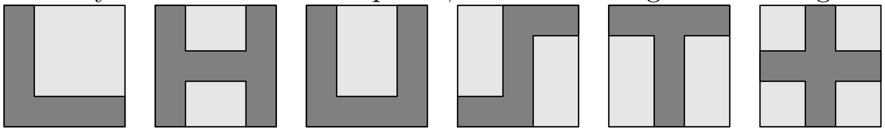
3 points

\# **1.** The number $200013 - 2013$ is not divisible by

(**A**) 2. (**B**) 3. (**C**) 5. (**D**) 7. (**E**) 11.

\# **2.** Mary drew six identical squares, each containing a shaded region.



How many of the regions have perimeter equal in length to the perimeter of one of the squares?

(**A**) 2 (**B**) 3 (**C**) 4 (**D**) 5 (**E**) 6

\# **3.** Mrs. Margareth bought 4 cobs of corn for each person in her family, which has four members. She got the discount shown in the sign.

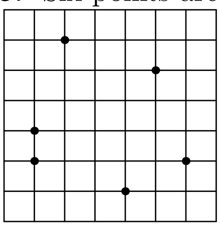
How much did she pay?

(**A**) 0,80 EUR (**B**) 1,20 EUR (**C**) 2,80 EUR (**D**) 3,20 EUR (**E**) 80 EUR

\# **4.** Three of the numbers 2, 4, 16, 25, 50, 125 have product 1000. What is the sum of those three numbers?

(**A**) 70 (**B**) 77 (**C**) 131 (**D**) 143
(**E**) 145

\# **5.** Six points are marked on a square grid with cells of size 1×1, as shown.

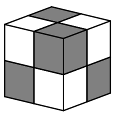


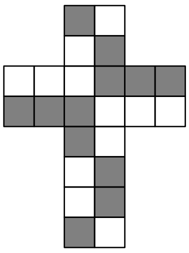
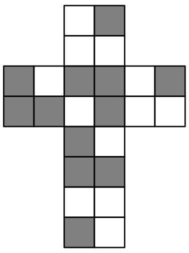
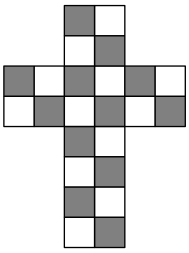
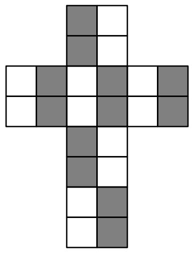
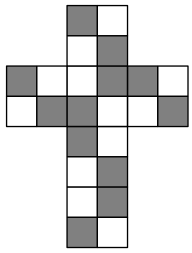
Kanga wants to choose three of the marked points to be the vertices of a triangle. What is the smallest possible area of such a triangle?

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

\# **6.** Which of the following is equal to $4^{15} + 8^{10}$?

(**A**) 2^{10} (**B**) 2^{15} (**C**) 2^{20} (**D**) 2^{30} (**E**) 2^{31}

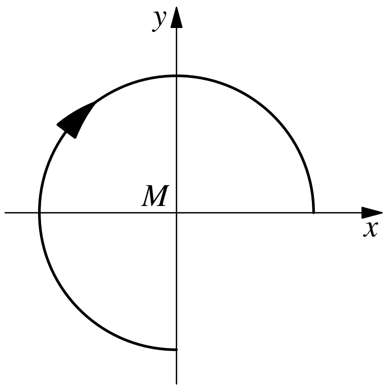
\# **7.** The outside of a cube is painted with grey and white squares in such a way that it appears as if it was built using smaller grey cubes and white cubes, as shown.  Which of the following could be a net of the painted cube?

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

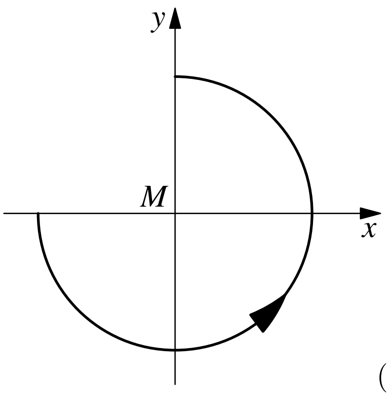
 # 8. The number n is the largest positive integer for which $4n$ is a 3-digit number, and m is the smallest positive integer for which $4m$ is a 3-digit number. What is the value of $4n - 4m$?

(**A**) 900 (**B**) 899 (**C**) 896 (**D**) 225 (**E**) 224

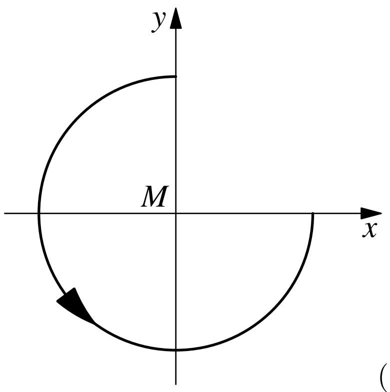
 # 9. The three-quarter circle shown, with center M and orientation arrow, is first rotated anticlockwise by 90° around M and then reflected in the x-axis.



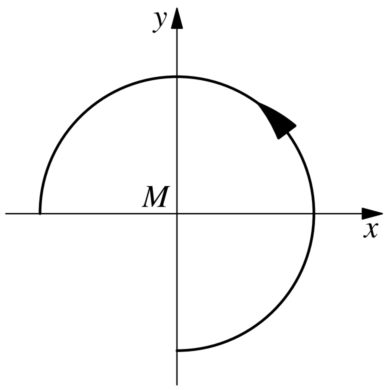
Which of the following shows the end result of these transformations?



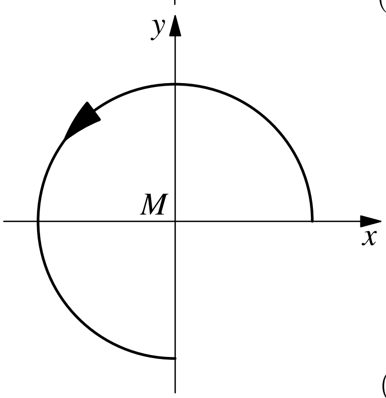
(**A**)



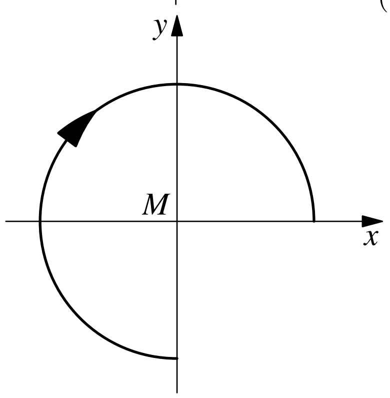
(**B**)



(**C**)



(**D**)



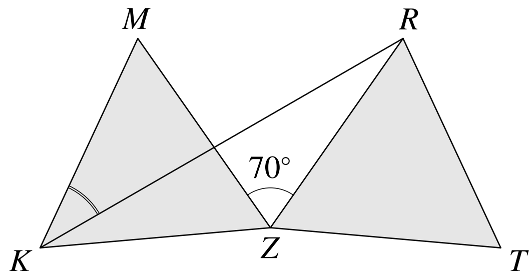
(**E**)

 # 10. Which of the following has the largest value?

(**A**) $\sqrt{20}\cdot\sqrt{13}$ (**B**) $\sqrt{20}\cdot 13$ (**C**) $20\cdot\sqrt{13}$ (**D**) $\sqrt{201}\cdot 3$ (**E**) $\sqrt{2013}$

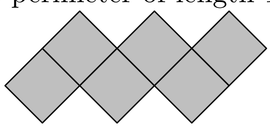
4 points

 # 11. Triangle RZT is the image of the equilateral triangle KZM upon rotation around Z.
What is the size of $\angle RKM$?



(**A**) 20° (**B**) 25° (**C**) 30° (**D**) 35° (**E**) 40°

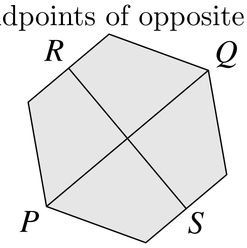
 # 12. The diagram shows a shape made from six squares, each measuring 1 cm by 1 cm. The shape has perimeter of length 14 cm.



The zigzag shape is continued until it has 2013 squares. What is the length of the perimeter of the new shape?

(**A**) 2022 (**B**) 4028 (**C**) 4032 (**D**) 6038 (**E**) 8050

 # 13. The points P and Q are opposite vertices of a regular hexagon and the points R and S are midpoints of opposite edges, as shown.



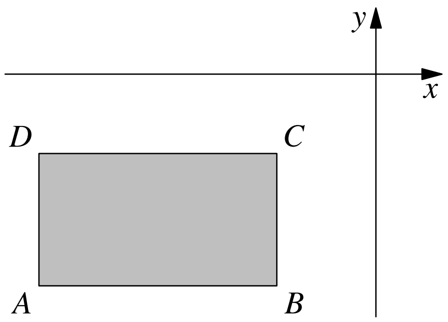
The area of the hexagon is 60 cm^2. What is the product of the lengths of PQ and RS?

(**A**) 40 cm^2 (**B**) 50 cm^2 (**C**) 60 cm^2 (**D**) 80 cm^2 (**E**) 100 cm^2

 # 14. A class of students had a test.
If each boy had got 3 points more for the test, then the average result of the class would had been 1.2 points higher.
What percentage of the class are girls?

(**A**) 20 (**B**) 30 (**C**) 40 (**D**) 60
(**E**) 50

 # 15. The rectangle $ABCD$ lies below the x-axis, and to the left of the y-axis. The edges of the rectangle are parallel to the coordinate axes.



For each point A, B, C, D, the y-coordinate is divided by the x-coordinate. Which of the points yields the smallest value from this calculation?

(**A**) A (**B**) B (**C**) C (**D**) D

(**E**) It depends on the size of the rectangle.

 # 16. On John's birthday this year, he multiplied his age by his son's age and correctly obtained the answer 2013.

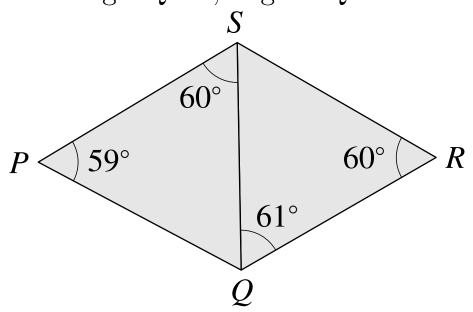
In which year was John born?

(**A**) 1981 (**B**) 1982 (**C**) 1953 (**D**) 1952

(**E**) More information is needed.

 # 17. In triangle QPS, angle $QPS = 59°$ and angle $PSQ = 60°$.

In triangle QRS, angle $RQS = 61°$ and angle $QRS = 60°$, as shown.



Which of the following line segments is the longest?

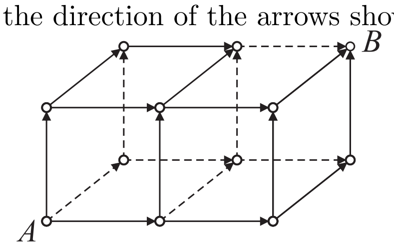
(**A**) PS (**B**) RS (**C**) QS (**D**) QR (**E**) PQ

 # 18. Ivana wants to write down five consecutive integers with the property that three of them have the same sum as the other two.

How many different sets of five numbers can she write down?

(**A**) 0 (**B**) 1 (**C**) 2 (**D**) 3 (**E**) 4

 # 19. How many different paths are there between points A and B, only travelling along the edges in the direction of the arrows shown?



(**A**) 6 (**B**) 8 (**C**) 9 (**D**) 12 (**E**) 15

 # 20. Roo wants to find a six-digit number, the sum of whose digits is even, and the product of whose digits is odd. Which of the following statements about such a number is correct?

(**A**) Either two or four of the digits are even.

(**B**) Such a number cannot exist.

(**C**) There is an odd number of odd digits.

(**D**) All six digits can be different.

(**E**) None of A to D is correct.

5 points

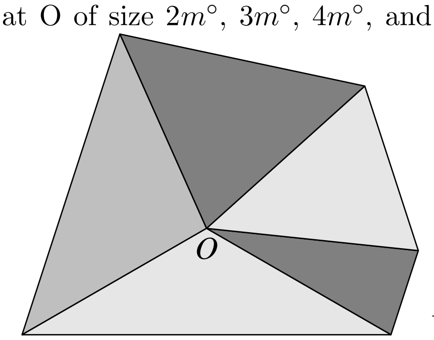
 # 21. The number $\frac{1}{1024000}$ is written as a decimal with the smallest possible number of digits. How many digits appear after the decimal point?

(**A**) 10 (**B**) 12 (**C**) 13 (**D**) 14 (**E**) 1024000

 # 22. How many positive integers are multiples of 2013 and have exactly 2013 divisors (including 1 and the number itself)?

(**A**) 0 (**B**) 1 (**C**) 3 (**D**) 6 (**E**) other

 # 23. Several non-overlapping isosceles triangles have vertex O in common. Every triangle shares an edge with each immediate neighbour. The smallest angle of a triangle at O has size $m°$, where m is a positive integer. The other triangles have angles at O of size $2m°$, $3m°$, $4m°$, and so on. The diagram shows an arrangement of five such triangles.



What is the smallest value of m for which such a set of triangles exists?

(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 6 (**E**) 8

 # 24. Julio creates a procedure for turning a set of three numbers into a new set of three numbers: each number is replaced by the sum of the other two. For example, $\{3, 4, 6\}$ becomes $\{10, 9, 7\}$. How many times must Julio apply this procedure to the set $\{1, 2, 3\}$ before he first obtains a set containing the number 2013?

(**A**) 8

(**B**) 9

(**C**) 10

(**D**) more than 10

(**E**) 2013 will never appear

 # 25. The numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 are to be written around a circle in some order. Then each number will be added to its two immediate neighbours to obtain ten new numbers. What is the largest possible value of the smallest of these new numbers?

(**A**) 14 (**B**) 15 (**C**) 16 (**D**) 17 (**E**) 18

 # 26. Using the whole numbers from 1 to 22 inclusive, Horatio wants to form eleven fractions by choosing one number as the numerator, and one number as the denominator. Every number will be used exactly once. What is the maximum number of Horatio's fractions that could have an integer value?

(**A**) 7 (**B**) 8 (**C**) 9 (**D**) 10 (**E**) 11

 # 27. A regular 13-sided polygon is inscribed in a circle with centre O. Triangles can be formed by choosing three vertices of this polygon to be the vertices of the triangle.

How many of the triangles that can be formed in this way have the point O inside?

(**A**) 72 (**B**) 85 (**C**) 91 (**D**) 100 (**E**) other value

 # 28. A car left point S and drove along a straight road at a speed of 50 km/h. Then every hour another car left S; each car was 1 km/h faster than the previous one. The last car (at a speed of 100 km/h) left 50 hours after the first one. What was the speed of the car which was in front of all the other cars 100 hours after the first car left S?

(**A**) 50 km/h (**B**) 66 km/h (**C**) 75 km/h (**D**) 84 km/h (**E**) 100 km/h

 # 29. A gardener wants to plant 100 trees (oaks and birches) along an avenue in the park. The number of trees between any two oaks must not be equal to five. Of these 100 trees, what is the greatest number of oaks that the gardener can plant?

(**A**) 48 (**B**) 50 (**C**) 52 (**D**) 60
(**E**) 80

 # 30. Yurko saw a tractor slowly pulling a long pipe down the road. Yurko walked along beside the pipe in the same direction as the tractor, and counted 140 paces to get from one end to the other. He then turned around and walked back to the other end, taking only 20 paces. The tractor and Yurko kept to a uniform speed, and Yurko's paces were all 1 m long. How long was the pipe?

(**A**) 30 m (**B**) 35 m (**C**) 40 m (**D**) 48 m (**E**) 80 m