

- 1) A restaurant offers a choice of 3 appetizers, 4 main courses, and 2 desserts. How many different 3-course meals are possible if a meal consists of one appetizer, one main course, and one dessert?
- 2) A rectangular garden has a length of 144 inches and a width of 60 inches. What is the area of the garden in square feet?
- 3) Two sides of a triangle are 12 in and 7 in, respectively. How many possible integer side lengths, in inches, are there for the third side?
- 4) Snape is creating a new potion for his class. He has an infinite supply of slime and water, but only 14 grams of acid. If he wants the potion to be 20% slime, 35% acid, and 45% water, at most how many grams of the potion can he make?
- 5) Lisa wants to buy a new bicycle that costs \$200. She has saved \$80 so far. Her parents agree to pay for 25% of the remaining cost. How much money does Lisa still need to save?
- 6) ABCD represents a four-digit number. The product of its digits is 70. What is the largest four-digit number that ABCD can represent?
- 7) Solve the system of equations for x and y :

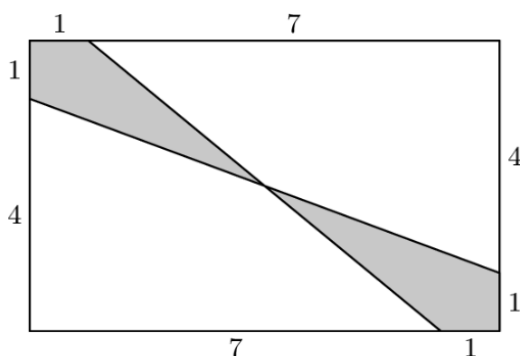
$$2x + 3y = 14$$

$$5x + 2y = 24$$

What is the value of xy ?

- 8) Lilac has a rectangular prism made of cubes. She paints the outside surface of the prism entirely in purple paint. After taking the prism back into cubes, she finds 24 cubes with two sides painted and 22 cubes that are painted on one side. What is the largest dimension of the rectangular prism in terms of cubes?
- 9) Two numbers have a sum of 10. The sum of their reciprocals is $\frac{5}{12}$. What is the product of the two numbers?
- 10) In a sequence of positive integers, each term after the second is the product of the previous two terms. The fifth term is 675. What is the first term?

- 11) A 4×4 square is divided into a 3×3 square and 7 1×1 squares. What is the sum of the perimeters of these 8 smaller squares?
- 12) Consider the list: 2, 5, 7, 9, 30. An integer n is added to the list. The new mean is twice the size of the median. What is n ?
- 13) What is the remainder when 2^{100} is divided by 7?
- 14) How many numbers less than 2025 are perfect squares with exactly 3 factors?
- 15) The area of the shaded region can be represented in the form a/b , where a and b are positive, relatively prime integers. What is $100a + b$?



- 16) At an event, a lottery game is being played with a spinner divided into four equal sections. Two of the sections are yellow, one is blue and the last one is red. To win a prize, a contestant must spin the spinner three consecutive times and get at least two red results. The probability of a contestant winning a prize can be expressed in the form a/b , where a and b are positive, relatively prime integers. What is $1000a + b$?
- 17) Triangle ABC has sides $AB = 13$, $BC = 14$, $AC = 15$. Point D lies on the line BC such that $AD^2 = BD \times DC + 97$. Find BD.
- 18) How many ways can NOETHER be rearranged so that the two Es are not next to each other?
- 19) A box contains 5 red marbles, 3 blue marbles, and 2 green marbles. If you pick one marble without looking, the probability that it's a blue marble can be expressed in the form a/b , where a and b are positive, relatively prime integers. What is $100a + b$?

- 20) How many positive cubes are there less than 2025?
- 21) Let A and B be distinct integers randomly chosen from $\{-5, -4, \dots, 0, \dots, 4, 5\}$. Let $\frac{m}{n}$ be the probability that $A^3 < B^2$. Find $100m + n$.
- 22) How many ways are there to express the number 2025 as a sum of 2 four-digit numbers ranging from 1000-9999, inclusive? Swapping the two numbers, like $a + b$ and $b + a$ does NOT count as separate ways.
- 23) A committee of 4 students is to be chosen from a group of 6 boys and 5 girls. How many different committees can be formed if there must be at least one boy and one girl?
- 24) You and three friends are playing cards. You distribute a shuffled deck evenly between everyone. Assume the Ace is the highest valued card, making the value rank: 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King, Ace. To decide who will play first, all of you pick a random card out of your respective hands. The person who places the highest card will start. Your friends placed a 6, 9, and Jack. The likelihood you will place a card of higher value can be expressed in the form a/b , where a and b are positive, relatively prime integers. What is $100a + b$?
- 25) A circle with center O has a radius of 10. Two chords, AB and CD , are parallel to each other. The distance between the two chords is 12. If the length of chord AB is 16, what is the length of chord CD ?
- 26) A large water tank can be filled with an inlet pipe in 3 hours and drained by a second pipe in 5 hours. If the tank is initially empty and both pipes are opened at the same time, let the number of hours it takes to fill the tank be a fraction a/b , where a and b are positive, relatively prime integers. What is $1000a + b$?
- 27) Function $f(n)$ is defined for all positive integers n , where $f(1) = 2$. For any integer $n \geq 1$, $f(n + 1) = f(n)/(1 + f(n))$. Let the value of $f(2025)$ be a/b , where a and b are positive, relatively prime integers. What is $100,000a + b$? (If your answer is an integer a , express it as $a+1$.)
- 28) Let $ABCDE$ be a five-digit number with each digit 1, 2, 3, 4, 5 being used once. Let ABC be divisible by 9, BCD be divisible by 3, and CDE be divisible by 5. What is the value of A ?

- 29) A person walks up a downward-moving escalator at a constant rate of 3 steps per second and reaches the top in 30 seconds. The next day, the escalator moves at the same speed, but the person walks at a faster rate of 5 steps per second and reaches the top in only 20 seconds. Assuming the escalator moves at a constant speed, how many total steps are visible on the escalator at any time?
- 30) Fill in the puzzle so that every row across, every column down and every 3 by 3 box contains the numbers 1 to 9. What is the sum of the numbers which are highlighted in yellow?

	6			7	2			1
8			1	3	6	5		
		3	4					
2			6	5			3	
		6			7		1	
			2			8	6	4
9		7		8	4			
		8			9		7	
			7	2	1		8	3

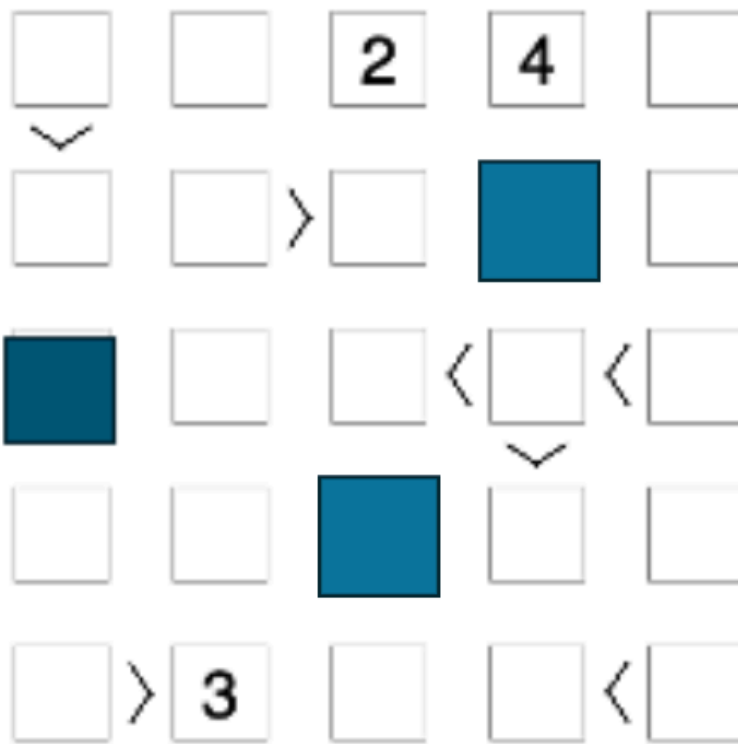
- 31) How many integers n with $1 \leq n \leq 1000$ are not divisible by the square of any prime?
- 32) A baker is arranging a collection of cookies in rows. When the cookies are arranged in rows of 5, there are 3 cookies left over. When they are arranged in rows of 6, there are 4 cookies left over. When they are arranged in rows of 7, there are 5 cookies left over. What is the smallest possible number of cookies the baker could have?

The following instructions are for the next two problems.

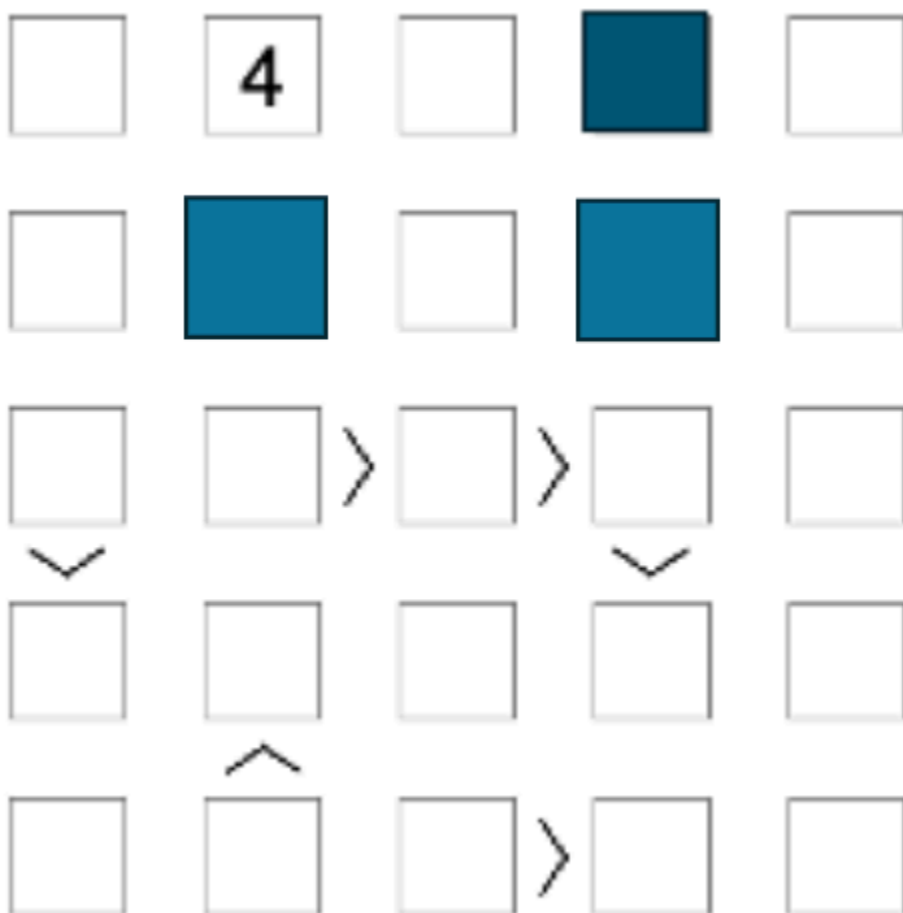
The purpose of the game is to discover the digits hidden inside the board's cells; each cell is filled with a digit between 1 and 5. On each row and column each digit appears exactly once.

At the beginning of the game some digits might be revealed. The board might also contain some inequalities between the board cells; these inequalities must be followed and can be used as clues in order to discover the remaining hidden digits.

- 33) What is the product of the numbers in the dark blue squares?



34) What is the product of the numbers in the dark blue squares?



35) Let $ABCD$ be a square. Let E be a point of CD such that $3CE = CD$. Let F be the intersection of AC and AE . If the area of $AFED$ is 22 units, find the area of $ABCD$.

36) In all the squares fill in single digit numbers from 1 to 7 without repeating in any row or column. The numbers used in the operation (addition, subtraction etc.) must combine to yield the target number (the upper corner number with operation sign) for that cage. For example, the first square's target number is 8, the operation is addition (+) Numbers inside a cage must not repeat. Operations follow standard mathematical rules, and in cages with more than one cell, the operation must be performed within that cage. A cage is marked by thick black lines.

What is the sum of the 3 cells highlighted in blue?

16+		13+	5—		9+	1
			2—			
10+	9+			6—		18+
		15+	2—	6+		
2—					3+	
	7+	4	12+			9+
		6—		1—		