round 3 Question 2

Solve for n:

$$n!5! = 6!$$

Junior Varsity Math Bowl Round 3 Question 3

What 2 digit number leaves a remainder of 3 when divided by 7 and a remainder of 2 when divided by 9?

Junior Varsity Math Bowl Round 3 Question 4

Suppose $\frac{x^3y^{-4}z^7}{x^{-2}y^2z^{10}} = x^a y^b z^c$.

What is $a + b + c$?

Junior Varsity Math Bowl Round 3 Question 5

In a circle of radius 3, two chords are parallel to each other and both have length 3. What is the square of the distance between the two chords?

Junior Varsity Math Bowl Round 3 Question 6

How many natural numbers less than 20 have more than one prime factor?

Junior Varsity Math Bowl Round 3 Question 7

What is the largest two digit number that has exactly 4 distinct positive factors?

Junior Varsity Math Bowl Round 3 Question 8

In a regular heptagon, each vertex is joined, in turn with the vertex that is 2 away (going clock-wise). What percentage of all the possible diagonals are now drawn in?

Junior Varsity Math Bowl Round 3 Question 9

In regular pentagon ABCDE, what is the degree measure of angle ABD ?

Junior Varsity Math Bowl Round 3 Question 10

Rectangle ABCD has side-lengths AB=6 and BC=16. What is the length of the shortest path that starts at A and goes to side BC and then ends at D?

Round 4

Junior Varsity Math Bowl Round 4 Sample Question

Simplify

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

Junior Varsity Math Bowl Round 4 Question 1

In the factorization
$12x^2 + 17x - 5 = (ax + b)(cx + d)$
find $a + b + c + d$.

Junior Varsity Math Bowl Round 4 Question 2

In triangle ABC the degree measures of the angles are natural numbers in arithmetic progression. What is the largest possible degree measurement for one of the angles?

Junior Varsity Math Bowl Round 4 Question 3

The first number in a sequence is 1. The n^{th} number in the sequence is the average of n and the previous number in the sequence. What is the 5th number in this sequence?

Junior Varsity Math Bowl Round 4 Question 4

Solve for x:

$$x + y + z = 10$$

$$x = 3(y + z)$$

$$y = 4z$$

Junior Varsity Math Bowl Round 4 Question 5

In quadrilateral ABCD, angles B and C are 90 degrees. AB has length 5, BC has length 9, CD has length 4. P is a point on BC such that angle APD measures 90 degrees and triangle ABP is NOT isosceles. What is the square of the length of AP?

Junior Varsity Math Bowl Round 4 Question 6

When the Euclid HS's senior class went to Pythagoras Elementary School to read to students, each senior read to 10 different elementary students and each elementary student listened to 4 different seniors. If there were 60 Euclid students, how many Pythagoras students were there?

Junior Varsity Math Bowl Round 4 Question 7

What is the smallest 4 digit number that leaves a remainder of 3 when divided by either 7 or 22?

Junior Varsity Math Bowl Round 4 Question 8

Square ABCD has side-length 100. Four congruent isosceles right triangles are to be cut off from the corners of the square so that the area of the resulting octagon has 82% of the square's original area. What is the length of the leg of one of the triangles?

Junior Varsity Math Bowl Round 4 Question 9

Calculate

$$\frac{22}{7} - \pi$$

to four places after the decimal point the value of

Junior Varsity Math Bowl Round 4 Question 10

A right cylindrical cone has height 4 and diameter $\frac{3}{\pi}$. What is the length of a piece of taut string that has one end on the bottom and goes around the cylinder once and the other end is at the top directly above the first end?

See you this afternoon
Varsity Math Bowl
2:15