

MATHEMATICS- ALGEBRA

1. If $A = \frac{1}{2019\sqrt{2017}+2017\sqrt{2019}}$ and $B = \frac{1}{\sqrt{2019}} - \frac{1}{\sqrt{2017}}$ Which statement is true?

- A) $A=B^2$
- B) $A=2|B|$
- C) $2A = |B|$
- D) $A^2=B$
- E) $A = B$

3. $\left. \begin{matrix} x + y = 1 + xy \\ xy = 4 + y \end{matrix} \right\}$ How many real solutions are there for the simultaneous equations?

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5

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2. What is the sum of values of x if $|x - 1|(x + 9) = 24$?

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

4. $x = \frac{111110}{111111}$ $y = \frac{222221}{222223}$ $z = \frac{333331}{333334}$
which of the following is correct?

- A) $x > y > z$
- B) $x < y < z$
- C) $y < x < z$
- D) $y > z > x$
- E) $x = y > z$

5. A man has 15 coins in his pockets. These coins are dimes and quarters that add up 2.4 dollars. How many quarters does the man have? (Dime: 10 cent, Quarter: 25 cent)

A) 4
B) 5
C) 6
D) 8
E) 9

6. When 4 is added to two numbers, the ratio is 5:6. When 4 is subtracted from the two numbers, the ratio is 1:2. What is the ratio of difference of the two numbers and sum of the two numbers?

A) 1:7
B) 2:5
C) 3:8
D) 4:13
E) 13:5

7. Divide me by 7 the remainder is 5. Divide me by 3 the remainder is 1 and my quotient is 2 less than 3 times my previous quotient. What am I?

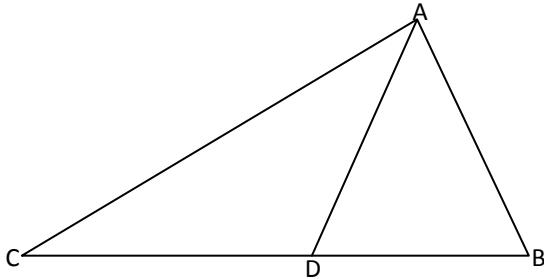
A) 25
B) 35
C) 40
D) 45
E) 50

8. The equation $\frac{24x^2+25x-47}{ax-2} = -8x - 3 - \frac{53}{ax-2}$ is true for all values of $x \neq \frac{2}{a}$, where a is a constant. What is the value of a ?

A) -8
B) -5
C) -3
D) -2
E) 2

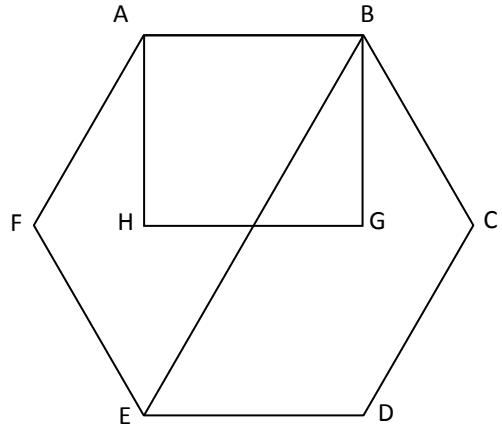
GEOMETRY

11. In triangle ABC, $|AD| = |DC|$, $|AB| = |BD|$



- A) $\angle ABD > 45^\circ$
- B) $\angle ABD < 45^\circ$
- C) $\angle ABD = 45^\circ$
- D) $\angle ADC < 45^\circ$
- E) $\angle ACB < 45^\circ$

13. Square ABGH and regular hexagon ABCDEF have a common side AB. What is $|BE|$ if $|AB| = 2$ cm?

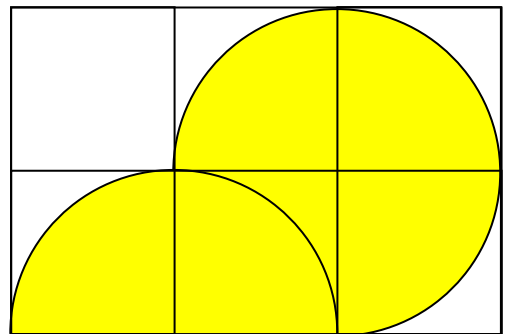


- A) $\frac{2}{\sqrt{3}}$
- B) $\frac{4}{\sqrt{3}}$
- C) $2\sqrt{3}$
- D) 3
- E) 4

12. Ally has three sticks with lengths 2cm, 3cm and 5cm. He tried to make a triangle using these sticks. Which of the following is true?

- A) Information is not enough
- B) He can make
- C) It is impossible to make a triangle
- D) He did not try
- E) None of them is true

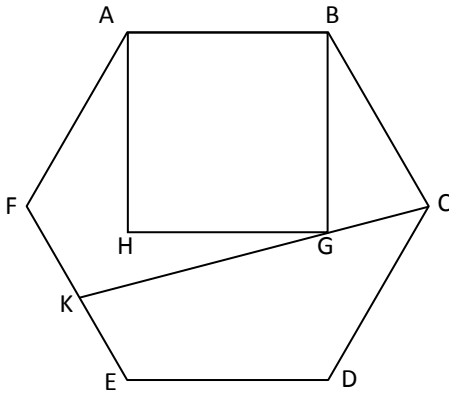
14. In the figure, a circle and a semicircle is inscribed in a rectangle with sides 3×2 . What is the area of the shaded region?



- A) $\pi + 3$
- B) $2\pi + 2$
- C) $\pi + 2$
- D) $2\pi + 1$
- E) $\pi + 1$

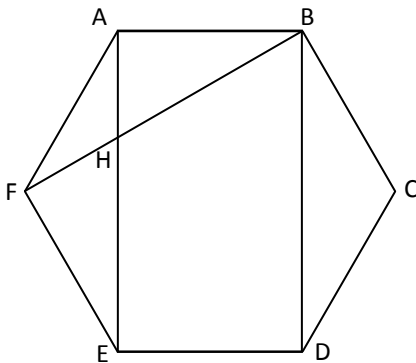
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15. Square $ABGH$ and regular hexagon $ABCDEF$ have a common side AB . What is $\angle HGK$?



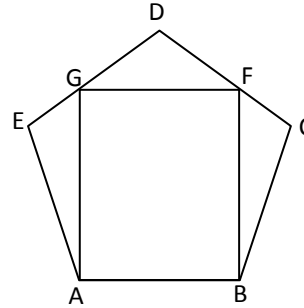
- A) 10°
- B) 15°
- C) 20°
- D) 30°
- E) 40°

16. Rectangle $ABDE$ and regular hexagon $ABCDEF$ have common sides AB and ED . What is $\angle AHB$?



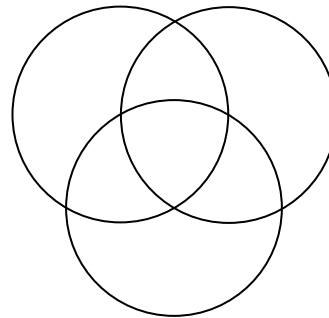
- A) 15°
- B) 20°
- C) 30°
- D) 45°
- E) 60°

17. Rectangle $ABFG$ and regular pentagon $ABCDE$ have a common side AB . What is $\angle EGA$?



- A) 18°
- B) 36°
- C) 54°
- D) 72°
- E) 108°

18. Three identical circles meet at their centers. What figure can you get if you join three centers by line segments?



- A) An obtuse angled triangle
- B) An right angled triangle
- C) A scalene triangle
- D) An Equilateral triangle
- E) A circle

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19. What is the percentage increase of an area of a circle if you increase the radius by 15%?

- A) 15%
- B) 20%
- C) 30%
- D) 32%
- E) 32.25%

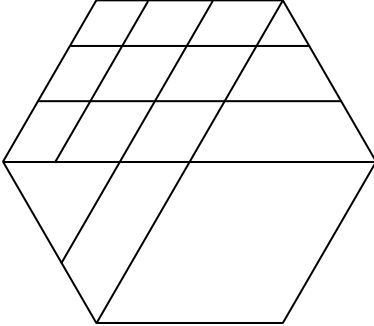
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20. A circular wire with radius 3cm is cut to make an equilateral triangle. The area of the equilateral triangle is :

- A) $\pi\sqrt{3}$
- B) $\pi^2\sqrt{3}$
- C) 3π
- D) $\pi 2\sqrt{3}$
- E) $3\pi^2$

COMBINATORICS

21. How many parallelograms are there in the figure?



- A) 36
- B) 32
- C) 18
- D) 9
- E) 6

22. A sector is divided into 8 sectors. At the beginning one sector contains only one zero and the others contain one 1's . In each turn Hassan must choose zero and make it 1 but make its neighbors 0. If he continues with this process what number can he get in all sectors?

- A) All zero
- B) All one
- C) Only one 1
- D) one 1 and zeros
- E) None

23. What is the minimum number of vertices if you draw a figure with 6 sides do not cross each other?

- A) 3
- B) 4
- C) 5
- D) 6
- E) 7

24. How many 3-digit number with last digit 2 and divisible by 18?

- A) 9
- B) 10
- C) 11
- D) 12
- E) 16

25. In how many ways can you paint 3×3 square by colors A,B,C such that each square must be painted by one color and adjacent squares are in different colors. When you rotate the figure through 90° , reflect in the midline the figure look same?

- A) 24
- B) 18
- C) 16
- D) 12
- E) 8

27. What is the middle digit of 13579111315...4749?

- A) 9
- B) 8
- C) 7
- D) 2
- E) 29

26. Numbers from 1 to 20 written on a screen. Ridwan and Collins play a game. Ridwan starts first. He deletes any two numbers instead he writes their sum. Each players do so in their turns. In how many turns may they finalize the game?

- A) 21
- B) 20
- C) 19
- D) 15
- E) 10

28. Victor has a book with 151 pages. He has to read his book in three days. He must read at least 50 pages and at most 80 pages in a day. In how many possible ways can he finish reading the book?

- A) 5
- B) 4
- C) 3
- D) 2
- E) 1

29. What is the maximum number of squares can you paint 3×3 square if you have two colors and you cannot paint two squares with a common point by the same colors?

- A) 12
- B) 10
- C) 8
- D) 6
- E) 4

30. Tanya is older than Eric. Cliff is older than Tanya. Eric is older than Cliff.
At most how many of these statements can be true?

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

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NUMBER THEORY

31. Find the difference between LCM and GCD of 819 and 1092

- A) 3003
- B) 2576
- C) 546
- D) 273
- E) 91

33. How many positive integers not exceeding 500 are multiples of 3 and 5 but not 4?

- A) 33
- B) 31
- C) 29
- D) 27
- E) 25

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32. The sum of the digits of a three-digit odd number is 12. When first and last digits are reversed, the new number is 396 more than the original number. If the sum of the first and last digit is 10. What is the multiplication of the digits of this number?

- A) 84
- B) 42
- C) 40
- D) 36
- E) 66

34. Six-digit number $81m34n$ is a multiple of 15. How many pairs of (m,n) can be found?

- A) 5
- B) 6
- C) 7
- D) 8
- E) 9

35. When 243 is divided by a natural number x , the remainder is 13. How many values of x are there?

- A) 8
- B) 7
- C) 5
- D) 3
- E) 2

37. From a number which is multiple of three with seven digits using digits 0, 5 and 7 only. You have to use 0, 5 and 7 at least once and digit sevens will be 2 more than digit zeros what is the sum of all seven digits?

- A) 45
- B) 42
- C) 38
- D) 36
- E) 30

36. If we copy the letters "GENIUSCUP" repeatedly, we get "GENIUSCUPGENIUSCUPGENIUSCUP...." What is the 2019th letter from the left?

- A) G
- B) E
- C) N
- D) U
- E) S

38. In adding up two numbers, Marijani has mistakenly read the hundred digits '2' of the first number as '6' and the thousands digit '7' of the second number as '2'. If Marijani got 2019 as the result, what should be the correct sum of the two numbers?

- A) 2119
- B) 3019
- C) 3119
- D) 4419
- E) 7419

39. What is the number of 7 factors in this product
 $1 \times 2 \times \dots \times 40$?

- A) 3
- B) 4
- C) 5
- D) 6
- E) 7

40. The sum of two natural numbers x and y is 100,
and the product of their greatest common
divisor and their least common multiple is 2100.
What is $x - y$?

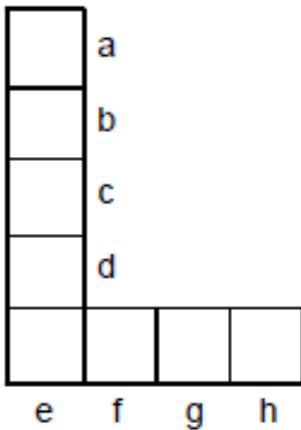
- A) 10
- B) 20
- C) 30
- D) 40
- E) 50

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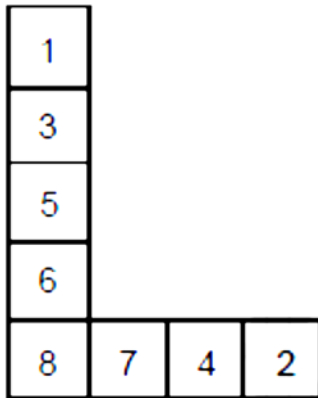
IQ

MAGIC NUMBERS

- Inside of the squares there are different numbers from 1 till 8
- Numbers becomes greater from up to down and right to left
- This figure for question 1 and 2.



EXAMPLE :



41. If $d=4$ then find , $h=?$

- A) 2
- B) 3
- C) 5
- D) 6
- E) 7

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42. When we arrange numbers according to the given rules above one of eight numbers should be placed exactly in a certain square. What square is that?

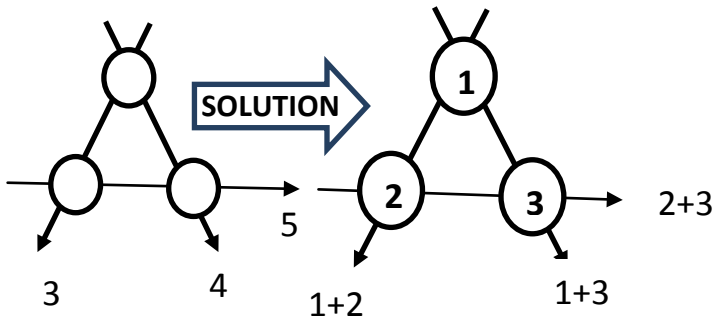
- A) a
- B) b
- C) c
- D) d
- E) e

NUMBER GAME

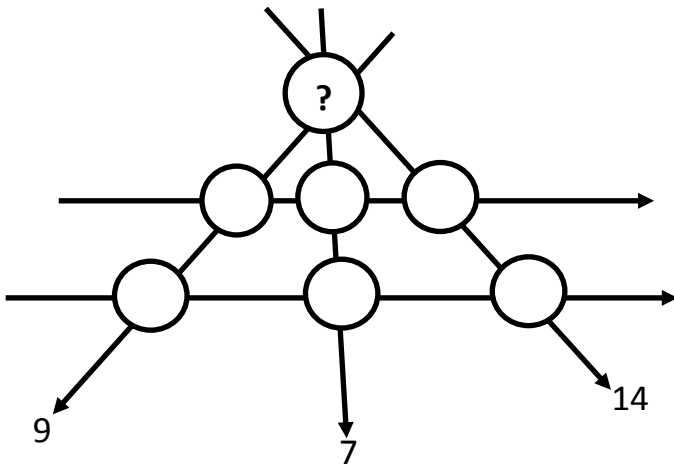
RULES :

- Inside of the circles the numbers are written
- The numbers must be from 1 till the number of circles (Eg: If there are 6 circles the numbers are 1,2,3,4,5,6)
- All the numbers inside circles are different
- The sum of the numbers inside of the circles is written at each end of the lines. See example

EXAMPLE

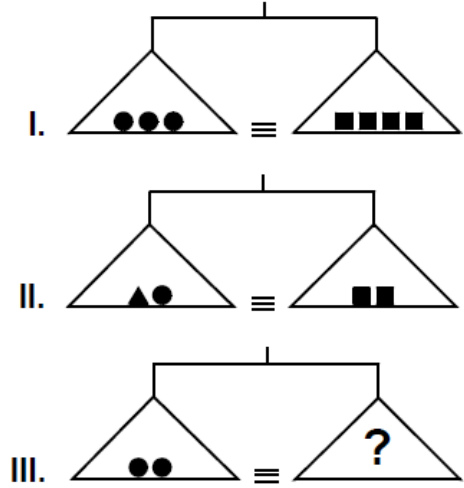


43. What number should be placed for question mark?



- A) 1
- B) 2
- C) 3
- D) 4
- E) 5

44. According to the given balance I and II , which group of masses , when place on the empty try in III , will make the scale balance ?



- A) ▲■■■
- B) ■■■■
- C) ▲▲▲
- D) ▲▲▲■
- E) ▲▲■■■

45. In the calculation below each letter represents different number ,then find the value of S+P=?

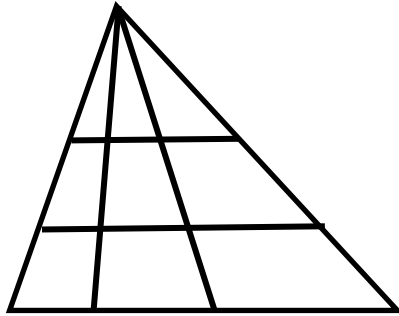
$$\begin{array}{r}
 KLM \\
 \times K6 \\
 \hline
 MMM \\
 + KLM \\
 \hline
 SP6M
 \end{array}$$

- A) 3
- B) 4
- C) 5
- D) 6
- E) 7

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46. How many triangles are there in the given figure ?

- A) 9
- B) 10
- C) 15
- D) 17
- E) 18

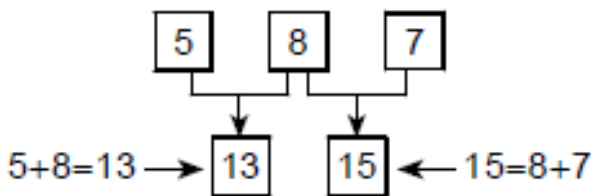


48. In the expression $2 \square 3 \square 4 \square 5$, an operation sign (addition, subtraction, multiplication or division) is placed in each \square . The same operation may be repeated, and brackets may be inserted. What is the largest two-digit number that can be obtained?

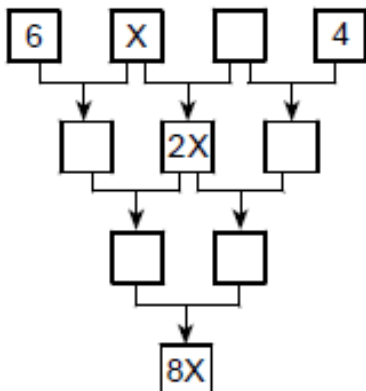
- A) 54
- B) 62
- C) 70
- D) 86
- E) 9

PYRAMID

In the given figure below. The rule is given as follows. The given two numbers below is added and then written down. For example:



47. What is X?



- A) 3
- B) 4
- C) 5
- D) 6
- E) 7

49. Which word does NOT belong with the others?

- A) book
- B) index
- C) glossary
- D) chapter
- E) page

50. In the 5×5 square, the numbers 1, 2, 3, 4 and 5 are to be placed in the squares so that each number appears exactly once in each row and once in each column. Some numbers have already been placed. When the square is completed, the number in the square marked with an X is:

			3	2
2				
		5	X	
		1		3
5			1	

- A) 1
- B) 2
- C) 3
- D) 4
- E) 5

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