



National Cyber Olympiad

The actual test paper has 50 questions. Time allowed : 60 minutes. There are 3 sections, 15 questions in section I, 15 in section II and 20 in section III.

SYLLABUS

Section – I (Mental ability) : Rational numbers, Operation on rational numbers, Decimal representation of rational numbers, Exponents, Direct and inverse variations, Percentage and its application, Algebraic expression, Factorization of algebraic expressions, Linear equation in one variable, More about triangles, Congruent triangles, Quadrilaterals, Circles, Area of rectangular Paths, Surface areas and volumes, Statistics, Squares and square roots, Cubes and cube roots.

Section – II (Logical and analytical reasoning) : Problem based on figures, Find odd numeral out, Series completion, Coding-decoding, Mathematical reasoning, Analytical reasoning, Mirror images, Embedded figures.

Section – III (Computers and IT) : History of computers: A review, Components of computer system: Hardware, Software, Virus infection, MS-Word, Introduction to spreadsheet: Lotus 123, Introduction to MS-Excel, Introduction to database: Foxpro, Html, Network at a glance and internet, Multimedia.



National Science Olympiad

The actual test paper has 50 questions. Time allowed : 60 minutes. There are 2 sections, 20 questions in section I and 30 in section II.

SYLLABUS

Section – I (Mental ability) : Rational Numbers, Linear Equations in One Variable, Understanding Quadrilaterals, Practical Geometry, Data Handling, Squares and Square Roots, Cubes and Cube Roots, Comparing Quantities, Algebraic Expressions and Identities, Visualising Solid Shapes, Mensuration, Exponents and Powers, Direct and Inverse Proportions, Factorisation, Introduction to Graphs, Playing with Numbers.

Section – II (Science) : Crop Production and Management, Microorganisms : Friend and Foe, Synthetic Fibres and Plastics, Materials : Metals and Non-metals, Coal and Petroleum, Combustion and Flame, Conservation of Plants and Animals, Cell Structure and Functions, Reproduction in Animals, Reaching the Age of Adolescence, Force and Pressure, Friction, Sound, Chemical Effects of Electric Current, Some Natural Phenomena, Light, Stars and the Solar System, Pollution of Air and Water.



International Mathematics Olympiad

The actual test paper has 50 questions. Time allowed : 60 minutes. There are 3 sections, 20 questions in section I, 20 in section II and 10 in section III.

SYLLABUS

Section – I (Logical Reasoning) : Mathematical operations, Series completion, Direction sense test, Analytical Reasoning, Problems on cubes and dice, Number ranking & Time sequence Test and general reasoning based on prescribed syllabus.

Section – II (Mathematical Reasoning) : Squares and Square Roots, Cubes and cube roots, Exponents and Radicals, Profit, loss and discounts, Algebraic identities, Polynomials, Equations in one Variable, Parallel Lines, Special types of Quadrilaterals and their constructions, Circles, Areas, Surface Areas, Volumes, Statistics.

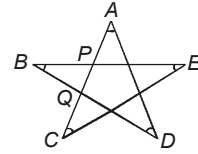
Section – III (Everyday Mathematics) : The Syllabus of this section will be based on the syllabus of Mathematical Reasoning.



National Cyber Olympiad

MENTAL ABILITY

1. In the star shape shown in figure, the sum of the angles marked at the corners A, B, C, D, E is
- (A) 90° (B) 135°
 (C) 180° (D) 140°

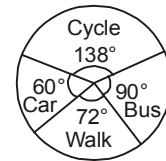


2. An acute angle is an angle whose measure is between 0° and 90° . Using the rays in the diagram, how many different acute angles can be formed?
- (A) 12 (B) 9 (C) 15 (D) 10

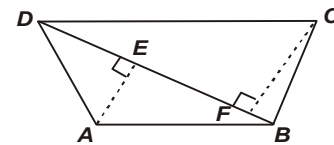


3. The age of a man is same as his wife's age with the digits reversed. Then sum of their ages is 99 and the man is 9 years older than his wife. How old is the man?
- (A) 50 (B) 49 (C) 54 (D) 44

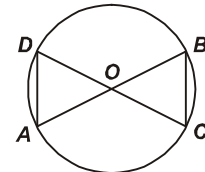
4. 50 students from a certain colony attend a public school. With the help of the given pie-chart, find the total number of students who walk to school.
- (A) 12 (B) 10 (C) 18 (D) 8



5. Total area of quadrilateral $ABCD$ is 20 cm^2 and offsets on BD are 2 cm and 3 cm. The length of BD is
- (A) 5 cm (B) 6 cm
 (C) 8 cm (D) 10 cm



6. In the adjoining figure, AOB and COD are the diameters of a circle. If $\angle ADO = 55^\circ$ then $\angle OCB$ is
- (A) $27\frac{1}{2}^\circ$ (B) $62\frac{1}{2}^\circ$
 (C) 55° (D) 35°

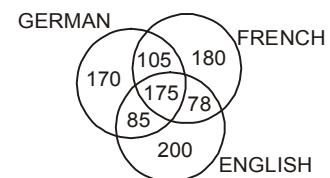


7. How many small cubes with edges of 10 cm can be just accommodated in a cubical box of 1 m edge?
- (A) 10 (B) 100 (C) 1000 (D) 10000
8. A cylinder and a cone have the same height and the same radius of the base. The ratio between the volumes of the cylinder and the cone is
- (A) 1:3 (B) 3:1 (C) 1:2 (D) 2:1

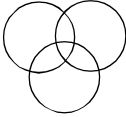
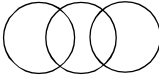
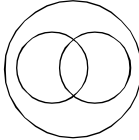
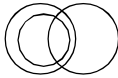
LOGICAL & ANALYTICAL REASONING

9. If in a certain code SAND is VDQG and BIRD is ELUG, then what is the code for LOVE?
- (A) PRYG (B) ORTG (C) NPUH (D) ORYH

10. A survey was conducted on a sample of 1000 persons with reference to their knowledge of English, French and German. The results of the survey are presented in the given Venn diagram. The ratio of the number of persons who do not know any of the three languages to those who know all the three languages is



- (A) $\frac{1}{27}$ (B) $\frac{1}{35}$ (C) $\frac{7}{175}$ (D) $\frac{175}{1000}$

11. The number of times in a day the hour-hand and the minute-hand of a clock are at right angles is
 (A) 44 (B) 48 (C) 24 (D) 12.
-
12. Which one of the following diagrams correctly represents the relationship among tennis fans, cricket players and students?
 (A)  (B)  (C)  (D) 
-
13. A, B, C, D, E and F, not necessarily in that order, are sitting on six chairs regularly placed around a round table. It is observed that A is between D and F, C is opposite D, D and E are not on neighbouring chairs. The person sitting opposite B is
 (A) A (B) D (C) E (D) F

COMPUTERS & INFORMATION TECHNOLOGY

14. Who defined the binary system ?
 (A) A.N.D. Leibniz (B) Pascal
 (C) Newton (D) Aristotle
-
15. Computers use the seven digit code called ASCII. What does ASCII stand for?
 (A) American Standard Code for Information Interchange
 (B) Association of Software Coding and Information Institute
 (C) American Standard Computing and Information Institute
 (D) American Scientists Convention for Information Interchange.
-
16. Match the following
- | Binary Number | Corresponding decimal number |
|--------------------|------------------------------|
| 1. 1010101 | A. 31 |
| 2. 101011 | B. 85 |
| 3. 11111 | C. 139 |
| 4. 10001011 | D. 43 |
| (A) 1B, 2D, 3A, 4C | (B) 1D, 2A, 3B, 4D |
| (C) 1C, 2B, 3C, 4A | (D) 1A, 2C, 3D, 4B |
-
17. What is the addition of 101010 with 111111 ?
 (A) 1101001 (B) 1001001
 (C) 1111001 (D) 1100001
-
18. Modern Computers do not work with decimal numbers. Instead they process binary numbers, groups of 0's and 1's because
 (A) Electronic devices are most reliable when designed for two state (binary) operation
 (B) Binary circuits are simple
 (C) Memory is only possible for binary numbers
 (D) With decimal numbers, the circuits are complex and costly
-
19. The first Indian analog computer was assembled by Indian Statistical Institute (ISI) of Calcutta in
 (A) 1953 (B) 1946
 (C) 1950 (D) 1963
-
20. Debug is a term denoting
 (A) Error correction processs
 (B) Writing of instructions in developing a new program
 (C) Fault detection in equipment
 (D) Determining useful life

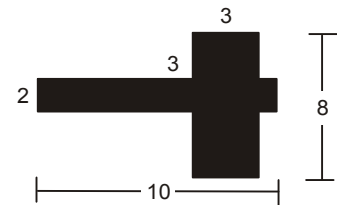


National Science Olympiad

MENTAL ABILITY

1. A contest began at noon one day and ended 1000 minutes later. At what time did the contest end?
(A) 10:00 p.m. (B) Midnight
(C) 2:30 a.m. (D) 4:40 a.m.
2. Which of the following sets of whole numbers has the largest average?
(A) Multiples of 2 between 1 and 101 (B) Multiples of 3 between 1 and 101
(C) Multiples of 4 between 1 and 101 (D) Multiples of 5 between 1 and 101.
3. Beena used a calculator to find the product 0.075×2.56 . She forgot to enter the decimal points. The calculator showed 19200. If Beena had entered the decimal points correctly, the answer would have been
(A) 0.0192 (B) 0.192
(C) 1.92 (D) 19.2
4. Two cyclists, k km apart, and starting at the same time, would be together in r hours if they travelled in the same direction, but would pass each other in t hours if they travelled in opposite directions. The ratio of the speed of the faster cyclist to that of the slower is
(A) $\frac{r+t}{r-t}$ (B) $\frac{r}{r-t}$ (C) $\frac{r+t}{r}$ (D) $\frac{r}{t}$

5. The shaded area formed by the two intersecting perpendicular rectangles, in square units is
(A) 23 (B) 38
(C) 44 (D) 46

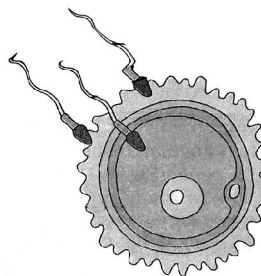


SCIENCE

6. **A Brief History of Time** is the title of a book written by
(A) Albert Einstein (B) Stephen Hawking
(C) Hendrick Lorentz (D) Isaac Newton
7. Which of the following can produce a virtual image ?
(A) Plane mirror (B) Concave lens
(C) Convex lens (D) All of these
8. A bar magnet marked with poles N and S is freely suspended. Then the end marked N would point towards
(A) The south magnetic pole of the earth
(B) The south geographic pole of the earth
(C) The north magnetic pole of the earth
(D) The north geographic pole of the earth
9. A body immersed in a fluid experiences an upward thrust which depends on
(A) The weight of the fluid displaced by it (B) The volume of the body
(C) The mass of the body (D) All of these.
10. A concave mirror may be used in all except one of the following. This is
(A) A magnifying mirror (B) A torch reflector
(C) A reflecting telescope (D) A car rear view mirror

11. How does the eye change in order to focus on near or distant objects?
 (A) The lens moves in or out (B) The retina moves in or out
 (C) The iris changes colour (D) The lens bulges or relaxes
-
12. When Cu is exposed to moist air for a long time, which of the following is formed?
 (A) $\text{Cu}(\text{OH})_2$ (B) CuCO_3
 (C) Both (A) and (B) (D) Cu_2O
-
13. Which of the following statements is true with respect to diamond ?
 (A) The carbon atoms are connected to each other by metallic bonds.
 (B) In the diamond crystal, the carbon atoms are very loosely packed.
 (C) Each carbon atom in the crystal is surrounded by four others at the corners of a regular tetrahedron.
 (D) It is a very soft substance.
-
14. Under Indian space programme, the abbreviation GSLV stands for
 (A) Geosynchronous Satellite Launch Vehicle
 (B) Global Satellite Link Vehicle
 (C) Geostationary Solar Light Vehicle
 (D) Geostationary Satellite Link Vehicle
-
15. If there were no organic life on the Earth, the amount of oxygen in the atmosphere will
 (A) Remain unchanged (B) Be approximately hundred percent
 (C) Be almost nil (D) Be approximately fifty percent
-
16. A vaccine is usually given
 (A) At any time
 (B) At the time disease causing germs enter the body
 (C) Before the symptoms of the disease appear
 (D) After the disease has appeared
-
17. Mark the odd one out.
 (A) Cholera (B) Tuberculosis
 (C) Polio (D) Night blindness
-
18. Some basic steps are needed in agricultural practice. Which of the following given as A, B, C, D is the right sequence?
 (1) Preparation of the soil (2) Harvesting (3) Irrigation
 (4) Broadcasting (5) Tilling (6) Weeding
 (7) Manuring.
 (A) 1, 5, 4, 7, 6, 3, 2 (B) 1, 3, 5, 6, 4, 2, 7
 (C) 1, 3, 5, 2, 4, 6, 7 (D) 1, 5, 6, 2, 4, 7, 3
-

19. The process shown in the given figure is
 (A) Cleavage
 (B) Fertilization
 (C) Assimilation
 (D) Budding.



20. Which of the following is not true?
 (A) Burning of coal releases SO_2 .
 (B) Acid rain is harmful to crops.
 (C) CNG is a clean fuel.
 (D) Incomplete combustion of coal releases O_2 .
-

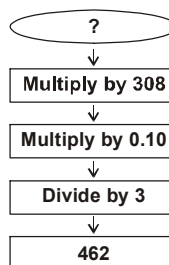


International Mathematics Olympiad

LOGICAL REASONING

1. What is the number you started with?

- (A) 5
- (B) 45
- (C) 56
- (D) 25



2. One term in the number series is wrong. Find out the wrong term.

24, 27, 31, 33, 36

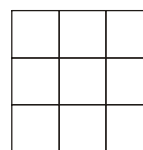
- (A) 24
- (B) 27
- (C) 31
- (D) 33

3. A is 40 m South-west of B. C is 40 m South-East of B. Then C is in which direction of A?

- (A) East
- (B) West
- (C) North-east
- (D) South

4. The maximum number of squares in the following figure is

- (A) 14
- (B) 13
- (C) 10
- (D) 9



5. Standing on a platform, Amit told Sunita that Aligarh was more than ten kilometres but less than fifteen kilometres from there. Sunita knew that it was more than twelve but less than fourteen kilometres from there. If both of them were correct, which of the following could be the distance of Aligarh from the platform?

- (A) 11 km
- (B) 12 km
- (C) 13 km
- (D) 14 km

6. If the day before yesterday was Saturday, what day will fall on the day after tomorrow?

- (A) Friday
- (B) Thursday
- (C) Wednesday
- (D) Tuesday

7. Count the number of cubes in the figure given here.

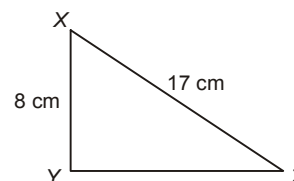
- (A) 14
- (B) 15
- (C) 12
- (D) 20



MATHEMATICAL REASONING

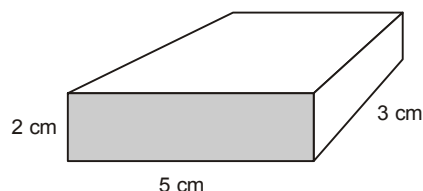
8. What is the length of \overline{YZ} ?

- (A) 9 cm
- (B) 15 cm
- (C) 19 cm
- (D) 25 cm



9. What is the volume of the rectangular solid shown below?

- (A) 10 cubic cm
- (B) 25 cubic cm
- (C) 30 cubic cm
- (D) 62 cubic cm

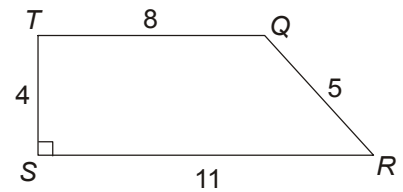


10. What is the value of x if $-3x + 2 = -7$?

- (A) $x = -6$ (B) $x = -3$ (C) $x = 3$ (D) $x = 6$

11. What is the area of trapezoid $QRST$ in square units?

- (A) 22 (B) 27
(C) 38 (D) 48



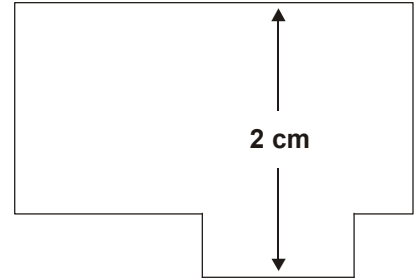
12. Mr. Gupta made a scale drawing of his office.

$$\frac{1}{2} \text{ cm} = 3 \text{ m}$$

The width of the scale drawing of the office is 2 cm.

What is the actual width, in metres, of Mr. Gupta's office?

- (A) 3 (B) 6
(C) 9 (D) 12



13. Which property is used in the equation given below?

$$12(x + 4) = 12x + 48$$

- (A) Associative Property of Addition (B) Commutative Property of Addition
(C) Distributive Property (D) Reflexive Property

14. Which of the following equations illustrates the inverse property of multiplication?

- (A) $5 \times \frac{1}{5} = 1$ (B) $5 \times 1 = 5$ (C) $5 \times 0 = 0$ (D) $5 \times 5 = 25$

15. A right triangle's hypotenuse has length 5 units. If one leg has length 2 units, what is the length of the other leg?

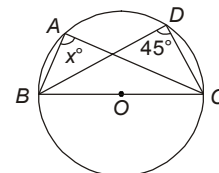
- (A) 3 (B) $\sqrt{21}$ (C) $\sqrt{29}$ (D) 7

16. The sum of a number (n) and 14 is 72. Which equation shows this relationship?

- (A) $14 + n = 72$ (B) $72n = 14$ (C) $14 - n = 72$ (D) $72 + n = 14$

17. O is the centre of the circle. Find the value of x ?

- (A) 45 (B) 90
(C) 60 (D) 30.



EVERYDAY MATHEMATICS

18. Dennis the Menace is thinking of two numbers. Their greatest common factor is 6. Their least common multiple is 36. One of the numbers is 12. What is the other number?

- (A) 18 (B) 16 (C) 6 (D) 24

19. Farmer Ramu put a square fence around his vegetable garden to keep the deer from eating his corn. One side was 10 m in length. If the posts were placed 2 m apart, how many posts did he use?

- (A) 16 (B) 20 (C) 10 (D) 15

20. Anita passed around a basket of strawberries to the girls at her party. Before the party she ate 5 strawberries and gave a friend 3. Eight girls arrived at the party. The first girl took a strawberry, the second girl took 3 strawberries, the third girl took 5 strawberries and so on. After the last girl took her strawberries, the basket was empty. How many strawberries were there in the basket at the beginning?

- (A) 72 (B) 60 (C) 65 (D) 45

