NATIONAL TEACHERS COUNCIL

NATIONAL LEVEL
MATHEMATICS OLYMPIAD

Class 8

Time Allowed: 90 Minutes   **Maximum Mark: 50**

This Test Booklet contains 10 pages. Do not open the Test Booklet until you are asked to do so.

Important instructions

1.   ***The Answer Sheet is inside this Test Booklet.*** *When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with **blue/black ball point pen.***

2.   *The question paper is divided into two sections.* **Mathematical Reasoning** *(40 Questions) and* **Logical Reasoning** *(10 Questions)*

3.   *All the two Sections contain Multiple Choice Questions (MCQs). Each of these questions has four options out of which only one option is correct.*

4.   *Each question should be answered by **darkening** the appropriate circle (A, B, C, or D) with a **blue or black ball pen**.*

5.   *All questions are compulsory. There is no negative marks for wrong answer.*

6.   *Answer recorded once in the answer sheet cannot be altered.*

7.   *All rough works should be done only in the space provided for **rough work** in this question paper.*

8.   *Calculator is not permitted in the examination hall.*

9.   *Candidate should write his / her name in the space provided for the purpose.*

Candidate's Name:

Roll Number   :

....
Candidate's Signature   Invigilator's Signature

MATHEMATICAL REASONING

1   If the square root of a number is between 6 and 7 then its cube root lies between

   [A] 2 and 3   [B] 2.5 and 3

   [C] 3 and 4   [D] 4 and 4.5

2   What must be added to 24136 to make it a perfect square?

   [A] 100   [B] 200

   [C] 111   [D] None of these

3   The sum of three consecutive odd integers is 29 more than twice the largest. The numbers are

   [A]33, 35, 37   [B] 29, 31, 33

   [C] 32, 34, 36   [D] 31, 33, 35

4   The average of the middle two rational numbers if **4/7, 1/3, 2/5, 5/9** are arranged in ascending order is

   [A] 86/90   [B] 86/45

   [C] 43/45   [D] 43/90

5   A rational number between $\frac{1}{4}$ and $\frac{1}{3}$ is

   [A] 7/24   [B] 0.29

   [C] $\frac{13}{48}$ [D] All of these

6   Find the length of each side of a square park whose area is the same as the area of a rectangular field of dimensions 45m X 20m.

   [A] 3m   [B] 30m

   [C] 300cm.   [D] 300m

7   The product of 3.2×10^6 and 4.1×10^{-2} in the standard form is

   [A] 1.312×10^5 [B] 1.312×10^4

   [C] 1.312×10^{-2} [D] 1.312×10^3

8   If $-15mn^4p^2$ is divided by $\frac{1}{6}m^4n^4p^2$ the quotient is

   [A] $\frac{-5}{3m^3}$ [B] $\frac{-90n^8p^4}{m^3}$

   [C] $\frac{-90}{m^3}$ [D] $\frac{90}{m}$

9 The number of times a particular observation occurs in a given data is called:

[A] Frequency [B] Range

[C] Mean [D] Median

10 $9x^2 + 25 - 30x$ is the square of

[A] $3x + 5$ [B] $3x^2 - 25$

[C] $3x - 5$ [D] $-3x - 5$

11 A wire is in the form of a circle of radius 35cm. If it is bent into the shape of a rhombus, what is the side of the rhombus?

[A] 32 cm [B] 35cm

[C] 55cm [D] 17cm

12 The product of 3.2 x 10^6 and 4.1 x 10^{-2} in the standard form is

[A] 1.312x10^5 [B] 1.312x10^4

[C] 1.312x10^{-2} [D] 1.312x10^3

13 A's age is twice that of B, B's age is twice that of C and C's age is twice that of D. If the average of the ages of A, B, C and D is 15 years, then what is the age of B?

[A] 4 years [B] 8 years

[C] 16 years [D] 32 years

14 A businessman allows two successive discounts of 20% and his 10%. If he gets ₹ 108 for an article, then its marked price is

[A] ₹ 124 [B] ₹ 140

[C] ₹ 150 [D] ₹ 170

15 The value of $(0.9)^2 - (0.6)^2$ is

[A] 0.54 [B] -0.54

[C] -0.45 [D] 0.45

16 If each of the dimensions of a triangle is increased by 100%, its area is increased by

[A] 100% [B] 200%

[C] 300% [D] 400%

17 If $\sqrt{0.04 \; X \; 0.4 \; X \; a} = 0.004 \; X \; 0.4 \; X \; \sqrt{b}$, then $\frac{a}{b}$ is equal to

[A] 16 X 10^{-3} [B] 16 X 10^{-4}

[C] 16 X 10^{-5} [D] 16 X 10^{-2}

18 The area of a rectangle is $x^2 + 12xy + 27y^2$ and its length is $(x + 9y)$. Find the breadth of the rectangle

        [A] $x + 3y$ [B] $2x + y$

        [C] $3x + 2y$ [D] $x^2 + 3y$

19 In the following statements, the one that is incorrect is

        [A] Doubling the base of a given rectangle doubles the area

        [B] Doubling the altitude of a triangle doubles the area

        [C] Doubling the radius of a given circle doubles the are

        [D] Doubling the divisor of a fraction and dividing its numerator by 2 changes the quotient

20 In the following figure, CE is drawn parallel to BD. If <BAD = 100°., <ABD = 40°, <ADC = 85°. And <BCD = 70°.then <BCE is.

        [A] 90°

        [B] 85°

        [C] 65°

        [D] 45°
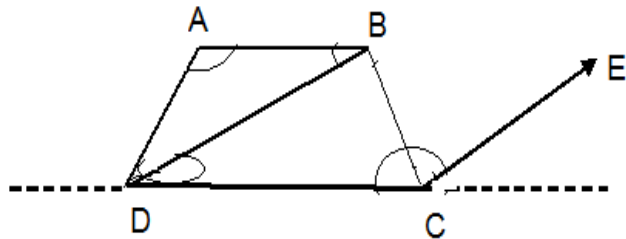
21 How many of the following four numbers are rational?

$$\sqrt{3} + \sqrt{3}, \quad \sqrt{3} - \sqrt{3}, \quad \sqrt{3} \times \sqrt{3}, \quad \sqrt{3} \div \sqrt{3}$$

        [A] One   [B] Two

        [C] Three   [D] Four

22 The denominator of a rational number is greater than its numerator by 3. If 3 is subtracted from the numerator and 2 is added to its denominator, the new number becomes 1/5. The original number is

        [A] -5/8   [B] 5/8

        [C] -3/8   [D] 3/8

23 What is 25% of 25%?

        [A] 6.25   [B] 0.625

        [C] 0.0625   [D] 0.00625

24 The value of expression $(8^o - 3^o)$ **X** $(8^o + 3^o)$

    [A] 0   [B] 1

    [C] 2   [D] 3

25 The product of $(x^2 + 3x + 5)$ and $(x^2 - 1)$ is

    [A] $x^4 + 3x^3 - 4x^2 - 3x - 5$ [B] $x^4 + 3x^3 + 4x^2 - 3x - 5$

    [C] $x^4 + 3x^3 + 4x^2 + 3x - 5$ [D] $x^4 + x^3 + x - 3x - 5$

26 Three numbers are in the ratio 2 : 3 : 4. The sum of their cubes is 33957. The numbers are

    [A] 14, 21, 28   [B] 12, 15, 17

    [C] 14, 18, 21   [D] 21, 28, 32

27 For the construction of a quadrilateral, minimum we need the measure of

    [A] 4 sides   [B] 2 diagonals

    [C] 3 sides and 2 diagonals   [D] 2 sides and 3 angles

28 A can do a piece of work in 3 days and B can do the work in 6 days. How long will A and B take together to complete the work.

    [A] 3 days   [B] 1 day

    [C] 4 days.   [D] 2 days.

29 What is the value of x in the given equation?

$$\frac{(3x+1)}{16} + \frac{(2x-3)}{7} = \frac{(x+3)}{8} + \frac{(3x-1)}{14}$$

    [A] 2   [B] 4

    [C] 3   [D] 5

30 Given that $(1^2 + 2^2 + 3^2 + \ldots 10^2) = 385$ then the value of $(2^2 + 4^2 + 6^2 + \ldots 20^2)$ is

    [A] 770   [B] 1155

    [C] 1540   [D] 1570

31 How much pure alcohol should be added to 500ml of 16% solution to make its strength 30%.

    [A] 80ml   [B] 90ml

    [C] 100ml   [D] 120ml

32 The least possible values of A for which 90 X A is a perfect cube is

    [A] 200   [B] 300

    [C] 500   [D] 600

33 If one of the diagonals of a rhombus and its sides are equal, then angles of the rhombus are

[A] 60^0, 120°, 60°, 120° [B] 70^0, 110°, 70°, 110°

[C] 50^0, 90°, 50°, 90° [D] 100^0, 30°, 100°, 30°

34 The centroid of a triangle is located 12 unit from one of the vertices of the triangle. Find the length of the median of the triangle drawn from that same vertex.

[A] 16   [B] 18

[C] 24   [D] 36

35 Numbers 1 to 10 are written on ten separate slips (one number on each slip), kept in a box and mixed well. One slip is randomly chosen from the box. What is the probability of the number chosen being less than 6?

[A] $\frac{1}{3}$ [B] $\frac{1}{2}$

[C] $\frac{2}{3}$ [D] $\frac{4}{3}$

36 The radii of two cylinders are in the ratio of 2 : 3 and their heights in the ratio 5 : 3, their volumes will be

[A] 4 : 9   [B] 27 : 20

[C] 20 : 27   [D] 9 : 4

37 In a scout camp, there is food provision for 300 cadets for 42 days. If 50 more persons join the camp, for how many days will the provision last?

[A] 32   [B] 34

[C] 36   [D] 40

38 0.6 of a number equals 0.09 of another number. The ratio of the numbers is

[A] 2 : 3   [B] 1 : 15

[C] 20 : 3   [D] 3 : 20

39 A metal sheet 27 cm long, 8 cm broad and 1 cm thick is melted into a cube. The difference between surface areas of two solids is

[A] 284 cm^2 [B] 286 cm^2

[C] 296 cm^2 [D] 280cm^2

40 Four angles of a quadrilateral are in the ratio 3 : 5 : 7 : 9. The greatest angle is

[A] 125° [B] 75°

[C] 135° [D] 120°

LOGICAL REASONING

41 Determine the number of rectangles and hexagons in the following figure.
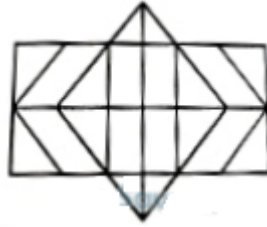
[A] 30, 5   [B] 32, 3

[C] 28, 5   [D] 30, 3

42 Among B, F, I, k and W, each one of them is of different heights. F is taller than only I, B is taller than F and W, but not as tall as K. Who among them is the third tallest?

[A] B   [B] F

[C] K   [D] W

43 In a family of five members, there are two married couples, A is the father in law of X, X is married with W. Z is the son of W. D has only one daughter.

How is A related with Z?

[A] Grandfather   [B] Grandmother

[C] Father in law   [D] Daughter in law

44 Find out which of the figures [A], [B], [C] and [D] can be formed from the pieces given in figure (X).
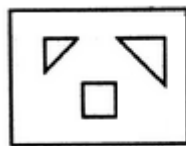
45 Four Forms of a dice is shown below. In this dice which digit will be on the surface opposite to the digit 4.

[A] 1   [B] 2

[C] 3   [D] 5

46 A series is given with one term missing. Out of the four alternatives, choose the alternative that will complete the series.
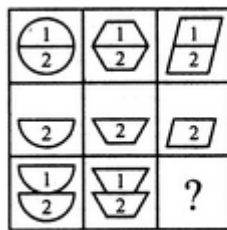
ACE, GIK, ?, SUW, YAC

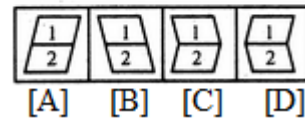[A] MOP   [B] MOQ

[C] MPQ   [D] MNP

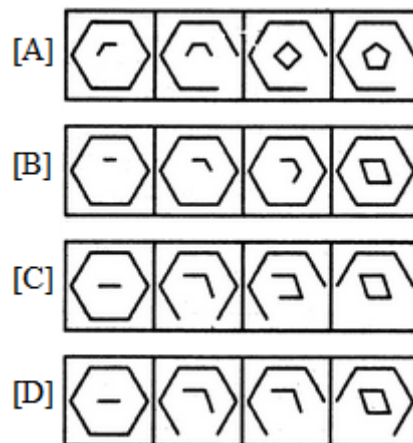47 Select a suitable figure from the four alternatives that would complete the figure matrix.

48 Choose the set of figures which follows the given rule.

Rule: Closed figures losing their sides and open figures gaining their sides.

49 Select the word which can be formed using the letters of the given word.

Word: ALPHABETICAL

[A] CLINIC   [B] BEAUTIFUL
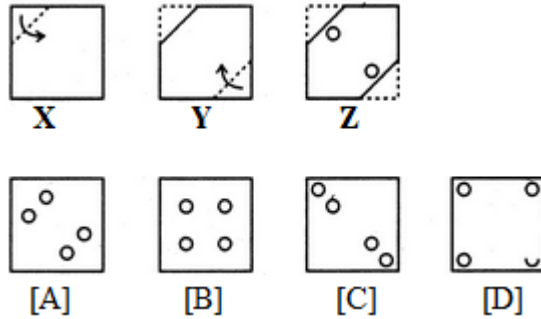
[C] CABLE   [D] OPTICAL

50   In the following question consists of a set of three figures X, Y and Z showing a sequence of folding of a piece of paper. Figure (Z) shows the manner in which the folded paper has been cut. These three figures are followed by four answer figures from which you have to choose a figure which would most closely resemble the unfolded form of figure (Z).

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SPACE FOR ROUGH WORK