



NAME _____

CLASS _____

Points: _____

Kangaroo leap: _____

Separate this answer sheet from the test. Write your answer under each problem number.

A right answer gives 3, 4 or 5 points. Every problem has exactly one right answer.

For each wrong answer, $\frac{1}{4}$ of the points of the problem will be deducted, for example for a 4-point problem -1 point. If you leave the answer empty, no deduction will be made.

There are two goals: to score as many points as possible or to have as many consecutive right answers as possible (Kangaroo leap).

3 points

PROBLEM	1	2	3	4	5	6	7	8	9	10
ANSWER										

4 points

PROBLEM	11	12	13	14	15	16	17	18	19	20
ANSWER										

5 points

PROBLEM	21	22	23	24	25	26	27	28	29	30
ANSWER										

Contest not to be held before 16th of March.

Logo design by Petra Siilanen.

3 points

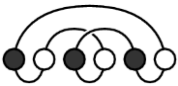
1.

$$\frac{20 \cdot 17}{2 + 0 + 1 + 7} =$$

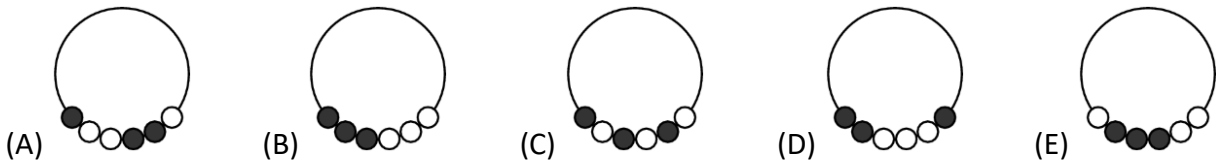
- (A) 3,4 (B) 17 (C) 34 (D) 201,7 (E) 340

2.

Here is a necklace:



Which of the following is the same necklace?



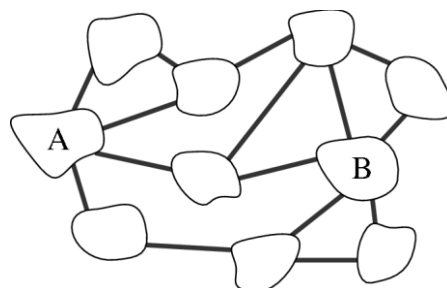
3.

Robin is building a model railway in H0-scale (that is in scale 1 : 87). In the model, there is a 2.00 cm tall human character. How tall would the actual human be?

- (A) 1.74 m (B) 1.62 m (C) 1.86 m (D) 1.94 m (E) 1.70 m

4.

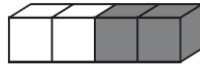
In the figure you see 10 islands connected by 15 bridges. At least how many bridges must be demolished so that island B cannot be reached from island A by bridges?



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

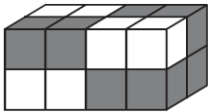
5.

Leo has 4 x 1 x 1 - blocks like this:

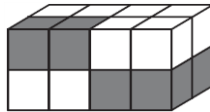


Which of the following bodies can he build using four such blocks?

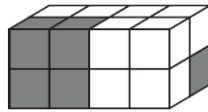
(A)



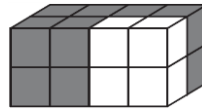
(B)



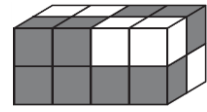
(C)



(D)



(E)



6.

Brita wrote the word KANGAROO on a piece of glass as in the figure.



Which of the following is the same piece of glass flipped over?

(A)



(B)



(C)



(D)



(E)



7.

A group of students is sitting around a bonfire. Marie is fifth to the left from Vinski and eighth to the right from Vinski. How many students are there in total?

(A) 11

(B) 12

(C) 13

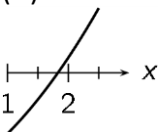
(D) 14

(E) 15

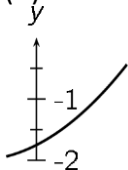
8.

Four of the following figures are clipped from the graph of the same quadratic function. Which one is not?

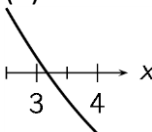
(A)



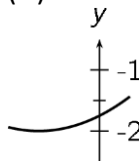
(B)



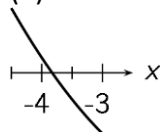
(C)



(D)

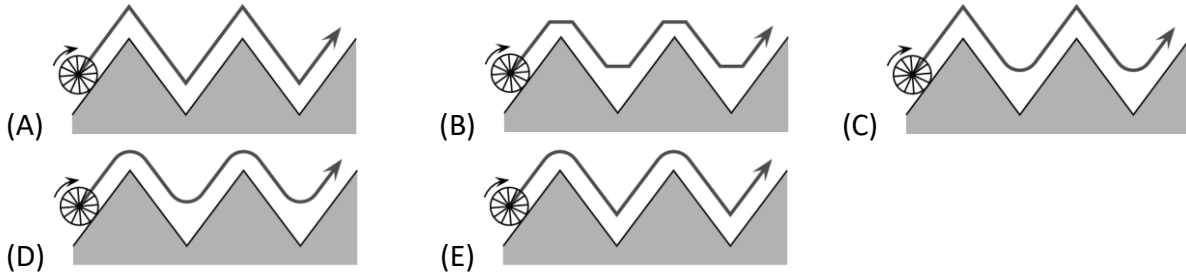


(E)



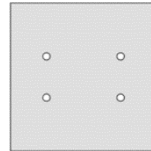
9.

A wheel crosses over terrain. Which of the figures best describes the route of the center of the wheel?

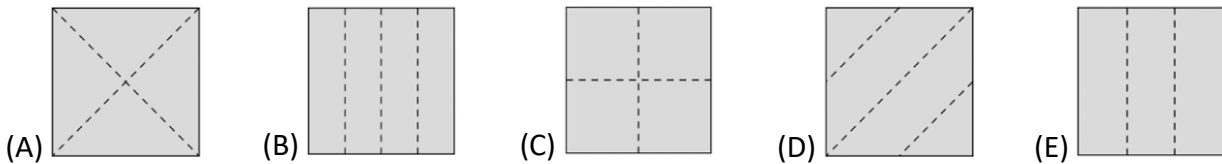


10.

Lilli folded a piece of paper and cut one hole through it. After unfolding, the paper looked like this:



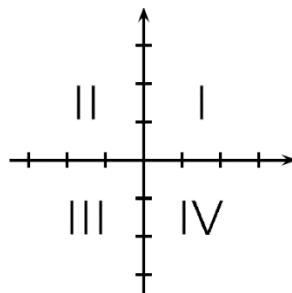
How was the paper folded?



4 points

11.

Which quarter of the xy -plane contains no points of the graph of the function $f(x) = -3,5x + 7$?



- (A) I (B) II (C) III (D) IV (E) They all contain points of the graph.

12.

The number p is smaller than 1 but positive. The number q is greater than 1. Which of the following numbers is the largest?

- (A) $p \cdot q$ (B) $p + q$ (C) $\frac{p}{q}$ (D) p (E) q

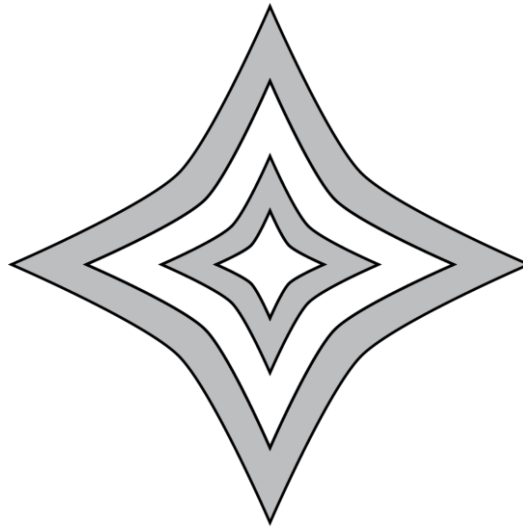
13.

When the graphs of the following functions are drawn, which one of them has the most points in common with the graph of $f(x) = x$?

- (A) $g_1(x) = x^2$ (B) $g_2(x) = x^3$ (C) $g_3(x) = x^4$ (D) $g_4(x) = -x^4$ (E) $g_5(x) = -x$

14.

Elias drew stars in side each other as in the figure. The areas of the stars are 1 cm^2 , 4 cm^2 , 9 cm^2 and 16 cm^2 . How large is the shaded area?



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

15.

Abdulwahhab offers you sweets from a box that contains 203 red, 117 white and 28 blue sweets. How many sweets must you take to be sure to get at least 3 of the same colour?

- (A) 3 (B) 6 (C) 7 (D) 28 (E) 203

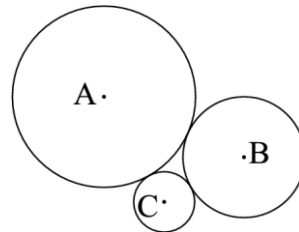
16.

Roope wants to go jogging three times a week, always on the same days. He does not want to run on two consecutive days. How many different schedules are possible?

- (A) 6 (B) 7 (C) 9 (D) 10 (E) 35

17.

Three circles with centers A, B and C are tangent to each other as in the figure. The radii of the circles are 3, 2 and 1. What is the area of the triangle ABC?



- (A) 6 (B) $4\sqrt{3}$ (C) $3\sqrt{2}$ (D) 9 (E) $2\sqrt{6}$

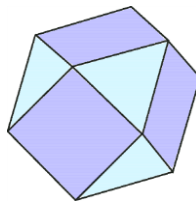
18.

For two consecutive positive integers the sums of their digits are calculated. Both sums turn out to be multiples of 7. At least how many digits does the smaller integer have?

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

19.

The polyhedron in the figure is formed of squares and triangles. Every square is surrounded by 4 triangles and every triangle by 3 squares. There are 6 squares in total. How many triangles are there?



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

20.

Joonas wants to fill in the following 3×3 -grid so that the sum of the numbers in any 2×2 -grid is constant. Some numbers are already filled in. Which number belongs to the place of the question mark?

3		1
2		?

- (A) 5 (B) 4 (C) 1 (D) 0 (E) there is more than one option

5 points

21.

How many positive integers exist such that when the last digit is erased, the resulting number is $1/14$ of the original?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) infinitely many

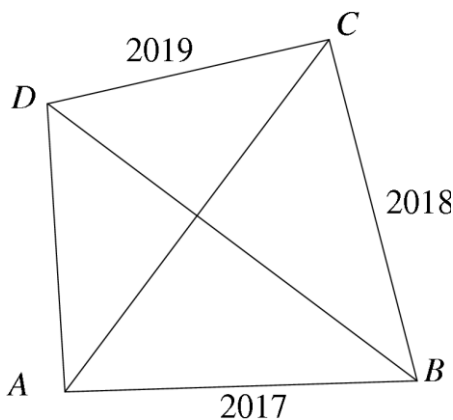
22.

Consider the sequence a_n , for which $a_1 = 2017$ and $a_{n+1} = \frac{a_n - 1}{a_n}$. What is a_{2017} ?

- (A) -2017 (B) $\frac{-1}{2016}$ (C) $\frac{2016}{2017}$ (D) 1 (E) 2017

23.

A convex quadrilateral ABCD has diagonals perpendicular to each other. The sides have lengths $|AB| = 2017$, $|BC| = 2018$ and $|CD| = 2019$. What is the length of AD ?



- (A) 2016 (B) 2018 (C) $\sqrt{2020^2 - 4}$ (D) $\sqrt{2018^2 + 2}$ (E) 2020

24.

You have 5 boxes, 5 black balls and 5 white balls. You put the balls to the boxes so that there is at least one ball in each box. How to maximize the probability that a random ball from a random box is black?

- (A) Put one black and one white ball to each box
- (B) Put all black balls to three boxes, and all white balls to the other two.
- (C) Put one white ball to each box and the black ones into one box.
- (D) Put all black balls into four boxes and the white ones to the fifth box.
- (E) Some other way.

25.

Oona tries to be a good little Kangaroo, but lying is too much fun. Therefore, every third thing she says is a lie and the rest is true. (Sometimes she starts with a lie and sometimes with one or two true statements.)

Oona is telling Elina of a two digit number she is thinking of:

"One of its digits is a 2."

"It is larger than 50."

"It is an even number."

"It is less than 30."

"It is divisible by three."

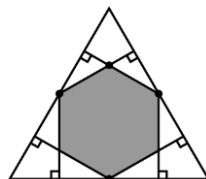
"One of its digits is a 7."

What is the sum of the digits of the number Oona is thinking of?

- (A) 9
- (B) 12
- (C) 13
- (D) 15
- (E) 17

26.

Six perpendiculars to the sides are drawn from the midpoints of the sides of an equilateral triangle (see figure). What fraction of the area of the initial triangle does the resulting hexagon cover?



- (A) $\frac{1}{3}$
- (B) $\frac{2}{5}$
- (C) $\frac{4}{9}$
- (D) $\frac{1}{2}$
- (E) $\frac{2}{3}$

