MNYMO

August 22, 2026

General

You have 40 minutes to complete 20 problems. There is no penalty for guessing. Answers are only valid if they are written in the below table.

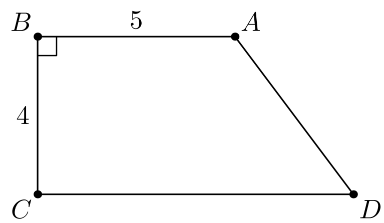
First and last name	

p	Answer	p	Answer
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

1. On Monday, there is one slime-duck in a lake at noon. Every night, each slime-duck splits into two slime-ducks, which themselves split in the follwoing nights. How many slime-ducks will be in the lake after seven nights have passed?

2. My locker combination contains three numbers between 1 and 50, inclusive. The first number is a perfect square, the second number is divisible by 5, and the third number is a power of 3. Compute the number of possible locker combinations. (The numbers in the combination don't need to be distinct.)

3. Trapezoid $ABCD$ has $AB \parallel CD$ and $\angle ABC = 90^\circ$. If $AB = 5$, $BC = 4$, and $[ABCD]$ is 26, compute the perimeter of $ABCD$. (Note: $[ABCD]$ denotes the area of polygon $ABCD$.)

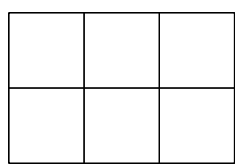


4. Three years ago, Bob's age was exactly twice that of Alice's, and Alice's age was exactly the square of Caleb's age. Given that Alice is currently exactly 6 or 7 years old, how many years older than Caleb is Bob?

5. Compute the minimum number of 9×15 rectangular tiles needed to form a square.

6. Compute the average of the lengths of the three altitudes of a 15–20–25 right triangle.

7. Compute the number of ways to choose a positive number of squares from the 2×3 grid below such that the squares together form a rectangle.



8. Zack and Jack are playing the 2^n game! In this game, Zack jumps once, then Jack jumps twice, then Zack jumps four times, then Jack jumps eight times. This continues until someone gives up, with each player jumping twice as much as the previous person on each turn. After some positive number of turns, Jack gives up. If the total number of times Zack has jumped is a multiple of 13, then what is the minimum number of times Zack jumped on his last turn?

9. Daniel has a fair 100-sided die with faces labeled $1, 2, \ldots, 100$. Compute the expected value of the square of Daniel's roll divided by the expected value of Daniel's roll.

10. Michael is playing a number game. He starts with an integer and repeatedly applies the following rule until he reaches 1.

    - If his current number is not divisible by 3, he subtracts 1 from it.
    - If his current number is divisible by 3, he divides it by 3.

    If Michael starts the game with $3^{2026} - 1$, he will eventually reach 1. How many moves will it take him to reach 1? (For example, if $n = 2$, it takes 1 move to reach 1.)

11. Jeff is given some angle θ and is asked to compute $(2^{\cos(\theta)})^2(2^{\sin(\theta)})^2$. Unfortunately, he simplifies this as $2^{\cos^2(\theta)}2^{\sin^2(\theta)}$, and proceeds correctly from there. He is surprised to get the right answer. Compute $\sin(2\theta)$.

12. Let AC be a diameter of circle ω and BD be a chord on ω such that $AC \perp BD$. Let E be the point where AC and BD intersect. Given that $AE = 8$ and $BC = 6\sqrt{13}$, compute the radius of ω.

13. Let x be a real number such that

$$x^2 + x + \frac{1}{x} + \frac{1}{x^2} = 10.$$

Compute the sum of all possible values of $x^4 + \frac{1}{x^4}$.

14. A positive integer is *kretzschmary* if it cannot be written as the sum of two positive composite numbers. Compute the sum of all kretzschmary positive integers.

15. How many ways are there to color a 2×6 grid of squares red or blue such that no two red squares share an edge?

16. Triangle ABC with circumcircle ω satisfies $AB = BC = 1$ and $\angle BAC = 45°$. Point D lies on minor arc BC of ω such that $[ACD] = \frac{1}{8}$. Compute BD.

17. Andy the Ant starts at the lattice point $(0, 0)$ and wants to reach $(6, 7)$. He may move one unit up, down, or right at each step. The bug must remain within the rectangle $0 \le x \le 6$ and $0 \le y \le 7$, and it may not visit the same lattice point more than once.

    Let N be the number of possible paths Andy can take. Compute $\lfloor \log_2 N \rfloor$.

18. Evaluate the summation

$$\sum_{n=1}^{\infty}(0.\underbrace{6\ldots6}_{2n-1\text{ 6's}}\underbrace{7\ldots7}_{2n-1\text{ 7's}} - 0.\underbrace{6\ldots6}_{2n\text{ 6's}}\underbrace{7\ldots7}_{2n\text{ 7's}}) = (0.67 - 0.6677) + (0.666777 - 0.66667777) + \ldots$$

as a fraction.

19. In triangle ABC, with $AB = 13, BC = 14$, and $CA = 15$, incircle ω_0 is inscribed, with radius r_0. An infinite sequence of circles $(\omega_n)_{n\ge1}$ is drawn such that for all $n \ge 1$, ω_n is tangent to AB, BC, and ω_{n-1}, and ω_n is smaller than ω_{n-1}. If r_n denotes the radius of ω_n, compute

$$\sum_{n=1}^{\infty} r_n.$$

20. How many pairs of integers (n, k) with $0 \le k \le n \le 1023$ are there for which $\binom{n}{k}$ is odd?