Regional Math Bee – Finals (5^{th}-6^{th})

Regulation Tossups

(1) **Read Twice. Computation Basic** – Convert 0.28 to a fraction in lowest terms.

ANSWER: **7/25** (or **seven twenty-fifths**)

(2) **Read Twice. Computation Pyramidal** - **After Jason walks 6 meters directly east and 8 meters directly north, he wants to figure out how far he is from his starting point. He can calculate this by adding up the squares of the two numbers and square-rooting that. By doing this (*)**, he finds that he is, for the point, how far from where he started?

ANSWER: **10** meters

(3) **Read Twice. Computation Basic** – Factor the expression 4x plus 6y and state it in lowest terms.

ANSWER: **2 (2x plus 3y)** (or **two times** the quantity **2x plus 3y**)

(4) **Non-Computation** - **In trigonometry, the sine, cosine, and tangent functions are defined using this figure in a right triangle. This geometric figure is formed when two rays (+) share a common endpoint called a vertex. This geometric figure is commonly measured in degrees or radians. (*)** For the point, right ones of which figures have a measure of exactly 90 degrees?

ANSWER: **angle**s

(5) **Read Twice. Computation Basic** – Solve the following inequality for x: x minus 19 is greater than or equal to 5.

ANSWER: x is **greater than or equal to 24** (prompt on just "24")

(6) **Read Twice. Computation Basic** – State the number 17,200 using scientific notation.

ANSWER: **1.72 times 10 to the 4th** power (accept **1.720** or **1.7200** in place of "1.72")

(7) **Read Twice. Computation Basic** – Consider this set of numbers: (0, 1, 2, 3, 4, 5, 6, 7, 8). If one of the numbers in that set is chosen at random, find, in simplest fractional form, the probability that the number is a solution of the equation 3x + 1 is less than or equal to 13.

ANSWER: **5/9** (or **five-ninths**)

(8) **Read Twice. Computation Basic** – What is the perimeter of the rectangle formed by the four points with coordinates A (2, 2), B (2, -4), C (-3, -4) and D (-3, 2)?

ANSWER: **22**

(9) **Non-Computation** - **The limit of one over x as x approaches zero from the left is sometimes described using this term. Vertical asymptotes may involve this value when a function decreases without bound. (+) This value is not a real number but is used to describe unbounded decrease. (*)** For the point, name this two-word quantity represented by a minus sign next to a figure eight lying on its side, which represents a quantity smaller than any number.

ANSWER: **negative infinity** (do NOT accept just "infinity" or "positive infinity")

(10) **Read Twice. Computation Basic** – What is negative 5 times negative 13 plus negative 8?

ANSWER: **57**

(11) **Read Twice. Computation Basic** – What is 2% of 512?

ANSWER: **10.24**

(12) **Read Twice. Computation Pyramidal** - **A group of 5 workers can tear down a wall in 18 hours, and the company wants to figure out how long it will take 9 workers to perform the same task, assuming linearity. To do this, they multiply the number of hours it took 5 workers by the ratio of the number of old workers to new workers. They will find (*)** that it takes 9 workers, for the point, how many hours to tear down the same wall?

ANSWER: **10** hours

(13) **Read Twice. Computation Basic** – Consider the following set of numbers: 298, 291, 311, 2, 300, 291, 297, 298. The number 2 in that set can be referred to by what one-word term used in statistics that refers to a data point that differs significantly from others in a set and is frequently disregarded when analyzing data?

ANSWER: **outlier**

(14) **Non-Computation** - **A type of these things called Diophantine contains only integer coefficients and solutions. Linear examples of these statements can be written in forms like (+) y equals mx plus b. Systems of these statements can be solved by substitution or elimination. (*)** For the point, name these mathematical statements that show that two expressions are the same.

ANSWER: **equation**s (accept **equalities**)

(15) **Read Twice. Computation Basic** – Solve the equation 7x = 56 for x.

ANSWER: **8**

(16) **Read Twice. Computation Pyramidal** - **Lucy randomly chooses a number between 1 and 10, inclusive, and wants to know the probability that the number she gets is a solution for x in the inequality 5 times x plus 14 is less than 39. To do this, she tests all the cases and records the number of solutions and divides it by the number of options. (*)** For the point, what probability does she calculate?

ANSWER: **0.4** (or **40%**; accept **four-tenths** or **two-fifths**)

(17) **Read Twice. Computation Pyramidal** - ***Round your answer to the nearest hundred.*** **There are 40,053 registered voters in a region with 97 voting centers, and the local government wants to find the approximate number of voters per center. To do this, they want to divide the number of registered voters by the number of voting centers, but they decide to round the numbers to make the computation easier. They find (*)** that, for the point, there are how many voters per center?

ANSWER: **400**

(18) **Read Twice. Computation Basic** – Simplify the expression 9 x minus the quantity (6 minus 4x).

ANSWER: **13x – 6** (or **thirteen x minus 6**)

(19) **Non-Computation** - **This statistic is often written as x-bar for a sample and as the Greek letter mu [[MEW]] for a population. If you add the same number to every value in a list, (+) this quantity increases by that number. In a perfectly symmetric distribution, this value is equal to the median and the mode. (*)** For the point, name this measure of central tendency, also called the "average."

ANSWER: **mean** (accept **average** before it is said)

(20) **Read Twice. Computation Basic** – Solve this equation for x: 5 times x minus 6 equals 64.

ANSWER: **14**

(21) **Read Twice. Computation Basic** – What is the area of a square with a side length of 19?

ANSWER: **361**

(22) **Read Twice. Computation Pyramidal** - **At a party to celebrate a successful season, a school's History Bowl team bought 13 sushi platters. Altogether, there were 156 pieces of sushi for the team to share. In order to figure out how many pieces of sushi each platter contained, you can write an equation in which x times the number of platters equals the total number of pieces of sushi, (*)** and determine, for the point, that each platter contained how many pieces?

ANSWER: **12**

(23) **Read Twice. Computation Basic** – We here at IAC like to have 3 calculation questions for every 1 pyramidal question in our math bee sets. Assuming that there are no other types of questions, in a 24 question set, how many of the questions should be calculation?

ANSWER: **18**

(24) **Non-Computation** - **This man's doubts about quantum theory caused him to remark that "God does not play dice with the universe." (+) Field equations that were developed and named for this man show how space and time are curved. (*)** For the point, name this German-born physicist whose famous equation E equals mc squared forms the basis of his theories of relativity.

ANSWER: Albert **Einsteinn**

(25) **Read Twice. Computation Basic** – Solve the equation f - 28 = 52 for f.

ANSWER: **80**

Extra Questions

(1) **Read Twice. Computation Basic** – A jacket whose sticker price is $80 is included in a 25% off sale. What is the price for the jacket after the sale discount is applied?

ANSWER: **$60**