

Students

Name and surname _____

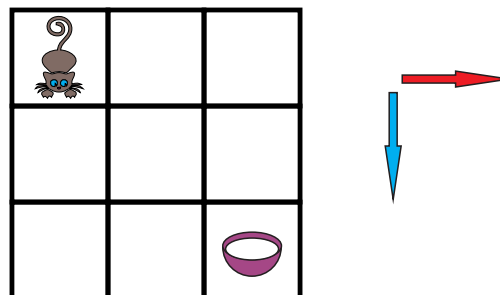
Reg. number _____ Faculty _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

You have 60 minutes to solve the problems. Write the answers into the table above. For every correct answer you get the corresponding number of points. For every incorrect answer you lose 1 point. If you leave the field in the table empty, you get 0 points. To avoid possible negative final score you get initial 24 points.

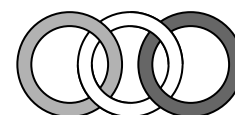
PROBLEMS WORTH 3 POINTS

1. A cat and a bowl of milk are in the opposite corners of a board with 9 fields (see the picture). The cat can only move from field to field vertically down or horizontally to the right. In how many ways can the cat reach the bowl of milk?



- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

2. Evita has 3 linked rings (see the picture). Which of the following pictures also shows 3 rings linked in the same way as Evita's rings?



- (A) (B) (C)
 (D) (E)

3. Klara drew a closed curved line on a cube. Which of the following nets could be the net of Klara's cube?

- (A) (B) (C) (D) (E)

4. The pages of Neca's handbook "Kako premagati strah pred vodo" are numbered in the usual way. The number of pages in the handbook is even. Digit 0 is used exactly 5 times for numbering, and digit 8 is used exactly 6 times. Which number is on the last page of Neca's handbook?

- (A) 48 (B) 58 (C) 60 (D) 68 (E) 88

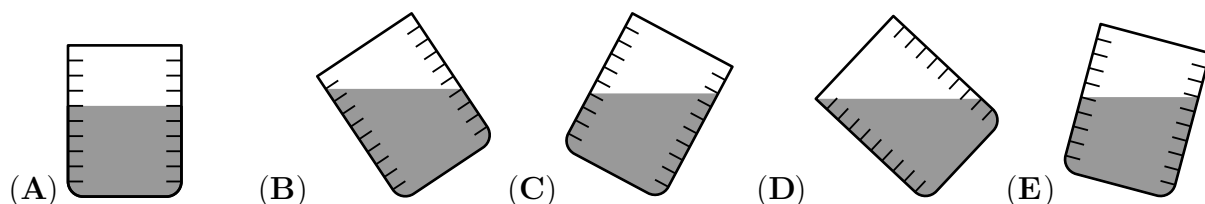
5. How many planes pass through exactly 4 vertices of a given cube?

- (A) 6 (B) 8 (C) 12 (D) 16 (E) 20

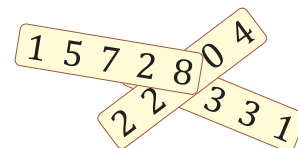
6. Frog Ajda eats 5 spiders per day, except when she is very hungry, then she eats 10 spiders per day. In the last 9 days, frog Ajda ate 60 spiders altogether. On how many days among the last 9 days was frog Ajda very hungry?

- (A) 1 (B) 2 (C) 3 (D) 6 (E) 9

7. Lana has 5 identical measuring cylinders filled with water. 4 of the 5 measuring cylinders contain the same amount of water. Which of the pictures shows the measuring cylinder that does not contain the same amount of water than the remaining 4 measuring cylinders?



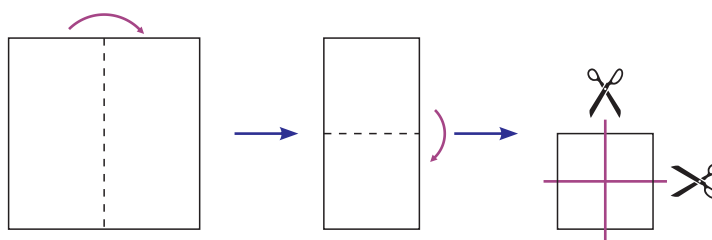
8. Ana wrote a 5-digit number on each of 3 cards. The sum of the 3 written 5-digit numbers was 57263. Then she put the cards on a table so that 3 of the digits were covered (see the picture). Which were the covered digits?



- (A) 0, 2 and 2 (B) 1, 2 and 9 (C) 2, 4 and 9 (D) 2, 7 and 8 (E) 5, 7 and 8

PROBLEMS WORTH 4 POINTS

9. Patricija is making birthday decorations from paper. She first folds a sheet of paper twice exactly in the middle, and then she makes 2 cuts with scissors exactly in the middle (see the picture). How many pieces of paper that Patricija gets by cutting a sheet of paper are squares?



- (A) 3 (B) 4 (C) 5 (D) 6 (E) 8

10. At least how many numbers need to be removed from set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$ so that the product of the remaining numbers will be a perfect square?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

11. Lara has built a large $4 \times 4 \times 4$ cube using 32 white and 32 black small cubes of size $1 \times 1 \times 1$. She has arranged the small cubes so that her large cube has the largest possible white surface area. What fraction of the surface area of her cube is white?

- (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$ (E) $\frac{3}{8}$

12. Luka was playing basketball. He made 20 shots and scored 55 % of the time. After making 5 additional shots, his scoring rate increased to 56 %. With how many of the last 5 shots did Luka score?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

13. Fruit grower Sandi arranged 60 apples and 60 pears into paper bags so that each paper bag contained the same number of apples, and no two paper bags contained the same number of pears. In at most how many paper bags could fruit grower Sandi arrange 60 apples and 60 pears in this way?

- (A) 6 (B) 10 (C) 12 (D) 15 (E) 20

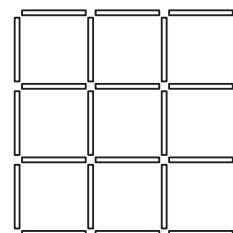
14. Friends Jože, Lojze and Tone go for a walk every day, and each of them has his own hat. If Jože isn't wearing the hat, then Lojze is wearing the hat. If Lojze isn't wearing the hat, then Tone is wearing the hat. Today, Tone isn't wearing the hat. Who among the friends is wearing the hat today?

- (A) Only Jože and Lojze. (B) Only Jože. (C) Jože, Lojze and Tone.
 (D) Neither Jože nor Lojze. (E) Only Lojze.

15. Val had 2 cylindrical candles with different heights and different diameters. The 1st candle lasted 6 hours, and the 2nd candle lasted 8 hours. Val lit both candles at the same time and 3 hours later both candles were the same height. What was the ratio of the heights of Val's candles before he lit them?

- (A) 4 : 3 (B) 8 : 5 (C) 5 : 4 (D) 3 : 5 (E) 7 : 3

16. Nataša has blue, red, yellow and green monochrome sticks of length 1 dm. She wants to make a $3 \text{ dm} \times 3 \text{ dm}$ grid with the sticks (see the picture) so that each $1 \text{ dm} \times 1 \text{ dm}$ square in the grid has 4 sides of different colors. What is the smallest number of green sticks that Nataša could use to make such a grid?



- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

PROBLEMS WORTH 5 POINTS

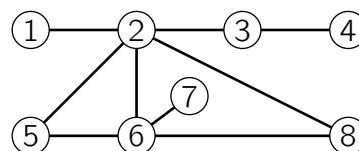
17. Let a be the sum of all positive divisors of number 1024 and b the product of all positive divisors of number 1024. Which of the following equalities holds?

- (A) $(a - 1)^5 = b$ (B) $(a + 1)^5 = b$ (C) $a^5 = b$ (D) $a^5 - 1 = b$ (E) $a^5 + 1 = b$

18. Ela got a box of 60 small chocolates for her birthday. She started by eating $\frac{1}{10}$ of the chocolates on Monday, then $\frac{1}{9}$ of the remaining chocolates on Tuesday, then $\frac{1}{8}$ of the remaining chocolates on Wednesday, then $\frac{1}{7}$ on Thursday and so on until she ate half of the remaining chocolates from the previous day. How many chocolates did Ela have left at the end?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 6

19. Rok paints each circle in the diagram either red, yellow or green so that no 2 circles that are joined directly are painted with the same color. Which 2 circles must Rok necessarily paint with the same color?



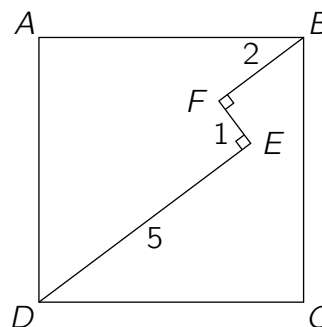
- (A) 5 and 8 (B) 1 and 6 (C) 2 and 7 (D) 4 and 5 (E) 3 and 6

20. Lucijana drew 4 straight lines passing through the origin of the coordinate system and intersecting parabola $y = x^2 - 2$ in 8 points. What can be the product of the x -coordinates of these 8 points?

- (A) Only 16. (B) Only -16 . (C) Only 8. (D) Only -8 .
 (E) There are more than 1 possible products.

21. In square $ABCD$ we have $DE \perp EF$ and $EF \perp FB$ as well as $|DE| = 5$, $|EF| = 1$ and $|FB| = 2$ (see the picture). What is the side length of square $ABCD$?

- (A) $3\sqrt{2}$ (B) $\frac{7\sqrt{2}}{2}$ (C) $\frac{11}{2}$ (D) $5\sqrt{2}$
 (E) None of the previously listed.



22. 3-player teams can enter a chess tournament. Each player in a team plays exactly once against every player that is not in his team. At the chess tournament, no more than 250 games are played in total. At most how many teams can enter the tournament?

- (A) 7 (B) 8 (C) 9 (D) 10 (E) 11

23. Petra wants to calculate the value of expression $\frac{a+b}{c}$ for positive integers a , b and c . She types $a + b \div c =$ on a pocket calculator and gets the result 11. She then types $b + a \div c =$ and gets the result 14. She realizes that the pocket calculator calculates divisions before additions. What is the correct value of expression $\frac{a+b}{c}$?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

24. In square $ABCD$, points P , Q and R are the midpoints of sides DA , BC and CD , respectively. What fraction of square $ABCD$ is shaded?

- (A) $\frac{3}{4}$ (B) $\frac{5}{8}$ (C) $\frac{1}{2}$ (D) $\frac{7}{16}$ (E) $\frac{3}{8}$

