

# Test

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**Your name:**

**Your grade:**

**Exercise 1. 1 point.** The professor is watching across a field how the son of the professor's father is fighting with the father of the professor's son. How is this possible?

**Answer:**

**Exercise 2. 1 point.** Bob spent the first Tuesday of the month hiking in Himalayas. He spent Tuesday after the first Monday of the same month at a conference in Seattle. In the next month he spent the first Tuesday on cruise in Black sea. He spent Tuesday after the first Monday of that month celebrating his birthday in Boston. When is his birthday?

**Answer:**

**Exercise 3. 1 point.** My friend Alice will celebrate her  $x$  birthday in the year  $x^2$ . When was she born?

**Answer:**

**Exercise 4. 1 point.** Two two-digit prime numbers are reverses of each other. Their difference is a square. What are the numbers?

**Answer:**

**Exercise 5. 1 point.** What is the smallest positive integer that is not a factor of  $100!$ ?

**Answer:**

**Exercise 6. 1 point.** Multiplications are expensive. You need to program a function to calculate  $x^{33}$  when  $x$  is given. What is the smallest number of multiplications that you need?

**Answer:**

**Exercise 7. 1 point.** What is the maximum number of edges that a planar graph with 44 vertices can have?

**Answer:**

**Exercise 8. 1 point.** I can predict the score of every basketball game before it starts. How?

**Answer:**

**Exercise 9. 2 point.** Someone put 30 dots inside a square and connected the dots with each other and with the vertices of the square in such a way that the square became divided into triangles. How many triangles are there?

**Answer:**

**Exercise 10. 2 points.** There are four silver coins marked 1, 2, 3, and 5. They are supposed to weigh the number of grams that is written on them. One of the coins is fake and is lighter than it should be. Find the fake coin using the balance scale twice. Explain.

**Answer:**

**Exercise 11. 2 points.** Can a power of 2 have the same number of zeros, ones, twos, ..., nines? Explain.

**Answer:**

**Exercise 12. 2 points.** In the following sentence replace the dots with a digit, so that the statement is true. “All the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 participate in this sentence, in particular, digit 0 — ... times, digit 1 — ... times, digit 2 — ... times, digit 3 — ... times, digit 4 — ... times, digit 5 — ... times, digit 6 — ... times, digit 7 — ... times, digit 8 — ... times, and digit 9 — ... times.

**Answer:**

**Exercise 13. 3 points.** Baron Munchausen has a habit of hunting wild ducks every day. For several days in a row he truthfully told to his cook “Today I caught more ducks than two days ago and fewer than a week ago.” Given that he never lies, for how many maximum days in a row can he repeat that?

**Answer:**

**Exercise 14. 3 points.** There are 12 people in the room. Some of them are liars and some truth-tellers. The first person said, “There are no truth-tellers

here.”. The second person said, “There are no more than 1 truth-teller here.” The third person said, “There are no more than 2 truth-tellers here.” And so on. The 12-th person said, “There are no more than 11 truth-tellers here.” How many truth-tellers are in the room? Explain.

**Answer:**

**Exercise 15. 2 points.** Shauna was killed one Sunday morning. The police questions everyone about their activities during the time of death. Here are the replies:

- Alyssa was doing laundry
- April was getting the mail
- Mark was planting in the garden
- Reggie was cooking

Who killed Shauna?

**Answer:**