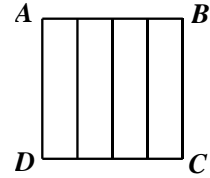# 2013 NMOS Question

1. The figure below shows a square *ABCD* which is divided into 4 identical rectangles. The perimeter of each rectangle is 50 cm. Find the area (in cm²) of the square *ABCD* .
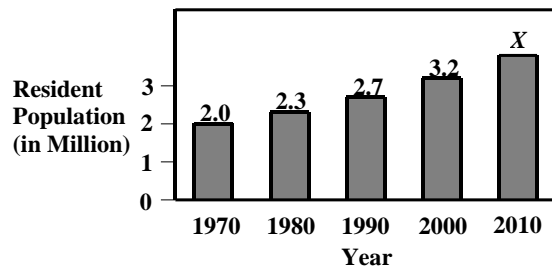

2. The numbers 21, 23 and 25 are three consecutive odd numbers and their sum is equal to 69. Given that the sum of three consecutive odd numbers is equal to 2013, find the smallest number among these three numbers.

3. The following bar chart shows the resident population in Singapore over the years from 1970 to 2010. For example, the resident population was 2.7 million in the year 1990 while it was *X* million in the year 2010.
Given that the percentage increase in the resident population from the year 1970 to the year 2010 is 90%, find the percentage increase in the resident population from the year 2000 to the year 2010.
(Round off your answer to the nearest whole number. For example, your answer is 13.56%, shade 14.)

4. The Goods and Services Tax (GST) of 7% is charged for all appliances at a shop. If the selling price of a camera is $500, customers need to pay $535 to buy the camera. Given that John paid $2033 for a TV set, what is the selling price of the TV set?

5. Given whole numbers A and B, the operator $*$ is defined as $A*B = (A \times B) + (A + B)$. For example, $5*2 = (5 \times 2) + (5 + 2) = 10 + 7 = 17$. Find the value of a, if $a*a = 143$.

6. The following table shows the preferred snack and drink of six students. Each student has a serial number. For example, the serial number of Amelia is 3. It is known that these six students are from two families of three siblings each. Given that children from the same family prefer either the same snack or drink, find the product of the serial numbers of Benjamin's siblings. (For example, if Amelia and Catherine are Benjamin's siblings, then the answer is $3 \times 7 = 21$.)

Serial Number	Name	Preferred Snack	Preferred Drink
3	Amelia	Potato Chips	Coffee
5	Benjamin	Chocolate	Coffee
7	Catherine	Potato Chips	Tea
11	David	Chocolate	Tea
13	Evelyn	Potato Chips	Coffee
17	Gabriel	Potato Chips	Tea

7. The average of ten numbers is 10. If one of the ten numbers is removed, the average of the remaining numbers is 9. What is the value of the number that is removed?

8. At first, John had 20 books while Lindy had 25 books. After Lindy gave John some books, the ratio of the number of books John had to that of Lindy was $7:2$. How many books did Lindy give to John?

9. It is known that a , b and c are whole numbers such that
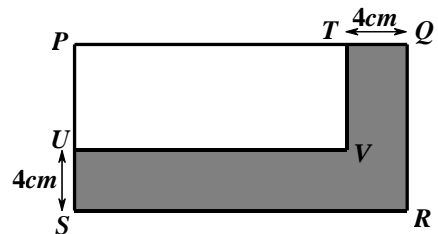· $a - b = c$
· $2a + b + c = 36$
· $b : c = 1 : 2$
What is the value of the smallest number among a , b and c ?

10. Peter takes 16 minutes to run 2400 m during the physical fitness test. After training, Peter improves his running speed by 20%. Now, how long does it take Peter to run 2400 m? (Round off your answer to the nearest minute.)
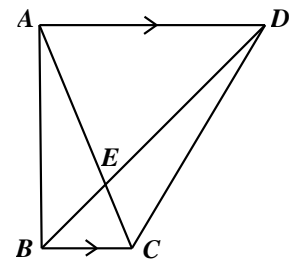
11. The figure below shows a margin of 4 cm from 2 sides of a rectangle $PQRS$. Given that $PQ = 2PS$ and the area of the shaded region is 116 cm², find the perimeter (in cm) of the rectangle $PTVU$.

12. The ratio of the number of students from class $5A$ to that of class $5B$ was $5 : 4$ at first. After 8 students from class $5A$ were transferred to class $5B$, the ratio became $3 : 4$. How many students were there in class $5A$ before the transfer?

13. When Daryl was 6 years old, his father was 34 years old. Now his father is 3 times as old as Daryl. How old is his father now?

14. The figure below shows a quadrilateral $ABCD$ with $AD // BC$. The lines AC and BD intersect at E. If $AD = DE = 5$ cm and $BE = 2$ cm, find BC (in cm).
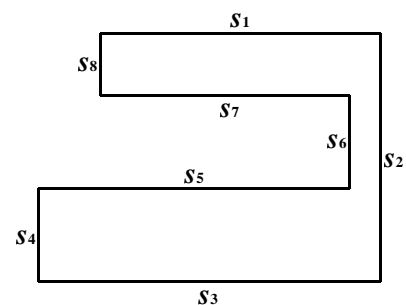

15. Every Friday, Ravi needs to rush to the music centre from school for his piano lesson. He jogs there at an average speed of 200 m/min. Last Friday, Ravi sprained his ankle and walked there at a speed of 40 m/min and arrived at the music centre 12 min later than usual. What is the distance (in m) between the school and the music centre?

16. There are 8-line segments in the following diagram, namely $s_1, s_2, s_3, ..., s_8$. Anna wants to find out the perimeter of the following diagram. She measures the line segment s_1 and is allowed to measure two other line segments. Which are the 2 other line segments that she needs to measure in order to know the perimeter?

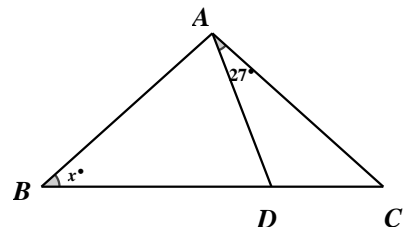(If your answer is s_2 and s_3, write it as 23. The order should be from the smallest to the biggest. For example, if the answer is s_8 and s_7, write it as 78.)

17. Melinda and Nina played a game twice. At the end of each game, the loser had to give the winner half of the number of marbles the loser had at the beginning of the game. Melinda lost the first game and won the second game. Before the first game, she had 12 more marbles than Nina. After the second game, she had 16 more marbles than Nina. How many marbles did Nina have after the second game?

18. In a math test, there were 25 problems. Each correct answer earned 4 points and 1 point was deducted for each incorrect answer. No points were added or deducted if a problem was not answered. Both Jack and Johnson obtained 61 points each, but Jack answered more questions correctly than Johnson. How many problems did Jack NOT answer?

19. The figure below shows an isosceles triangle ABC with $AB = AC$. The point D is on BC such that $BD = BA$, given that $\angle CAD = 27\,°$ and $\angle ABC = x\,°$, find the value of x.
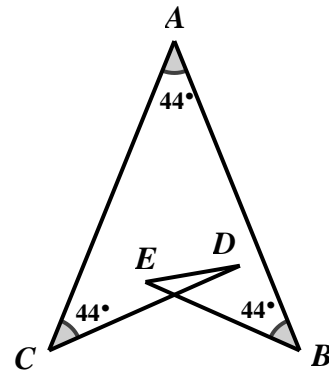

20. A four-digit whole number $\overline{abcd}$ is multiple of 9, and the three-digit whole number $\overline{abc}$ is a multiple of 7. What is the smallest value of the four-digit whole number $\overline{abcd}$.

21. The school canteen purchases the same number of vegetables this year as compared to last year, and 25% more meat this year than last year. The total cost of vegetables and meat last year was $240,000, whereas their total cost this year is $290,000. Given that the cost of vegetables and meat this year increased by 10% and 20% respectively compared to last year and that the school canteen spends $100N on vegetables this year, what is the value of N?

22. Notice that $11 \times 12 \times 13 \times 14 = 24024$ and hence, the last two digits of $11 \times 12 \times 13 \times 14$ is 24. What are the last two digits of $111 \times 112 \times 113 \times 114 \times 115 \times 116 \times 117 \times 118 \times 119$?
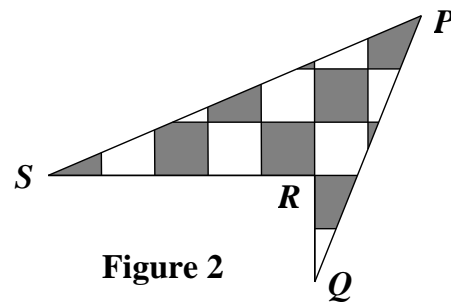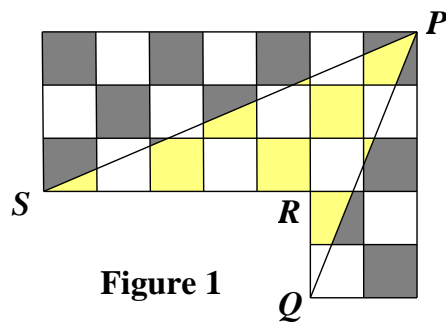
23. In the figure below, $\angle CAB = \angle ABE = \angle ACD = 44°$ and that $\angle DEB = 2\angle CDE$. Find $\angle CDE$.

24. A watermelon, with 92% of its weight being water, was left to stand in the sun. Some of the water evaporated so that now only 91% of its weight is water. The weight of watermelon is now 4048 grams. What was the weight of the watermelon (in grams) before the water evaporated?

25. Note that $6 = 1 \times 2 \times 3 = 1 + 2 + 3$. In other words, 6 is the product, as well as the sum of 1,2 and 3. Given that 2013 is the product, as well as the sum of n whole numbers, find the largest value of n.

26. Figure 1 is made up of shaded and non-shaded squares, each of which has an area of 1 unit². Figure 2 is the quadrilateral $PQRS$, which is cut from Figure 1.

Given that the ratio of the area of the shaded regions to that of the non-shaded regions in Figure 2 is $100 : N$, find the value of N.
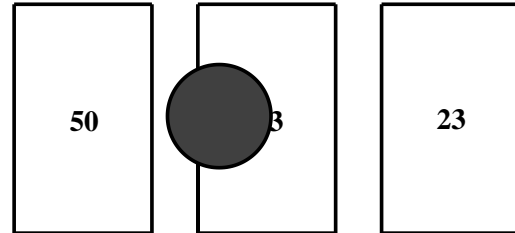
Figure 1

Figure 2

27. Jasmine takes 30 minutes to run 2800 m and swim 900 m. It takes her 55 minutes to run 4200 m and swim 1800 m. How fast (in m/min) does Jasmine swim?
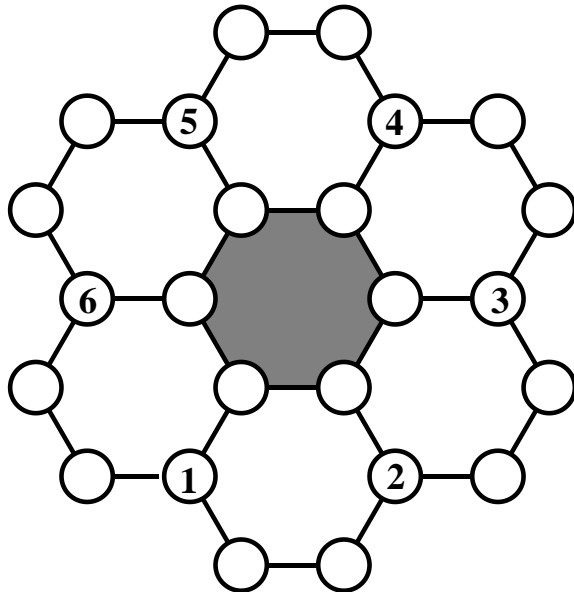
28. A magician wrote six different whole numbers, one on each side of the three cards. The cards were placed on the table and the middle one was partially covered by a coin, as shown below. It is known that

·The sum of the numbers on each card is the same and

·Only prime numbers were written on the sides of the cards facing downwards.

Find the sum of the three numbers on the sides of the cards facing downwards.

29. The figure below shows seven regular hexagons (including the one in the middle) and twenty-four small circles. The numbers 1 to 6, 10 to 27 are to be filled into these small circles such that the sum of any six numbers in each hexagon is equal to A. The numbers 1 to 6 have been filled. Find A.

30. Abel, Ben and Calvin completed a project together in 13 days. For the first 6 days, Abel and Ben completed $\frac{1}{3}$ of the project together. For the next 2 days, Ben and Calvin completed $\frac{1}{6}$ of the project together. For the last 5 days, Abel, Ben and Calvin completed the rest of the project together. They were paid a total of $1800, which was distributed among them according to the amount of work they did in this project. How much money should be given to Ben?