

**PUNCTAJ:**

Sub.I				Sub.II						total	Sub.II			total
1	2	3	4							mate				engl
0,50	0,50	0,50	0,50	0,25	0,25	0,25	0,25	0,50	0,50	4p	0,25	0,25	0,50	1p

Sub.III						total	Sub.III						total	
						mate								engl
0,25	0,25	0,25	0,25	0,50	0,50	2p	0,25	0,25	0,25	0,25	0,50	0,50	2p	

**BAREM DE CORECTARE****Clasa a IV-a**

I.

1	2	3	4
B	D	C	B

II. There are 11 different ways:

$$123+45-67+8-9=100$$

$$123+4-5+67-89=100$$

$$123-45-67+89=100$$

$$123-4-5-6-7+8-9=100$$

$$12+3+4+5-6-7+89=100$$

$$12+3-4+5+67+8+9=100$$

$$12-3-4+5-6+7+89=100$$

$$1+23-4+56+7+8+9=100$$

$$1+23-4+5+6+78-9=100$$

$$1+2+34-5+67-8+9=100$$

$$1+2+3-4+5+6+78+9=100$$

Remark: if it is not only allowed to put plus signs and minus signs *between* the digits, but also *in front of* the first 1, then there is a twelfth possibility:  $-1+2-3+4+5+6+78+9=100$ .

**III.**

John, Peter and George have got three coloured pencils/crayons together: a red one, a yellow one and a blue one. Each child has got a pencil. John hasn't got the red pencil or the blue one and George hasn't got the red pencil.

What colour is John's pencil?

What colour is Peter's pencil?

What colour is George's pencil?

**Soluție:** Ion nu primește R și nici A, deci Ion primește G. George nu primește R și G, deci George primește A. Petre primește R.

**BAREM DE CORECTARE****Clasa a V-a**

I.

1	2	3	4
C	A	B	D

II. If postman Pat would have delivered mail three times at each house, then the total sum of the house numbers per day would be  $(1+2+3+4+5+6+7+8+9+10) \times 3 = 165$ . Now that sum is  $18+12+23+19+32+25=129$ . The difference is  $165-129=36$ ; divided by 3 this is 12. The sum of the house numbers where no mail was delivered is therefore 12. The following combinations are possible:

$$2+10$$

$$3+9$$

$$4+8$$

$$5+7$$

Each day at four houses the mail was delivered. On Tuesday the sum was 12. 12 can only be made from four house numbers in 2 ways:

$$1+2+3+6$$

$$1+2+4+5$$

The same holds for Friday with the sum of 32:

$$5+8+9+10$$

$$6+7+9+10$$

From this we can conclude that the house numbers 1, 2, 9 and 10 for sure have received mail, which means that the combinations 2+10 and 3+9 are not possible. Also the combination 5+7 is not possible, because mail was delivered either at house 5 or at house 7. Thus the only remaining solution is: houses 4 and 8.

N.B.: there are various possibilities for the actual post delivery of the whole week. For example:

Monday	houses 1, 3, 5 and 9
Tuesday	houses 1, 2, 3 and 6
Wednesday	houses 1, 5, 7 and 10
Thursday	houses 2, 3, 5 and 9
Friday	houses 6, 7, 9 and 10
Saturday	houses 2, 6, 7 and 10

### III.

In a box there are black, blue and red coloured pencils. It is known/We know that 33 crayons are not red, 38 are not black and 35 of them are not blue.

How many crayons/coloured pencils of each colour are there in the box?

**Soluție:** Deci avem 33 creioane negre și albe, 38 creioane albe și roșii, respectiv 35 creioane negre și roșii. Dacă le adunăm avem de două ori numărul total de creioane = 106, deci în total sunt 53 de creioane.

Atunci avem 20 roșii, 15 negre, respectiv 18 albe.

### BAREM DE CORECTARE

#### Clasa a VI-a

I.

1	2	3	4
A	C	D	C

II. Assume the number of oranges is A. Then A-1 is divisible by 3, 5, 7 and 9. So, A-1 is a multiple of  $5 \times 7 \times 9 = 315$  (note: 9 is also a multiple of 3, so 3 must not be included!). We are looking for a value of N for which holds that  $315 \times N + 1$  is divisible by 11. After some trying it turns out that the smallest N for which this holds is  $N = 3$ . This means that the greengrocer has at least 946 oranges.

Note that for  $N = 14, 25, 36$ , etc. (so each time 11 more) it also holds that  $315 \times N + 1$  is divisible by 11.

III. Michael is twice older than his sister Alina. Alina has got a basket with cherries and Michael has got one with peanuts. She has got three times more cherries than Michael's peanuts. If we multiply the number which shows Michael's age by the number of cherries he has got we get 510.

How old is Alina and how many peanuts has Michael got?

**SOLUȚIE:** Se descompune numărul  $510 = 2 \cdot 3 \cdot 5 \cdot 17$ .

Deoarece vârsta lui Mihai este un număr par, iar nr. cireselor este multiplu de 3, vârsta băiatului nu poate fi decât  $2 \cdot 5 = 10$  ani, iar Alina are 5 ani. Numărul cireselor este  $3 \cdot 17 = 51$ , iar cel al alunelor este 17.

**BAREM DE CORECTARE****Clasa a VII-a**

I.

1	2	3	4
C	C(D)	C	C

II. Let the length of the bridge be  $x$  meters.

Running towards the train, Charles covers  $0.5x-10$  meters in the time that the train travels  $x-4$  meters. Running away from the train, Charles covers  $0.5x+2$  meters in the time that the train travels  $2x-8$  meters.

Because their speeds are constant, the following holds:

$$(0.5x-10) / (x-4) = (0.5x+2) / (2x-8)$$

we find that  $x=44$ , so the railway-bridge has a length of 44 meters

III.

At a mathematics contest, students were given an algebra problem and a geometry one. It is known that 25 students solved both problems correctly, 72% solved only the algebra problem correctly whereas 48% solved the geometry one.

Find out:

- How many students there are in the class;
- How many students solved the algebra problem correctly?
- How many students solved the geometry problem correctly?

**Solutie:** 72% au rezolvat corect algebra inseamna ca 28% au rezolvat corect numai geometrie. Deci  $48\%-28\%=20\%$  au rezolvat corect si algebra si geometrie. Total 100% va fi 125.

a) Numarul total de elevi este 125.

b) 90 de elevi au rezolvat geometrie

c)  $90-25=65$  au rezolvat numai geometrie

$125-65=60$  au rezolvat algebra.

**BAREM DE CORECTARE****Clasa a VIII-a**

I.

1	2	3	4
B	D	B	B

II. Note that Lisa does not know that William sometimes lies. Lisa reasons as if William speaks the truth. Because Lisa says after her third question, that she knows his number if he tells her whether the first digit is a 3, we can conclude that after her first three questions, Lisa still needs to choose between two numbers, one of which starts with a 3. A number that starts with a 3 must, in this case, be smaller than 50, so William's (lied) answer to Lisa's first question was "No". Now there are four possibilities:

	number is a square	number is not a square
number is a multiple of 4	<b>16, 36</b>	8, 12, 20, and more
number is not a multiple of 4	9, 25, 49	10, 11, 13, and more

Only the combination "number is a multiple of 4" and "number is a square" results in two numbers, of which one starts with a 3. William's (lied) answer to Lisa's second question therefore was "Yes", and William's (true) answer to Lisa's third question was also "Yes".

In reality, William's number is larger than 50, not a multiple of 4, and a square. Of the squares larger than 50 and at most 100 (these are 64, 81, and 100), this only holds for 81.

Conclusion: William's real house-number is 81.

III. The picture given shows the design of a toy in the form of a cube  $ABCD A'B'C'D'$ . On sides  $ABCD$ ,  $BCC'B'$ ,  $A'B'C'D'$  and  $ADD'A'$  respectively there are drawings of four equilateral triangles  $ABM$ ,  $B'C'N$ ,  $C'D'P$  and  $ADQ$ , which are coloured in red, blue, yellow and green.

- Demonstrate that points  $M, N, P, Q$  are coplanar;
- Demonstrate that the figure  $MNPQ$  is a rectangle.

Soluzie

Avem  $PF \perp A'C'$  și  $ME \perp AB$   
 $ME \parallel BC \parallel A'C' \parallel PF$  iar  
 $ME = PF = \frac{e\sqrt{3}}{2}$  (unde  $AB = e$ )

$\Rightarrow PFMN$  paralelogram

$\Rightarrow PM$  și  $FE$  se înjumătățesc

și  $PM \cap FE = \{O\}$  ①

fi  $QS \perp A'D'$  și  $NT \perp BC$

$\Rightarrow QS = NT = \frac{e\sqrt{3}}{2}$ ;  $SQ \parallel A'D' \parallel BC \parallel NT \Rightarrow SQTN$

paralelogram  $\Rightarrow QN$  și  $ST$  se înjumătățesc.

$SF \parallel A'C'$ ;  $EF \parallel AC \Rightarrow SFTE$  paralelogram  
 $SF = \frac{A'C'}{2}$   $EF = \frac{AC}{2}$

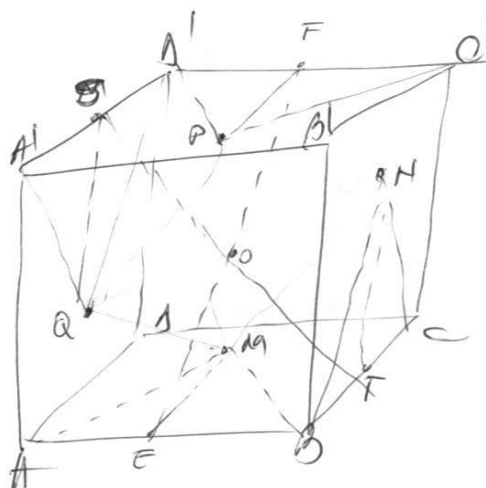
$FE$  și  $ST$  se înjumătățesc  $\Rightarrow FE \cap ST = \{O\} \Rightarrow$

$ST \cap QN = \{O\}$  ②

fi ① și ②  $\Rightarrow QN$  și  $PM$  se înjumătățesc  $\Rightarrow PM \cap QN = \{O\}$

$\Rightarrow QPMN$  paralelogram.

$\Rightarrow PM = QN \Rightarrow$



Deci  $MNPQ$  este paralelogram.