THE RATE OF UNEMPLOYMENT

With the exercises 5, 6, 7 we recommend to use a group work as the pupils might need to discuss their solutions with their peers.

The Košice region. It is needed to select the right one, the first one.

1. **October 2003**.

2. **No**.
   The pieces of information about the number of unemployed people in the first diagram are given in thousands and the numbers giving the number of thousands are rounded to the tenths. If the number of unemployed was 452 548 there would be the number 452.5 shown in the diagram (452 548 is 452.548 thousand, after rounding the number to the tenths it would be 452.5 thousand), but there is a number 452.6.

3. **No, she is not right**.
   It is seen in the diagram that the number of unemployed people in Trnava region is approximately 34 400 and in Košice region approximately 90 600 which is not a doubled number. The right answer should be: „ The unemployment rate in Košice region is almost two times higher than in Trnava region". Or „ There is almost three times more unemployed people in Košice region than in Trnava region".

4. **2 827 554**
   The percentage of the rate of unemployment *(p)* shows the percentage of registered unemployed people (N) from the number of employable people (PS), so

$$p = \frac{N}{PS} \cdot 100 \ (\%) \,,$$

   therefore

$$PS = \frac{N}{p} \cdot 100 \ . \quad (*)$$

   The numbers $N = 452{,}6$ (thousands) and $p = 16{,}00$ (%), which we have to insert into (*) are not exact numbers, they are just rounded:

   - Number 452.5 we get after rounding the exact number of unemployed (in thousands) to the tenths. It means that the total number of unemployed is between the numbers 452 550 (i.e. 452.550 thousand) and 452 649 (i.e. 452.649 thousand):

$$452\ 550 \le N \le 452\ 649 \ .$$

   - Similarly we get 16.00% after rounding it to the hundredths, it means that the percentage of the unemployment rate is bigger or equal to 15.995% and smaller than 16.005%:

$$15{,}995 \le p < 16{,}005$$

   If we want to get the smallest value of the formula (*) we have to take the smallest value of the nominator N and the biggest value of the denominator p. By inserting

   $N = 452\ 550$ and $p = 16.005$ to the right side in (*) we get the number

$$\frac{452\ 550}{16{,}005} \cdot 100 = 2\ 827\ 553{,}88...$$

The value we are looking for is the nearest bigger integer (as the number of people is a whole number) than the stated result. Therefore the sought smallest possible number of employable people is 2 827 554.

In discussion about the correctness of this result you may ask the students to fill in the missing details in the particular columns of the following table:

Number of the registered unemployed people	452 550	452 550		
Number of employable people	2 827 554	2 827 553	2 827 554	2 827 553
The rate of unemployment			16,005	16,005

We do not expect that the majority of pupils will find the correct solution, however, it is important they have tried to solve the problem. This exercise is used as a starting point of the discussion about rounded numbers.

5. **no**
    In the mentioned regions there are not equal numbers of employable people (this number is the base in calculating the umemployment rate), therefore we cannot calculate the rate of unemployment as an arithmetic average. We can show it in this exercise:
    From the solution of the Exercise 5 we know that neither the exact number of unemployed nor the exact number of employable people can be found in the diagrams. Therefore, let´s choose such numbers which <u>could possibly</u> be these numbers (it means they are in harmony with the data from the first diagram), e.g.

	Number of registered unemployed	Number of employable people
Prešov region	84 400	402 950
Košice region	90 600	395 700

In that case:

- the rates of unemployment would be

$$\frac{84\,400}{402\,950} \cdot 100 = 20,9455\ldots \cong 20,95 \ \% \quad \text{and} \quad \frac{90\,600}{395\,700} \cdot 100 = 22,8961\ldots \cong 22,90 \ \%,$$

  which are the numbers from the first diagram,

- in Eastern Slovakia there were 402 950 + 395 700 = 798 650 employable people and 84 400 + 90 600 = 175 000 unemployed people.

The rate of unemployment in Eastern Slovakia would be:

$$\frac{175\,000}{798\,650} \cdot 100 = 21,911\ldots \ \%$$

This correct result is different from the Milan´s one, it means, from the arithmetic average of the numbers 20.95 and 22.90.

6. **no**
    There are some possible explanations:

- If we assume that in the monitored period the number of employable people has not changed then the drop from 16.5 % to 16 % would represent 0.5 % *of the employable people*, not 0.5 % of unemployed people.

- According to the number of unemployed people in two month period it is not possible to determine how many people have found jobs, as some of them could lose job in the meantime and so, e.g. somebody could find a job two times and lost it twice as well.

- If the number of all employable people has changed, the problem is in different basic numbers from which we calculate the percentage.

This exercise should be a starting point for a discussion about variety of data interpretation and correctness or incorrectness of these interpretations.