Day 2: The Number Kingdom Quest

Your Mission

The Golden Acorn is safe, but the forest vault's ancient account book has been scrambled! The village elder needs your help to restore the Number Kingdom's records. Five legendary keepers guard the missing pages, and each one has a number puzzle only a true math detective can solve. Are you ready?

Warm-Up: Review Ideas from Last Time

Before we begin, let's review two tools you learned on Day 1:

- **Symmetry** means that a shape or pattern looks the same after you flip it. The two images mirror each other.
- **Elimination** means crossing out answers that are definitely wrong. If an option can't work, remove it! This makes the correct answer easier to find.

Quick Check: Which drawing is symmetric? Circle it.





Challenge 1: Grandma's Candy Record

The first keeper is Grandma, who keeps records of all the candy she gives to her grandchildren.

If Grandma gave each of her grandchildren 10 pieces of candy, there would not be enough candy for one of the grandchildren. If she gave each one of them 8 pieces of candy, she would have 6 pieces of candy left. How many grandchildren does she have?

(A) 4 (B) 6 (C) 8 (D) 10 (E) 12

Hint: Test each answer choice, starting with 4 grandchildren. If Grandma has 4 grandchildren, how much candy would she need for the 10-piece plan? How much for the 8-piece plan? Which number (from 4, 6, 8, 10, 12) makes both statements true? That is the correct number.

Challenge 2: Jerry's Basketball Shop

The second keeper is Jerry, who runs the village sports shop. He's trying to figure out the prices of basketballs.

> Jerry is planning to buy some basketballs. If he buys 5 basketballs, he will have 10 dollars left over, and if he buys 7 basketballs, he will have to borrow 22 dollars. How many dollars does one basketball cost?
>
> (A) 11 (B) 16 (C) 22 (D) 26 (E) 32

Hint: The difference between buying 5 and buying 7 is just 2 basketballs. How much more money does Jerry need to go from buying 5 to 7 basketballs? That extra amount of money is the cost of 2 basketballs. Can you find the cost of 1 basketball?

Challenge 3: The Mysterious Number

The third keeper is a Number Wizard who guards a secret code. The wizard whispers:

> The sum of the digits of the 10-digit number is 9. What is the product of the digits of this number?
>
> (A) 0 (B) 1 (C) 45 (D) $9 \times 8 \times 7 \times \ldots \times 2 \times 1$ (E) 10

Hint: If the digits add up to 9, could any of them be 0? What happens when you multiply something by 0?

Challenge 4: The Great Digit Count

The fourth keeper is a scribe who has been writing numbers all day. The scribe asks:

> How many digits have to be written in order to write down every number from 1 to 100 inclusive?
>
> (A) 100 (B) 150 (C) 190 (D) 192 (E) 200

Hint: Count in three groups. How many 1-digit numbers are there? (1–9) How many 2-digit numbers are there? (10–99) How many 3-digit numbers? (100 is the only one). Then add up all the digits.

Challenge 5: The Future Year Puzzle

The fifth keeper is a time traveler who has seen UFOs in the future and dinosaurs in the past. The traveler says:

After the first of January 2013, how many years will pass before the following event happens for the first time: the product of the digits in the notation of the year is greater than the sum of these digits?

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(A) 87 (B) 98 (C) 101 (D) 102 (E) 103

Hint: Start checking years after 2013. Which years have a 0 in them? What is the product when a year has a 0? Keep going until you find a year where the product is finally greater than the sum.

The Master Code

You've solved all five challenges! Now fill in the secret code to restore the Number Kingdom's account book.

Word Bank: *BACKWARDS, DIGITS, EQUATIONS, PATTERNS, SYSTEMATIC*

1. When counting digits from 1 to 100, be _____ and count in groups.
2. If you know the total and need to find a missing part, work _____ from what you know.
3. For problems with two situations (like Jerry's basketballs), compare the two _____ to find the difference.
4. When you see a 10-digit number with a small digit sum, think about what happens when one digit is 0. This is a _____ clue.
5. To find the first year where the product of _____ is greater than the sum, test years one by one and eliminate those with zeros.

You've restored the Number Kingdom’s account book and earned the title of Master Number Detective. The village elder thanks you for your bravery and sharp thinking. The Golden Acorn celebration can finally begin!

