

## 1. Real Numbers

### Task 1.1. (T 7.2015)

Let us assume that  $\frac{15}{16}$  is approximately equal to 0.9. The approximation error expressed as a percentage will be equal to

- A. 4%                      B. 0,04%                      C. 3%                      D. 0,03%

### Task 1.2. (T 1.2016)

The following table shows the number of votes received by each candidate in a by-election.

| Candidate       | I     | II    |
|-----------------|-------|-------|
| Number of votes | 13970 | 17780 |

The number of votes received by the winner was higher than the number of votes received by the other candidate by:

- A. 56 percentage points.                      B. 44 percentage points.  
C. 27 percentage points.                      D. 12 percentage points.

### Task 1.3. (T 2.2016)

If  $\log a = \frac{1}{2}$  and  $\log b = \frac{2}{5}$ , where  $a > 0$  and  $b > 0$ , then the value of the expression  $\log(a^2b)$  equals

- A.  $\frac{7}{5}$                       B.  $\frac{4}{10}$                       C.  $\frac{13}{20}$                       D.  $\frac{1}{10}$

### Task 1.4. (T 3.2016)

The number  $4(4^{18} + 4^{17})$  equals

- A.  $4^{35}$                       B.  $4^{36}$                       C.  $5 \cdot 4^{17}$                       D.  $5 \cdot 4^{18}$

**Task 1.5. (T 1.2017)**

It may be assumed that 0.3 is an approximation of  $\frac{5}{16}$ . What is the percentage error in this approximation?

- A. 2.5%                      B. 0,025%                      C. 4%                      D. 0,04%

**Task 1.6. (T 2.2017)**

Among those listed below, the only positive number is:

- A.  $(-3)^0$                       B.  $-3^0$                       C.  $(-3)^{2017}$                       D.  $-3^{2017}$

**Task 1.7. (T 10.2018)**

In February, the price of a certain product remained constant, but on March 1st it was increased by 10%. After a week, the new price was decreased by 20%. As a result of these two changes, the initial price of the product was decreased by

- A. 12%                      B. 14%                      C. 9%                      D. 4%

**Task 1.8. (T.1.2019)**

If we assume that  $\frac{8}{9}$  is approximately equal to 0.9, the percentage error of this approximation is equal to:

- A. 1%                      B. 1.25%                      C. 0.0125%                      D. 0.01%

**Task 1.9. (T.1.2020)**

The reciprocal of  $3\frac{2}{9} - 5\frac{1}{3} \cdot \sqrt{\frac{49}{144}}$  is:

- A. -9                      B.  $-\frac{1}{9}$                       C.  $\frac{1}{9}$                       D. 9

**Task 1.10. (T 5.2020)**

The number  $\frac{4^8+4^7}{320 \cdot 4^4}$  is equal to:

- A.  $4^{-1}$                       B.  $4^0$                       C.  $4^1$                       D.  $4^2$

**Task 1.11 (T. 6.2020)**

If  $\log_3 5 = 0.68$  then  $\log_3 45$  equals:

- A. 1.32                      B. 1.36                      C. 2.68                      D. 6.8

**Task 1.12 (T 2.2021)**

The Seine is shorter than the Vistula by 25%, and the Rhine is longer than the Vistula by 17%. Thus the Rhine is longer than the Seine by

- A. 64%                      B. 56%                      C. 42%                      D. 21%

**Task 1.13 (T 18.2021, 0 – 4 pts)**

Write down each of the sentences a–d below as an algebraic expression.

- a) The difference of  $a$  squared and  $b$ .

.....

- b) The absolute value of the sum of  $b$  and tripled  $a$ .

.....

- c) The quotient of  $a$  squared and the third power of  $b$ .

.....

- d) The product of  $a$  increased by 5 and the square root of  $b$ .

.....

**Task 1.14 (T 1.2023)**

Complete the sentence. Select the correct answer from the options given below.

$$\frac{2 \cdot 10^{31}}{4 \cdot 10^{17}}$$

is equal to

A.  $\frac{5^{31}}{10^{17}}$

B.  $\frac{5^{14}}{2}$

C.  $5 \cdot 10^{13}$

D.  $2 \cdot 5^{15}$

**Task 1.15 (T 2.2023)**

Complete the sentence. Select the correct answer from the options given below.

The square of the sum of the numbers 2 and  $\sqrt{2}$  is equal to

A. 6

B. 8

C.  $6 + 2\sqrt{2}$

D.  $6 + 4\sqrt{2}$

**Task 1.16 (T 1.2024)**

Complete the sentence. Choose the correct answer from the options given below.

The number  $(2^8 \cdot 4^4)$  divided by  $(2^8 + 4^4)$  gives the quotient

A.  $2^4$

B.  $2^7$

C.  $\left(\frac{4}{3}\right)^{13}$

D.  $\left(\frac{3}{4}\right)^{12}$

**Task 1.17 (T 2.2024)**

Complete the sentence. Choose the correct answer from the options given below.

The sum of the numbers  $\log_2(2\sqrt{2} + 2)$  and  $\log_2(2\sqrt{2} - 2)$  is

A. 0

B. 1

C. 1.5

D. 2

**Task 1.18 (T 1.2025)**

The value of the expression  $2 \cdot \log_5 20 - 2 \cdot \log_5 4$  is equal to

A. -2

B. -1

C. 1

D. 2

**Task 1.19 (T 2.2025)**

The number

$$\frac{5 \cdot 10^{25}}{25 \cdot 10^{23}}$$

is equal to

A.  $\frac{2^{25}}{10^{23}}$

B.  $\frac{10^2}{5}$

C.  $\frac{2^2}{5}$

D.  $\frac{1}{5^2}$

**Task 1.20. (T 3.2025)**

Marek put 40 000 euros on a three-year deposit account which earned compound interest annually. After the first year, the value of the investment was 105 % of the original amount.

**Complete the sentence so that it is true. Write the correct number in the blank.**

After the second year, the value of the investment was equal to ..... %  
of the original amount