Math Invitational for Girls Test - 2025 Solutions

(1) What is $1 - (2 - (3 - 4))$?

(a) 0   (b) 1   (c) 2   (d) -1   (e) -2

(2) What is $\dfrac{2}{2+\frac{\sqrt{4}}{2+\frac{\sqrt{4}}{2+\sqrt{4}}}}$?

(a) $\frac{9}{14}$ (b) $\frac{5}{7}$ (c) $\frac{3}{7}$ (d) $\frac{1}{2}$ (e) $\frac{4}{7}$

(3) January 1, 2025 is Wednesday. What day is January 2, 2027?

(a) Saturday   (b) Tuesday   (c) Wednesday   (d) Friday   (e) Thursday

(4) Adam has two similar triangles. The ratio of the areas of the triangles is $1 : 4$. What is the sum of their perimeters if the side lengths of the smaller triangle are 3, 4, and 5?

(a) 36   (b) 32   (c) 48   (d) 60   (e) 24

(5) A turtle crawls from city A to city B along a straight highway with a speed of 1 mile per hour. The turtle travels back by staying in a truck traveling at 80 miles per hour along the same highway. What is approximately the average traveling speed of the turtle?

(a) 0.99 mph   (b) 1.98 mph   (c) 3.90 mph   (d) 40 mph   (e) 40.5 mph

(6) If 2 chicken can lay 50 eggs in 5 days, how many eggs will 3 chickens lay in 2 days?

(a) 25   (b) 30   (c) 50   (d) 60   (e) 90

(7) Kaitlyn's average test score for the first two tests is 87, and the average score for the next three tests is 94. What is the minimum score in her 6th test she should make so that the overall average is at least 90?
(a) 84   (b) 91   (c) 92   (d) 93   (e) 86

(8) How many even positive divisors does 72 have?
(a) 6   (b) 8   (c) 12   (d) 16   (e) 9

(9) How many sequences of 4 digits x_1, x_2, x_3, x_4 can form, given the condition that no two adjacent x_i have the same parity? (*Parity* means "odd" or "even")
(a) 500   (b) 625   (c) 1250   (d) 1500   (e) 10000

(10) City A and B are 12 miles away. Lisa runs from city A to city B and Cathy runs from city B to city A along the same road at the same time. If Lisa runs in a speed of 4 miles per hour and Cathy runs at 6 miles per hour, how long does it take for them to meet?

(a) 6 hours   (b) 2 hours   (c) 1.5 hours   (d) 1.2 hours   (e) 3 hours

(11) How many 3-digit positive integers have the property that the first digit is at least triple the second digit?
(a) 330   (b) 620   (c) 210   (d) 150   (e) 780

(12) A regular tetrahedron is a triangular pyramid whose faces are all equilateral triangles. How many distinguishable ways can we paint the four faces of a regular tetrahedron with red, blue, green, and orange paint such that no two faces have the same color?
(a) 1   (b) 2   (c) 3   (d) 4   (e) 5

(13) In the diagram shown, how many paths are there from (0,0) to (5, 6) if you must pass (3, 4). Assume that you can only move up or right one unit at a time.

(a) 462   (b)310   (c) 210   (d) 475   (e) 500
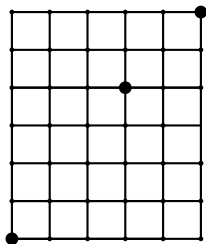
(14) Find $x^8 + \frac{1}{x^8}$ if $x + \frac{1}{x} = 3$.

(a) 1293   (b) 1526   (c) 2207   (d) 3824   (e) 8123

(15) $\sqrt{11 - 4\sqrt{7}} =$

(a) $\sqrt{7} - 2$ (b) $2 - \sqrt{7}$ (c) $\sqrt{7} - 4$ (d) $4 - \sqrt{7}$ (e) 3

(16) If you roll two fair 6-sided dice 20 times, what is the probability of getting at least one double 2?

(a) $\left(\frac{35}{36}\right)^{20}$ (b) $\frac{35}{36}$ (c) $\left(\frac{35}{36}\right)^{21}$ (d) $1 - \left(\frac{35}{36}\right)^{20}$ (e) $1 - \left(\frac{35}{36}\right)^{19}$

(17) ΔABC is a right triangle with angle C being the right angle. Point D is inside the segment AB such that the segment CD is perpendicular to the segment AB. The length of AC is 5, and the length of CD is 4. Find the sum of the lengths of AB and BC.

(a) 11   (b) 12   (c) 13   (d) 14   (e) 15

(18) Quadrilateral XYZW has an area of 30 m^2 with diagonals XZ and WY intersecting at a point O inside the quadrilateral. If the area of ΔWOZ is 12 m^2, the area of

$\triangle ZOY$ is 8 m^2, find the area of $\triangle WOX$.

(a) 4 m^2 (b) 6 m^2 (c) 8 m^2 (d) 10 m^2 (e) 12 m^2

(19) Take two real numbers randomly such that each of which is at most two but at least zero. What is the probability that the absolute value of their difference is at least 1?

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{2}{3}$ (e) $\frac{1}{5}$

(20) Two smaller congruent circles with centers A and B and one medium circle with center C are externally tangent to each other and are all contained and tangent to a larger circle with center O. If the radii of the smaller circles are 2 units, and triangle OAB is equilateral, what is the radius of the medium circle?

(a) $\frac{30-6\sqrt{3}}{13}$ (b) $\frac{30+5\sqrt{3}}{11}$ (c) $\frac{30-11\sqrt{3}}{15}$ (d) $\frac{30-7\sqrt{3}}{15}$ (e) $\frac{30+12\sqrt{3}}{13}$

(21) What are the last two digits of 7^{607}?

(a) 39   (b) 41   (c) 43   (d) 27   (e) 71

(22) Color the faces of a cube with six colors such that no two faces receive the same color. How many different ways are there to color the cube?

(a) 720   (b) 24   (c) 120   (d) 30   (e) 16

(23) Let a, b, c be the solutions to the equation $3x^3 - 3x^2 + 5x + 7 = 0$. Find the value of $a^2 + b^2 + c^2 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$. (a) $\frac{13}{21}$ (b) $-\frac{4}{7}$ (c) $\frac{15}{31}$ (d) $-\frac{64}{21}$ (e) $-\frac{28}{39}$

(24) The number 789788327328 is not divisible by which of the following numbers?

(a) 28   (b) 44   (c) 13   (d) 26   (e) 17

(25) We start with an equilateral triangle of side length a. We divide each side into 3 segments of equal length then add an equilateral triangle to each side using the middle third as a base. We then repeat it, to get a third figure. If we continue this process forever, what is the area of the resulting figure?

(a) $\frac{2a^2\sqrt{3}}{5}$ (b) $\frac{a^2\sqrt{3}}{5}$ (c) $3a^2$ (d) $\frac{3a^2\sqrt{3}}{5}$ (e) $\frac{\sqrt{14}a^2}{5}$