KÄNGURU DER MATHEMATIK 2022
17. 3. 2022

Level: Kadett, Grades 7 - 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 questions left unanswered: 0 points
each incorrect answer: minus ¼ of the points for the question

Please write the letter (A, B, C, D, E) of the correct answer in the square under the question number (1 bis 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

pwc

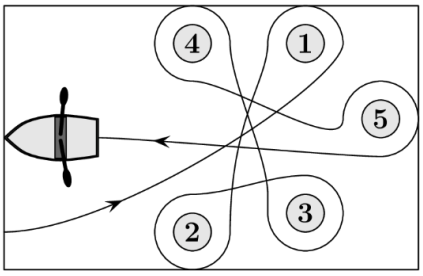
Information über den Känguruwettbewerb: www.kaenguru.at
Wenn du mehr in dieser Richtung machen möchtest,
gibt es die Österreichische Mathematikolympiade.
Infos unter: www.oemo.at

Känguru der Mathematik 2022
Level Kadett (Schulstufe 7 and 8)
Austria – 17. 3. 2022

- 3 Point Examples -

1. What is (20+22) ÷ (20−22) = ?

(A) -42 (B) -21 (C) -2 (D) 22 (E) 42

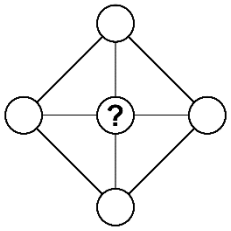


2. Meike paddles around five buoys with her boat (see diagram).
Which of the buoys does she paddle around in a clockwise direction?

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

3. Beate arranges the five cards so that the smallest nine-digit number is created. Which card is furthest on the right?

(A) 4 (B) 8 (C) 31 (D) 59 (E) 107



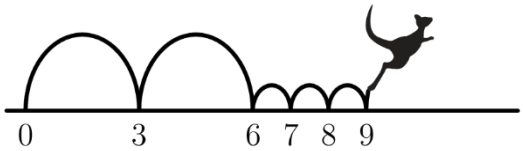
4. The numbers 3, 4, 5, 6, 7 are written inside the five circles of the shape. The product of the numbers in the four outer circles is 360. Which number is in the inner circle?

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

5. Anna, Beatrice and Clara altogether are 15 years old. Anna and Beatrice together are 11 years old. Beatrice and Clara together are 12 years old. How old is the oldest of the three?

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

6. Kengu likes to jump on the number line. He starts at 0, then always starts with two big jumps and then three small jumps (see diagram). He keeps repeating this in the same way, over and over again.
On which of the following numbers will he land in the course of his jumps?



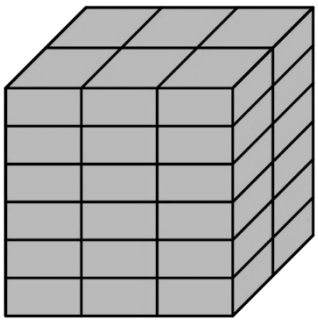
(A) 82 (B) 83 (C) 84 (D) 85 (E) 86

7. Otto attaches the number plate to his car the wrong way round, i.e. upside down. Luckily it doesn't matter because the number plate looks exactly the same this way.
Which of the following number plates could be the one from Otto?

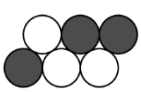
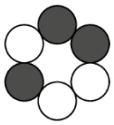
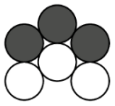
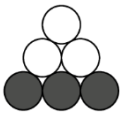
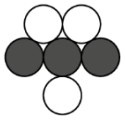
(A) 04 NSN 40 (B) 60 SOS 09 (C) 80 BNB 08 (D) 06 HNH 60 (E) 08 NBN 80

8. Sonja builds the cube shown, out of equally sized bricks. The shortest side of one brick is 4 cm long. What dimensions in cm does one brick have?

(A) $4 \times 6 \times 12$ (B) $4 \times 6 \times 16$ (C) $4 \times 8 \times 12$ (D) $4 \times 8 \times 16$ (E) $4 \times 12 \times 16$



9. The black-white caterpillar shown, rolls up to go to sleep. 
Which diagram could show the rolled-up caterpillar?

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

10. Gerhard writes down the sum of the squares of two numbers. Unfortunately, some ink has run out (see diagram) and therefore we cannot read all the digits.
What is the last digit of the first number?

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

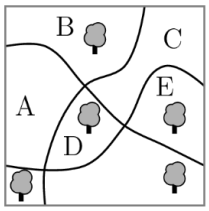
- 4 Point Examples -

11. There are five gaps in the following calculation. Adriana wants to write a „+“ into four of the gaps and a „−“ into one of the gaps so that the equation is correct. Where does she have to insert the „−“?

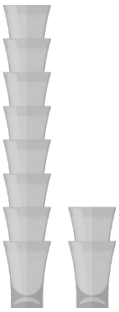
$$6\square 9\square 12\square 15\square 18\square 21=45$$

(A) between 6 and 9 (B) between 9 and 12 (C) between 12 and 15
(D) between 15 and 18 (E) between 18 and 21

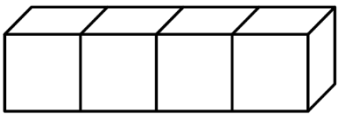
12. There are 5 trees and 3 paths in a park as shown on the map. Another tree is planted so that there is an equal number of trees on both sides of each path.
In which section of the park will the new tree be planted?
(A) A (B) B (C) C (D) D (E) E



13. The distance between two shelves in Monika's kitchen is 36 cm. She knows that a stack of 8 identical glasses is 42 cm high and a stack of 2 such glasses is 18 cm high.
How many glasses has the biggest stack that will fit between two shelves?
(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

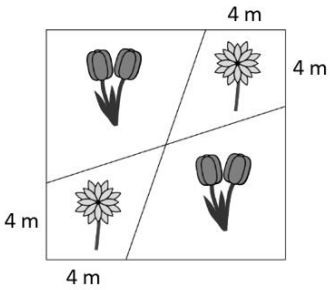


14. On an ordinary die the numbers on opposite sides always add up to 7. Four such dice are glued together as shown. All numbers that can still be seen on the outside of the solid are added together. What is the minimum of that total?
(A) 52 (B) 54 (C) 56 (D) 58 (E) 60



15. How many integers between 100 and 300 have only odd digits?
(A) 25 (B) 50 (C) 75 (D) 100 (E) 150

16. Gardener Toni plants tulips  and sunflowers  in a square flowerbed with side length 12 m, as shown in the diagram. How big is the entire area where sunflowers are planted?
(A) 36 m² (B) 40 m² (C) 44 m² (D) 46 m² (E) 48 m²

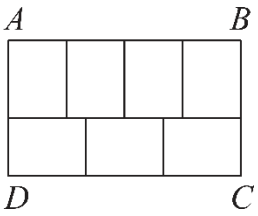


17. There are two clocks in my office. One of which is one minute fast every hour and the other one is two minutes behind every hour. Yesterday I have set them both on the correct time but when I checked today, one clock said 11:00 and the other 12:00.
At what time did I set the time yesterday?
(A) 23:00 (B) 19:40 (C) 15:40 (D) 14:00 (E) 11:20

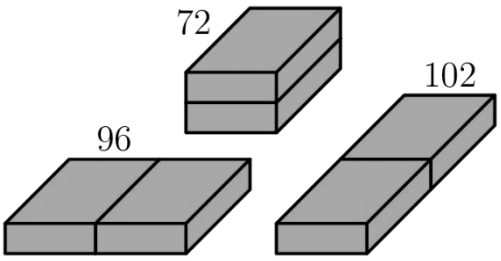
18. Werner has written some numbers on a piece of paper whose sum is 22. Ria has then subtracted each number from 7 and has also written down the results.
The sum of Ria's numbers is 34. How many numbers has Werner written down?
(A) 7 (B) 8 (C) 9 (D) 10 (E) 11

19. The big rectangle *ABCD* is made up of 7 congruent smaller rectangles (see diagram).
What is the ratio $\frac{AB}{BC}$?

(A) $\frac{1}{2}$ (B) $\frac{4}{3}$ (C) $\frac{8}{5}$ (D) $\frac{12}{7}$ (E) $\frac{7}{3}$



20. Two identical bricks can be placed side by side in three different ways as shown in the diagrams. The surface areas of the resulting cuboids are 72, 96 and 102 cm².
What is the surface area (in cm²) of one brick?
(A) 36 (B) 48 (C) 52 (D) 54 (E) 60



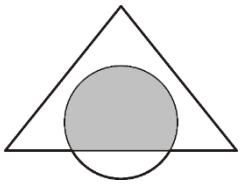
- 5 Point Examples -

21. Jenny writes numbers into a 3×3 table so that the sums of the four numbers in each 2×2 area of the table are the same. The numbers in three of the cells in the corner can already be seen in the diagram. Which number does she write into the cell in the fourth corner?

2		4
?		3

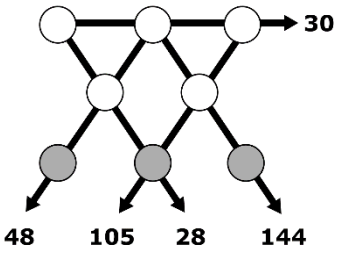
(A) 0 (B) 1 (C) 4 (D) 5 (E) 6

22. A shape is made up of a triangle and a circle that partially overlap.
The grey area is 45 % of the entire area of the shape.
The white part of the triangle is 40 % of the total area of the shape.
What percent of the area of the circle is the white part, outside the triangle?



(A) 20 % (B) 25 % (C) 30 % (D) 35 % (E) 50 %

23. The numbers 1 to 8 are written into the circles shown so that there is one number in each circle. Along each of the five straight arrows the three numbers in the circles are multiplied. Their product is written next to the tip of the arrow. How big is the sum of the numbers in the three circles on the lowest row of the diagram?



(A) 11 (B) 12 (C) 15 (D) 17 (E) 19

24. By bike it takes Marc 20 minutes to go from home to school and back. He rides the entire distance with a constant speed. By foot it takes him 60 minutes for the same distance. He also walks with a constant speed.
Yesterday Marc took his bike to go to Eva's house which is on the way to school. He left the bike there and continued on foot to school. On the way home he first walked to Eva's house and then cycled the rest of the way back home. He needed 52 minutes for the entire journey (from home to school and back home). Which part of his journey did he cover by bike?

(A) $\frac{1}{6}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

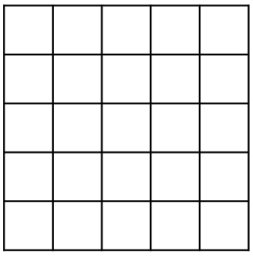
25. The four villages *A, B, C* and *D* are situated (not necessarily in this order) along a straight road. The villages *A* and *C* are 75 km away from each other, *B* and *D* 45 km away from each other and *B* and *C* 20 km away from each other. Which of the following distances **cannot** be the distance from *A* to *D*?

(A) 10 km (B) 50 km (C) 80 km (D) 100 km (E) 140 km

26. A painter wants to mix 2 litres of blue paint with 3 litres of yellow paint to obtain 5 litres of green paint. He accidentally uses 3 litres of blue paint and 2 litres of yellow paint and thus produces the wrong shade of green. What is the minimum amount of this green paint he has to throw away so that he can use the rest to add blue or yellow paint in order to get exactly 5 litres of the correct shade of green?

(A) $\frac{5}{3}$ litre (B) $\frac{3}{2}$ litre (C) $\frac{2}{3}$ litre (D) $\frac{3}{5}$ litre (E) $\frac{5}{9}$ litre

27. What is the minimum number of cells of a 5×5 grid that have to be coloured in so that every possible 1×4 rectangle and every 4×1 rectangle respectively in the grid has at least one cell coloured in?



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

28. Mowgli asks a bear and a panther which day of the week it is. The bear always lies on Monday, Tuesday and Wednesday. The panther always lies on Thursday, Friday and Saturday. On all other days they both always speak the truth. The bear says: „Yesterday was one of my lying days." The panther says: „Yesterday was also one of my lying days." On which day of the week did this conversation take place?

(A) Thursday (B) Friday (C) Saturday (D) Sunday (E) Monday

29. Some points are marked on a straight line. Renate marks another point between every pair of adjacent points. She repeats this process three more times.
Now 225 points are marked on the straight line. How many points were there to begin with?

(A) 10 (B) 12 (C) 15 (D) 16 (E) 25

30. In total there are 2022 kangaroos and some koalas living within seven parks. As many kangaroos live in each park as there are koalas in all other parks together. How many koalas in total live in the seven parks?

(A) 288 (B) 337 (C) 576 (D) 674 (E) 2022