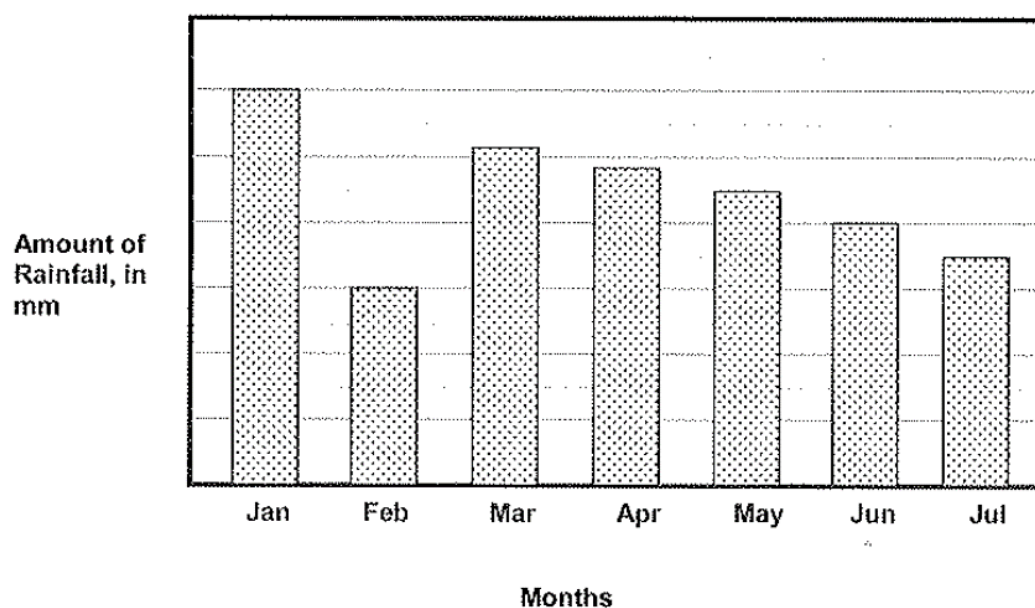


## 2016 NMOS Question

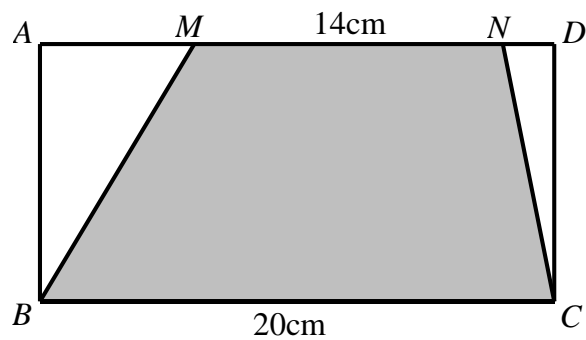
1. Evaluate  $2016 \times \left( \frac{1}{16} + \frac{2}{63} \right)$

2. The following bar chart shows the amount of rainfall, in mm, of a city in the first seven month in year 2015. Given that the average amount of rainfall in May, June and July was 160 mm, find the total amount of rainfall, in mm, of the month with the highest amount of rainfall and the month with the lowest amount of rainfall.



3. Ali has 5 marbles less than the average of Bronson's and Charlie's, Bronson has twice as many marbles as Ali. How many marbles does Charlie have?

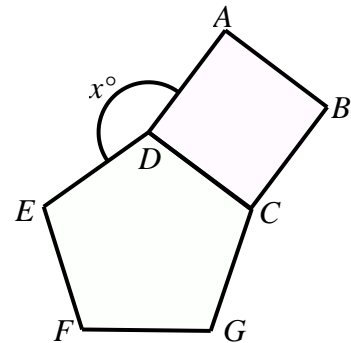
4. The figure below shows a rectangle  $ABCD$  with  $BC = 20$  cm.  $M$  and  $N$  are points on  $AD$  and  $MN = 14$  cm. If the ratio of the area of  $BMNC$  to the area of  $ABCD$  is  $\frac{S}{100}$ , find the value of  $S$ .



5. Last week, Adam and Brandon sat for a Mathematics test, of which the full mark was 100. Adam scored  $x$  marks and Brandon scored  $y$  marks, where  $x$  and  $y$  are whole numbers. Given that  $8x = 5y$ , find the largest possible value of Adam's score.

6. The number of story books that Xavier, Leon and Maggie have is in the ratio  $4:5:8$ . Given that the total number of story books they have is more than 300, find the smallest possible number of story books that Maggie has.

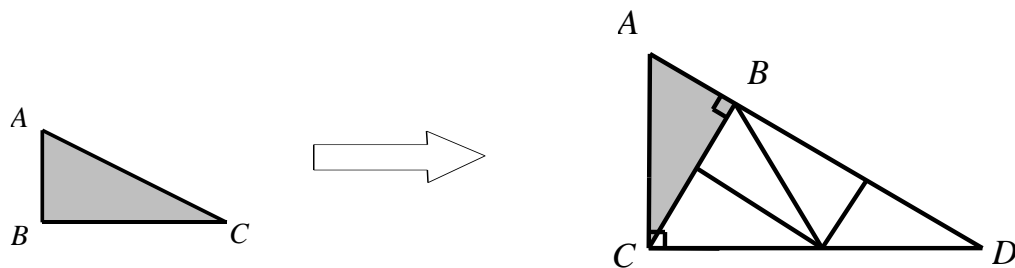
7. The following shape is made up of square  $ABCD$  and a regular pentagon  $CDEFG$ , where each of the segments is of the same length. Find the value of  $x$ .



8. Cindy and Daisy love to collect badges. Cindy collected 9 badges more than Daisy. The number of badges that Cindy has is 56% of total number of Cindy's and Daisy's badges. Find the number of Daisy's badges.

9. A box contains some 20-cent coins and 50-cent coins, the total value of which is \$98.80. The ratio of the number of 20-cent coins to the number of 50-cent coins is  $2:3$ . Find the number of 20-cent coins.

10. As shown in the following figure, 5 identical right-angled triangles are tessellated to form a bigger right-angled triangle  $ACD$ , where  $\frac{AB}{BC} = \frac{AC}{CD} = \frac{1}{2}$ . Given that the area of triangle  $ABC$  is  $100 \text{ cm}^2$ , find the length, in cm, of  $AD$ .

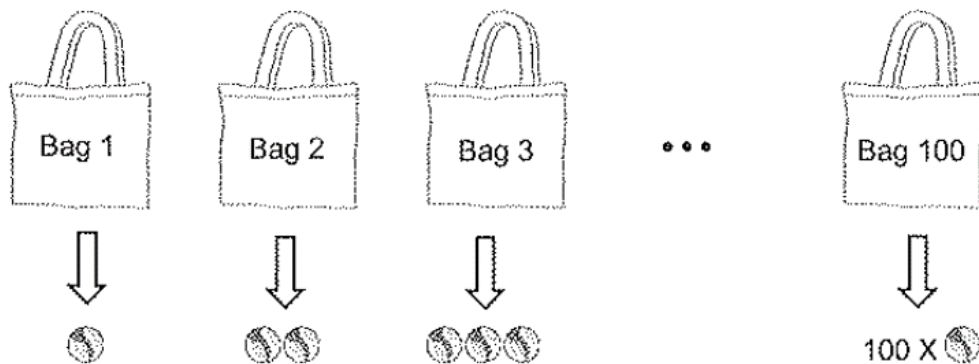


11. A glass contains a certain amount of oil and water. 90% of the mixture is water, and 10% is oil. After adding 105 ml of water to the glass, 96% of this new mixture is water. Find the amount of oil, in ml, in the glass.

12. There are 100 bags of marbles, labelled Bag 1 to Bag 100. It is known that 99 of the bags contain marbles that weigh 1 g each, and the remaining bag contain marbles the weigh 3 g each. Suppose

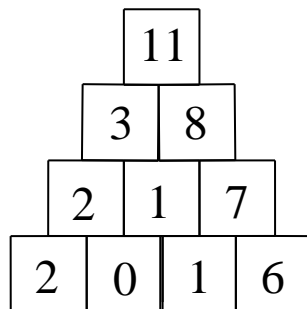
1 marble is taken out from Bag 1,  
 2 marbles are taken out from Bag 2,  
 $\vdots$   
 100 marbles are taken out from Bag 100.

If the total weight of these marbles taken out is 5164 g, and Bag  $M$  contains marbles that weigh 3 g each, find the value of  $M$ .

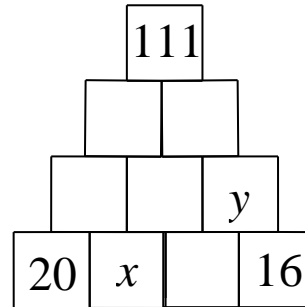


13. A fruit seller sells only apples and pears. At first, 40% of the fruits in his stall are apples. After he has sold 10 apples and 29 pears, 75% of the fruits in his stall are now apples. Find the total number of apples and pears remaining in his stall.

14. The figures below show two 'number pyramids' of four rows. Except for the bottom row, the value in each square is the sum of the two numbers directly beneath it. See the example of Figure(a), which has been completed. Find the value of  $x + y$  in Figure(b).



Figure(a)



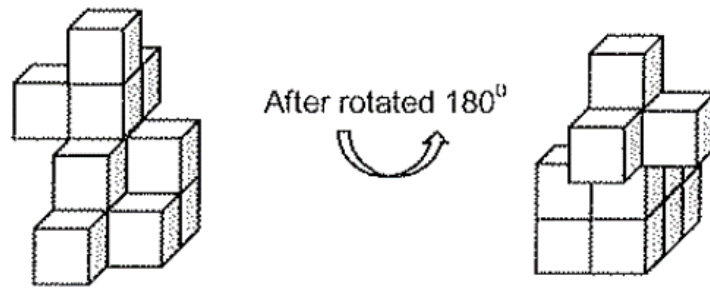
Figure(b)

15. There are 100 numbers in a row, as shown:

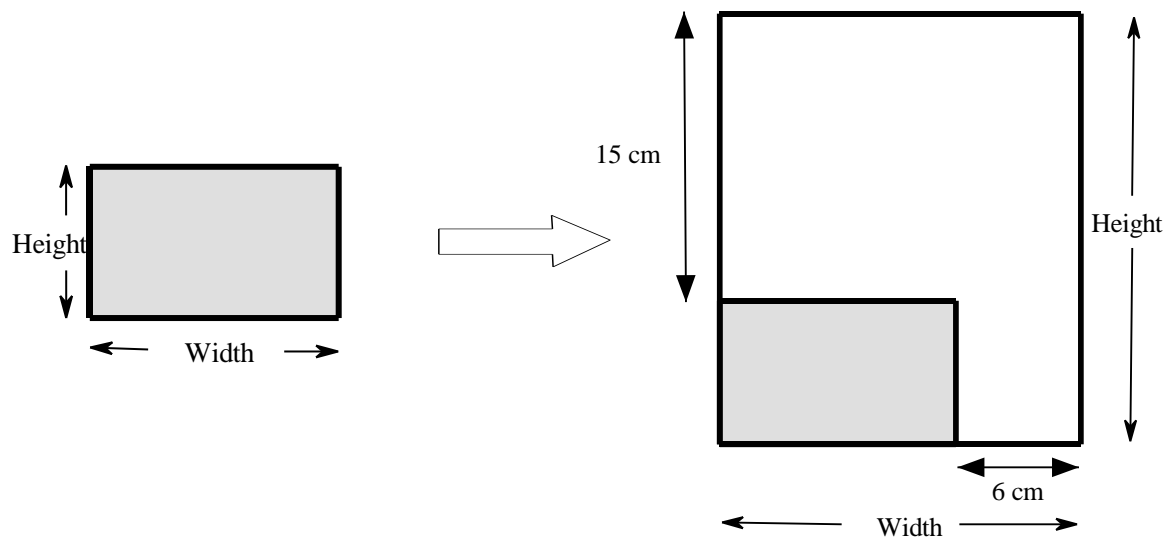
$$a_1, a_2, a_3, \dots, a_{100}$$

Given that the average of these 100 numbers is 100; while the average of the first 51 numbers is 102 and the last 50 numbers is 99. Find the value of  $a_{51}$ .

16. The figure below shows two different views of a solid. This solid was formed by gluing 12 identical cubes with side length 10 cm. The solid was then painted. Find the total area, in  $\text{cm}^2$ , of the solid being painted.

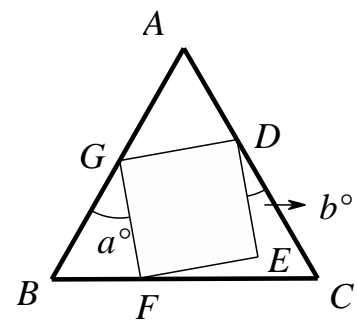


17. The width and height of a rectangle is in the ratio  $4:3$ . If the width is increased by 6 cm and the height is increased by 15 cm, a new rectangle is obtained. The width and height of the new rectangle is in the ratio  $3:4$ , Find the perimeter, in cm, of the initial rectangle.



18. Two year ago, Daniel's age was 6 times of his daughter's age. Two years from now, Daniel's age will be 4 times of his daughter's age. How old is Daniel this year?

19. As shown in the following figure,  $ABC$  is an equilateral triangle while  $DEFG$  is a square. Given that  $D$ ,  $G$  and  $F$  lie on  $AC$ ,  $AB$  and  $BC$  respectively, find the value of  $a + b$ .

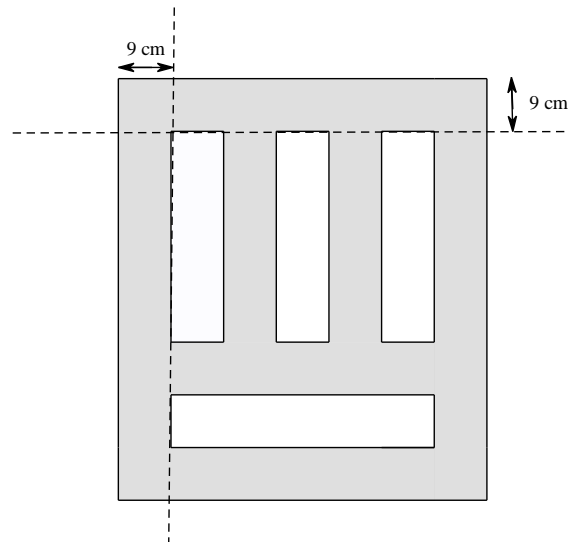


20. Abby and Benedict left from Clementi and Changi Airport respectively and travelled towards each other at the same time. When Abby arrived at Changi Airport, Benedict needed to travel for another 12 km more to reach Clementi. If Abby travelled 60% faster than Benedict, find the distance, in km, between Clementi and Changi Airport.



21. Leonard, Colin and Alfred took part in a 150-metre race. When Leonard crossed the finishing line, he was ahead of Colin by 25 m and ahead of Alfred by 50 m. Given that Colin and Alfred maintained their speeds throughout the whole race, how far, in m, was Alfred from the finishing line when Colin had completed the race?

22. The figure below shows a model of a rectangular window frame with constant width of 9 cm. There are 4 identical rectangular shapes left empty in the frame. If the length and the width of an empty rectangular shape are in the ratio  $9 : 2$ , find the total area, in  $\text{cm}^2$ , of the shaded region.



23. A group of 100 students play either basketball or soccer or both. Among this group of students, if the number of students who play basketball is three times the number of students who play soccer, what is the maximum number of students who play both basketball and soccer?

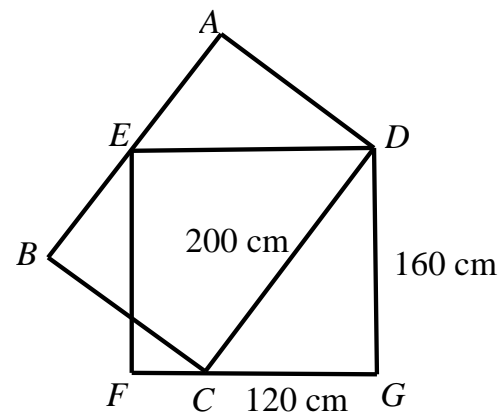
24. In each of following 5-digit numbers:

10368, 49681, 84019, 60984,

Each digit is selected, without repetition, from  $\{0,1,3,4,6,8,9\}$ . There are more than 1500 such numbers. Let  $M$  and  $N$  be such 5-digit numbers and both  $M$  and  $N$  are multiples of 9. Find the

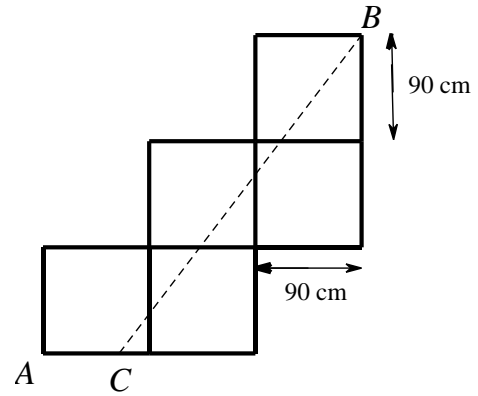
largest possible value of  $\frac{M - N}{9}$  .

25. The figure below shows a rectangle  $ABCD$  and square  $DEFG$ . The point  $E$  lies on  $AB$  while the point  $C$  lies on  $FG$ . If  $CG = 120$  cm,  $GD = 160$  cm and  $CD = 200$  cm, find the length, in cm, of  $AD$ .



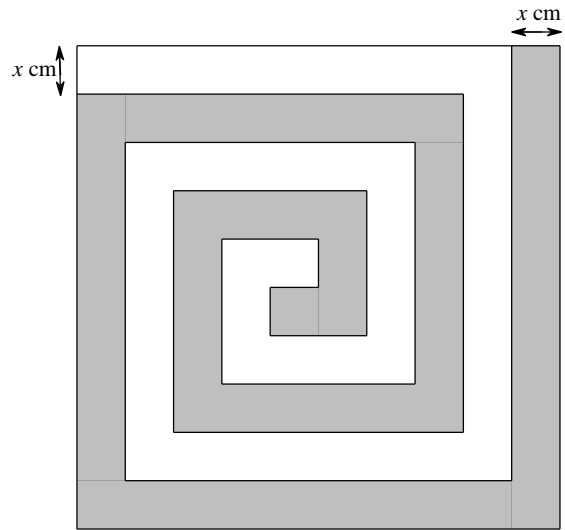
26. A shopkeeper bought 550 oranges and some apples. He found that 8% of the oranges and 2% of the apples were rotten and hence the percentage of fruits in good condition was 95.25%. How many apples did the shopkeeper buy?

27. The following shape is made up of 5 identical squares side length 90 cm. It is known that the line segment  $BC$  divide the shape into two parts of equal area. Find the length, in cm, of  $AC$ .



28. What is the average of all 4-digit numbers that can be formed by using each of the digits 1, 4, 6 and 9 exactly once?

29. The figure below shows two 'rectangular spirals' with constant width,  $x$  cm. Given that the figure is a square of area  $500 \text{ cm}^2$ , find the total area, in  $\text{cm}^2$ , of the shaded 'rectangular spiral'.



30. In a Mathematics test, there were 20 problems. Each correct answer earned 5 points, and 2 points were deducted for each incorrect answer. No points were added or deducted if a problem was not answered. Amy scored 21 points more than Beatrice, but Beatrice answered more question correctly than Amy. None of them had a negative total score. What was the smallest possible points Amy had scored?