



3 points

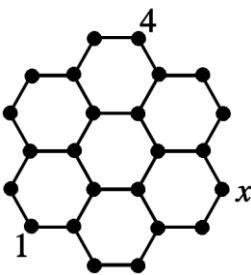
1.

In three games FC Kangaroo scored three goals and let one goal in. In these three games, the club won one game, drew one game and lost one game. What was the score in the game FC Kangaroo won?

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

2.

A number has to be written at each of the dots of the lattice shown so that the sum of the numbers at the ends of each line segment is the same.



Two of the numbers have already been written. What number goes in the place labelled x ?

- (A) 1
- (B) 3
- (C) 4
- (D) 5
- (E) more information is needed

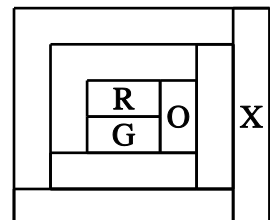
3.

Three sportsmen participated in a race: Michael, Fernando and Sebastian. Immediately after the start, Michael was in the lead, Fernando was second, and Sebastian third. During the race, Michael and Fernando changed places 9 times, Fernando and Sebastian did so 10 times, and Michael and Sebastian did so 11 times. In what order did they finish?

- (A) Michael, Fernando, Sebastian
- (B) Fernando, Sebastian, Michael
- (C) Sebastian, Michael, Fernando
- (D) Sebastian, Fernando, Michael
- (E) Fernando, Michael, Sebastian

4.

Each region in the figure is coloured with one of four colours: red (R), green (G), orange (O), or yellow (Y). (The colours of only three regions are shown.) Any two regions that touch have different colours. The colour of the region X is



- (A) red
- (B) orange
- (C) green
- (D) yellow
- (E) impossible to determine



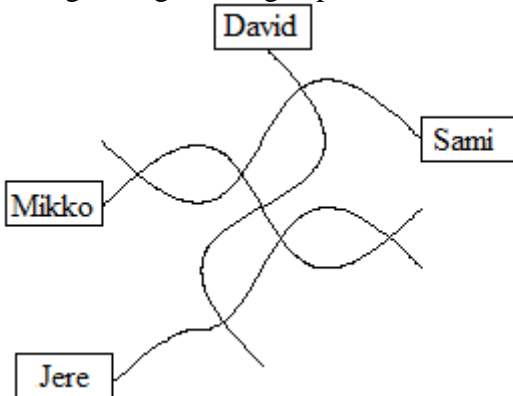
5.

Given that $2^x = 15$ and $15^y = 32$, what is the value of xy ?

- (A) 5 (B) $\log_2 15 + \log_{15} 32$ (C) $\log_2 47$ (D) 7 (E) $\sqrt{47}$

6.

During a rough sailing trip, Joni tried to sketch a map of his home village



He managed to draw the four streets, their seven crossings and the houses of his friends. However, in reality Arrow Street, Nail Street and Ruler Street are all perfectly straight. The fourth street is Curvy Road. Who lives on Curvy Road?

- (A) David (B) Jere (C) Mikko (D) Sami (E) better map is needed to be able to tell

7.

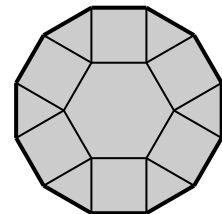
Every 4-digit number whose digits add up to 4 is listed in descending order. In which place in the list is the number 2011?

- (A) 6th (B) 7th (C) 8th (D) 9th (E) 10th

8.

The figure shows a shape consisting of a regular hexagon of side one unit, six triangles and six squares.

What is the perimeter of the shape?



- (A) $6(1 + \sqrt{2})$ (B) $6(1 + \frac{\sqrt{3}}{2})$ (C) 12 (D) $6 + 3\sqrt{2}$ (E) 9



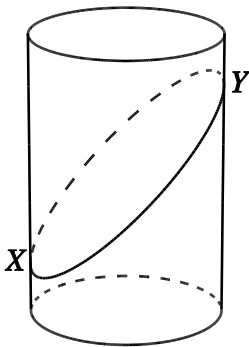
9.

48 children went on a ski trip. Six of them had exactly one sibling with them, nine children went with exactly two siblings and four of them went with exactly three siblings. The rest of the children didn't have any siblings with them. How many families went on the trip?

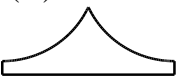
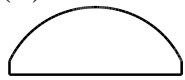

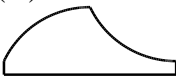
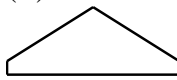
- (A) 19 (B) 25 (C) 31 (D) 36 (E) 48

10.

A rectangular piece of paper is wrapped around a cylinder and a plane cut is made through the cylinder and paper. The cut passes through the points X and Y shown in the figure.



The bottom part of the paper is then unwrapped. Which picture could be the result?

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

4 points

11.

Jesse wrote all the odd numbers from 1 to 2011 on a board and then Bob erased all the multiples of 3. How many numbers were left on the board?

- (A) 335 (B) 336 (C) 671 (D) 1005 (E) 1006

12.

The brothers Andrej and Brano gave truthful answers to a question about how many members their chess club has.

Andrej said: "All the members of our club, except for five girls, are boys."

Brano said: "Every group of six members always includes at least four girls."

How many members does the chess club have?

- (A) 6 (B) 7 (C) 8 (D) 12 (E) 18

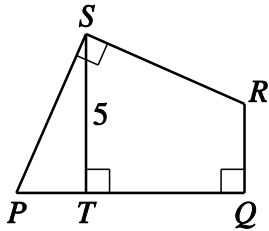
**13.**

There are some balls in a raffle bucket. One positive integer is written on each ball; all the integers are different. A number divisible by 6 is written on 30 balls, a number divisible by 7 is written on 20 balls and a number divisible by 42 is written on 10 balls. What is the smallest possible number of balls in the bucket?

- (A) 30 (B) 40 (C) 53 (D) 54 (E) 60

14.

The figure shows a quadrilateral $PQRS$, in which $PS = SR$, $\sphericalangle PSR = \sphericalangle RQP = \sphericalangle QTS = 90^\circ$ and $ST = 5$.



What is the area of the quadrilateral $PQRS$?

- (A) 20 (B) 22,5 (C) 25 (D) 27.5 (E) 30

15.

Three rectangles are to be combined, without gaps or overlaps, to form a large rectangle. One of the three has size 7 by 11 and another has size 4 by 8. The third rectangle is chosen to have the largest possible area. What is its size?

- (A) 1 by 11 (B) 3 by 4 (C) 3 by 8 (D) 7 by 8 (E) 7 by 11

16.

An airline company does not charge luggage fees if the luggage is under a certain weight limit. For every extra kilogram, a fee is charged. The luggage of Mr and Mrs Trip weighed 60 kg and they paid 3 euros. Mr Wander's luggage weighed the same but he paid 10.50 euros. What is the maximum weight of luggage one passenger can take free of charge?

- (A) 10 kg (B) 18 kg (C) 20 kg (D) 25 kg (E) 39 kg

17.

Max and Hugo throw a handful of dice to decide who shall be the one to wash the dishes. If there are no sixes it will be Max; if there is one six it will be Hugo; and if there are two or more sixes they will not wash the dishes today. How many dice should they throw if they want there to be an equal chance of having to wash the dishes?

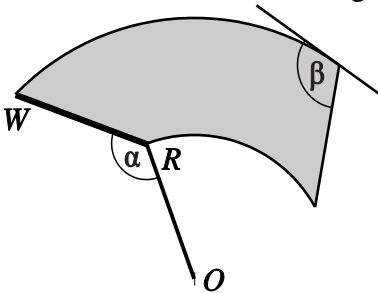
- (A) 3 (B) 5 (C) 8 (D) 9 (E) 17



5 points

21.

The rear windshield wiper of a car is constructed in such a way that the wiper blade RW and the connecting rod OR are of equal length and joined at a fixed angle α . The wiper pivots about the centre O and clears the shaded area shown. Determine the angle β between the right-hand edge of the cleared area and the tangent to the curved upper edge.



- (A) $270^\circ - \frac{\alpha}{2}$ (B) $180^\circ - \frac{\alpha}{2}$ (C) $270^\circ - \alpha$ (D) $90^\circ + \alpha$ (E) $180^\circ + \frac{\alpha}{2}$

22.

The sides PQ , QR , RS , ST , TU and UP of a hexagon are all tangent to a common circle. The lengths of the sides PQ , QR , RS , ST and TU are 4, 5, 6, 7 and 8 respectively. What is the length of side UP ?

- (A) 9 (B) 8 (C) 7 (D) 6 (E) the length cannot be calculated from this information

23.

On the (x, y) -plane, with the axes positioned in the standard way, the point $A = (1, -10)$ was marked on the parabola $y = ax^2 + bx + c$. After that, the coordinate axes and almost all of the parabola were erased, leaving the figure shown.



Which of the following statements can be false?

- (A) $a > 0$ (B) $b < 0$ (C) $a + b + c < 0$ (D) $b^2 > 4ac$ (E) $c < 0$

24.

Find the sum of all positive integers x less than 100 for which $x^2 - 81$ is a multiple of 100.

- (A) 200 (B) 100 (C) 90 (D) 81 (E) 50

**25.**

In the expression $\frac{K \cdot A \cdot N \cdot G \cdot A \cdot R \cdot O \cdot O}{G \cdot A \cdot M \cdot E}$ different letters stand for different non-zero digits, but the same letter always stands for the same digit. What is the smallest possible positive integer value of the expression?

- (A) 1 (B) 2 (C) 3 (D) 5 (E) 7

26.

The sequence of functions $f_1(x), f_2(x), \dots$, satisfies the following two conditions:

$f_1(x) = x$ and $f_{n+1}(x) = \frac{1}{1 - f_n(x)}$. What is the value of $f_{2011}(2011)$?

- (A) 2011 (B) $-\frac{1}{2010}$ (C) $\frac{2010}{2011}$ (D) 1 (E) -2011

27.

Let a , b and c be positive integers such that $a^2 = 2b^3 = 3c^5$. What is the minimum possible number of divisors of abc (including 1 and abc)?

- (A) 30 (B) 49 (C) 60 (D) 77 (E) 1596

28.

Twenty different positive integers are written in a 4×5 - table. Any two neighbours (numbers in cells with a common side) have a common divisor greater than 1. If n is the largest number in the table, find the smallest possible value of n .

- (A) 21 (B) 24 (C) 26 (D) 27 (E) 40

29.

A box contains some red balls and some green balls. If we randomly pick two balls from the box, the probability that they are the same colour is $\frac{1}{2}$. Which of the following could be the total number of balls in the box?

- (A) 81 (B) 101 (C) 1000 (D) 2011 (E) 10001

30.

A $3 \times 3 \times 3$ - cube is composed of 27 identical small cubes. A plane is perpendicular to a diagonal of the large cube and passes through its centre. How many small cubes does that plane intersect?

- (A) 17 (B) 18 (C) 19 (D) 20 (E) 21