Mission Math Winter Competition 2026 6-8 Exam

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. Adrian is reading a book that has 120 pages. He reads at a rate of 5 pages per minute. How many minutes will it take him to finish the book?

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2. What is $0.\overline{67}$ expressed as a common fraction?

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3. What is 130% of 40% of 500?

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4. The sum of three consecutive integers is 231. What is the value of the largest number?

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5. Ananya is playing with blocks in the shape of cubes. She builds it so that the length is 30 blocks, the width is 30 blocks and the volume of the figure is 9000 blocks. What is the height of the figure?

_____

6. A shop sells 3 different flavors of ice cream: vanilla, chocolate, and strawberry. You can choose 2 not necessarily distinct scoops for your cone. How many unique 2 scoop cones can you make?

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7. A cylinder and a cone have the same volume and radius. What is the ratio of the height of the cone to the cylinder?

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8. The sum of Anita's and her brother's ages are 24 and the product is 140. How much older is Anita than her brother?

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9. Ryan flips a coin 8 times. What is the probability he gets at least 2 heads? Express your answer as a common fraction.

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10. What is the area of an equilateral triangle with side length 6? Express your answer in simplest radical form.

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11. $f(x) = x^3 - 3$ and $g(x) = 2x - 1$. What is the value of $f(g(3))$?

_____

12. Express 1101001101_2 in base 4.

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13. There is a bag with 9 yellow marbles, 11 green marbles, and 13 blue marbles. What is the minimum number of marbles you can pick to guarantee you have at least 10 of 1 color of marbles?

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14. Square A has a side length of s_a and an area of A_a. Square B has a side length of s_b and an area of A_b. Given that $\frac{A_a}{A_b} = 25$ what is $\frac{s_a}{s_b}$?

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15. What is the expected value of a single roll of a 20 sided dice where even numbers show up twice as often as odd numbers? Express your answer as a common fraction.

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16. Square $ABCD$ with side length 4 has E on the interior of CD so that $CE = 3$. If AE intersects BC at F, what is DF? Express your answer in simplest radical form.

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17. Walmart sells 1 liter of lemonade that is 70% water and 30% lemon juice. Sreeram pours x liters of this lemonade into a bucket that already contains 1 liter of water. He mixes the bucket, then pours x liters of the mixture back into the Walmart lemonade bottle so that it is full again. If the new lemonade is 50% water and 50% lemon juice, what is the value of x? Expres your answer as a common fraction.

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18. Integers x and y satisfy $x^2 + 2x - y^2 = 16$. Find the sum of all possible values of $x + y$.

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19. r, s, and t are the roots of the polynomial $3x^3 + 15x^2 - 12x + 6$. What is the value of $\frac{1}{r} + \frac{1}{s} + \frac{1}{t}$?

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20. What is the units digit of $2026^{67} \cdot 93^{2025} \cdot 22^{41}$?

_____

21. Hailey and Tao each go to a coffee shop. They will each arrive at a random time between 1pm and 4pm. Afterwards they will remain there for 30 minutes. What is the probability they run into each other at the coffee shop? Express your answer as a common fraction.

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22. Chords AB and CD are drawn on circle ω such that they interest at point X. Given that $AX = 6$, $BX = 4$, and $CX = 3$ what is the length of DX?

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23. What is the smallest positive integer that leaves a remainder of 1 when divided by 2, 3, 4, 5, and 6?

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24. The cyclic quadrilateral $ABCD$ has side lengths $4, 6, 10, 12$. What is the area of $ABCD$? Express your answer as a common fraction.

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25. Find the real number x such that

$$\sqrt{x+\sqrt{2x-1}}+\sqrt{x-\sqrt{2x-1}}=3$$

Express your answer as a common fraction.

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26. A giraffe is located at one vertex of a regular octagon. Every minute, he randomly jumps to a neighboring vertex (each with equal probability). What is the expected number of minutes that pass before he returns to his inital vertex?

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27. $ABCDE$ is a regular pentagon of side length 1. M is the midpoint of BC and and F is on the same side of AD as E such that $\triangle FAD$ and $\triangle MDC$ are similar. What is the ratio of the area of $\triangle ADB$ to FAD? Express your answer in simplest radical form.

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28. Max computes and writes down all numbers $\binom{2026}{k}$ for $0 \leq k \leq 2026$. What is the largest n such that 3^n divides at least one of the numbers Max has written down?

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29. Finn the frog is jumping around 5 lily pads in a circle, labeled 0 to 4 in clockwise order. He is currently on the lily pad labeled 0. Each minute, he jumps 1, 2, or 3 lilypads clockwise, each with equal probability. What is the probability that after 3 moves, he finishes on a lily pad labeled with an even number? Express your answer as a common fraction.

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30. Consider circle ω with center O and radius 3. Point A lies outside ω such that $AO = 5$. Let X and Y be the points of tangency from A to ω, and let the intersection of ω and AO be M. If T is the midpoint of minor arc XM and P is the intersection of OT and YM, what is PT? Express your answer in simplest radical form.
