ASSOCIATION OF MATHEMATICS TEACHRS OF INDIA

Screening Test – Kaprekar Contest

(NMTC SUB-JUNIOR LEVEL—VII and VIII Grades)

Saturday, the 7th October 2023

Instructions:

1. Fill in the Response sheet with your Name, Class and the Institution through which you appear, in the specified places.
2. Diagrams are only Visual guides; they are not drawn to scale.
3. You may use separate sheets to do rough work.
4. Use of Electronic gadgets such as Calculator, Mobile Phone or Computer is not permitted.
5. Duration of Test: 10 am to 12 Noon (Two hours)
6. For each correct response you get 1 mark; for each incorrect response, you lose ½ mark.

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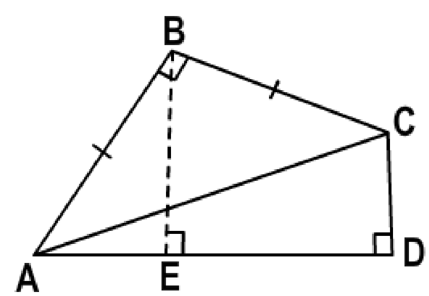
1. The value of $\sqrt{2023\sqrt{2022\sqrt{(2021\times 2019)+1}\ +\ 1}\ +\ 1}$ is

a) 2023 **b)** 2022 **c)** 2021 **d)** $\sqrt{2023\times 2022}$

2. In the adjoining figure, ΔABC is an isosceles right-angled triangle. BE is perpendicular to AD. If $BE = 1\ cm$, then the area (in cm^2) of the quadrilateral $ABCD$ is



a) 1 **b)** $\frac{3}{2}$

c) 2 **d)** $\frac{4}{3}$

3. If $a+b+c=0$, then the value of $\frac{(a^2+b^2+c^2)^2}{a^4+b^4+c^4}$ is

a) 1 **b)** 2 **c)** 3 **d)** 4

4. Ram, Rahim, Robin and Ria are four children, the product of whose ages is 5040. Ram is older than Rahim by one year, older then Robin by two years and older than by Ria by three years. The age of Ram (in years) is

a) 15 **b)** 7 **c)** 12 **d)** 10

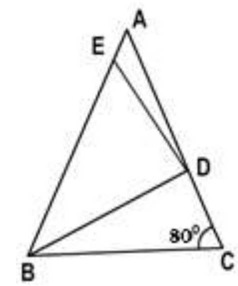
5. A fruit-seller sells apples, oranges and pineapples. In his stock, 20% are pineapples and 60% are oranges. There are 40 apples. If half the oranges are replaced by pineapples, how many pineapples are there in the shop now?

a) 40 **b)** 60 **c)** 80 **d)** 100

6. A carpenter can repair 4 tables in 5 hours. The time (in hours) for him to Repair (at the same rate) 7 tables is

a) 8 **b)** 7 **c)** 7½ **d)** 8¾

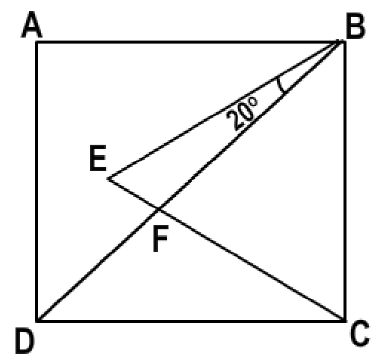
7. In the adjoining figure, $AB = AC$, $\angle C = 80^o$ and $BC = BD = DE$. Then the measure (in degrees) of angle ADE is



a) 9 **b)** 35

c) 15 **d)** 40

8. In the adjoining figure, $ABCD$ is a Square. Given $BE = AB$. If the measure of $\angle DFC$ (in degrees) is x^o then the value of $2x$ (in degrees) is



a) 205 **b)** 190

c) 200 **d)** 215

9. Two real numbers a, b (where $a > b$) are given such that their sum is equal to 4 times their difference. The value of $\frac{2ab}{3(a^2 - b^2)}$ is

a) ⅔ **b)** ½ **c)** 1 **d)** ⅝

10. The average of three numbers is x. Two of the three numbers are y and z. Then, the third number is

a) $3x + y + z$ **b)** $y + z - 3x$ **c)** $3x - y - z$ **d)** $\frac{y+z}{3}$

11. From a natural number 3 is subtracted, then the result is divided by 4 and the outcome is increased by 4 and the whole result is then divided by 5. The final resulting number is 2. Then the natural number taken in the beginning is

a) a perfect square **b)** a perfect cube

c) an even number **d)** divisible by 13

12. For all permissible natural numbers 'n', the number $\frac{9n^2 - 64}{n - 1 - \frac{1}{1 - \frac{n}{n+4}}}$ is

a) a proper fraction **b)** an improper fraction

c) a natural number divisible by 4 **d)** an odd integer

13. The number of solutions of the equation $\sqrt{x+5}+\sqrt{3x+4} = \sqrt{12x+1}$ is

a) 0 **b)** 1 **c)** 2 **d)** 3

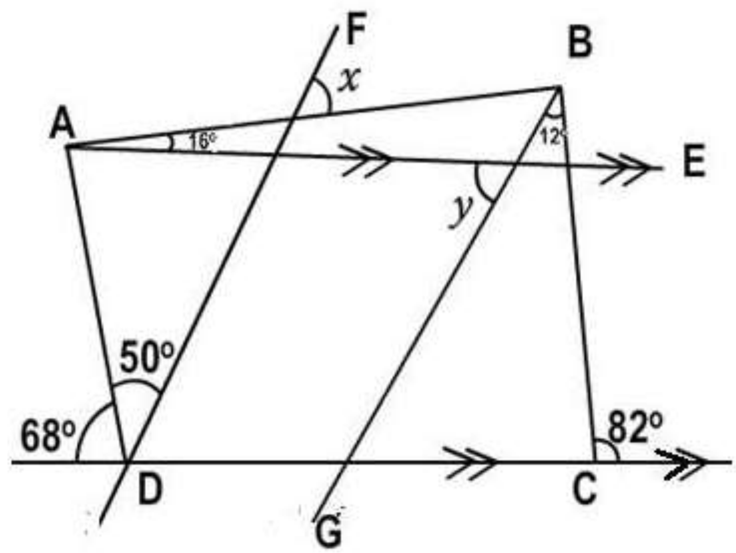
14. If $\frac{1}{1\times 3}+\frac{1}{2\times 4}+\frac{1}{3\times 5}+\ldots+\frac{1}{n(n+2)}=\frac{3553}{4830}$, then n =

a) 68 **b)** 65 **c)** 73 **d)** 90

15. In the adjoining figure, $\angle BAE = 16^{o}$ and $\angle CBG = 12^{o}$. Then the measure of $x + y$ (in degrees) is

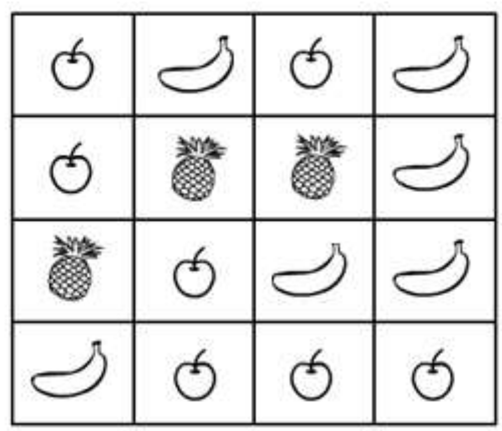
a) 116^{o} **b)** 123^{o}

c) 114^{o} **d)** 122^{o}



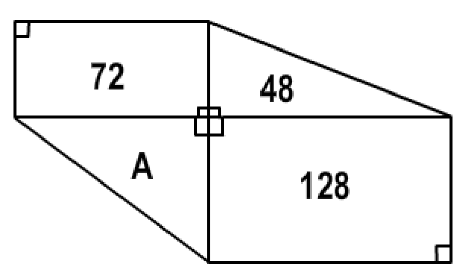
PART B

16. There are 3 pineapples, 6 bananas and 7 apples. Each fruit of the same category is of same price.
The total amount of the fruits of the 1st row is ₹44, that of the 3rd row is ₹54 and that of the 1st column is ₹72.
Then the total amount (in Rupees) of the fruits in the 2nd row is __________



17. If $2^{2^{x^2-1}} = 16$, then the value of x^4 is _______

18. In the adjoining figure, two rectangles and two right-angled triangles are arranged as shown. The numbers shown inside each are their respective areas. Then the area of A is __________



19. The sum of the length and breadth of a rectangle is 6 cm. A square is constructed whose side is equal to the diagonal of the rectangle. If the ratio of the areas of the square and the rectangle is 5:2, then the area of the square (in cm^2) is _______

20. If the area of a circle of radius 5 is numerically x % of its circumference, then x = __________

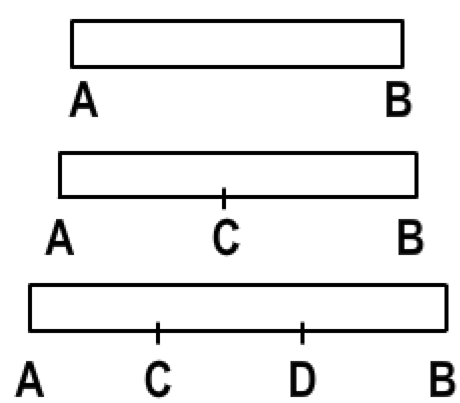
21. There are 3 real positive numbers. The second is greater than the first by the amount the third is greater than the second. The product of the two smaller numbers is 85 and that of the two bigger numbers is 115. Then the difference between the smallest and the greatest numbers is ________

22. The numbers 1, 3, 6, 10, . . . are called triangular numbers. The n^{th} triangular number $T_n = \frac{n(n+1)}{2}$. Then the value of $T_{3n+1} - 9T_n$ is equal to ____________

23. I read $\frac{3}{8}$ of a book on one day and $\frac{4}{5}$ of the remainder on another day. If 30 pages are still unread, then the total number of pages in the book is ______.

24. Three persons *A, B, C* participate in a running race for 1 *km* distance. When *A* and *B* run, *A* wins by 60 seconds; when *A, C* run, *A* wins by 375 metres. When *B* and *C* run, *B* wins by 30 seconds. If the time taken by *B* to run the 1 *km* distance is x minutes and 30 seconds, then x = ____________.

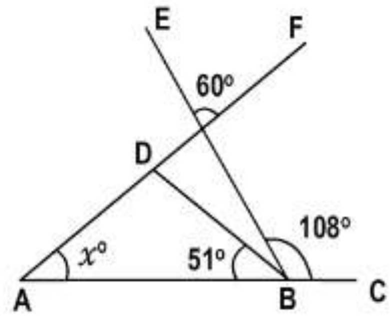
25. A ruler with no mark on it can measure its own length *AB.*
A ruler with only one mark on it can measure 3 lengths *AB, AC, BC.*
A ruler with two marks on it can measure 6 lengths *AB, AC, CD, DB, AD and CB.*
Then the number of lengths a ruler with 4 marks on it can measure is __________



26. In the adjoining figure,

The value of x (in degrees)

is ______________



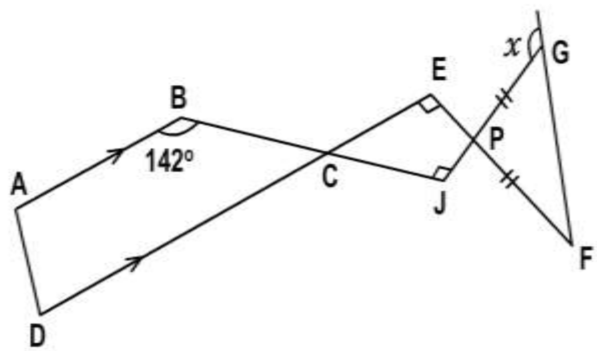
27. In the adjoining figure,

$AB \parallel DC$.

Also, $PG = PF$.

The measure of angle x

(in degrees) is __________



28. The sum of the first and last of four consecutive odd integers is 52. The sum of all of them is ________.

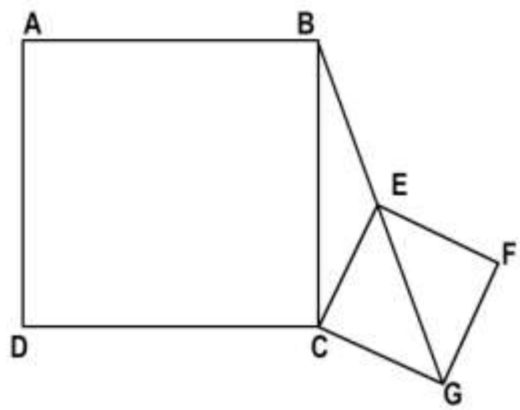
29. The square root of a number plus 2 gives the number itself. Then the number is ___________.

30. *ABCD and CEFG* are two squares such That the extension of GE (diagonal Of *CEFG* passes through *B*.

Given $BE = 6$ *cm* and $CG = 4\sqrt{2}$ *cm*.

Then the area of square *ABCD* (in cm^2)

is ____________



End of Question Paper.