

KÄNGURU DER MATHEMATIK 2017

16. 3. 2017



Level: Kadett, Grade: 7 and 8

Name:	
School:	
Class:	

Time: 75 min.

30 starting points

Each correct answer to questions 1. – 10.: 3 Points

Each correct answer to questions 11. – 20.: 4 Points

Each correct answer to questions 21. – 30.: 5 Points

Each question left unanswered 0 Points

Each incorrect Answer: $\frac{1}{4}$ of the points for the question are subtracted

Please write the letter (A, B, C, D, E) of the correct answer in the square under the question number (1 to 30). Write clearly and carefully!

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

S-VERSICHERUNG
VIENNA INSURANCE GROUP

Information über den Känguruwettbewerb: www.kaenguru.at

Wenn du mehr in dieser Richtung machen möchtest,
gibt es die Österreichische Mathematikolympiade.

Infos unter: www.math.aau.at/OeMO/



Känguru der Mathematik 2017

Level Kadett (Grade 7 and 8)

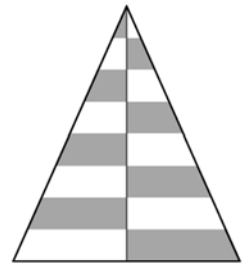
Österreich – 16. 3. 2017



3 Points Questions

1 The diagram shows an isosceles triangle, where the height is marked and its area is split up into equally wide white and grey stripes. Which fraction of the area of the triangle is white?

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



2 What is the time 17 hours after 17 o'clock?

- (A) 8:00 (B) 10:00 (C) 11:00 (D) 12:00 (E) 13:00

3 Which number has to be subtracted from -17 in order to obtain -33 ?

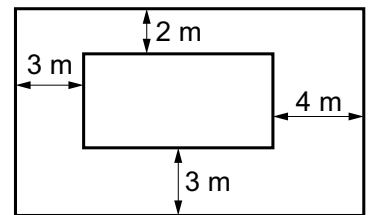
- (A) -50 (B) -16 (C) 16 (D) 40 (E) 50

4 Which statement is correct?

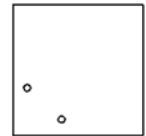
- (A) $\frac{4}{1} = 1.4$ (B) $\frac{5}{2} = 2.5$ (C) $\frac{6}{3} = 3.6$ (D) $\frac{7}{4} = 4.7$ (E) $\frac{8}{5} = 5.8$

5 The diagram shows two rectangles whose sides are parallel to each other. By how much is the perimeter of the bigger rectangle greater than the perimeter of the smaller rectangle?

- (A) 12 m (B) 16 m (C) 20 m (D) 21 m (E) 24 m



6 Paul folds a piece of paper, then punches a hole into the paper and unfolds it again. The unfolded paper then looks like the picture on the right.



Along which dotted line can Paul have folded the paper beforehand?

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

7 The sum of three different positive whole numbers is 7. How big is their product?

- (A) 12 (B) 10 (C) 9 (D) 8 (E) 5

8 Petra crafts a piece of jewellery out of two black and two white hearts. The hearts have areas of 1 cm^2 , 4 cm^2 , 9 cm^2 and 16 cm^2 respectively. She places the hearts on top of each other as shown in the diagram and glues them together.

How big is the total area of the visible black parts?

- (A) 9 cm^2 (B) 10 cm^2 (C) 11 cm^2 (D) 12 cm^2 (E) 13 cm^2



9 Yvonne has 20 €, each of her four sisters has 10 €. How much does Yvonne have to give to each of her sisters so that all of them have the same amount of money?

- (A) 2 (B) 4 (C) 5 (D) 8 (E) 10

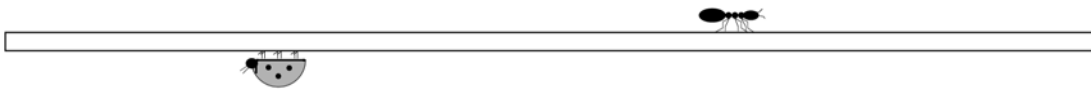
10 Some girls are standing in a circle. The teacher makes them do a headcount. Bianca says one, her neighbour says two and so on. If they count in a clockwise direction, Antonia says five. If they count in an anticlockwise direction, Antonia says eight.

How many girls are forming the circle?

- (A) 9 (B) 10 (C) 11 (D) 12 (E) 13

- 4 Points Questions -

11 Ant Annie starts at the left end of the stick and crawls $\frac{2}{3}$ of the length of the stick. Ladybird Bob starts at the right end of the stick and crawls $\frac{3}{4}$ of the length of the stick. Which fraction of the length of the stick are they then apart from each other?



- (A) $\frac{3}{8}$ (B) $\frac{1}{12}$ (C) $\frac{5}{7}$ (D) $\frac{5}{12}$ (E) $\frac{7}{12}$

12 One sixth of all spectators in a children's theater are adults, the rest are children. Two fifths of the children are girls. Which fraction of all spectators are boys?

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

13 The black and the dashed line together form seven equilateral triangles. The dashed line is 20 cm long. How long is the black line?



- (A) 25 cm (B) 30 cm (C) 35 cm (D) 40 cm (E) 45 cm

14 Four cousins are 3, 8, 12 and 14 years old. Emma is younger than Rita. The sum of the ages of Zita and Emma is divisible by 5, as is the sum of the ages of Zita and Rita. How old is Ina (the 4th cousin)?

- (A) 14 (B) 12 (C) 8 (D) 2017 (E) 3

15 More than 800 people take part in the kangaroo-run. Amongst the participants 35 % are female. There are 252 more male than female participants. How many people in total are taking part in the run?

- (A) 802 (B) 810 (C) 822 (D) 824 (E) 840

16 Ria wants to write a number into each box. She has already written two numbers. The sum of all five numbers should be 35, the sum of the first three numbers should be 22, the sum of the last three numbers should be 25. What is the product Ria gets, if she multiplies the two numbers in the grey boxes?

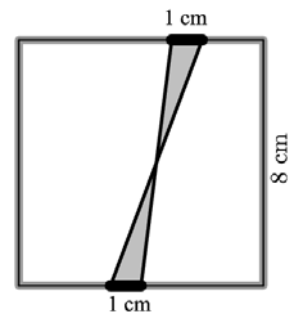


- (A) 63 (B) 108 (C) 0 (D) 48 (E) 39

17 Simon wants to cut a piece of wire into 9 equally long pieces and makes marks where he needs to make his cuts. Barbara wants to cut the same piece of wire into 8 equally long pieces and makes marks where she needs to make her cuts. Carl cuts the piece of wire at every mark. How many pieces does Carl get?

- (A) 15 (B) 16 (C) 17 (D) 18 (E) 19

18 Two 1 cm long segments are marked on opposite sides of a square with side length 8 cm. The end points of the segments are connected with each other as shown in the diagram. How big is the area of the grey part?



- (A) 2 cm² (B) 4 cm² (C) 6.4 cm² (D) 8 cm² (E) 10 cm²

19 Tycho plans his running training. Each week he wants to go for a run on the same weekdays. He never wants to go for a run on two consecutive days. But he wants to go for a run two days a week. How many different weekly plans meet those conditions?

- (A) 16 (B) 14 (C) 12 (D) 10 (E) 8

20 Emily wants to insert nine numbers into the 3 x 3 table so that the sum of the numbers in two adjacent cells (with a common side) is always the same. She has already written two numbers into the table. How big is the sum of all nine numbers?

2		
		3

- (A) 18 (B) 20 (C) 21 (D) 22 (E) 23

- 5 Points Questions -

21 If you measure the angles of a triangle, you obtain three different natural numbers. What is the smallest possible sum of the biggest and the smallest angle of the triangle?

- (A) 61° (B) 90° (C) 91° (D) 120° (E) 121°

22 There are 10 kangaroos in a row, as seen in the picture. Two kangaroos, that are standing next to each other and can see each other are allowed to change places by hopping past each other. This is carried out until no more jumps are allowed. How often do two kangaroos swap places?



- (A) 15 (B) 16 (C) 18 (D) 20 (E) 21

23 Diana adds either 2 or 5 to every whole number from 1 to 9. She wants to achieve as few different sums as possible. What is the minimum number of different values she obtains?

- (A) 5 (B) 6 (C) 7 (D) 8 (E) 9

24 Every three minutes a bus is leaving the airport to drive to the city centre. A car leaves the airport at the same time as a bus and travels the same route as the bus to the city centre. Every bus takes 60 minutes for the journey from the airport to the city centre, the car only 35 minutes.

How many buses does the car overtake on its way to the city centre? The bus that starts at the same time as the car does not count.

- (A) 8 (B) 9 (C) 10 (D) 11 (E) 13

25 The diagram shows Maria's square tablecloth to scale. All small light squares are equally big and their diagonals are parallel to the sides of the table cloth.

Which part of the whole table cloth is black?

- (A) 16 % (B) 24 % (C) 25 % (D) 32 % (E) 36 %

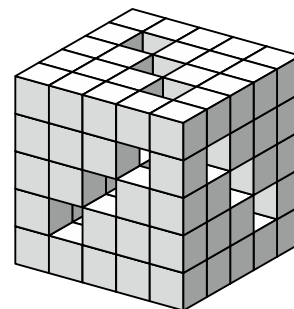


26 The number sequence 2, 3, 6, 8, 8, ... is created by the following rule: The first two digits are 2 and 3. After that every subsequent digit is the unit digit of the product of the two previous digits. Which digit is the 2017th digit of the sequence?

- (A) 2 (B) 3 (C) 4 (D) 6 (E) 8

27 Mike has 125 small, equally big cubes. He glues some of them together in such a way that one big cube with exactly nine tunnels is created (see diagram). The tunnels go all the way straight through the cube. How many of the 125 cubes is he not using?

- (A) 52 (B) 45 (C) 42 (D) 39 (E) 36



28 Two runners are training at the same time on a 720 m long, round running track. They run with constant speed in opposite directions. The first runner needs four minutes for one lap, the second five minutes.

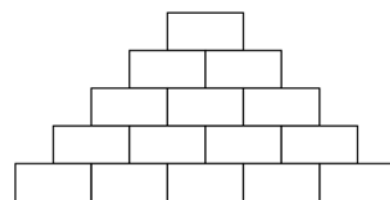
How many meters does the second runner run in between two consecutive meetings of the two runners?

- (A) 355 (B) 350 (C) 340 (D) 330 (E) 320

29 Sarah wants to write a positive whole number onto every tile in the number wall shown, so that every number is equal to the sum of the two numbers on the tiles that are directly below.

What is the maximum number of odd numbers Sarah can write on the tiles?

- (A) 5 (B) 7 (C) 8 (D) 10 (E) 11



30 The parallelogram has area 1. The two diagonals intersect each other at point M. Another point P lies on the side DC. E is the point of intersection of the segments AP and BD, and F is the point of intersection of the segments BP and AC. What is the area of the quadrilateral EMFP, if the sum of the areas of the triangles AED and BFC is $\frac{1}{3}$?

- (A) $\frac{1}{6}$ (B) $\frac{1}{8}$ (C) $\frac{1}{10}$ (D) $\frac{1}{12}$ (E) $\frac{1}{14}$

