Day 5: The Great Counting Carnival

Your Mission

A golden ticket arrives in your mailbox: "*You are invited to the Great Counting Carnival, a festival where every booth is a game of possibilities. Win all five Carnival Challenges, and you will earn the Golden Abacus.*"

At the gate, a cheerful Carnival Keeper hands you a scorecard. "Each booth asks a different counting question," she says. "Some ask how many ways, some ask how many different results, and some ask how many combinations. Solve them all, and the Golden Abacus is yours."

You step inside. Music plays. Booths glow. Let the counting game begin!



Warm-Up: Your Counting Tools

You already know how to eliminate, deduce, and work backwards. Today you add two new tools:

- **Detailed listing**: Write choices in an organized list or table. Don't jump around.
- **Tree diagram**: When one choice leads to more choices, draw branches. Multiply the number of branches at each step.

Quick Check: If you have 2 different hats and 3 different shirts, how many different hat-and-shirt outfits can you make? Draw a tree diagram or list them.



Challenge 1: The Conductor's Trio Booth

The first booth is run by a conductor who wants to form a trio of musicians: one violinist, one pianist, and one drummer.

He has to choose one of two violinists, one of two pianists, and one of two drummers. He decided to try each possible trio. How many attempts did he have to make?

(A) 3 (B) 4 (C) 8 (D) 24 (E) 25

Hint:

Draw a tree diagram.

- 2 choices for violinist
- For each violinist, 2 choices for pianist
- For each violinist-pianist pair, 2 choices for drummer

Multiply 2 × 2 × 2.

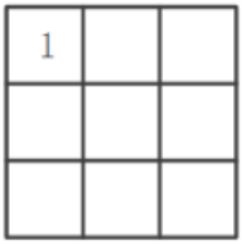


Challenge 2: The Grid of Secrets Booth

The next booth has a 3×3 grid. You must write one of the digits 1, 2, or 3 in each cell so that every row and every column contain each digit exactly once. The top-left cell already has a 1. In how many different ways can the square be filled?

(A) 2 (B) 3 (C) 4 (D) 5 (E) 8

Hint: Start with the first row. Since the top left is 1, the other two cells in the first row must be 2 and 3 in some order. Try both. Then complete the rest of the grid step by step, checking rows and columns. How many full grids can you make?

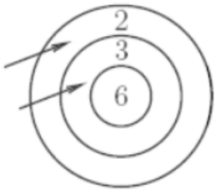


Challenge 3: The Archer's Target Booth

A target has three rings worth 2, 3, and 6 points. Lynn the archer shoots two arrows. How many different scores can she get if both arrows hit the target?

(A) 4 (B) 6 (C) 8 (D) 9 (E) 10

Hint: List all possible pairs of hits. The order doesn't matter, so 2+3 is the same as 3+2. Possible sums: 2+2, 2+3, 2+6, 3+3, 3+6, 6+6. Count the different totals.



Challenge 4: The Card Shuffler's Booth

Olga the magician has three cards. One card has 6 on one side and 9 on the other. One card has 8 on both sides. One card has 6 on one side and 9 on the other.

Using all three cards, she can form different 3-digit numbers, for example 989, 986, 866, and so on. How many different 3-digit numbers can she form using these three cards?

(A) 4 (B) 6 (C) 8 (D) 9 (E) 12

Hint: Remember, a 6 can be turned upside down to become a 9, and a 9 can become a 6. List all possible combinations carefully. Count each distinct number only once.



Challenge 5: The Photo Booth

Four happy friends, Laura, Iggy, Val, and Kate, want to stand in one row for a photo. Kate and Laura are best friends and want to stand next to each other. Iggy wants to stand next to Laura because he likes her.

In how many different ways can they pose for the photo?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

Hint: Treat Kate and Laura as a best-friend pair that must stay together. But Iggy must also be next to Laura. Draw the possible orders. One example is: Val Kate Laura Iggy. Can you find all of them?



The Master Code

You've solved all five Carnival Challenges! The Golden Abacus is almost yours. Fill in the secret code to claim it.

Word Bank: LIST, TREE, MULTIPLY, ORGANIZE, CHECK

1. When counting possibilities, make an organized _____.
2. For choices that branch, draw a _____ diagram.
3. When one choice leads to more choices, _____ the numbers of options.
4. _____ your work so you don't miss a combination or count the same one twice.
5. _____ your final answer by testing one or two examples.

Mission Complete!

The Carnival Keeper hands you the Golden Abacus. The crowd cheers. You've mastered the art of counting possibilities. As you leave, she whispers, "*There are always more possibilities than you think. You just have to count them carefully.*"

