

MATHEMATICS - ALGEBRA

1. If $(\sqrt{a+\sqrt{b}})^2 + (\sqrt{a-\sqrt{b}})^2 = 14$

then what is the value of a?

- A) 7
- B) 10
- C) 12
- D) 14

2. Aika asks her teacher his age. He replied "My age now is a square of number but after my birthday it will be a prime number." Assuming his age is below 65 and above 20, how old is he now ?

- A) 25
- B) 36
- C) 49
- D) 64

3. Place each of these symbols "+", "-", and "x", into the blanks of the expressions $5_4_6_3$, one symbol only one blank for, each resulting expression will have a value. What is the largest of these values?

- A) 19
- B) 23
- C) 26
- D) 28

4. Two different numbers a and b (not necessarily integers) satisfy $a^2 - 100a = b^2 - 100b$. Find the sum of a and b?

- A) 10
- B) 100
- C) 200
- D) -100

5. If $\begin{cases} a + \frac{3}{b} = 11 \\ a - \frac{3}{b} = 5 \end{cases}$ then find $a + b$?

- A) 0
- B) 2
- C) 4
- D) 9

7. Find the simplest form?

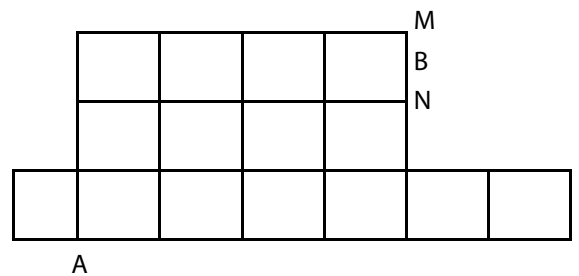
$$\frac{\frac{x}{x-y} - \frac{y}{x+y}}{\frac{x}{x+y} + \frac{y}{x-y}}$$

- A) $x \cdot (x-y)$
- B) $x^2 + y^2$
- C) 0
- D) 1

6. Two numbers are called mirror numbers if one is obtained from the other by reversing the order of digits. For example, 23 and 32. If the product of a pair of mirror numbers is 1207, then what is the sum of this pair of mirror numbers?

- A) 88
- B) 90
- C) 96
- D) 100

8. The diagram shown in the figure below composed of 15 units squares. AB divides the area of the given figure into two equal parts. Find the value of MB/BN?



- A) 1/2
- B) 1/4
- C) 1/3
- D) 3/4

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9. If $3x^2 - 3x - 4 + 3x^2 - 3x - 2 + 3x^2 - 3x - 1 = 37$

then find the product of possible values of x ?

- A) 4
- B) 1
- C) -1
- D) -4

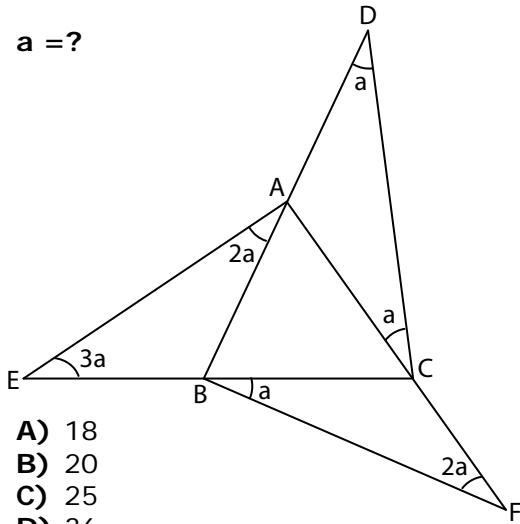
10. $a > 1, a \in \mathbb{R}$. If $\frac{20a}{a^2 + 1} = \sqrt{2}$ find

the value of $\frac{14a}{a^2 - 1} = ?$

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

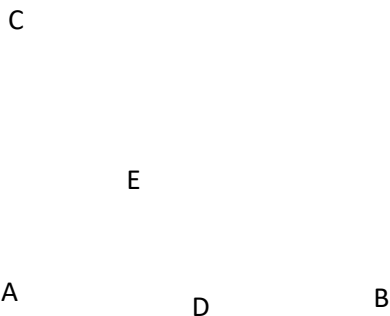
GEOMETRY

11. $a = ?$



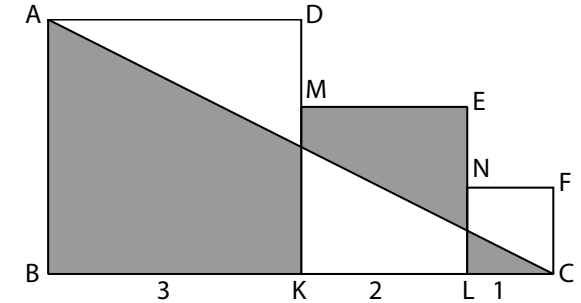
- A) 18
- B) 20
- C) 25
- D) 36

12. $|AB|=9\text{cm}$, $|AC|=8\text{ cm}$, $AE = ED$
 ΔABC is a right angled triangle and the area of ΔABC is divided into 3 equal part by the line AD and AE.
 what is the length of AE ?



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

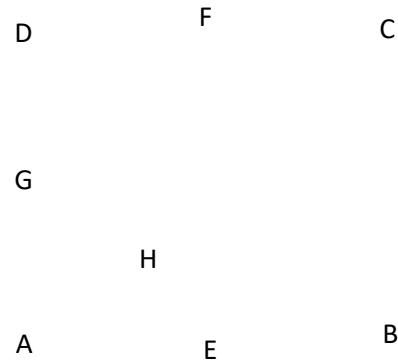
13. $ABKD$, $MKLE$ and $NLCF$ are three square.
 $|BK|=3\text{cm}$, $|KL|=2\text{cm}$ and $|LC|=1\text{cm}$.
 What is the area of the shaded part?



- A) 5
- B) 7
- C) 9
- D) 12

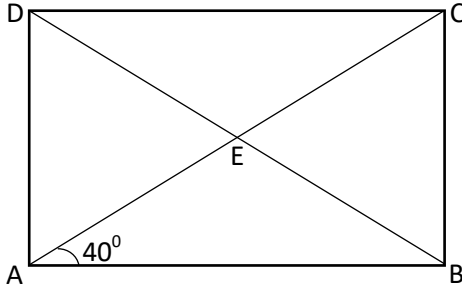
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14. Area of Square ABCD is 160 cm^2 .
 Points F, G, H and E are midpoints of DC, DA, GE and AB respectively FH equals:



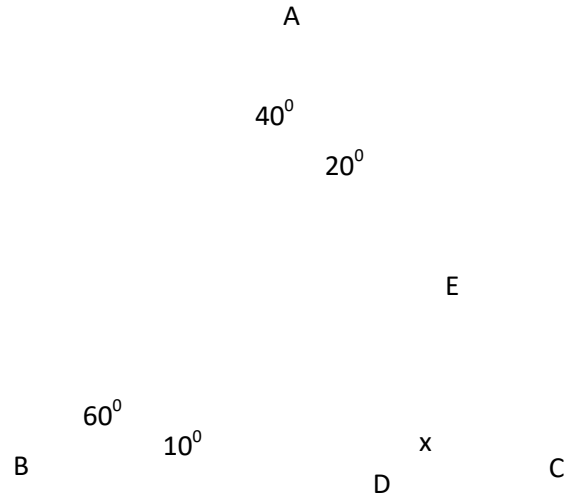
- A) 10
- B) 16
- C) 18
- D) 20

15. ABCD is a rectangle
 $\angle DCE = ?$



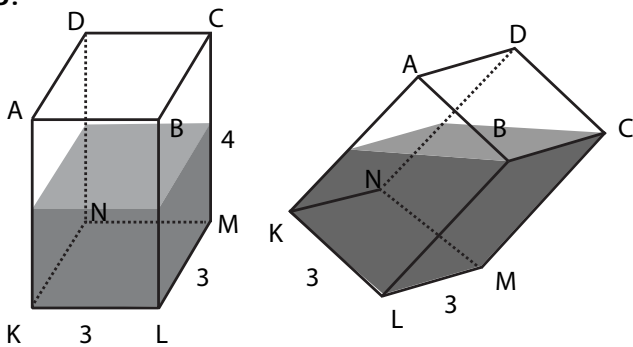
- A) 30
- B) 40
- C) 50
- D) 60

17. ABC is a triangle
 $\angle BAD = 40^\circ$, $\angle DAE = 20^\circ$, $\angle DBE = 10^\circ$, $\angle ABE = 60^\circ$.
 $\angle CDE = x$, so $x = ?$



- A) 80
- B) 60
- C) 30
- D) 15

- 16.



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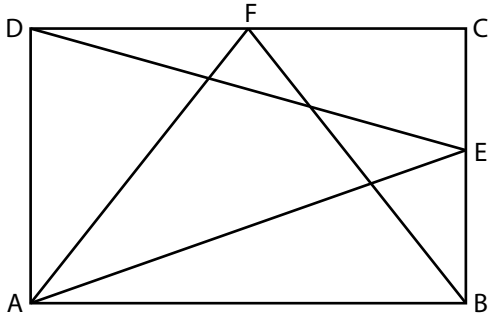
In the rectangular prism above, $|KL| = 3\text{cm}$, $|LM| = 3\text{cm}$ and $|CM| = 4\text{cm}$. The volume of water is $1/2$ of the total. "When the prism is taken the second position," "the level of the water is reached $|PR|$ and downed the $|KN|$ ". What is the surface area of the water in the second position.

- A) 9
- B) 10
- C) 12
- D) 15

18. ABCD is a square and DEC is a triangle. If area of ABCD is 100cm^2 and area of DEC is 24cm^2 . What is the perimeter of DEC.

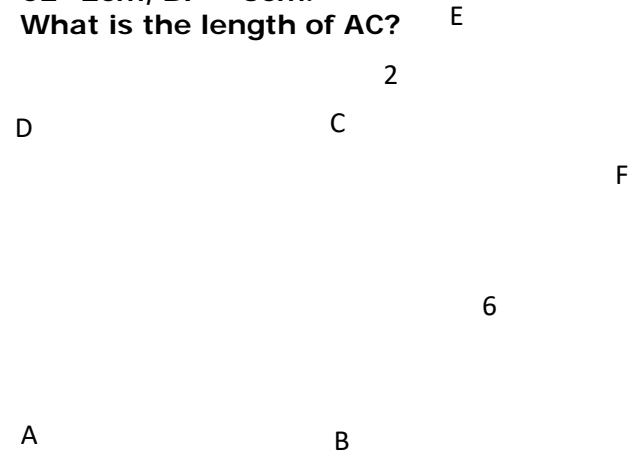
- A) 18
- B) 24
- C) 30
- D) 36

19. ABCD is a rectangle and area of AED is 12cm^2 . Find the area of ABF?



- A) 30
- B) 20
- C) 15
- D) 12

20. In the figure ABCD is a square, $CE=2\text{cm}$, $BF = 6\text{cm}$. What is the length of AC? E



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

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NUMBER THEORY

21. We know that 0,2,4,6 and 8 are even digits. How many even digits are used from 1 to 50 ?

- A) 25
- B) 29
- C) 31
- D) 40

23. By adding three consecutive integers what number can you get?

- A) 100
- B) 99
- C) 98
- D) 50

22. Let p and q be prime numbers greater than 3. Which is not possible for $p^2 - q^2$?

- A) divisible by 3
- B) divisible by 4
- C) even
- D) odd

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24. How many of the following numbers $1 \times 2, 2 \times 3, 3 \times 4, \dots, 29 \times 30$ are divisible by 3 or 5?

- A) 14
- B) 17
- C) 21
- D) 23

25. The number $A1\dots 1B$ has 2017 digits (all digits standing between A and B are 1). This number is divisible by 9. What is the greatest possible sum of the digits A and B?

- A) 10
- B) 12
- C) 15
- D) 18

27. The ratio of two numbers is 3:4 and their GCF is 4. What is LCM of these numbers?

- A) 12
- B) 48
- C) 16
- D) 24

26. When an integer n is divided by 8, the remainder is 3. What is the remainder if $6n$ is divided by 8?

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

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28. Two containers contain 60 and 165 litres of milk respectively. The maximum capacity of a container which can measure the milk in each container an exact number of times in litres :

- A) 15
- B) 3
- C) 5
- D) 10

29. Three friends meet at DonutShop at 7:00 AM. One returns every 20 minutes, the second returns every 30 minutes, and the third returns every 25 minutes. At what time will three friends meet again at DonutShop?

- A) 12:00
- B) 13:00
- C) 15:00
- D) 10:00

30. If the LCM and GCF of three numbers are 210 and 3 respectively. What is the first number if two numbers are 15 and 21?

- A) 8
- B) 6
- C) 3
- D) 2

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COMBINATORICS

31. The number 60 is written on a blackboard. Alice and Bob take turns subtracting from the number on the blackboard any of its divisors (including 1 or the number itself), and replacing the original number with the result of this subtraction. The player who writes the number 0 loses. Alice starts. What is the correct statement?
- A) Alice wins
B) Bob wins
C) No one wins
D) not known
32. $\text{INK} + \text{INK} + \text{INK} + \text{INK} = \text{PEN}$ (INK and PEN are 3-digit numbers, and different letters stand for different digits) What does PEN stand for?
- A) 140
B) 240
C) 410
D) 420
33. Money in Wonderland comes in \$5 and \$7 bills. What is the smallest amount of money you need to have in order to buy a slice of pizza which costs \$1 and get back your change in full? (The pizza man has plenty of \$5 and \$7 bills.) For example, having \$7 won't do, since the pizza man can only give you \$5 back.
- A) 15
B) 21
C) 28
D) 42
34. How many times in a half-day (= 12 hours) the hour and the minute hand of a clock form the right angle with each other?
- A) 4
B) 3
C) 2
D) 1

35. Put 5 points on the plane so that each 3 of them are vertices of an isosceles triangle (i.e., a triangle with two equal sides), and no three points lie on the same line. What is the maximum number of triangles?

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

37. Three adjacent faces of a cube as shown in the figure. Which one of the following is the net of that cube?

- A) 
- B) 
- C) 
- D) 

36. Athuman, who is older than Allen by 2 years minus 1 day, was born on January 1, 2003. What is the Allen's date of birth?

- A) January 2, 2005
- B) January 2, 2001
- C) December 31, 2000
- D) December 31, 2002

38. In a primary school, 20 male and female students formed a circle. It appeared that there is no child such that both its neighbors are male. What is the least possible number of female students?

- A) 11
- B) 10
- C) 9
- D) 8

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39. How many right triangles can be formed by diagonals of a fixed square (it is not possible to rotate or translate) ?

- A) 10
- B) 9
- C) 8
- D) 7

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40. Three drawers, one with socks, another with boxers and the third one with a mixture of socks and boxers, are labeled "SOCKS", "BOXERS" and "SOCKS AND BOXERS". It is known that all labels are incorrect. Can you tell what each drawer contains by just picking one item from one of the drawers (of your choice)?

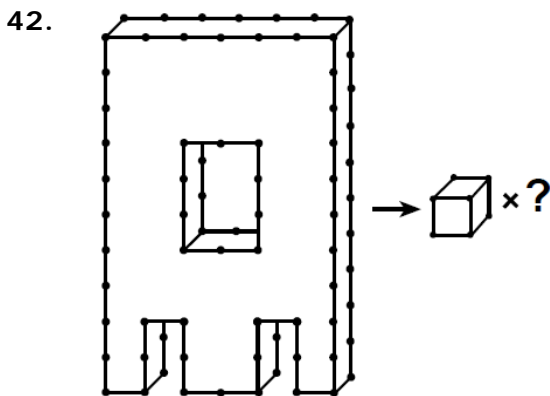
- A) yes
- B) no
- C) impossible
- D) lack of information

IQ QUESTIONS

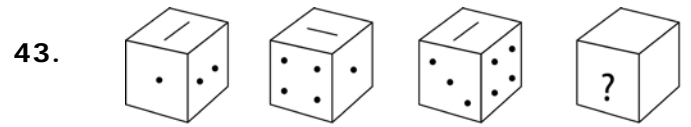
41.
$$\left\{ \begin{array}{ccc} \text{田} & \diamond & \diamond \\ \odot & \text{田} & \diamond \\ \diamond & \odot & \triangle \\ \diamond & \diamond & \odot \\ \text{田} & \triangle & \text{田} \end{array} \right\} = \left\{ \begin{array}{cc} 213 & 235 \\ 371 & 721 \\ 757 & \end{array} \right\}$$

$\diamond \odot \triangle = ?$

- A) 213
- B) 235
- C) 371
- D) 721



- A) 50
- B) 60
- C) 70
- D) 80



- A)
- B)
- C)
- D)

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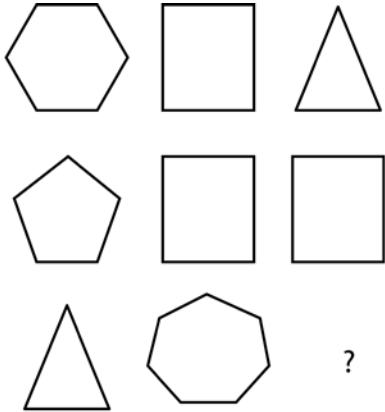
44. A donkey must transport 780 carrots to the market which is 40 miles away. The donkey carries a maximum of 300 carrots, and eats 2 carrots for every mile. If it does not eat, it will not move.



What is the minimum number of turns for that donkey to deliver carrots at the market?

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

45.



- A)
- B)
- C)
- D)

47.

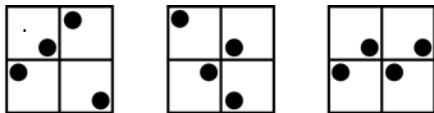
In the picture three faces of one dice is given. If the sum of the numbers at the opposite faces are equal which number should be at the opposite side of 6?



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

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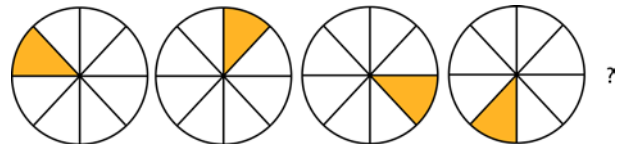
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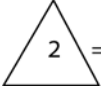



What comes next in the above sequence?

- A)
- B)
- C)
- D)

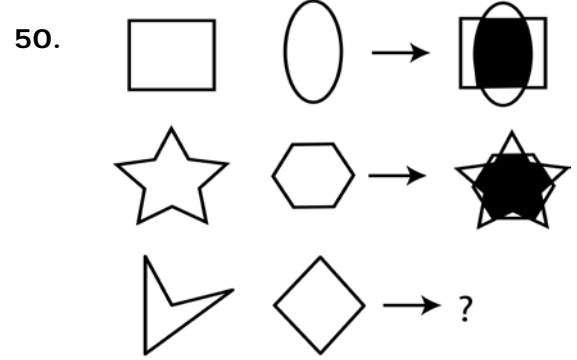
48.







- A)
- B)
- C)
- D)

49.  = 6  = 12  = 20  = ?

- A) 18
- B) 24
- C) 28
- D) 36



- A) 
- B) 
- C) 
- D) 

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