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**NATIONAL
INTERACTIVE
MATHS
OLYMPIAD**

NIMO

10
Class

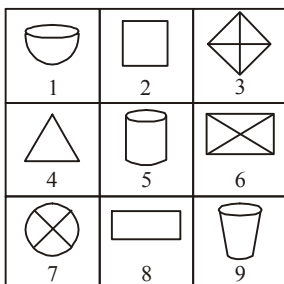
B1
Paper
Code

IMPORTANT INFORMATION

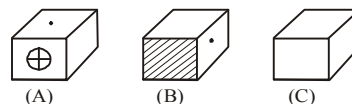
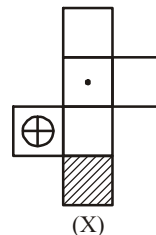
- You are allowed additional 10 minutes to fill the required details in the **RESPONSE SHEET**.
- The question paper is made as per syllabus guidelines & pattern given in the information Booklet. The Question Paper for Classes 1 to 6 contains 25 Questions each to be answered in 40 minutes. The Question paper for classes 7 to 12 contains 50 Questions each to be answered in 60 minutes. All questions are compulsory. Further instructions are given in the instruction letter to the coordinator teacher.
- Use the response sheet to mark your responses by darkening the required circle. The response sheet has to be returned to the foundation, duly filled in. The student can retain the Question Paper.

MENTAL ABILITY

- A candidate appearing for an examination has to secure 40% marks to pass paper I. But he secured only 40 marks and failed by 20 marks. What is the maximum mark for paper I?
 (1) 100 (2) 150
 (3) 200 (4) None of these
- Group the given figures into three classes using each figure only once.

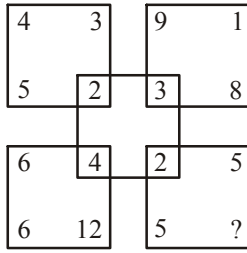


- 1, 5, 9; 3, 6, 7; 2, 4, 8
 - 2, 3, 6; 4, 8, 9; 1, 5, 7
 - 3, 6, 8; 2, 4, 9; 1, 5, 7
 - None of these
- The figure (X) given is folded to form a box. Choose from amongst the alternatives (A), (B) and (C) the boxes that are similar to the box formed.



- A only
 - A and C only
 - A, B and C
 - None of these
- 729 ml of a mixture contains milk and water in the ratio 7 : 2. How much more water is to be added to get a new mixture containing milk and water in the ratio of 7 : 3 ?
 (1) 60 ml (2) 90 ml
 (3) 81 ml (4) None of these
- A man can row 6 km/hr in still water. It takes him twice as long to row 'up' as to row 'down' the river. Find the rate of stream.
 (1) 2 km/hr (2) 3 km/hr
 (3) 2.5 km/hr (4) None of these
- Talekar is as much heavier than Suresh as he is lighter than Gokhale. If the total weight of Suresh and Gokhale is 140 kg, what is the weight of Talekar?

- (1) 55 kg (2) Data insufficient
 (3) 70 kg (4) None of these
7. Which number replaces the question mark in the bottom square?



- (1) 3 (2) 4
 (3) 2 (4) None of these
8. Which letter goes in the last box?
- J** **O** **S** **V** **□**
- (1) X (2) W
 (3) Y (4) None of these
9. Which group of numbers has the same but least frequency among all digits in the given sequence
5 4 8 7 3 5 9 8 7 6 3 2 9 5 7 2 4 6 5 8 9 8
- (1) 2, 3, 4, 6 (2) 7, 8, 3
 (3) 3, 4, 9 (4) None of these
10. Vidya is the wife of Gopi and Gopi is the brother of Akhil. Akhil is the uncle of Rahul. What is Rahul's relation with Vidya?
- (1) Daughter (2) Nephew
 (3) Niece (4) None of these

13. The sum of a two digit number and the number obtained by reversing the order of its digits is 99. If the digits differ by 3, find the number.
- (1) 36 & 63 (2) 48 & 84
 (3) 23 & 32 (4) None of these

14. Sum of two numbers x and y is 8 and the absolute value of whose difference is 10. Construct the equation of x.
- (1) $x^2 + 8x - 9 = 0$ (2) $x^2 - 8x + 9 = 0$
 (3) $x^2 - 8x - 9 = 0$ (4) None of these

15. Consider the equation $x + \frac{c}{x} = k$
- How many solutions are there if $c=1$ and $k=4$.
- (1) 2 (2) 3
 (3) 1 (4) None of these

16. Find zeroes of the equation, $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = \frac{13}{6}$
- (1) $\frac{9}{13}$ and $\frac{5}{13}$ (2) $\frac{4}{13}$ and $\frac{5}{13}$
 (3) $\frac{4}{13}$ and $\frac{9}{13}$ (4) None of these

17. If the sides of a right triangle are in an arithmetic progression then find their ratio.
- (1) 3 : 4 : 5 (2) 4 : 5 : 6
 (3) 2 : 3 : 4 (4) None of these

18. If a, b, c are in A. P., then find the value of $(a + 2b - c)(2b + c - a)(c + a - b)$
- (1) 2abc (2) 3abc
 (3) 4abc (4) None of these

19. If origin (0, 0) is shifted to (5, 2), what will be the coordinate of the point in the new axis which was represented by (1, 2) in the old axis.
- (1) -4, -1 (2) -4, 0
 (3) 4, 0 (4) None of these

20. If $\tan 2A = \cot (A - 18^\circ)$, where 2A is an acute angle, find the value of A.
- (1) 72° (2) 18°
 (3) 36° (4) None of these

21. A conical tent has 60° angle at the vertex. What is the ratio of its radius and slant height?
- (1) 1 : 2 (2) 2 : 3
 (3) 3 : 4 (4) None of these

22. The accompanying diagram shows two circles which touch internally at a point P. From T common tangent PT is drawn. Then tangent segments TQ and TR are drawn to both circles. Which type of triangle is TQR?

MATHEMATICS

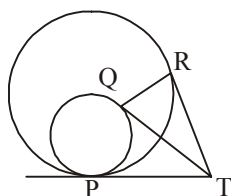
11. Let α, β be the zeroes of the polynomial $ax^2 + bx + c$. Find the value of

$$\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$$

- (1) $3abc - (b^3/c)$ (2) $\frac{3abc - b^3}{a^2c}$
 (3) $\frac{3abc + b^3}{a^2c}$ (4) None of these

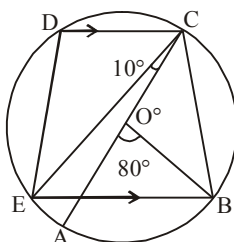
12. Solve the pair of equations $3^{x+y} = 81, 81^{x-y} = 3$

- (1) $x = \frac{17}{8}, y = \frac{15}{8}$ (2) $x = \frac{15}{8}, y = \frac{17}{8}$
 (3) $x = \frac{15}{8}, y = \frac{19}{8}$ (4) None of these



- (1) Right - angled (2) Isosceles
 (3) Equilateral (4) None of these

23. The accompanying diagram shows a circle where AC is the diameter and O is the centre. If CD is the parallel to BE and $\angle AOB = 80^\circ$ and $\angle ACE = 10^\circ$, what is the measure of $\angle BEC$?



- (1) 40° (2) 100°
 (3) 50° (4) None of these

24. If a rectangular paper of length 6 cm. and width 3 cm is rolled to form a cylinder with height equal to the width of the paper, then find its base radius.

- (1) 3 cm (2) $\frac{2}{\pi}$ cm
 (3) $\frac{3}{\pi}$ cm (4) None of these

25. Solve

$$-6x + 5y = 2$$

$$-5x + 6y = 9$$

- (1) $x = 3, y = 4$ (2) $x = 1, y = 2$
 (3) $x = 2, y = 3$ (4) None of these

26. In a $\triangle ABC$, $\angle C = 3\angle B = 2(\angle A + \angle B)$. Find the three angles.

[Hint : $\angle A + \angle B + \angle C = 180^\circ$]

- (1) 20, 40, 110 (2) 20, 40, 120
 (3) 10, 40, 130 (4) None of these

27. Solve in the lowest terms :

$$\frac{x^2 - 13x + 42}{x^2 - 8x + 12}$$

- (1) $(x-5)/(x-2)$ (2) $(x-7)/(x-2)$
 (3) $(x+7)/(x-2)$ (4) None of these

28. The product of Manoj's age (in years) five years ago and his age (in years) nine years later is 15. Determine Manoj's present age.

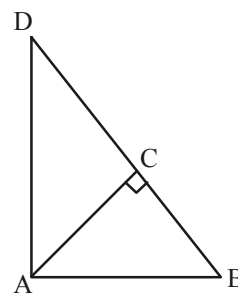
- (1) 6 (2) 4
 (3) 10 (4) None of these

29. Find the common difference of the AP

$$0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, \dots$$

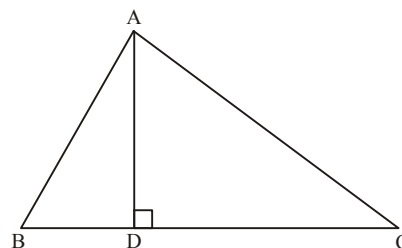
- (1) $\frac{1}{4}$ (2) $\frac{1}{3}$
 (3) $\frac{1}{5}$ (4) None of these

30. ABD is a triangle in which $\angle DAB = 90^\circ$ and $AC \perp BD$. Which of the following is true :



- (1) $AB^2 = BC \times BD$ (2) $AC^2 = BC \times DC$
 (3) Both (1) and (2) (4) None of these

31. In Fig. $AD \perp BC$. If $\frac{BD}{DA} = \frac{DA}{DC}$, $\angle A$ is



- (1) Acute angle (2) Right angle
 (3) Obtuse angle (4) None of these

32. $\sqrt{\frac{1 + \sin A}{1 - \sin A}} =$



- (1) $\sec A$ (2) $\tan A$
 (3) $\sec A + \tan A$ (4) None of these

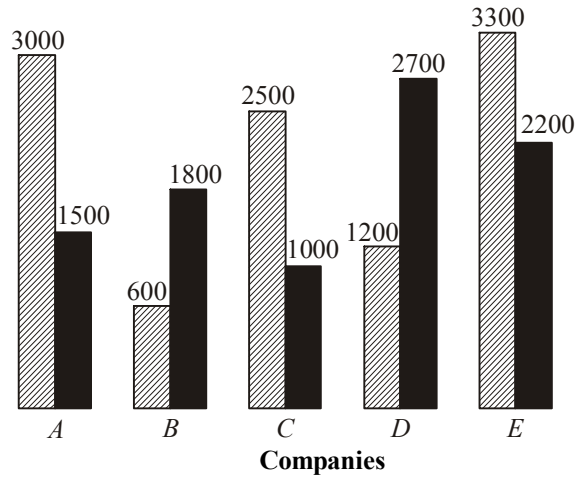
33. The locus of a point equidistant from the three vertices of a triangle is

- (1) Circumcentre (2) Incentre
 (3) Straight line (4) None of these

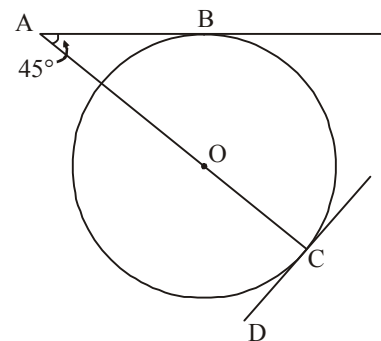
For next three questions

Demand and production of colour T.V.s of Five Companies for October 1988

 Demand
 Production



41. What is the ratio of companies having more demand than production to those having more production than demand?
(1) 2 : 3 (2) 4 : 1
(3) 3 : 2 (4) None of these
42. The production of company D is approximately how many times that of the production of the company A?
(1) 1.8 (2) 1.5
(3) 2.5 (4) None of these
43. If company 'A' desires to meet the demand by purchasing surplus T.V. sets from a single company, which one of the following companies can meet the need adequately?
(1) B (2) C
(3) D (4) None of these
44. If the radius of the circle is 2 cm, what is the measure of AB?



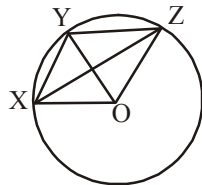
- (1) 2 cm (2) $2\sqrt{2}$ cm
- (3) $\sqrt{2}$ cm (4) None of these

34. If $\left(a + \frac{1}{a}\right)^2 = 3$, then $a^3 + \frac{1}{a^3}$ equals
(1) $7\sqrt{7}$ (2) $3\sqrt{3}$
(3) 0 (4) None of these

35. If $\log_{10}(x^2 - 3x + 6) = 1$, then the value of x
(where $\log_b a = c \Rightarrow b^c = a$) is
(1) 4 or -1 (2) 4 or -2
(3) 4 only (4) None of these

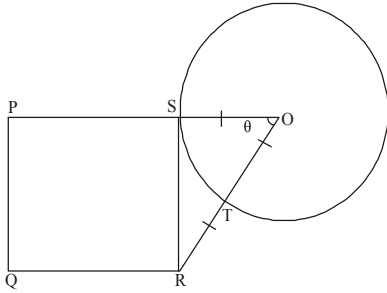
36. At the end of the year 2002. Ram was half old as his grandpa. The sum of the years in which they were born is 3854. Age of Ram at the end of year 2003 is
(1) 50 (2) 35
(3) 51 (4) None of these

37. In the figure, O is the centre of the circle, then $\angle XOZ$ is

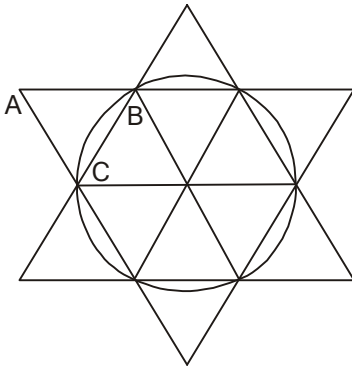


- (1) $2\angle X$ (2) $2\angle Y$
(3) $2[\angle XZY + \angle YXZ]$ (4) None of these
38. The area of sector of a circle is equal to
(1) πr^2 (2) $\frac{\pi r^2 \theta}{360^\circ}$
(3) $2\pi r$ (4) None of these
39. If a coin is tossed twice, the probability of getting at least one head is
(1) $\frac{1}{4}$ (2) $\frac{1}{3}$
(3) $\frac{3}{4}$ (4) None of these
40. A number x is chosen at random from the numbers -3, -2, -1, 0, 1, 2, 3. The probability that $|x| < 2$ is
(1) $\frac{2}{5}$ (2) $\frac{1}{5}$
(3) $\frac{3}{7}$ (4) None of these

45. PQRS is a square. SR is a tangent (at point S) to the circle with centre O and TR = OS. Take radius of circle = r. Find area of square in terms of r.



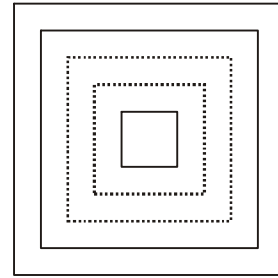
- (1) $2r^2$ (2) $3r^2$
 (3) $4r^2$ (4) None of these
46. A circle of radius 'a' is divided into 6 equal sectors. An equilateral triangle is drawn on the chord of each sector to lie outside the circle. Find area of triangle ABC.



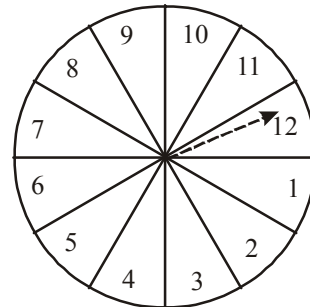
- (1) $\frac{\sqrt{3}a^2}{4}$ (2) $\frac{\sqrt{3}a^2}{2}$
 (3) $\sqrt{3}a^2$ (4) None of these

For next three questions,

The figure below shows a set of concentric squares. If the diagonal of the innermost square is 2 units, and if the distance between the corresponding corners of any two successive squares is 1 unit.



47. Find the length of diagonal of 7th square
 (1) 16 (2) 15
 (3) 14 (4) None of these
48. Find the length of diagonal of 8th square
 (1) 15 (2) 16
 (3) 17 (4) None of these
49. Find the difference between the areas of the eighth and the seventh square, counting from the innermost square.
 (1) 30 unit^2 (2) 20 unit^2
 (3) 15 unit^2 (4) None of these
50. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers, 1, 2, 3,.....12 as shown in figure. Find the probability that it will point to 12?



- (1) $\frac{1}{8}$ (2) $\frac{1}{6}$
 (3) $\frac{1}{12}$ (4) None of these



END OF THE EXAM

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