LAKSHYA ACADEMY

SAINIK SCHOOL | MILITARY SCHOOL | RIMC [ONLINE & OFFLINE]

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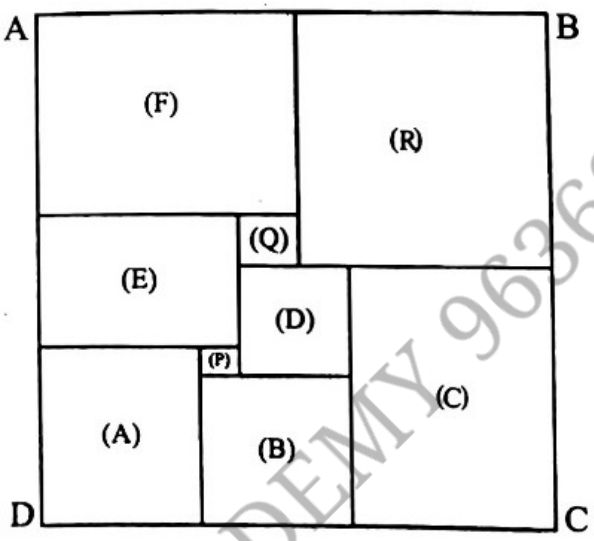
PRACTICE QUESTIONS

NAME : _____ DATE : ___/___/_____

1. Nine squares are arranged to form a rectangle ABCD. The smallest square P has an area 4 sq. units. Find the areas of Q and R.



2. a, b, c, d, e are five integers such that $a+b=b+c=c+d=d+e=2012, a+b+c+d+e=5024$. Then the value of $(d-a)$ is

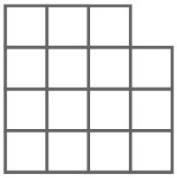
3. Falguni puts 12 plastic bags inside another plastic bag. Each of these 12 bags is either empty or contains 12 other plastic bags. All together if 12 bags were non-empty, find the total number of bags.

4. The number 27000001 has exactly four prime factors. Find their sum.

5. After the school final exams are over, all students in a class exchange their photographs. Each student gives his photograph to each of the remaining students and gets the photograph of all his friends. There are totally 870 exchanges of photos. The number of students in the class is _____.

6. A class contains three girls and four boys. Every Saturday, five students go on a picnic, a different group is sent each week. During the picnic, each person (boy or girl) is given a cake by the accompanying teacher. After all possible groups of five have gone once; the total number of cakes received by the girls during the picnic is _____.

27. Divide the figure into 3 parts of the same shape and size. (All cuts should follow grid lines.)



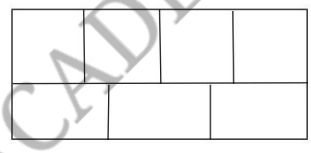
28. 100^{th} term of the sequence $1, 3, 3, 3, 5, 5, 5, 5, 5, 7, 7, 7, 7, 7, 7, 7, \ldots$ is

29. Each letter of the following words is a positive integer. The letters have the same value wherever they occur. The numerical values given for each word is the product of the corresponding numbers of the letters appearing in the word

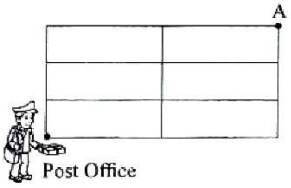
$$\text{BILL} = 35, \text{BLAB} = 225, \text{BLANK} = 270, \text{SLANG} = 2574$$

Find the value of SINKING.

30. In the figure given below, a rectangle of perimeter 76 units is divided into 7 congruent rectangles. What is the perimeter of each of the smaller rectangles?



31. The postman has to deliver a parcel to Point A from the post office. How many ways can he deliver the parcel? (Only ↑ and → movements are allowed.)

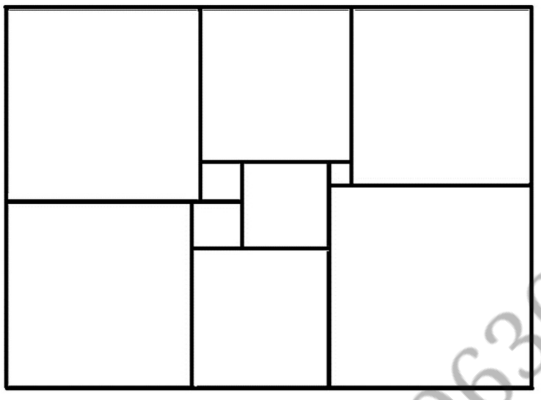


32. The countries of birth of Alice, Bryan and Chloe are Korea, Vietnam and Indonesia but not in that order. One of them is an accountant, the other two are lawyer and doctor.

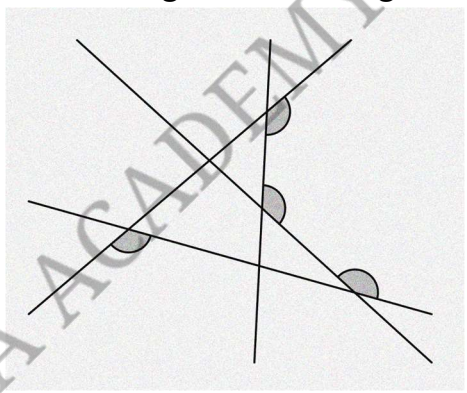
Bryan is not the accountant.
Chloe is not the lawyer.
The accountant was not born in Indonesia.
The lawyer was born in Korea.
Chloe was not born in Vietnam.

What is the Bryan's occupation? Where is his country of birth?

56. In the diagram below, there is a rectangle made of 10 squares, each of a different size. If the dimensions of the two smallest squares in the figure are 3×3 and 5×5, can you determine the dimensions of all the other squares?



57. What is the sum of the four marked angles in the diagram?



58. Find the sum

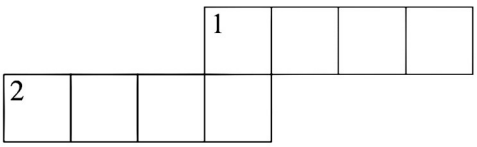
$$11 + 192 + 1993 + 19994 + 199995 + 1999996 + 19999997 + 199999998 + 1999999999$$

59. Evaluate: $\frac{1}{2} + \left(\frac{1}{3} + \frac{2}{3}\right) + \left(\frac{1}{4} + \frac{2}{4} + \frac{3}{4}\right) + \cdots + \left(\frac{1}{100} + \frac{2}{100} + \cdots + \frac{99}{100}\right)$

60. Eight of the digits from 0 to 9 inclusive are used to fill the cells of the cross number. What is the sum of the two digits which are not used?

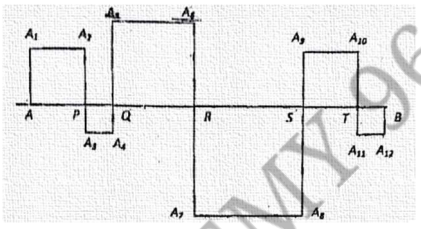
Across
1. A power of 5
2. A power of 4

Down
1. A power of 6



92. Doug constructs a square window using 8 equal-size panes of glass, as shown. The ratio of the height to width for each pane is 5 : 2, and the borders around and between the panes are 2 inches wide. In inches, what is the side length of the square window?

93. AB is a line segment $2011cm$ long. Squares are drawn as in the diagram. The length of the broken line segment $AA_1A_2A_3A_4A_5A_6A_7A_8A_9A_{10}A_{11}A_{12}B$ is



94. (a) A palindromic number is a number that reads the same backward and forward. (For example, 13,531 is palindromic.) How many 5-digit numbers are palindromic?
(b) How many 5-digit numbers are palindromic and consist of distinct digits?

95. Evaluate $\frac{1}{3}+\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}$.

96. Let x and y be natural numbers such that $x^2 + 361 = y^2$. What are the possible values of x?

97. The rectangle shown at right has been broken into four smaller rectangles. The areas of three of the smaller rectangles are shown in the diagram. Find the area of the fourth one.

234	312
270	

98. 1152 digits are used to number the pages of a book consecutively from page 1. How many pages are there in the book?

131. What logical conclusion can be drawn from:
A says both B and C tell the truth;
B says A tells the truth;
C says A and B are both liars?

132. Here is a magic square, created using the four numbers $10, 20, 30, 40$ once in each row, column or diagonal. The value of $A + B$ is

C	10	D	E
A	30	F	G
B	H	20	K
L	M	N	10

133. Observe the sequence 9, 91, 19, 911, 191, 119, 9111, 1911, 1191, 1119, ... What is the 45^{th} term of the sequence?

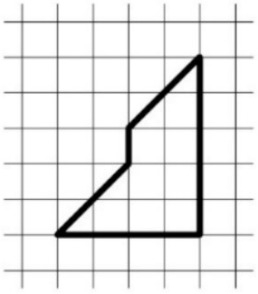
134. Find the sum of all the digits of the result of the subtraction $10^{99} - 99$.

135. One hundred flowers were kept in 4 baskets. After some time, $4, 5, 3$ and 8 flowers were taken out from the first, second, third and fourth baskets respectively. Now all the 4 baskets have the same number of flowers. The number of flowers in the fourth basket at the beginning was

136. Khurana would like to take a new apartment on rent. The owner asks him: "Please tell me how many children you have." Khurana answers: "I have three of them." The owner: "What are the ages of your children?". He answers: "The product of the ages is equal to 72." The owner replies: "This is not enough information dear!". "Sorry that I was a little bit unclear, but the sum of the ages is equal to the house number in front of your apartment," says Khurana. The owner: "This still isn't enough information!" Khurana replies: "My oldest child loves chocolate." The owner: "Thanks for your cooperation, I now know the ages." Are you as smart as the owner? Then give the ages of the children.

137. A thief wants to open a lock with 5 digits as the key to open it. He knows that the 3^{rd} digit is three less than 2^{nd} digit, while 2^{nd} digit is four smaller than 4^{th} digit. The first digit is three times the fifth digit. There are three pairs whose sum is 11 and third and fifth digits are equal. Find the key to open the lock.

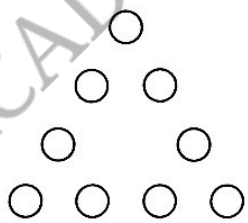
157. Cut the figure in the picture into two congruent parts: when superimposed on top of each other, they should match perfectly. Each part may be turned or flipped.



158. Eight trees are planted in a single row 5 meters apart from one another. There is a well next to the rightmost tree. Joe the Gardener is standing with an empty bucket next to the well. He plans to water all the trees, one full bucket per two trees, and to get back to the well. What is the length of the shortest possible route for Joe?

159. Find the value of n to make $2^8 + 2^{11} + 2^n$ a perfect square.

160. Can you put the numbers 1 through 9 into these discs so that each side of the triangle adds up to 20?



161. Hui is an avid reader. She bought a copy of the best seller Math is Beautiful. On the first day, Hui read $\frac{1}{5}$ of the pages plus 12 more, and on the second day she read $\frac{1}{4}$ of the remaining pages plus 15 pages. On the third day she read $\frac{1}{3}$ of the remaining pages plus 18 pages. She then realized that there were only 62 pages left to read, which she read the next day. How many pages are in this book?

162. What is the largest power of 2 that is a divisor of $13^4 - 11^4$?

163. On the planet Vulcan there are eight big volcanoes and six small volcanoes. Big volcanoes erupt every three years and small volcanoes erupt every two years. In the past five years, there were 30 eruptions. How many volcanoes could erupt this year?

190. David and Lisa are in a charity tennis tournament at the local tennis club. The first player to win either two consecutive games or a total of three games wins the match. In how many different ways can their match end?

191. While house hunting in London, I came across a very good basehold property. Discussing the lease the landlady told me:

'The property was originally on a 99 years lease and two-thirds of the time past is equal to four-fifths of the time to come. Now work it out for yourself and see how many years are there to go.'

How many years of unexpired lease did the property have?

192. My friend Asha was throwing a very grand party and wanted to borrow from me 100 wine glasses. I decided to send them through my boy servant Harish. Just to give an incentive to Harish to deliver the glasses intact I offered him 3 paise for every glass delivered safely and threatened to forefeit 9 paise for every glass he broke. On settlement Harish received Rs 2.40 from me. How many glasses did Harish break?

193. The date 8.8.64, meaning August 8, 1964 is a very interesting date, because the product of the first two numbers equals the third.

Can you find the year of the twentieth century which gives the greatest number of occasions of this kind?

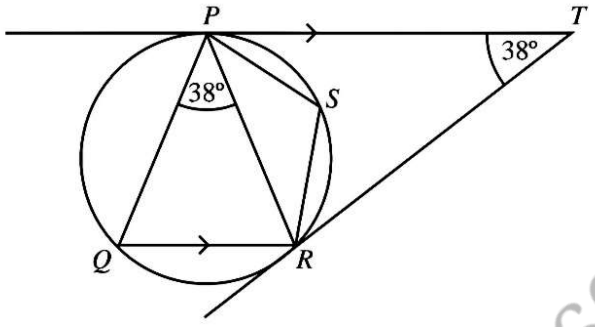
194. One night three naughty boys stole a basketful of mangoes from a garden, hid the loot and went to sleep. Before retiring they did some quick counting and found that the fruits were less than a hundred in number.

During the night one thief awoke, counted the mangoes and found that he could divide the mangoes into three equal parts if he first took one for himself. He then took one mango, ate it up, and took $\frac{1}{3}$ of the rest, hid them separately and went back to sleep.

Shortly thereafter another thief awoke, counted the mangoes and he again found that if he took one for himself the loot could be divided into three equal parts. He ate up one mango, bagged $\frac{1}{3}$ of the remainder, hid them separately and went back to sleep. The third thief also awoke after some time, did the same and went back to sleep.

In the morning when they all woke up; and counted their mangoes, they found that the remaining mangoes again totaled 1 more than could be divided into three equal parts.
How many mangoes did the boys steal?

215. In the diagram PT and QR are parallel. TP and TR are tangents to the circle PQRS. $\angle PTR = \angle RPQ = 38^0$. Find $\angle PQR$ and $\angle PSR$.



216. If two positive integers m and n, and their difference is bigger than 1, satisfy the equation $2005^2 + m^2 = 2004^2 + n^2$, find the value of $m + n - 200$.

217. When a certain two-digit number, AB, is added to another two-digit number, BA, the sum is a perfect square. Find the sum of all such possible two-digit numbers.

218. The Principal of Lakshya Academy plans to employ more teachers. If she employs 10 new teachers, then the number of pupils per teacher will be reduced by 5. However, if she employs 20 new teachers, then the number of pupils per teacher will be reduced by 8. How many pupils are there at Lakshya Academy?

219. How many of the statements in the following are true?

None of these statements is true.
Exactly one of these statements is true.
Exactly two of these statements are true.
All of these statements are true.

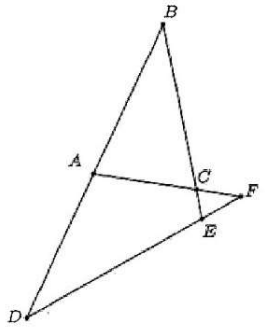
220. Arrange the digits 1 through 9 in a row, without repetition, so that:

All the digits between 1 and 2 add up to 6
All the digits between 2 and 3 add up to 14
All the digits between 3 and 4 add up to 38
All the digits between 4 and 5 add up to 9

Find the smallest value for this 9-digit number.

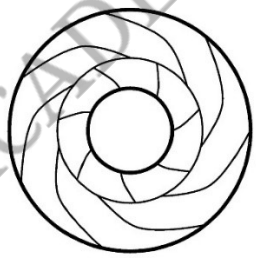
221. In a $\Delta ABC, \angle ABC = 90^o$ and BD is perpendicular to AC. If $BD = 8\,cm$ and $AD = 4\,cm$, then find the length of CD?

242. In the figure below, BAD, BCE, ACF and DEF are straight lines. It is given that $BA = BC, AD = AF, EB = ED$. If $\angle BED = x^o$, find the value of x.



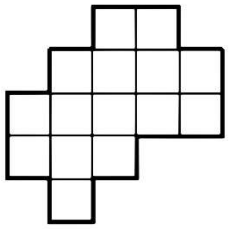
243. Let x be a real number. If $a = 2011x + 9997$, $b = 2011x + 9998$ and $c = 2011x + 9999$, find the value of $a^2 + b^2 + c^2 - ab - bc - ca$.

244. The following annulus is cut into 14 regions. Each region is painted with one colour. What is the minimum number of colours needed to paint the annulus so that any no two adjacent regions share the same colours?



245. Simplify; $$\frac{\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right)\ldots\left(1-\frac{1}{2005^2}\right)}{\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\ldots\left(1-\frac{1}{2005}\right)}$$

246. Cut this figure into three equal parts.



44. 7 units
45. 3297
46. $A = 1, B = 8, C = 5$
47.

1	15	14	4
12	6	7	9
8	10	11	5
13	3	2	16

48. 720^0
49. 2011^{th} term = 4023; Quotient = 8044
50. 1881
51. (a) 16
    (b) 64
52. $-\frac{2007}{4018}$
53. 14
54. $4 \times 5 \times 4 \times 7 \times 4 = 2240$
55. Breadth = 2 cm
56. $6 \times 6,\ 11 \times 11,\ 17 \times 17,\ 19 \times 19,\ 22 \times 22,\ 23 \times 23,\ 24 \times 24,\ 25 \times 25$
57. 540^0
58. 2222222175
59. 2475
60. $7 + 8 = 15$
61. A_{10}
62. 105072
63. 8 dots
64. 13579
65. 28 sweets
66. 4 and 6
67. 8 years, 5 years, 1 year
68. 9, 15, 21, 39, 45, 69, 81
69. N
70. Sum = 360
71. 9 dates
72. Perimeter = 84 cm
73. $\frac{1}{6}$