

IQ

1. If each of three cats can drink three bottles of milk in 3 minutes, how long does it take for 9 cats to drink 9 bottles of milk?

- A) 3
- B) 6
- C) 9
- D) 27

2. O - T - T - F - F - S - S - ?
Which is the missing letter?

- A) O
- B) E
- C) N
- D) T

3. In a family a girl has the same number of sisters and brothers. A boy has sisters twice of brothers. How many children are there in this family(father and mother not included)?

- A) 5
- B) 7
- C) 9
- D) 13

4. Some students sit around a round table with equal distances from each other. If the fourth and the fifteenth ones are face to face (opposite) how many students are there?

- A) 11
- B) 19
- C) 22
- D) 24

5. Five brothers live in an old house where there is no electricity and no computers or any other electronic device.

- Brother-1: Reading a book
- Brother-2: Doing his homework
- Brother-3: Playing Bao Bao
- Brother-4: Sleeping
- Brother-5 : what is he doing ?

- A) Reading a book
- B) Doing homework
- C) Playing Bao
- D) Sleeping

6.



A grocer has only one balance scale and 4 weights. Using only these four weights he can measure the substances from 1 kg to 40 kg. Find the weights he uses?

- A) 1, 2, 4, 8
- B) 1, 3, 7, 20
- C) 1, 2, 5, 30
- D) 1, 3, 9, 27

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7. Tanga = 2
Morogoro = 0
Singida = 1
Manyara = 3

In relation with the assigned numbers which number should be given to Dodoma?

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

8. Which is the next number in the following series? $\frac{2}{3}, \frac{4}{7}, \frac{7}{13}, \frac{11}{21},$

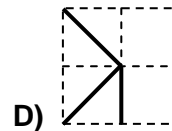
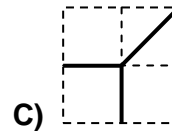
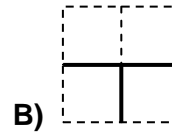
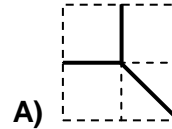
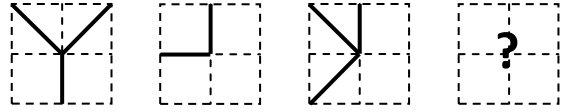
- A) $\frac{13}{23}$
- B) $\frac{14}{25}$
- C) $\frac{15}{31}$
- D) $\frac{16}{36}$

9. Five books are lying on a shelf. Q is lying on M and O is lying under N. M is lying above N and P is lying under O. Which one is lying at the bottom?



- A) M
- B) N
- C) O
- D) P

10. What is the next in the sequence ?



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ALGEBRA

11. If $a*b = a^2 + b$, find y given that $4*(2*y) = 25$

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

12. If $|a - 2| + |b - 4| + |c - 6| = 0$, what is the value of $a + b - c$?

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

13. If $0 < x < 1$ and $a = x$, $b = x^2$, $c = \frac{1}{\sqrt{x}}$ are given, so which of the following statement is correct?

- A) $b > a > c$
- B) $c > a > b$
- C) $a > b > c$
- D) $a = b = c$

14. A man has a daughter and a son. The son is three years older than the daughter. In one year the man will be six times as old as the daughter is now. In ten years the man will be fourteen years older than the combined ages of his children at that time. What is the man's present age?

- A) 14
- B) 10
- C) 7
- D) 2

15. Simplify $\frac{x^2 + \left(b - \frac{1}{a}\right)x - \frac{b}{a}}{x - \frac{1}{a}}$

- A) $x + b$
- B) $x - b$
- C) $-x - b$
- D) $-x + b$

16. Solve for x ; $\frac{16-x^4}{2-x} = 0$

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

17. A watch loses 3 seconds and another watch loses 1 second every 24 hours. In how many days will they show a difference of 10 minutes?

- A) 100
- B) 500
- C) 200
- D) 250

18. What is the relation between b and c if $4x^2 + bx + c$ is a perfect square ?

- A) $\left(\frac{b}{4}\right)^2 = c$
- B) $b^2 = c$
- C) $b = c^2$
- D) $b^2 = 4c$

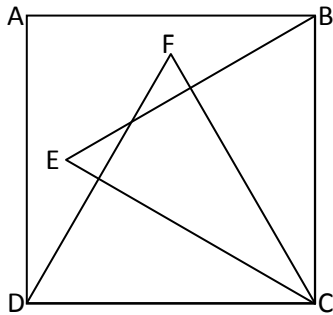
19. Two buses start traveling from Dar to Dodoma at the same time. One's speed is 41 km/h more than the other. The faster bus arrives in Dodoma 7 hours earlier than the other. Find their average speeds if the distance between Dar and Dodoma is 574 km.

20. One hundred Red, Green and Yellow cars traveled 100 kilometer totally. Each red car traveled 10 km, each green car traveled 1 km and each yellow car traveled 0.5 km. Find the possible number of red cars

22. In square ABCD, two quarter circles are drawn with centers C and A with radii 8 and 4 units respectively. Do these quarter circles intersect ?
- A) Yes
 B) No
 C) cannot be determined
 D) they are tangent

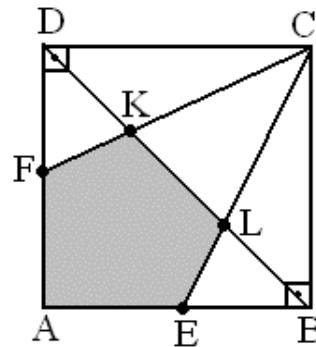
GEOMETRY

21. In the figure, ABCD is a square, DFC and BEC are equilateral triangles. What is angle between lines BE and DF.



- A) 90°
 B) 60°
 C) 45°
 D) 30°

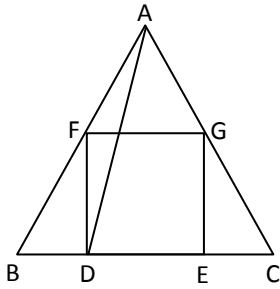
23. ABCD is a square and E, F are midpoints. If the shaded area is $24\sqrt{3}$ cm² then find $A(ABCD)$.



- A) $72\sqrt{3}$
 B) $64\sqrt{3}$
 C) $48\sqrt{3}$
 D) $36\sqrt{3}$

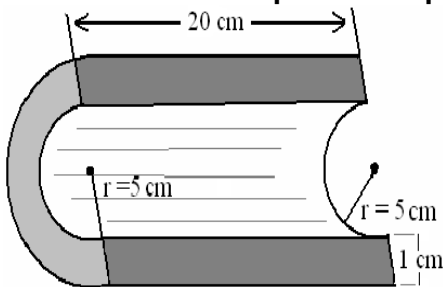
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24. ABC is an equilateral triangle DEGF is a square, then what is $\angle ADC$?



- A) 60
- B) 70
- C) 75
- D) 80

25. In the figure, a half part of a cylindrical pipe is given. The thickness of the pipe is 1 cm, inner radius is 5 cm and length of pipe is 20 cm then what is the volume of the inner part of the pipe?



- A) 180π
- B) 150π
- C) 200π
- D) 250π

26. What is the minimal number of acute triangles one can cut the regular polygon with 8 sides?

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

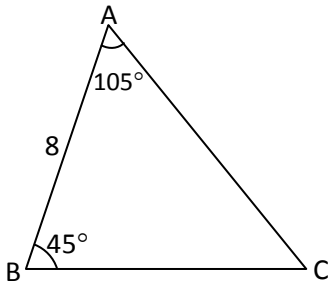
27. A craftsman has 4 kg of paint in order to paint all faces of a cube with the edge equal to 1 m. He cuts the cube into 8 smaller identical cubes. How much more paint does he need in order to paint completely faces of all smaller cubes?

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

28. In the figure, two quarter circles are inscribed in square ABCD with centers C and A with radii 8 and 4 units respectively. Which statement is true ?

- A) To find length of arc DE we need length of DE segment
- B) If we know size of angle BAE, then we can find the area between two quarter circles
- C) After finding angle ECB we can evaluate length of arc DE
- D) None of these true

29. Find the length of AC in the given triangle below.



30. Find the angle between hour-hand and minute-hand when the time is 10:24 in a clock.

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COMBINATORICS

31. How many triangles can you form using 4 sticks with lengths 1, 2, 3 and 4 cm

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

32. How many squares contain at least 2 R's ?

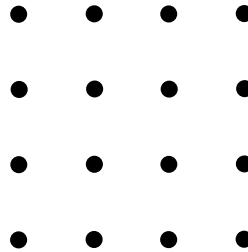
R			
		R	
	R		
			R

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

33. What number is the maximum among all numbers obtained by deleting any 24 digits from the number 1357911131517...31

- A) 993
- B) 995
- C) 997
- D) 999

34. In the grid, the distances between two neighbor points vertically or horizontally is one unit. How many squares can we form using the dots as vertices?



- A) 20
- B) 25
- C) 27
- D) 30

35. In a contest to guess the number of balloons in a bunch, Sarah guessed 25, Betty guessed 31, Nomsa guessed 29, Jakkie guessed 23 and Edith guessed 27. Two guesses were wrong by 2, and two guesses were wrong by 4. The other guess was correct. The number of balloons in the bunch was

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

36. Saul plays a video game in which he scores 6 for a hit and -4 for a miss. After 20 rounds his score is 30. The number of times he has missed is
- A) 9
 - B) 10
 - C) 11
 - D) 15

37. How many different isosceles triangles, with natural numbers as side lengths, can be constructed so that the perimeter of each triangle is 12?
- A) 7
 - B) 5
 - C) 4
 - D) 2

38. A boy has as many sisters as brothers, but each sister has only half as many sisters as brothers. How many brothers and sisters are in the family?
- A) 7
 - B) 5
 - C) 4
 - D) 2

39. There are three closed boxes on a table. It is known that one contains two blackballs, another contains one black and one white ball, and the third one contains two white balls. Each box has a sticker: "Two whites", "Two blacks", "One white and one black". It is known that all stickers are wrong. How can one place stickers on the boxes correctly by taking just one ball from one box, and not looking inside?

40. The set of positive integers is divided into subsets in the following way $\{1\}$, $\{2,3\}$, $\{4,5,6\}$, $\{7,8,9,10\}$, ... Find the greatest number in the 25th subset

42. Let $3p + 1$ is a square of a number, where p is a prime number, p equals :
- A) 2
 - B) 3
 - C) 4
 - D) 5

NUMBER THEORY

41. Let p and q be prime numbers with difference 2 and $q < p < 23$. How many such pairs are there?

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

43. The teacher asked each of four children to think of a four-digit number. "Now please transfer the first digit to the end and add the new number to the old one. Tell me your results".
- Mary: 8,612
Jack: 4,322
Kate: 9,867
John: 13,859. "
- Everyone except Kate is wrong", said the teacher. How did he know?

- A) Divisibility by 11
- B) Divisibility by 9
- C) The last digit
- D) She guessed

44. What prime number can be expressed as sum of two prime numbers?

- A) 2
- B) 3
- C) 5
- D) 11

46. What is the least common multiple of 16, 24, 28 which is divisible by 9?

- A) 1008
- B) 144
- C) 336
- D) 992

45. Is it possible to arrange the whole numbers 1 through 10 in a row so that sum of two adjacent numbers form a sequence 11,12,...,11,12?

- A) Yes
- B) No
- C) Not enough information
- D) Undefined

47. Fifty students took part in a math contest and 3 problems are submitted to the contestants. Each student solved at least one problem and the total number of correct solutions is 100. What is the maximum numbers of students who solved all three problems?

- A) 50
- B) 40
- C) 30
- D) 25

48. How many prime numbers p have the property that $\sqrt{2p - 12}$ is an integer?

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

49. $7abc - abc7 = 5886$ where a, b and c are digits find possible values of a, b, c .

50. A natural number is said to be a palindrome if it remains the same when its base 10 digits are read from right to left (for instance, 68386, 1234321) find x if both x and $x+312$ are palindroms; x has four digits, while $x+312$ has five digits.