



White Level

1. (6 credits) Three pokemon trainers Ash, Misty and Brock went for a walk with their pets: Pikachu, Geodude and Togepi. It is known that Geodude's trainer is not a girl, Misty is allergic to Pikachu's hair, and Brock calls his pet 'Dude'. Who is Pikachu's trainer? Prove it. (Answer: Ash.)

Solution. Since Geodude's trainer is not a girl, and Misty is allergic to Pikachu's hair, her pet is Togepi. Brock's pet is Geodude, therefore Ash is Pikachu's trainer.

2. (6 credits) Mary Poppins has 5 unused vacation days. Weekends and holidays are marked red (in the frame) in Fig. 1. What is the maximum number of subsequent calendar days of rest she may have? (Answer: 11 days.)

Понедельник Monday	Вторник Tuesday	Среда Wednesday	Четверг Thursday	Пятница Friday	Суббота Saturday	Воскресенье Sunday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5

Fig. 1

Solution. If Mary takes a vacation comprising the 8th, 10th, 11th, 12th and 15th days of the month, her vacation lasts from the 6th day to the 16th day, i.e. 11 days.

This interval includes 4 weekend days and 2 holidays. The maximum number of weekend days which may be included in the vacation is 4, because there are five days between weekends. Accordingly, with any other combination of days one holiday (or more) is not included and the vacation period reduces.

3. (6 credits) Pippi Longstocking washed 9 pairs of stockings in her washing machine (all pairs were of different colours). What a minimum number of stockings must be taken out of the washing machine to get a pair of them for sure? (Answer: 10.)

Solution. As it follows from Dirichlet's principle, one can certainly find two identical stockings among 9+1 stockings taken out from the box.

4. (10 credits) Hermione wanted to buy a bookshelf. She came to the store with a tape measure and measured the bookshelf she liked. The thickness of each of the side walls of the bookshelf and each of the two partitions was 1.5 cm, and the distances between the side walls and the partitions were the same everywhere and were equal to 30 cm. What was the width of the bookshelf? (Answer: 96 cm.)

Solution. The bookshelf contains two side walls and two partitions, each of them is 1.5 cm thick, i.e. we get $4 \cdot 1.5 = 6$ cm in total. The distances between the left wall and the first partition, between the first partition and the second partition and between the second partition and the right side wall are 30 cm each, i.e. we get $3 \cdot 30 = 90$ cm in total. The total width is $6 + 90 = 96$ cm.

5. (10 credits) Lyra Belacqua has three cans of Dust: two full cans and one partially filled can. Each can full of Dust weighs 1.7 kg, an empty can weighs 200 g. What is the weight of Dust (in kg) in the third can, if the total weight of three cans is 4.5 kg? (Answer: 0.9 kg.)

Solution. The weight of two full cans is $1.7 \cdot 2 = 3.4$ kg, therefore the weight of the third can is $4.5 - 3.4 = 1.1$ kg. To get the weight of Dust, we need to subtract the weight of a can: $1.1 - 0.2 = 0.9$ kg.

6. (10 credits) Alice loves to solve puzzles. When she asked her elder sister about her age, the sister answered that now she is 4 times older than Alice, and 2 years later she will be 3 times older. What is the age of Alice's sister? (Answer: 16 years.)

Solution. Let Alice's present age be x years. This means that now her elder sister is $4x$ years old. Two years later Alice will be $x+2$ years old, and her sister will be three times older, i.e. her age will be $3(x+2)$ years, and it follows from here that $4x+2=3(x+2)$. Therefore, $x=4$ and the present elder's sister age is $4x=4*4=16$ years.

7. (10 credits) A figure consisting of squares only is shown in Fig. 2. The length of each side of the smallest square is 1 cm. What is the perimeter of the whole figure? (Answer: 56 cm.)

Solution. Since every component is a square, the length of each side of the square adjacent to the bottom of the group of small squares is 5 cm, the length of each side of the upper right square is 6 cm, the length of each side of the lower square is 11 cm. Therefore, the perimeter is equal to $1*5+6+6+11+11+11+5+1=56$ cm.

8. (12 credits) The Wizard of Oz and Dorothy decided to fly an air balloon and took a basket with three kilograms of food to have something to eat during their journey. To get off the ground, they dropped 5 sandbags, each of which weighed 18 kg. What was Dorothy's weight, if the Wizard is 20 kg heavier than the girl? (Answer: 33.5 kg.)

Solution. The total weight of the sandbags is equal to the total weight of the Wizard and Dorothy and their food. If Dorothy weighs x kg, then the Wizard weighs $x+20$ kg. This means that the total weight added to the basket is $x+x+20+3=2x+23$ kg. The total weight of the sandbags is $5*18=90$ kg. Thus, we get the equation $2x+23=90$, therefore $2x=67$, and $x=33.5$ kg.

9. (12 credits) In our world, kings and queens of Narnia Peter, Susan, Edmund and Lucy Pevensie live in the same street. The distance between houses of Edmund and Peter is 400 meters, between houses of Edmund and Lucy – 750 meters, between houses of Susan and Lucy – 650 meters. Owners of the houses in these pairs are not neighbours. What is the distance between houses of Susan and Peter? (Answer: 300 meters.)

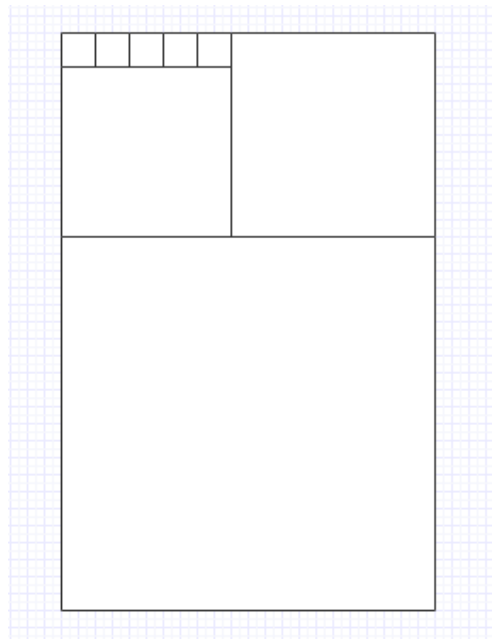


Fig. 2

Solution. Since every two Pevensies mentioned in the pairs are not neighbours, Edmund lives in the first (or last) house, and Susan is his neighbour, because Peter and Lucy cannot be his neighbours under such conditions. Houses of the Pevensies are lined in the following order: Edmund-Susan-Peter-Lucy. According to the condition, the distance between the houses of Edmund and Lucy is 750 meters, between houses of Susan and Lucy is 650 meters, therefore the distance between the houses of Edmund and Susan is $750-650=100$ meters. Similarly, based on the distances between the houses of Edmund and Lucy (750 meters) and between the houses of Edmund and Peter (400 meters), we can calculate the distance between the houses of Peter and Lucy: $750-400=350$ meters. The distance between the houses of Susan and Lucy is 650 meters, and this means that the distance between the houses of Susan and Peter is $650-350=300$ meters. It is convenient to visualize the solution, see Fig. 3.

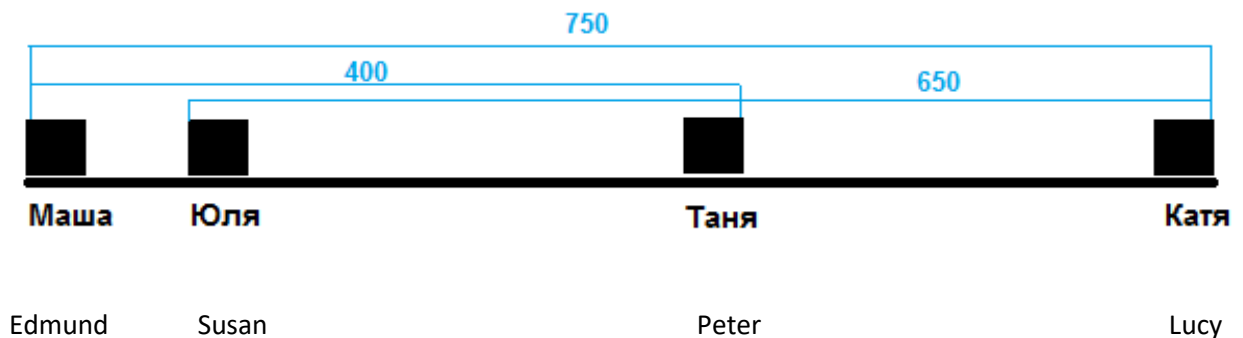


Fig. 3

10. (18 credits) Scrooge McDuck changed the PIN of his bank card, but when he tried to withdraw money from an ATM, it turned out that he forgot the new PIN. When Scrooge decided to change the PIN, he chose such number of four different digits that first two digits and last two digits of the PIN were squares of natural numbers, and the sum of inside digits of the PIN was equal to the sum of outside digits. Scrooge listed all possible combinations and at last decided to try the smallest number meeting the mentioned conditions. Fortunately, the PIN happened to be correct. What number was chosen by Scrooge McDuck as the PIN? (Answer: 1649.)

Solution. The list including all possible numbers of different digits, first two digits and last two digits of which are perfect squares of natural numbers, contains 20 different positions. After checking whether the sum of inside digits of every such number is equal to the sum of its outside digits, only four numbers meeting the mentioned conditions remain in the list: 1649, 2536, 3625, 4916; the first one is the smallest of them.

Press Lunch.

Jem and Scout got from Atticus Finch 1 dollar and 50 cents as pocket money. Jem paid 55 cents for a miniature steam engine and Scout paid 35 cents for ice cream. Then they counted their coins and discovered that they have the same amount of money. How much money did Scout get from her father?

Answer: 65 cents.

Solution. Let Jem and Scout each have x cents after their shopping. If we add the money spent on shopping to the remaining money, we get $2*x+35+55$, i.e. 150 cents. Therefore $2*x+90=150$, $x=30$ cents. Since Scout spent 35 cents, she initially had $35+30=65$ cents.