Känguru der Mathematik 2018
Level Kadett (Grade 7 and 8)
Austria – 15. 3. 2018

1. Which result is obtained by the calculation $(20 + 18) : (20 - 18)$?

(A) 18 (B) 19 (C) 20 (D) 34 (E) 36

2. If the letters of the Word MAMA are written underneath each other then the word has a vertical axis of symmetry. For which of these words does that also hold true?

(A) ADAM (B) BAUM (C) BOOT (D) LOGO (E) TOTO

3. A triangle ABC has side lengths 6 cm, 10 cm and 11 cm. An equilateral triangle XYZ has the same perimeter as the triangle ABC. What are the side lengths of the triangle XYZ?

(A) 6 cm (B) 9 cm (C) 10 cm (D) 11 cm (E) 27 cm

4. Which number has to replace the ☆ in the calculation so that it is true?

$$2 \cdot 18 \cdot 14 = 6 \cdot ☆ \cdot 7$$

(A) 8 (B) 9 (C) 10 (D) 12 (E) 15

5. The fence on the right has many holes. One morning the fence falls over and lies on the floor. Which of the following pictures shows the fallen down fence?

(A) (B) (C) (D) (E)
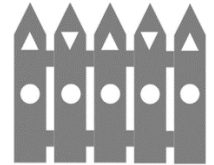
6. Bernd produces steps for a staircase which are 15 cm high and 15 cm deep (see diagram). The staircase should reach from the ground floor to the first floor which is 3 m higher. How many steps does Bernd have to produce?
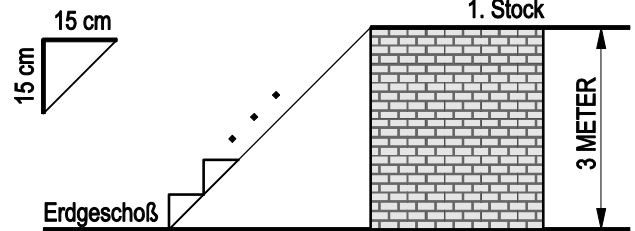
(A) 8 (B) 10 (C) 15
(D) 20 (E) 25
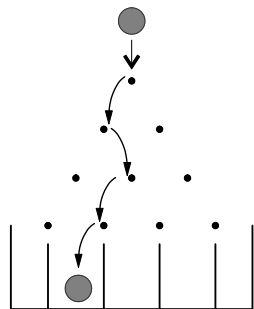
7. In a game of luck, A ball rolls downwards towards hammered nails and is diverted either to the right or the left by a nail immediately below it. One possible path is shown in the diagram. How many different ways are there for the ball to reach the second compartment from the left?

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

8. A large rectangle is made up of 9 equally big rectangles. The longer side of each small rectangle is 10 cm long. What is the perimeter of the large rectangle?

(A) 40 cm (B) 48 cm (C) 76 cm (D) 81 cm (E) 90 cm
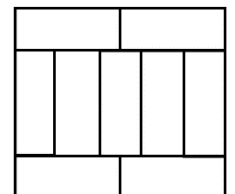
9. Two circles are inscribed into an 11 cm long and 7 cm wide rectangle so that they each touch three sides of the rectangle. How big is the distance between the centres of the two circles?

(A) 1 cm (B) 2 cm (C) 3 cm (D) 4 cm (E) 5 cm
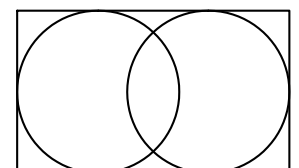
10. The square ABCD has side length 3 cm. The points M and N, which lie on the sides AD and AB respectively, are joined to the corner C. That way the square is split up into three parts with equal area. How long is the line segment DM?

(A) 0.5 cm (B) 1 cm (C) 1.5 cm (D) 2 cm (E) 2.5 cm
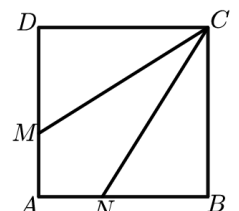
11. Martina multiplies two, two-digit numbers and then paints over some of the digits. How big is the sum of the three digits that Martina has painted over?

$$\blacksquare 3 \times 2\blacksquare = 3\blacksquare 2$$

(A) 5   (B) 6   (C) 9   (D) 12   (E) 14

12. A rectangle is split up into 40 equally big squares. The rectangle consists of more than one row of squares. Andreas colours in all squares of the middle row. How many squares did he not colour in?

(A) 20   (B) 30   (C) 32   (D) 35   (E) 39

13. Philipp wants to know how much his book weighs correct to half a gram. However, his scale only shows correct to 10 g and therefore he weighs several identical books all together. What is the minimum number of identical books he has to put on the scale in order to reach his aim?

(A) 5   (B) 10   (C) 15   (D) 20   (E) 50

14. A lion hides in one of three rooms. On the door to room number 1 a note reads: „The lion is here". On the door to room number 2 a note reads: „The lion is not here". On the door to room number 3 a note reads: „2 + 3 = 2 x 3". Exactly one of the three notes is true. Which room is the lion in?

(A) Room 1   (B) Room 2   (C) Room 3
(D) It can be in any room.   (E) It is either in room 1 or room 2.

15. Valentin draws a zig-zag line inside a rectangle as shown in the diagram. For that he uses the angles 10°, 14°, 33° and 26°. How big is angle φ?

(A) 11°   (B) 12°   (C) 16°   (D) 17°   (E) 33°
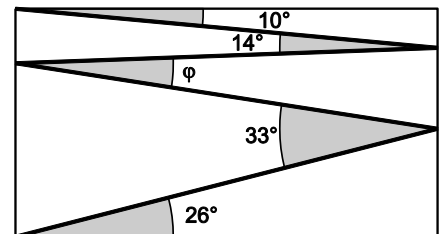
16. Alice writes down three prime numbers that are all less than 100. She only uses the digits 1, 2, 3, 4 and 5, in fact she uses each digit exactly once. Which of the following prime numbers did she definitely write down?

(A) 2   (B) 5   (C) 31   (D) 41   (E) 53

17. A hotel in the carribean correctly advertises using the slogan: „350 days of sun in the year!" How many days does Mr. Happy have to spend in the hotel in a year with 365 days to be guaranteed to have two consecutive days of sunshine to enjoy?

(A) 17   (B) 21   (C) 31   (D) 32   (E) 35

18. The diagram shows a rectangle and a straight line x, which is parallel to one of the sides of the rectangle. There are two points A and B on x inside the rectangle. The sum of the areas of the two triangles shaded in grey is 10 cm². How big is the area of the rectangle?
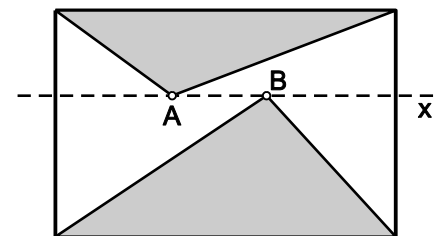
(A) 18 cm^2 (B) 20 cm^2 (C) 22 cm^2 (D) 24 cm^2 (E) It depends on the position of the points A and B.

19. Jakob writes one of the natural numbers 1 to 9 into each cell of the 3x3-table. Then he works out the sum of the numbers in each row and in each column. Five of his results are 12, 13, 15, 16 and 17. What is the sixth sum?

(A) 17   (B) 16   (C) 15   (D) 14   (E) 13
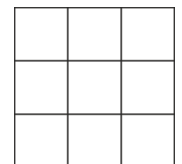
20. 11 points are marked left to right on a straight line and their distances recorded. The sum of the distances from the first point to every other point is 2018. The sum of all distances from the second point to every other point, including the first point, is 2000. What is the distance between the first and the second point?

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

21. At an election for student representatives there are three candidates. 130 students have voted. The candidate that has the most votes wins. Currently Samuel has 24, Kevin 29 and Alfred 37 votes. How many of the currently not yet counted votes does Alfred need to get in order to definitely win the election?

(A) 13   (B) 14   (C) 15   (D) 16   (E) 17

22. The diagram shows the net of a box consisting only of rectangles. How big is the volume of the box?

(A) 43 cm³   (B) 70 cm³   (C) 80 cm³   (D) 100 cm³   (E) 1820 cm³
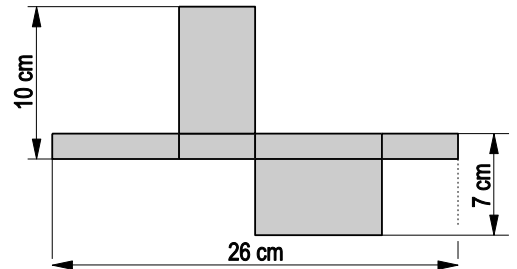
23. Rita wants to write a number into every square of the diagram shown. Every number should be equal to the sum of the two numbers from the adjacent squares. Squares are adjacent if they share one edge. Two numbers are already given. Which number is she going to write into the square marked with x?
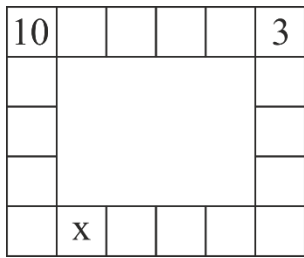
(A) 10   (B) 7   (C) 13   (D) −13   (E) −3

24. Simon runs along the edge round a 50 m long rectangular swimming pool, while at the same time Jan swims lengths in the pool. Simon runs three times as fast as Jan swims. While Jan swims 6 lengths, Simon manages 5 rounds around the pool. How wide is the swimming pool?

(A) 25 m   (B) 40 m   (C) 50 m   (D) 80 m   (E) 180 m
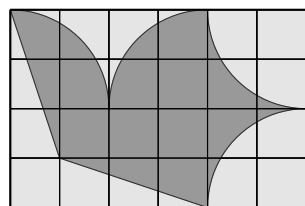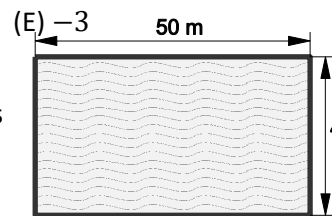
25. Lisas aviation club designs a flag with a flying „dove" on a 4x6-grid. The area of the „dove" is 192 cm². The perimeter of the „dove" is made up of straight lines and circular arcs. What measurements does the flag have?

(A) 6 cm x 4 cm   (B) 12 cm x 8 cm   (C) 20 cm x 12 cm
(D) 24 cm x 16 cm   (E) 30 cm x 20 cm

26. The points N, M and L lie on the sides of an equilateral triangle ABC so that NM ⊥ BC, ML ⊥ AB and LN ⊥ AC holds true. The area of the triangle ABC is 36 cm². What is the area of the triangle LMN?

(A) 9 cm²   (B) 12 cm²   (C) 15 cm²   (D) 16 cm²   (E) 18 cm²
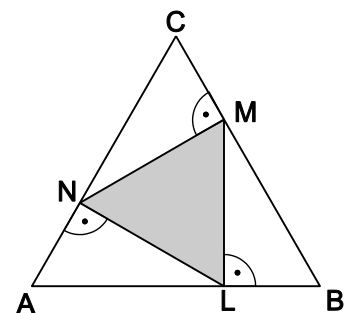
27. Anna, Bettina and Claudia go shopping. Bettina spends 85% less than Claudia. Anna spends 60% more than Claudia. Together they spend 55 €. How much money does Anna spend?

(A) 3 €   (B) 20 €   (C) 25 €   (D) 26 €   (E) 32 €

28. Viola practices long-jumping. On average she has jumped 3.80 m so far. On the next jump she reaches 3.99 m and thus the mean increases to 3.81 m. How far does she have to jump on her next attempt in order to increase her mean to 3.82 m?

(A) 3.97 m   (B) 4.00 m   (C) 4.01 m   (D) 4.03 m   (E) 4.04 m

29. In the isosceles triangle ABC (with base AC) the points K and L are added on the sides AB and BC respectively so that AK = KL = LB and KB = AC. How big is the angle ∠ ABC?

(A) 30°   (B) 35°   (C) 36°   (D) 40°   (E) 44°
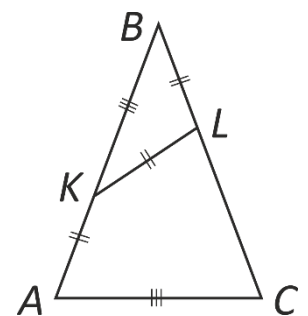
30. In a game of dominoes the tiles always have to be placed so that the touching halves of two adjacent domino tiles show the same number of dots. Paul has six domino tiles in front of him (see diagram).
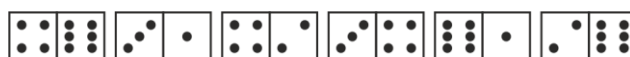
In several steps Paul tries to arrange them in a correct order. In each step he is either allowed to swap any two domino tiles or he is allowed to turn one domino tile 180° around. What is the minimum number of steps he needs in order to arrange the domino tiles correctly?

(A) 1   (B) 2   (C) 3   (D) 4   (E) This is impossible.