Mathematics Kangaroo 2012
Group Kadett (Grades 7./8.)
Austria - 15.3.2012

- 3 Point Questions -

1. Three bars of chocolate cost 6 €. How much is one bar of chocolate?
(A) 1 €   (B) 2 €   (C) 3 €   (D) 4 €   (E) 5 €

2. $11.11 - 1.111 =$
(A) 9.009   (B) 9.0909   (C) 9.99   (D) 9.999   (E) 10

3. A wristwatch lies on the table with its face upwards. The minute hand points towards north-east. How many minutes have to pass for the minute hand to point towards north-west for the first time?
(A) 45   (B) 40   (C) 30   (D) 20   (E) 15

4. Eva has a pair a scissors and five letters made from cardboard. She cuts up each letter with a single straight cut so that as many pieces as possible are obtained. For which letter does she obtain the most pieces?

(A) O   (B) F   (C) S   (D) H   (E) M
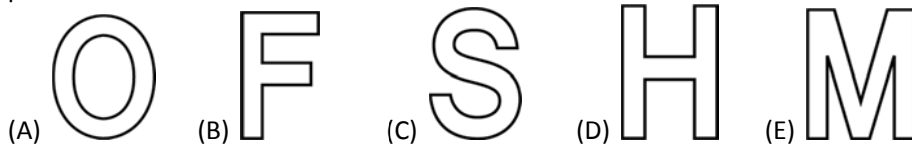
5. The digit sum of a six-digit number is 5. How big is the product of the digits?
(A) 0   (B) 5   (C) 6   (D) $1 \times 2 \times 3 \times 4 \times 5 \times 6$ (E) 4

6. A dragon has 5 heads. Each time someone chops off one head, 5 new heads are grow back. If 6 heads are chopped off one after the other, how many heads does the dragon end up with?
(A) 25   (B) 28   (C) 29   (D) 30   (E) 31

7. Each of the nine paths in a park are 100 m long. Anna wants to walk from A to B without using the same path twice. How long the longest path she can choose?
(A) 900 m   (B) 800 m   (C) 700 m   (D) 500 m   (E) 400 m
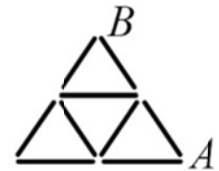
8. One vertex of the triangle on the left is connected to one vertex of the triangle on the right using a straight line so that no connecting line segment dissects either of the two triangles into two parts. In how many ways is this possible?
(A) 1   (B) 2   (C) 3   (D) 4   (E) more than 4
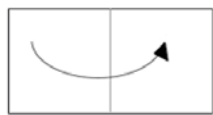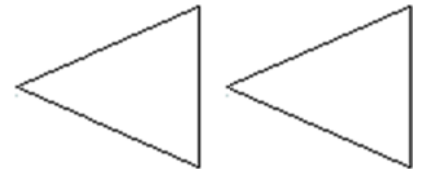
9. Werner folds a piece of paper as shown in the diagram. With a pair of scissors he makes two straight cuts into the paper. Then is unfolds it again. Which on the following shapes are not possible for the piece of paper to show afterwards?

(A)   (B)   (C)   (D)   (E)
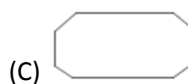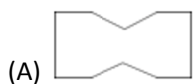
10. A cuboid consists of three building blocks. Each building block has a different colour and is made up of 4 cubes. What does the white building block look like?

(A)   (B)   (C)   (D)   (E)
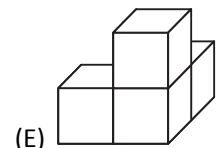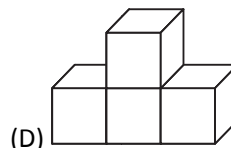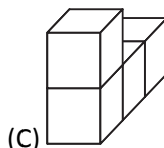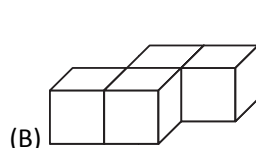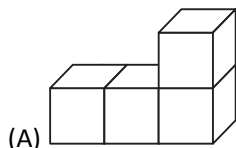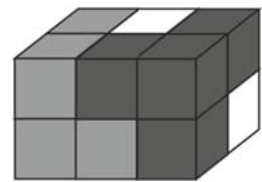
11. From the digits 1, 2, 3, 4, 5, 6, 7, 8 we form two four-digit numbers so that every digit is used exactly once and the sum of the two numbers is as small as possible. What is the value of this sum?

(A) 2468   (B) 3333   (C) 3825   (D) 4734   (E) 6912

12. Ms. Green plants peas ("Erbsen") and strawberries ("Erdbeeren") only in her garden. This year she has changed her pea-bed into a square-shaped bed by increasing one side by 3 m. By doing this her strawberry-bed became 15 m^2 smaller. What area did the pea-bed have before?

alte Beete

Erbsen
Erdbeeren

neue Beete

Erbsen
Erdbeeren

(A) 5 m^2 (B) 9 m^2 (C) 10 m^2 (D) 15 m^2 (E) 18 m^2

13. Barbara wants to complete the grid shown on the right by inserting three numbers into the empty spaces. The sum of the first three numbers should be 100, the sum of the middle three numbers 200 and the sum of the last three numbers 300. Which is the middle number in this grid?

10			130

(A) 50   (B) 60   (C) 70   (D) 75   (E) 100

14. The diagram shows a five-pointed star. How big is the angle A?

(A) 35°   (B) 42°   (C) 51°   (D) 65°   (E) 109°
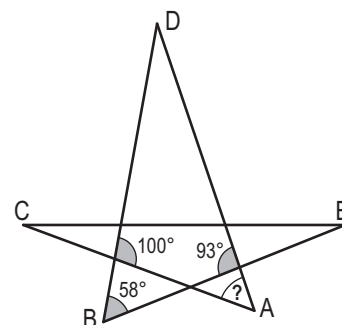
15. Take four cards and on each one write one of the numbers 2, 5, 7, 12. On the back of each card write one of the following properties: "divisible by 7", "prime number", "odd", "greater than 100" so that the number on the other side does not have this property. Every number and every property is used exactly once. Which number is on the card with the property "greater than 100"?

(A) 2   (B) 5   (C) 7   (D) 12   (E) It is impossible to state the number.

16. How many natural numbers n are there for which n − 24 and n + 24 are two-digit numbers?

(A) 42   (B) 48   (C) 51   (D) 52   (E) 66

17. In which of the following expressions can one exchange each number 8 with 8 different sets of equal positive numbers without changing the result?

(A) $(8 + 8) \div 8 + 8$ (B) $8 \times (8 + 8) \div 8$ (C) $8 + 8 - 8 + 8$ (D) $(8 + 8 - 8) \times 8$ (E) $(8 + 8 - 8) \div 8$

18. Three equally sized equilateral triangles are cut from the vertices of a large equilateral triangle of side length 6cm . The three little triangles together have the same perimeter as the remaining grey hexagon. What is the side-length of one side of one small triangle?

(A) 1 cm   (B) 1.2 cm   (C) 1.25 cm   (D) 1.5 cm   (E) 2 cm
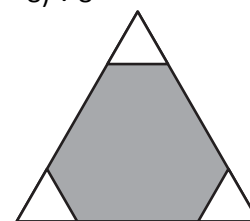
19. The lazy tomcat Garfield observes some mice stealing cheese. Each mouse carries away at least one piece of cheese but less than ten pieces. Each mouse steales a different amount of cheese pieces. No mouse steals exactly twice as many pieces as another mouse. What is the maximum number of mice Garfield can have observed?

(A) 4   (B) 9   (C) 6   (D) 7   (E) 8

20. At an airport there is a "rolling pavement" which is 500 m long and transports people with a speed of 4 km/h. Anna and Peter step onto the rolling pavement at the same time. While Peter is standing still, Anna continues to walk with a speed of 6 km/h. How big is Anna's head start on Peter when she leaves the rolling pavement after 500 m?

(A) 100 m   (B) 160 m   (C) 200 m   (D) 250 m   (E) 300 m

21. Initially the side length of a talking magic square is 8 cm. Every time it speaks the truth its sides each decrease by 2 cm. If it lies its perimeter doubles. It says four sentences, two of which are true and two are false, in which order is unknown. What is the biggest possible perimeter it can have after those four sentences?

(A) 28   (B) 80   (C) 88   (D) 112   (E) 120

22. The diagram shows the 7 positions 1, 2, 3, 4, 5, 6, 7 of the bottom side of a die which is rolled around its edge in this order. Which two of these positions were taken up by the same face of the die?

(A) 1 and 7   (B) 1 and 6   (C) 1 and 5   (D) 2 and 7   (E) 2 and 6
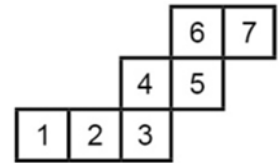
23. Stefan has 5 dice in different sizes. If he places them in order next to each other from smallest to biggest then the height of two neighbouring dice each differ by 2 cm. The biggest die is as big as the tower build by the two smallest dice. How high is a tower made up of all 5 dice?

(A) 6 cm   (B) 14 cm   (C) 22 cm   (D) 44 cm   (E) 50 cm

24. In a square ABCD M is the midpoint of AB. MN is perpenticular to AC. Determine the ratio of the area of the grey triangle to the area of the square ABCD.

(A) 1:6   (B) 1:5   (C) 7:36   (D) 3:16   (E) 7:40
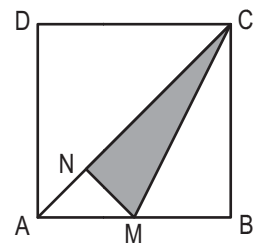
25. Tango is being danced in pairs, a man with a woman. No more than 50 people attend a dance evening. At a certain moment 3/4 of the men were dancing with 4/5 of the women. How many people were dancing at this moment?

(A) 20   (B) 24   (C) 30   (D) 31   (E) 32

26. David wants to place the twelve numbers from 1 to 12 in a circle so that two adjacent numbers always differ by 2 or 3. Which numbers are therefore adjacent?

(A) 4 and 6   (B) 3 and 5   (C) 7 and 9   (D) 6 and 8   (E) 5 and 8

27. Wanted are all three-digit numbers from 100 to 999 that have the following property: If you remove the first digit a square number remains and if you remove the last digit again a square number remains (e.g. 164 – (1)64 – 16(4)). How big is the sum of all numbers with this special property?

(A) 1013   (B) 1177   (C) 1465   (D) 1993   (E) 2016

28. There are 30 chapters in a book. Each chapter has a different length, i.e. 1, 2, 3, …, 30 pages. Each chapter starts on a new page. The first chapter starts on page 1. At most how many chapters start on a page with an odd page number?

(A) 15   (B) 18   (C) 20   (D) 21   (E) 23

29. A piece of string is folded as shown in the diagram by folding it in the middle, then folding it in the middle again und finally folding it in the middle once more. Then this folded piece of string is cut so that several pieces emerge. Amongst the resulting pieces there are some with length 4 m and some with length 9 m. Which of the following lengths cannot be the total length of the original piece of string?

(A) 52 m   (B) 68 m   (C) 72 m   (D) 88 m   (E) All answers are possible.

30. Three lines disect a big triangle into four triangles and three quadrilaterals. The sum of the perimeters of the three quadrialterals is 25 cm. The sum of the perimeters of the four triangles is 20 cm. The perimeter of the big triangle is 19 cm. How big is the sum of the lengths of the three dissecting lines?

(A) 11 cm   (B) 12 cm   (C) 13 cm   (D) 15 cm   (E) 16 cm