

Math Bee – Sample Packet (6th Grade)

Regulation Tossups

(1) [Computational Pyramidal] A triangle has a base length of 13 meters and a height of 6 meters. Given that the area of a triangle can be determined by multiplying one-half times the length of the base times the height, calculate the area of the triangle. You have five seconds to answer.

ANSWER: **39** square meters

(2) [Computational Non-Pyramidal] If the current time is 11:25 am, what time was it 2 hours and 30 minutes ago? You have 30 seconds to answer.

ANSWER: **8:55** am (accept equivalents like **5 minutes before 9**; do NOT accept “8:55 pm”)

(3) [Computational Non-Pyramidal] If Malachi randomly chooses two distinct elements from the set {2, 3, 4, 7}, what is the SUM of the least possible and greatest possible products of those two elements? You have 30 seconds to answer.

ANSWER: **34**

(4) [Computational Non-Pyramidal] What is the area between y equals 4, y equals 8, x equals 0, and x equals 2? You have 30 seconds to answer.

ANSWER: **8**

(5) [Computational Pyramidal] Consider this set of numbers: 7, 9, 12, 12, 15, 18, 22, 28, 32. The median and the mode of this set are, respectively, the number that appears in the middle of an ordered list of the numbers, and the number that appears most frequently. What is the sum of the set’s median and mode? You have five seconds to answer.

ANSWER: **27**

(6) [Computational Non-Pyramidal] You have a bag that contains 5 green marbles, 3 yellow marbles, and 2 blue marbles. What is the probability of drawing a yellow marble from the bag? You have 30 seconds to answer.

ANSWER: **3/10** (or **30%**)

(7) [Computational Non-Pyramidal] If 7 to the 7th power is divided by 8, what is the remainder? You have 30 seconds to answer.

ANSWER: **7**

(8) [Non-Computational Pyramidal] In many programming languages, performing this operation on a floating-point number results in an IEEE-754 exception. This operation, which contradicts the property that every number has a unique multiplicative inverse, is sometimes invoked in paradoxes like “proving $1 = 2$ ” by canceling certain terms. For the point, name this forbidden arithmetic operation that results from attempting to invert the additive identity. You have three seconds to answer.

ANSWER: **dividing by zero**

(9) [Computational Pyramidal] A student has four exam scores of 85, 92, 79, and 84. You can determine the average score by dividing the total exam score by the total number of exams taken. If the final is counted as 2 exams, what minimum score on the final is needed for the student to finish with an exam average of at least 90? You have five seconds to answer.

ANSWER: **100**

(10) [Computational Non-Pyramidal] Convert the fraction two-thirds to an equivalent fraction with the denominator 27. You have 30 seconds to answer.

ANSWER: **18/27** (or **eighteen twenty-sevenths**)

(11) [Non-Computational Pyramidal] Lagrange’s Four-Theorem, named for these numbers, asserts that every natural number can be expressed as the sum of four of them. These are the only non-negative integers whose prime factorizations contain only even exponents. For the point, identify these numbers, such as 1, 4, 9, and 16, which are equal to some integer multiplied by itself. You have three seconds to answer.

ANSWER: perfect **square** numbers

(12) [Computational Non-Pyramidal] Evaluate this expression: $1+2+3+4+5+6+7+8+9+10$. You have 30 seconds to answer.

ANSWER: **55**

(13) [Computational Non-Pyramidal] Ellie is counting by eights. If the first number she says is 126, what is the sixth number she says? You have 30 seconds to answer.

ANSWER: **166**

(14) [Computational Non-Pyramidal] What is the perimeter of an irregular pentagon with a base of 4 meters, two sides of 9 meters each, and two sides of 11 meters each? You have 30 seconds to answer.

ANSWER: **44** meters

(15) [Computational Pyramidal] If each side of this shape is 7 centimeters long, then the perimeter of this shape is 21 centimeters. For the point, name this shape that contains 180 degrees of internal angles. You have five seconds to answer.

ANSWER: **triangle**

(16) [Non-Computational Pyramidal] In Euclidean geometry, these entities intersect to form adjacent angles that are congruent and supplementary. The existence of one of these through a given point not on a line is guaranteed by Playfair’s axiom. For the point, name this type of line pair that intersects at a right angle. You have three seconds to answer.

ANSWER: **perpendicular** lines (accept **orthogonal** lines; accept “lines that meet at **right angles**” until it is said)

(17) [Computational Pyramidal] Billy has 291 dollars and wants to buy as many video games as he can that cost 35 dollars apiece, and there is a one-time shipping fee of \$20. You can determine how many games he can buy by subtracting the shipping fee from his total money available, and then dividing by the cost per game and rounding down. What is the maximum number of video games he can buy? You have five seconds to answer.

ANSWER: **7**

(18) [Non-Computational Pyramidal] When each term in these things equals the previous term plus a fixed value, they are arithmetic, but when each term is multiplied by a fixed ratio, they are geometric. Notable examples of these things include the Catalan numbers and the Fibonacci numbers. For the point, name these ordered lists of elements that are often studied for convergence. You have three seconds to answer.

ANSWER: **sequences**

(19) [Computational Non-Pyramidal] There are 3 black marbles and 4 white marbles in a bag. If you choose a marble at random, what is the probability that it is black? You have 30 seconds to answer.

ANSWER: **3/7 (Three-Sevenths)**

(20) [Computational Non-Pyramidal] If the quantity open parenthesis x plus y close parenthesis cubed is expanded, what is the sum of the resulting expression’s numerical coefficients? You have 30 seconds to answer.

ANSWER: **8**

(21) [Non-Computational Pyramidal] The harmonic mean of two numbers is equal to twice their product divided by their sum, which corresponds to the mean of these values. The harmonic series is the divergent sum of these values for positive integers. In elementary arithmetic, dividing one by a number produces one of these. For the point, identify these values that, when multiplied by a given number, produce one. You have three seconds to answer.

ANSWER: **reciprocals** (accept **multiplicative inverses**; prompt on “inverses”)

(22) [Computational Non-Pyramidal] If a cube has a side length of 3, what is its volume? You have 30 seconds to answer.

ANSWER: **27**

(23) [Computational Non-Pyramidal] If $4x - 2 = 8$, what is the value of $6x^2 + 2$? You have 30 seconds to answer.

ANSWER: **39.5** (or **39 and a half**)

(24) [Computational Non-Pyramidal] Given 1 red car, 2 blue cars, and 2 yellow cars, how many ways can you arrange the cars, assuming that color is the only differentiating factor? You have 30 seconds to answer.

ANSWER: **30**

(25) [Computational Non-Pyramidal] What is 500 plus 500 plus negative 400 minus negative 300? You have 30 seconds to answer.

ANSWER: **900**