International Kangaroo Mathematics Contest 2010

Junior Level: Class (9 & 10) **Max Time: 3 Hours**

3-point *problems*

Q1) Which of these is the result when 20102010 is divided by 2010?

A) 11 B) 101 C) 1001 D) 10001 E) not an integer number

Q2) Ivan gained 85 % of all points in a test; Tibor gained 90 % of all points in the same test. However, he gained only one point more than Ivan did. What was the maximum number of points in this test?

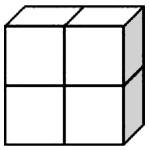
A) 5 B) 17 C) 18 D) 20 E) 25

Q3) If both rows have the same sum, what is the value of *?

1	2	3	4	5	6	7	8	9	10	2010
11	12	13	14	15	16	17	18	19	20	*

A) 1010 B) 1020 C) 1910 D) 1990 E) 2020

Q4) The solid in the diagram picture is formed of four identical cubes. Surface of each of the cubes is 24 cm^2. What is the surface of the solid?

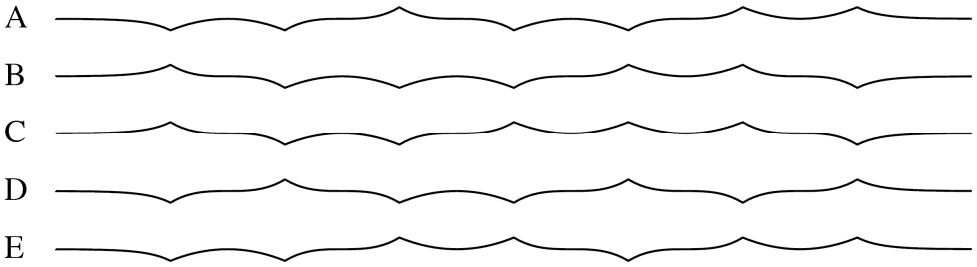


A) 80 cm^2 B) 64 cm^2 C) 40 cm^2 D) 32 cm^2 E) 24 cm^2

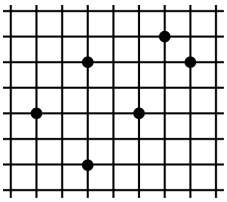
Q5) Every birthday, Roza receives as many flowers as her age in years. She dries and keeps the flowers and now has 120 flowers. How old is she?

A) 10 B) 12 C) 14 D) 15 E) 20

Q6) A paper strip was folded three times in half and then completely unfolded such that you can still see the 7 folds going up or down. Which of the following views from the side cannot come out this way?

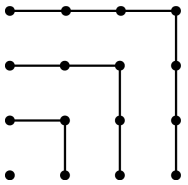


Q7) 6 points are marked at nodes of a squared sheet of paper. What geometrical figure cannot have all its vertices among these points?



A) square
B) parallelogram but not rhombus
C) trapezoid
D) obtuse triangle
E) all the figures A – D can

Q8) From the picture, we can see that
$1 + 3 + 5 + 7 = 4 \times 4$.
What is the value of $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$?

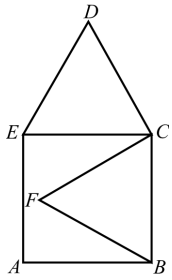


A) 14 x 14 B) 9 x 9 C) 4 x 4 x 4 D) 16 x 16 E) 4 x 9

Q9) Brigitte goes to Verona on vacation, and plans to cross each of the five famous old bridges over the river Adige at least once. She starts walking from the train station, and when she returns there, she has crossed all of these bridges and no other. During her walk she crossed the river n times. Which is a possible value for *n*?

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

Q10) *ABCE* is a square and *BCF* and *CDE* are equilateral triangles. If *AB* is of length 1, what is the length of *FD*?



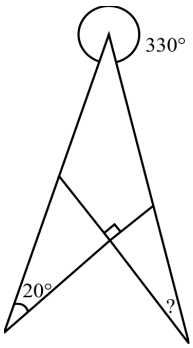
A) $\sqrt{2}$ B) $\frac{\sqrt{3}}{2}$ C) $\sqrt{3}$ D) $\sqrt{5}-1$ E) $\sqrt{6}-1$

4-point *problems*

Q11) My teacher said that the product of his age and his father's age is 2010. In what year my teacher born?

A) 1943 B) 1953 C) 1980 D) 1995 E) 2005

Q12) What is the value of angle marked with a question mark?

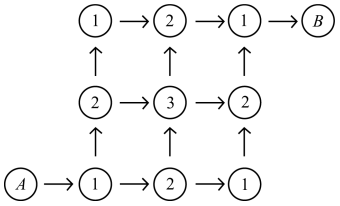


A) 10º B) 20º C) 30º D) 40º E) 50º

Q13) How many integers are there, such that the sum of their digits is 2010 and the product of their digits is 2?

A) 2010 B) 2009 C) 2008 D) 1005 E) 1004

Q14) In the figure we have to go from circle A to circle B following the arrows. On each walk we compute the sum of all numbers we passed through. How many different sums can we get?

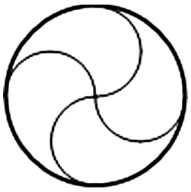


A) 1 B) 2 C) 3 D) 4 E) 6

Q15) Three Tuesdays of a month coincided with even dates. What day of a week was the 21st day of this month?

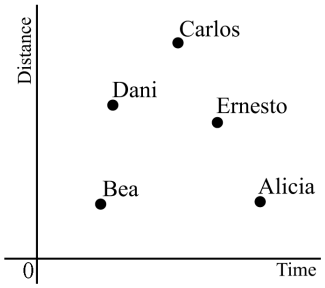
A) Wednesday B) Thursday C) Friday D) Saturday E) Sunday

Q16) A circle of radius 4 cm is divided into four congruent parts by arcs of radius 2 cm as shown. What is the perimeter of one of the resulting parts?



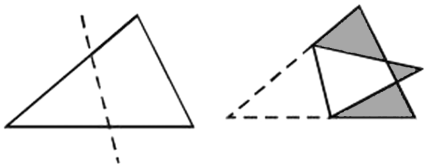
A) 2π B) 4π C) 6π D) 8π E) 12π

Q17) The scatter graph shows the distance run and time taken from some time-trials run by 5 students. Who was the fastest?



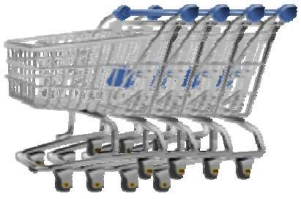
A) Alicia B) Bea C) Carlos D) Dani E) Ernesto

Q18) A triangle is folded along the dotted line to obtain a figure as shown in the picture. The area of the triangle is 1.5 times that of the resulting figure. Given that the total area of the three shaded regions is 1. Find the area of the original triangle.



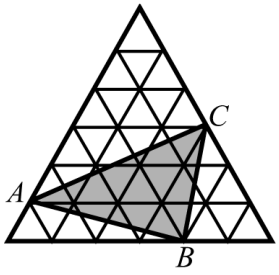
A) 2 B) 3 C) 4 D) 5 E) impossible to determine

Q19) In a supermarket trolley park, there are two lines of tightly-packet trolleys. The first line has ten trolleys and is 2.9 m long. The second line has twenty trolleys and is 4.9 m long. What is the length of one trolley?



A) 0.8 m B) 1 m C) 1.1 m D) 1.2 E) 1.4

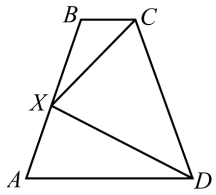
Q20) The big equilateral triangle consists of 36 smaller equilateral triangles with area 1 cm^2 each. Find the area of ΔABC.



A) 11 cm^2 B) 12 cm^2 C) 13 cm^2 D) 14 cm^2 E) 15 cm^2

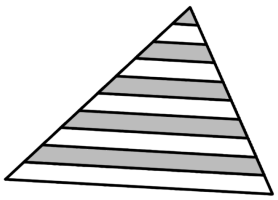
5-point *problems*

Q21) In an isosceles trapezoid *ABCD*, *X* is the midpoint of the lateral side *AB*, *BX* = 1, and ∠*CXD* = 90°. Find the perimeter of the trapezoid *ABCD*.



A) 5 B) 6 C) 7 D) 8 E) impossible to determine

Q22) Lines parallel to the base divide each of the other two sides of the triangle shown into 10 equal segment.
Which percentage of the area of triangle is grey?



A) 41.75% B) 42.5% C) 45% D) 46% E) 47.5%

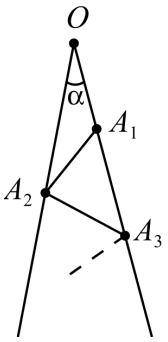
Q23) For how many integers n ($1 \le n \le 100$) is the number n^n a perfect square?

A) 5 B) 50 C) 55 D) 54 E) 15

Q24) Six-, seven- and eight-legged octopus serve the underwater king. Those who have got 7 legs always lie, but those with 6 or 8 legs - always tell the truth. One day four octopuses met. The blue one said: «Altogether we've got 28 legs», the green one said: «Altogether we've got 27 legs», the yellow one said: «Altogether we've got 26 legs», the red one said: «Altogether we've got 25 legs». How many legs has the red octopus got?

A) 6 B) 7 C) 8 D) 6 or 8 E) impossible to determine

Q25) In the figure, ∠α = 7° and the segments OA_1, A_1A_2, A_2A_3, ... are all equal. What is the greatest number of segments that can be drawn in this way?



A) 10 B) 11 C) 13 D) 25 E) as many as we wish

Q26) In a sequence the first 3 elements are 1,2 and 3. From the 4th element on the next elements is calculated from the previous 3 elements, the third of them was subtracted from the sum of the 1st and the 2nd one: 1, 2, 3, 0, 5, –2, 7, … What is the 2010th element of the sequence?

A) –2006 B) 2008 C) –2002 D) –2004 E) other answer

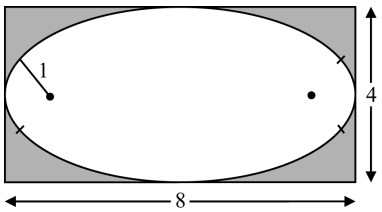
Q27) On each side of a pentagon there is a natural number such that adjacent numbers never have a common divisor greater than 1 and non-adjacent numbers always have a common divisor greater than 1. There are several possibilities, but one of the following numbers will never occur on any of the sides of the pentagon. Which one is it?

A) 16 B) 18 C) 19 D) 21 E) 22

Q28) How many 3-digit integers have the property that their central digit is the average of the other two?

A) 9 B) 16 C) 25 D) 41 E) 45

Q29) An oval is built by four arcs of circles. The arcs on the left and right are the same and also the arcs above and below. The oval has vertical and horizontal line of symmetry. The oval fits exactly in a rectangle of length 4 x 8. The radius of the little arcs is 1. What is the radius of the big arcs?



A) 6 B) 6.5 C) 7 D) 7.5 E) 8

Q30) A bar-code of the type shown is composed of alternate strips of black and white, always beginning and ending with a black strip. Each strip (of either colour) has the width 1 or 2, and the total width of the bar code is 12. How many different codes are possible, always reading from left to right?

A) 24 B) 132 C) 66 D) 12 E) 116