FIITJEE

MAHARASHTRA SCIENCE TALENT SEARCH EXAMINATION

for students of Class IX

Time: 3 Hours   **Maximum Marks: 225**

> ➤ **Please read the instructions carefully. You are allotted 5minutes specifically for this purpose.**
> ➤ **You are not allowed to leave the examination hall before end of the test**.

INSTRUCTIONS

Note:

- The question paper contains 3 Parts

- **PART – 1** contains 25 questions of **IQ**

- **PART – 2** contains1-7 questions of **Physics ,** 8-14 questions of **Chemistry** and 15-20 questions of **Biology.**

- **PART – 3** contains 30 questions of **Mathematics**

- All are multiple choice questions. Each question has four choices (A), (B), (C) and (D), out of which only one is correct.

Marking Scheme:

- For each question, in all the three parts, you will be awarded **3 marks** if you have darkened only the bubble corresponding to the correct answer, **zero marks** for not darkening any bubble and in all other cases **minus one (-1) mark** will be awarded.

Name of the Candidate **:**   _____

Test Centre   **:**   _____

PART – 1 - I.Q

Directions: In each Question, a series of numbers is given with blank space with Question mark on it. Find the correct alternative.

1. 520, 350, 222, 130, ?, 30
    (A) 52   (B) 64   (C) 68   (D) 74

2. 243, 179, 130, 94, 69, ?
    (A) 61   (B) 65   (C) 57   (D) 53

3. 1, 64, 4, 4, 27, 6, 9, 8, 8, 16, ?, ?
    (A) 18, 9   (B) 2, 15   (C) 4, 16   (D) 1, 10

4. 75, 291, 416, 480, 507, ?
    (A) 515   (B) 532   (C) 511   (D) 521

5. 10, 200, 3000, 40000, ?
    (A) 50000   (B) 400000   (C) 500000   (D) 60000

Complete the following sequence

6. a b c _ a _ _ d _ b c d a b c d
    (A) d b b a   (B) d c a a   (C) a b c d   (D) d b c a

7. _ b a b _ b c b c _ c a _ a b
    (A) a b c c   (B) a b c b   (C) a c a c   (D) a a c b

Complete the following sequence:-

8. E, J, O, T, Y, _
    (A) D   (B) Z   (C) E   (D) C

9. E, A, ?, O, I
    (A) D   (B) X   (C) V   (D) U

10. AP, BQ, CR, DS, ?
    (A) ET   (B) EU   (C) TE   (D) EV

Direction: Analytical Reasoning **Question No. (11 to 15)**

A Question followed by two statements numbered I and II. The Question may be answered with the help of these statements.
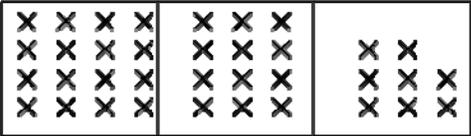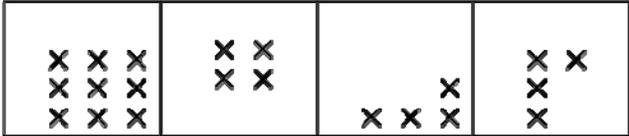(A) If only statement I is sufficient, not II
(B) If only statement II is sufficient, not I
(C) If both statements I & II together sufficient to answer
(D) If either statement I or Statement II is sufficient to answer.

11. What is the age of a student?
    I. 10 years ago the student was half old as his father.
    II. 5 years from now his father will be one and half times as old as he.

12. How much is the Area of circle?
    I. The radius of the circle is 7 cm.
    II. The circumference of the circle is 44 cm.

13. Around a circular table, six persons are sitting A, B, C, D, E and F. Who is on the Immediate right of A?
    I. B is opposite to C and D is opposite to E.
    II. F is on the immediate left of B.

14. What is the speed of train X?
    I. It crosses a pole in 5 seconds
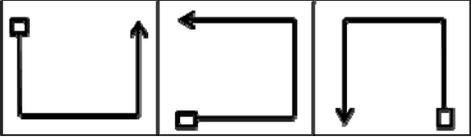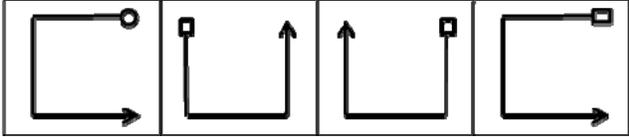   II. The train is 200 m long.

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15. Is tomorrow a Tuesday?
    I. Tomorrow is 20th March, 1876.
    II. 17th June, 1885, was a Monday

16. Will It be a Sunday tomorrow?
    I. It is not a Saturday today.
    II. It was Wednesday the day before Yesterday.

17. Is Mohan taller than Sudha?
    I. Sudha is not the tallest.
    II. The group consist of two people.

Directions: From the four answer figures given on the right hand side, find the one which will continue to figure series indicates by three problem figures in each question
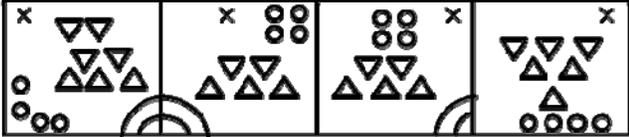
18.

19.

20.

21.

Direction For (Question 22 to 25)

In a school periodical examinations are held every second Month. In a session during April 2013 – March 2014, A student of Class IX appeared for each of the periodical exams. The aggregate marks obtained by him in each periodical exam are represented by line graph.
Marks obtained by student in six periodical exams during the session year 2013-2014.
Maximum total marks in each periodical exam = 500 Marks
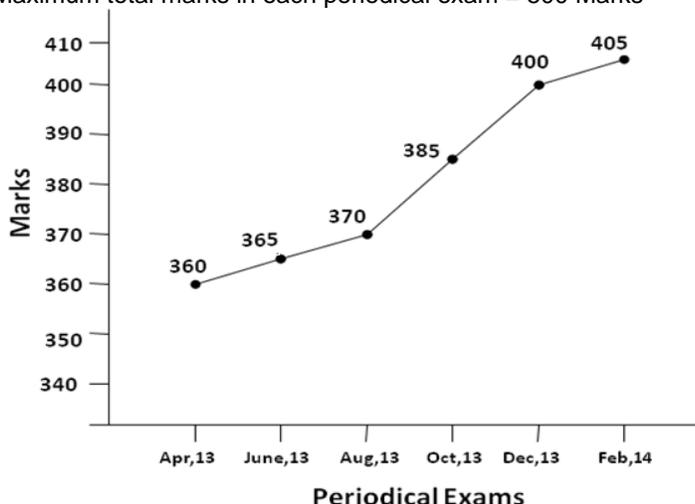
22. In which periodical exams did the student obtain the highest percentage increase in marks over the previous periodical exams?
    (A) Feb -14   (B) Oct -13   (C) Dec -13   (D) Aug -13

23. The total number of Marks obtained in Feb -14, is what percent of the total Marks obtained in April -13?
    (A) 115%   (B) 81%   (C) 110%   (D) 112.5%

24. What is the percentage of marks obtained by the student in the periodical exams of Aug -13, and Oct -13 taken together
    (A) 72%   (B) 73.25%   (C) 75.5%   (D) 78%

25. In which periodical exams there is fall in percentage of marks as compared to the previous Periodical exams?
    (A) June -13   (B) Oct -13   (C) Feb -14   (D) None

PART – 2 - PHYSICS

26. A particle is travelling with a constant speed. This means
    (A) Its position remains constant as time passes.
    (B) It covers equal distances in equal time intervals.
    (C) Its acceleration is zero
    (D) It does not change its direction of motion.

27. By applying a Force of 1N, one can hold a body whose mass is approximately equal to
    (A) 100 mg   (B) 100 g   (C) 1 Kg   (D) 10 Kg

28. When a bus starts suddenly, the passengers standing on it lean backwards in the bus. This is an example of
    (A) Newton's first law   (B) Newton's second law
    (C) Newton's third law   (D) None of Newton's law

29. A body floats in a liquid if the buoyant force is
    (A) Zero   (B) Greater than its weight
    (C) Lesser than its weight   (D) Equal to its weight

30. A train moving at a speed of 40 km/h at 10.00 a.m. and at 50 km/h at 10.02 a.m. , assuming that the train moves along a straight track and the acceleration is constant, the magnitude of the acceleration is
    (A) 100 km/h^2 (B) 200 km/h^2 (C) 300 km/h^2 (D) 400 km/h^2

31. A cubical block of copper is immersed completely in water. Each edge of the block is 1 cm length. The density of the water is 1000 kg/m^3. The buoyant force acting on the cube is
    (A) 9.8 x 10^{-3} N
    (B) 19.6 x 10^{-3} N
    (C) 14.7 x 10^{-3} N
    (D) 24.5 x 10^{-3} N

32. A force acting on a particle of mass 200g displaces it through 400 cm in 2 s. The magnitude of the force, if the initial velocity of the particle is zero, is
    (A) 0.2 N
    (B) 0.4 N
    (C) 0.6 N
    (D) 0.8 N.

PART – 3 - CHEMISTRY

33. A gas can be best liquefied:
    (A) By increasing the temperature
    (B) By lowering the pressure
    (C) By increasing the pressure and reducing the temperature
    (D) None of these

34. Which one of the following is a chemical change?
    (A) Melting of ice
    (B) Freezing of water
    (C) Cooking of food
    (D) Evaporation of alcohol

35. A mixture of ammonium chloride and sodium chloride can be separated by:
    (A) Crystallization
    (B) Hand picking
    (C) Sublimation
    (D) Centrifugation

36. In carbon disulphide (CS_2) the mass of sulphur in combination with 3.0 g of carbon is:
    (A) 4.0 g
    (B) 6.0 g
    (C) 64.0 g
    (D) 16.0 g

37. Maximum number of electrons that can be filled in the third orbit of an atom is:
    (A) 18
    (B) 8
    (C) 10
    (D) 32

38. The alpha particles are the same as:
    (A) Protons
    (B) Helium atoms
    (C) Helium nuclei
    (D) Lithium nuclei

39. In Rutherford's gold foil experiment, most of the α-particles pass across the gold foil without any deviation from their paths. This indicates that
    (A) The atom is spherical
    (B) There is a positively charged nucleus at the centre of the atom
    (C) The entire mass of the atom is concentrated at the nucleus of the atom
    (D) Most portion of the atom is an empty space.

PART – 4 – BIOLOGY

40. In the Five kingdom system of classification, which single kingdom out of the following can include blue- green algae, Nitrogen –fixing Bactria and methanogenic archaebacteria?
    (A) Fungi
    (B) Monera
    (C) Protista
    (D) Plantae

41. The semi autonomous organelle found in both plants and animals is
    (A) Golgi complex
    (B) Mitochondrion
    (C) Plastid
    (D) Endoplasmic reticulum

42. Membranous bag with hydrolytic enzymes which is used for controlling intracellular digestion is
    (A) Endoplasmic reticulum
    (B) Golgi complex
    (C) Lysosome
    (D) Plastid

43. *Vibrio* is related to
    (A) Typhoid
   (B) Polio
    (C) Cholera
    (D) TB

44. In which kingdom would you place an organism that is unicellular and possesses both nucleoid & mesosome?
(A) Protista   (B) Monera   (C) Fungi   (D) Plantae

45. Identify the pathogen that belongs to kingdom protista
(A) Plasmodium   (B) Salmonella   (C) Rhabdovirus   (D) Aspergillus

PART – 5 - MATHEMATICS

46. Find the values of 'K' for which the roots of $x^2 + x(14 - k) - 14k + 1 = 0$ are equal integers.
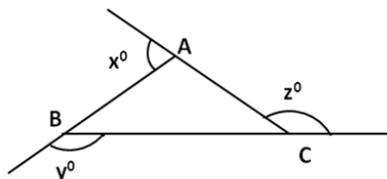(A) – 11, - 13   (B) – 12, - 16   (C) – 13, - 16   (D) None

47. If points (a, 0), (0, b) and (1, 1) are collinear, then $\dfrac{1}{a} + \dfrac{1}{b} =$

(A) 1   (B) 0   (C) – 1   (D) $\dfrac{1}{2}$

48. In a $\triangle$ ABC, perpendicular bisector of sides AB & AC intercepts side BC at Q & S points respectively. If $\angle$ ABC = 32° & $\angle$ ACB = 36°, then $\angle$ QAS =
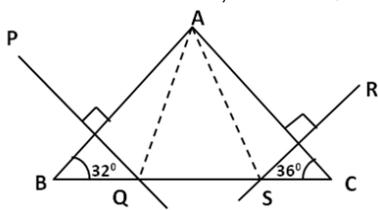
(A) 68°   (B) 112°   (C) 44°   (D) 72°

49. In a $\triangle$ ABC, each side is extended as shown in figure, then $x° + y° + z° =$

(A) 180°   (B) 120°   (C) 330°   (D) 360°

50. The distance between the points $(a \cos\theta + b \sin\theta, 0)$ and $(0, a \sin\theta - b \cos\theta)$ is
(A) $a^2 + b^2$ (B) $\sqrt{a^2 + b^2}$ (C) $a + b$ (D) $a - b$

51. A solid sphere of radius 'r' is melted and cast into the shape of a solid cone of height 'r', the radius of the base of the cone is
(A) 2 r   (B) 3 r   (C) r   (D) 4 r

52. The mean of n observations is $\overline{X}$. If the first term is increased by 1, second by 2 and so on, then the new mean is

(A) $\overline{X} + 1$ (B) $\overline{X} + n + 1$ (C) $\overline{X} + n - 1$ (D) $\overline{X} + \dfrac{n+1}{2}$

53. If α, β, γ are the zeros of the polynomial $f(x) = px^3 + qx^2 + rx + s$ then $\dfrac{1}{\alpha} + \dfrac{1}{\beta} + \dfrac{1}{\gamma} =$

(A) $-\dfrac{q}{p}$ (B) $\dfrac{r}{p}$ (C) $-\dfrac{r}{p}$ (D) $-\dfrac{r}{s}$

54. The value of 'K' for which the system of equations x + 3y - 5 = 0 and 2x + ky + 9 = 0 has no solutions, is
(A) 6   (B) $\dfrac{-5}{9}$ (C) $\dfrac{1}{2}$ (D) None

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55. The value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \ldots}}}$ is
    (A) 4   (B) 3   (C) – 2   (D) 36

56. The value of $\tan 1° \cdot \tan 2° . \tan 3° \ldots \ldots \tan 89°$ is
    (A) 0   (B) 1   (C) – 1   (D) $\dfrac{1}{\sqrt{2}}$

57. If A and B are complementary angles, then
    (A) cos A = cos B   (B) sin A = sin B   (C) tan A = cot B   (D) sec A = sec B

58. If the angles of elevation of the top of a tower from two points distant 'a' and 'b' from the base and in the same straight line with it are complementary, then the height of the tower is
    (A) ab   (B) $\dfrac{a}{b}$ (C) $\sqrt{\dfrac{a}{b}}$ (D) $\sqrt{ab}$

59. Two circles touch each other externally at C and AB is a common tangent to the circles, then, $\angle ACB =$
    (A) 60°   (B) 45°   (C) 30°   (D) 90°

60. If the radius of a circle is diminished by 10%, then its area is diminished by
    (A) 10°   (B) 100%   (C) 81%   (D) 19%

61. If the mean of the following distribution is 6, Find the value of 'P'.
    X: 2   4   6   10   p+5
    F: 3   2   3   1   2
    (A) 6   (B) 7   (C) 9   (D) 5

62. A plane left 30 minutes later than the schedule time and in order to reach its destination 1500 KM away in time it has to increase its speed by 250 km/hr from its usual speed, then plane's usual speed is
    (A) 1000 km/hr   (B) 750 km/hr   (C) 600 km/hr   (D) 1250 km/hr

63. If θ and $(2\theta - 45°)$ are acute angles such that $\sin \theta = \cos(2\theta - 45°)$, then $\tan \theta$ is equal to
    (A) 0   (B) 1   (C) $\sqrt{3}$ (D) $\dfrac{1}{\sqrt{3}}$
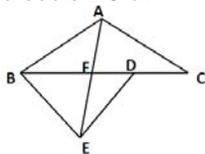
Comprehension I **(Question No. 64 to Question No. 66)**
If $\sec\theta + \tan\theta = x$ & $\sec^2\theta - \tan^2\theta = 1$ then

64. $\sin\theta$ is equal to
    (A) $x + \dfrac{1}{x}$ (B) $x - \dfrac{1}{x}$ (C) $\dfrac{x+1}{x}$ (D) $\dfrac{x^2 - 1}{x^2 + 1}$

65. $\tan\theta$ is equal to
    (A) 1 + x   (B) $\dfrac{1}{2}\left(x + \dfrac{1}{x}\right)$ (C) $\dfrac{1}{2}\left(x + \dfrac{1}{x}\right)$ (D) $x^2 + 1$

66. $\sec\theta$ is equal to
    (A) $\dfrac{1}{2}\left(x + \dfrac{1}{x}\right)$ (B) $\dfrac{1}{2}\left(x - \dfrac{1}{x}\right)$ (C) $x^2 + 1$ (D) $x^2 - 1$

Comprehension II **(Question 67 to Question 69)**
$\triangle$ ABC and $\triangle$ BDE are two equilateral triangles such that D is the mid-point BC.
AE intersects BC at F.

67. area(Δ BDE) is equal to

     (A) area(Δ ABF)   (B) area(Δ AFC)   (C) area Δ AFD   (D) $\frac{1}{4}$area(Δ ABC)

68. area(Δ AFD) is equal to
    (A) area(Δ ACD)   (B) area(Δ BDE)   (C) area(Δ BFE)   (D) None

69. area(Δ BFE) is equal to
    (A) $\frac{1}{2}$area(ΔBAE)   (B) 2area(EFD)   (C) $\frac{1}{4}$area(Δ ABC)   (D) None

70. The sum of a two digit number and the number formed by interchanging its digit is 110. If 10 is substracted from the first number, the new number is 4 more than 5 times the sum of the digits in the first number. Then first number is
    (A) 46   (B) 28   (C)64   (D) 82

71. If the price of a book is reduced by Rs. 5 a person can buy 5 more books for Rs 300. Then original list price of the book is
    (A) 20   (B) 15   (C) 12   (D) 60

72. The median of a given frequency distribution is found graphically with the help of
    (A) Histogram   (B) frequency curve
    (C) Frequency polygon   (D) Ogive

73. Twelve spheres of the same size area made from melting a solid cylinder of 16 cm diameter and 2 cm height. The diameter of each sphere is
    (A) 3 cm   (B) $\sqrt{3}$ cm   (C) 2 cm   (D) 4 cm

74. If points (1, 2), (-5, 6) and (a, -2) area collinear, then 'a' is
    (A) – 3   (B) 2   (C) 7   (D) – 2

75. If A, B and C area interior angles of a triangle ABC, then $\sin\left(\frac{B+C}{2}\right)$ is

     (A) $\sin\dfrac{A}{2}$ (B) $-\sin\dfrac{A}{2}$ (C) $\cos\dfrac{A}{2}$ (D) $-\dfrac{\cos A}{2}$

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MAHARASHTRA SCIENCE TALENT SEARCH EXAMINATION

for students of Class IX
Answers

Part 1 - IQ

1.	**C**	8.	**A**	15.	**C**	22.	**B**
2.	**D**	9.	**D**	16.	**C**	23.	**D**
3.	**D**	10.	**A**	17.	**C**	24.	**C**
4.	**A**	11.	**C**	18.	**B**	25.	**D**
5.	**C**	12.	**D**	19.	**D**		
6.	**D**	13.	**C**	20.	**C**		
7.	**C**	14.	**C**	21.	**A**		

Part 2- Physics

26.	**B**	29.	**A**	31.	**C**
27.	**B**	30.	**D**	32.	**A**
28.	B				

Part 2 - Chemistry

33.	**C**	36.	**C**	38.	**A**
34.	**C**	37.	**D**	39.	**C**
35.	D				

Part 2 - Biology

40.	**B**	42.	**C**	44.	**B**
41.	**B**	43.	**C**	45.	**A**

Part 3 - Mathematics

46.	**B**	54.	**A**	62.	**B**	70.	**C**
47.	**A**	55.	**B**	63.	**B**	71.	**A**
48.	**C**	56.	**B**	64.	**D**	72.	**D**
49.	**D**	57.	**C**	65.	**B**	73.	**D**
50.	**B**	58.	**D**	66.	**A**	74.	**C**
51.	**A**	59.	**D**	67.	**D**	75.	**C**
52.	**D**	60.	**D**	68.	**C**		
53.	**D**	61.	**B**	69.	**B**		