Grade 9

Problem №1.

How many integers between 1000 and 5000 are perfect squares?

A) 37 B) 38 C) 39 D) 40 E) 41

Problem №2.

In the magic square shown, five of the numbers are represented by letters A, B, C, D and E. As it is a magic square, the numbers in each row, the numbers in each column, and the numbers on each diagonal have the same sum.

What is the value of A+B+C+D+E?

0	20	A
B	4	C
D	−12	E

A) 8 B) 12 C) 16 D) 20 E) 24

Problem №3.

For the number a and b, the notation $a * b$ means $a^2 + ab - 4b$. For example,

$5 * 3 = 5^2 + 5 \times 3 - 4 \times 3 = 25 + 15 - 12 = 28$

What is the value of the expression shown below?

$$\big((8) * (1) - (7) * (2)\big) * ((6) * (3) - (5) * (4))$$

A) 13 B) 49 C) 62 D) 169 E) 286

Problem №4.

An arithmetic sequence is a sequence in which each term after the first is obtained by adding a constant to the previous term. For example, 2, 5, 8, 11 and 1, 5, 9, 13 are arithmetic sequences.

The 7th term of an arithmetic sequence is 29. What is the sum of 2nd and 12th term of this term?

A) 36 B) 45 C) 50 D) 58 E) 60

Problem №5.

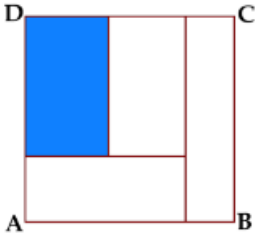
The sum of all five positive whole numbers A, B, C, D, and E in the boxes is equal to 2031, where the difference between any two adjacent numbers is 2. Which number(s) can be equal to 403?

A	B	C	D	E	=	2031

A) only A or E B) only A or C C) only C or E D) only C E) all

Problem №6.

The area of square ABCD is 196 square units. The square is divided into four non-overlapping rectangles, as shown. It is known that each of the four rectangles has the same perimeter. What is the **area** of the shaded rectangle?



A) 40 B) 50 C) 60 D) 70 E) 80

Problem №7.

Ms. Kim writes the following system of equations on the board:

- Equation 1: $2^a = 2^{4(b+1)}$
- Equation 2: $2a = 3b + 11$

Using the values of a and b in the equations above, we find the value of the following expression: $\frac{a+b}{a-b}$

When this expression is written in the form of $\frac{P}{Q}$ such that the fraction is in the lowest terms, what is the value of **P**+**Q**?

A) 64 B) 35 C) 29 D) 19 E) 13

Problem №8.

The faces of each of two fair dice are numbered 1, 2, 3, 5, 7 and 8. When the two dice are tossed, what is the probability that their sum will be an even number?

A) $\frac{4}{9}$ B) $\frac{1}{2}$ C) $\frac{5}{9}$ D) $\frac{3}{5}$ E) $\frac{2}{3}$

Problem №9.

The letter A represents a digit from 0 to 9. Using this unknown digit, $\overline{2A}$, $\overline{3A}$, and $\overline{4A}$ each represents a two-digit number whose digit on the ones place is A. Similarly, $\overline{10A}$ represents a three-digit number whose digit on the ones place is A. Given that $\overline{2A} + \overline{3A} + \overline{4A} = \overline{10A}$, what is the value of A?

Problem №10.

In 1980, Katie's age was the same as the sum of the digits in her birth year. In which year was Katie born?

Problem №11.

What is the sum of the next two values in the sequence 5, 8, 12, 18, 24, …, …?

Problem №12.

Shauna takes five tests, each worth a maximum of 100 points. Her scores on the first three tests are 76, 94, and 87. In order to average 81 for all five tests, what is the lowest score she could earn on one of the other two tests?

Problem №13.

Alice has 24 apples. In how many ways can she share them with Becky and Chris so that each of the three people has at least two apples?

Problem №14.

The lengths of the sides of a triangle in inches are three consecutive integers. The length of the shorter side is 30% of the perimeter. What is the length of the longest side?

Problem №15.

In a tournament there are six teams that play each other twice. A team earns 3 points for a win, 1 point for a draw, and 0 points for a loss. After all the games have been played it turns out that the top three teams earned the same number of total points. What is the greatest possible number of total points for each of the top three teams?