2026 Mission Math Spring Competition 6-8

You will have 40 minutes to complete as much of this test as you can. There are 30 free response questions total, and questions are arranged roughly from easiest to most difficult. Units are not needed. Write answers on the given line below each question. Calculators are not allowed. Do not begin the test until told to do so. Good Luck!

Full name: _____

Grade: _____

Age: _____

1. The arithmetic mean of $15, 8, 12, 13, x$, and 7 is 12. What is x?

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2. We know $(15 - x)/5 = x + 8$, what is the value of x? Express your answer as a common fraction.

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3. How many even divisors does 48 have?

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4. What is the perimeter of a square with area 49?

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5. Aria bought 3 pencils and 2 pens for \$1.80. Ben bought 5 pencils and 4 pens for \$3.20. All pencils and pens are the same price regardless of buyer. What is the price of 1 pen?

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6. Alice has played 30 basketball games, and has only won 6. She wants her win rate to be at least $\frac{2}{5}$. Assuming she wins every game she plays starting now, how many more games will she need to play?

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7. A dozen of doughnuts costs \$4.99. What is the cost of 60 dozen doughnuts, to the nearest dollar?

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8. The probability of drawing a red marble from a bag of marbles is $\frac{3}{8}$ When 14 more red marbles are added, the probability goes up to $\frac{1}{2}$. How many marbles total are now in the bag?

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9. A sheet of paper with side lengths 8π and 10 perfectly covers the lateral surface of a cylinder . What is the volume of this cylinder if the height of the cylinder is an integer?

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10. How many liters of a 20% solution must be mixed with 30 liters of a 70% solution to create a final mixture that is 50% solution?

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11. A circle is inscribed in an equilateral triangle with side length $12\sqrt{3}$. What is the area of the circle? Express your answer in terms of π.

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12. If $a\%b = ab(a+b)$, then what is the value of $3\%(4\%2)$?

13. A 6 digit password contains digits from $0-9$. How many passwords exist with exactly 2 sevens?

14. Find the area of equilateral triangle $\triangle ABC$ inscribed in a circle of radius 6. Express your answer in simplest radical form.

15. What is the remainder when 3^{2026} is divided by 34.

16. Given $\sqrt{2x+16} - \sqrt{2x+9} = 1$, what is the value of x?

17. A triangular pool is surrounded with a concrete walkway of equal width on all sides. If the width of the walkway is 1 meter and the triangle containing the pool and the walkway has sides $12, 16$, and 20 meters, what is the circumference of the largest floatie that can fit in the pool? Express your answer in terms of π.

18. If there are 4 distinct blue waterbottles, 7 distinct red waterbottles, and 3 distinct green waterbottles,

in how many ways can I choose 2 waterbottles of distinct colors?

19. In an Among Us lobby, Bob and his 7 other friends are playing together. Bob is not the imposter. He knows there are either 2 or 3 imposters, but he doesn't know which of his 7 friends they are. How many different combinations of imposters are there?

20. Compute $\sum_{n=1}^{19} \frac{4}{n^2+2n}$ Express your answer as a common fraction.

21. Atharv really wants to win his March Madness Bracket. There are 9 games: 3 worth 100, 3 worth 200, 3 worth 400. Each game has a 50 percent probability of winning. What is the probability Atharv scores at least 1500? Express your answer as a common fraction.

22. How many ways are there to tile a 4 x 4 checkerboard with 1 x 2 dominoes?

23. Triangle $\triangle ABC$ has $AB = 13$, $BC = 14$, and $AC = 15$. D is on ray BC such that the B-angle bisector of triangle ABC intersects AD at E such that $AE/ED = 1/2$. What is CD?

24. Find the sum of all real values of x that satisfy the equation $|2x - 5| = |x + 4|$. Express your answer as a common fraction.

25. Find the sum of the divisors of the 6th smallest perfect square

26. Timmy is standing at $(0, 0, 0)$. At each second, Timmy can travel from (x, y, z) to $(x + 1, y, z)$, $(x, y + 1, z)$, or $(x, y, z + 1)$. After 5 seconds, at how many coordinates can Timmy end up?

27. Evaluate $(1 + i)^{16}$ Hint: $i^2 = -1$.

28. If an unfair coin has a $\frac{3}{5}$ chance of landing on heads, what is the expected number of flips it will take to get 3 heads in a row? Express your answer as a common fraction.

29. How many integers between 1 and 63, have three 1's in their binary representations?

30. Jon has a cube of side length 4. On each face, he connects the opposite midpoints together, dividing each face into 4 equal squares. He then marks the center of all of these squares. What is the volume of the smallest convex polyhedron containing all of the marked points? Express your answer as a common fraction.

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