SAMPLE PAPER

Aakash

NATIONAL

YOUNG TALENT SEARCH EXAM

2014

Science, Mathematics & Mental Ability

(for VIII Studying Students)

Aakash

Medical | IIT-JEE | Foundations

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SECTION-A : SCIENCE

1. Which of the following is an example of contact force?
   (1) Magnetic force  (2) Muscular force
   (3) Electrostatic force  (4) Gravitational force

2. What is the value of angle \( x \) in the figure given below?
   \[
   \text{Plane mirror-3} \quad \text{Light ray} \quad \text{Plane mirror-1}
   \]
   (1) 60°  (2) 120°  (3) 90°  (4) 30°

3. Two charged bodies of masses \( m_1 \) and \( m_2 \) are placed close to each other. The forces acting between the two bodies are
   (1) Gravitational force and electrostatic force
   (2) Gravitational force and magnetic force
   (3) Electrostatic force and magnetic force
   (4) Magnetic force and frictional force

4. We do not see our image in a cardboard because of
   (1) Absorption of light by cardboard
   (2) Deflection of light by cardboard
   (3) Diffused reflection by cardboard
   (4) Failure of laws of reflection in case of irregular surfaces

5. A body is acted upon by two forces \( F_1 = 6 \) N and \( F_2 = 4 \) N. If net force acting on body is 10 N, then which of the following is true?
   (1) \( F_1 \) and \( F_2 \) are in the same direction
   (2) \( F_1 \) and \( F_2 \) are in the opposite directions
   (3) \( F_1 \) and \( F_2 \) are perpendicular to each other
   (4) \( F_1 \) and \( F_2 \) are inclined at an angle of 60°

6. Which of the following instruments is used in submarines to keep watch on enemies?
   (1) Kaleidoscope  (2) Electroscope
   (3) Periscope  (4) Hydrometer

7. A boy running towards a plane mirror sees that his image is approaching him at speed \( V \). The speed of the boy is
   (1) \( V \)  (2) \( \frac{V}{2} \)
   (3) \( \frac{V}{4} \)  (4) \( \frac{V}{3} \)

8. The beaker shown below contains some liquid. Which of the following is true about the liquid pressure at various indicated points?

   \[
   \text{A} \quad \text{B} \quad \text{C} \quad \text{D}
   \]
   (1) \( P_C > P_A > P_B > P_D \)  (2) \( P_D > P_B > P_C > P_A \)
   (3) \( P_A > P_B > P_C = P_D \)  (4) \( P_C = P_B = P_A = P_D \)

Space for Rough Work
9. A perpendicular force of 600 N acts on a circular surface of radius 1.4 m. The surface will just break if an additional perpendicular force of 16 N is applied on it. The maximum pressure that the surface can withstand is

(1) 50 Pa  (2) 100 Pa
(3) 175 Pa  (4) 200 Pa

10. At high altitudes, some people suffer from nose bleeding because atmospheric pressure there is

(1) Greater than the pressure inside their bodies
(2) Smaller than the pressure inside their bodies
(3) Equal to the pressure inside their bodies
(4) Zero

11. Black gold is

(1) Coal  (2) Charcoal
(3) Bitumen  (4) Petroleum

12. Which of the following substances is not obtained during refining of petroleum?

(1) Coke  (2) Kerosene
(3) Lubricating oil  (4) Diesel

13. A highly reactive element, which is stored in water is

(1) Sodium  (2) Potassium
(3) Carbon  (4) Phosphorus

14. Hydrogen gas is evolved during the reaction between

(1) Copper and dilute hydrochloric acid
(2) Magnesium and oxygen
(3) Aluminium and sodium hydroxide
(4) Sulphur and dilute hydrochloric acid

15. The correct order of increasing reactivities of zinc, iron and copper is

(1) Iron < Copper < Zinc
(2) Copper < Iron < Zinc
(3) Zinc < Iron < Copper
(4) Copper < Zinc < Iron

16. Which of the following is not responsible for the formation of acid rain?

(1) Oxide of sulphur  (2) Oxide of calcium
(3) Oxide of nitrogen  (4) Oxide of carbon

17. Which of the following is a metal-pair that can be cut with a knife?

(1) Sodium and Carbon
(2) Lead and Phosphorus
(3) Sodium and Potassium
(4) Phosphorus and Carbon

18. Which of the following is a chemical property of a metal?

(1) Ductility  (2) Combustibility
(3) Malleability  (4) Lustre

19. The slow process of conversion of dead vegetation into coal is called

(1) Carbon processing  (2) Carbonisation
(3) Coal refining  (4) Coal conservation

20. The constituent of petroleum used for road surfacing is

(1) Bitumen  (2) Coal tar
(3) Charcoal  (4) Paraffin

21. All of the following are used to remove unwanted plants from the field, except

(1) Seed drill  (2) Combine
(3) 2, 4-D  (4) Khurpi
22. Identify A, B and C.
   (1) A-Anopheles mosquito, B-Protozoan, C-Dengue
   (2) A-Culex mosquito, B-Virus, C-Polio
   (3) A-Ascaris, B-Bacterium, C-Ringworm
   (4) A-Anopheles mosquito, B-Bacterium, C-Dengue

23. How many of the above organism(s) is/are oviparous and undergo internal fertilisation?
   (1) Four
   (2) Two
   (3) One
   (4) Three

24. An organism 'P' is used for the commercial preparation of wine by the process of 'Q'. The 'P' reproduces by
   (1) Budding
   (2) Fission
   (3) Sporulation
   (4) Vegetative propagation

25. Refer the diagram and identify the part which is responsible for the movement of sperm.

   (1) C
   (2) D
   (3) B
   (4) A

26. Select the crops that are grown during winter season from the following.
   a. Mustard
   b. Maize
   c. Soyabean
   d. Wheat
   e. Cotton
   (1) a & d
   (2) Only b
   (3) a, b & d
   (4) a, b, c & e

27. For cloning Dolly enucleated egg cell was obtained from
   (1) Holstein Friesian
   (2) Finn Dorsett sheep
   (3) Scottish blackface ewe
   (4) Apis cerana indica

28. The vaccine for small pox was discovered by
   (1) Gregor Mendel
   (2) Louis Pasteur
   (3) Alexander Fleming
   (4) Edward Jenner

29. In humans, the fusion of sperm and ovum takes place in the
   (1) Ovary
   (2) Oviduct
   (3) Uterus
   (4) Vagina

30. **Statement-1**: A fertiliser is an organic salt.
    **Statement-2**: Manure provides a lot of humus to the soil.
   (1) Both the statements are true
   (2) Both the statements are false
   (3) Statement-1 is true and Statement-2 is false
   (4) Statement-1 is false and Statement-2 is true
SECTION-B : MATHEMATICS

31. Which of the following is a perfect cube?
   (1) 316
   (2) 729
   (3) 243
   (4) 121

32. If 17% of $P$ is equal to 102, then the value of $P$ is
   (1) 634
   (2) 520
   (3) 600
   (4) 588

33. The area of a rectangle whose dimensions are $4x$ and $3y$ is
   (1) $4x + 3y$
   (2) $12xy^2$
   (3) $3x \times 4y$
   (4) $8x + 6y$

34. The square of a number can never end with
   (1) 1
   (2) 4
   (3) 5
   (4) 2

35. The sum of all the exterior angles of a pentagon is
   (1) $180^\circ$
   (2) $360^\circ$
   (3) $240^\circ$
   (4) $540^\circ$

36. $2.567 \times 10^4$ can be written in the usual form as
   (1) 2567
   (2) 0.0002567
   (3) 256.7
   (4) 25670

37. The value of the expression $2x^2 + 3x - 5$ at $x = -1$ is
   (1) $-6$
   (2) $-10$
   (3) $6$
   (4) $0$

38. The cube of $\frac{1}{5}$ is
   (1) $\frac{8}{125}$
   (2) $\frac{126}{125}$
   (3) $\frac{316}{125}$
   (4) $\frac{216}{125}$

39. If the lengths of perpendicular and base of a right triangle are 13 cm and 15 cm respectively, then the length of its hypotenuse is
   (1) $\sqrt{294}$ cm
   (2) $\sqrt{194}$ cm
   (3) $\sqrt{394}$ cm
   (4) $\sqrt{405}$ cm

40. If $\left(\frac{-2}{5}\right)^5 + \left(\frac{-2}{5}\right)^7 = \left(\frac{-2}{5}\right)^{4-a}$, then the value of $a$ is
   (1) 2
   (2) -6
   (3) -8
   (4) 8

41. The angles of a hexagon are in the ratio $1 : 2 : 3 : 5 : 6 : 7$. Measure of the largest angle is
   (1) $105^\circ$
   (2) $240^\circ$
   (3) $210^\circ$
   (4) $315^\circ$

42. Which of the following is a monomial?
   (1) $2x + 3x^2$
   (2) $4x^2 + 3x - 1$
   (3) $3x + 5$
   (4) $2x^2 - 3x^2$

43. The expression $(x - 2)(x - 3)$ can be simplified as
   (1) $x^2 + 5x - 6$
   (2) $x^2 + 5x + 6$
   (3) $x^2 - 5x + 6$
   (4) $x^2 - 5x - 6$

44. The value of $\sqrt{1331 \cdot 512}$ is
   (1) 77
   (2) 88
   (3) 44
   (4) 66

45. The value of $\left[\left(13\right)^2\right]^3 + \left[\left(13\right)^3\right]^2$ is
   (1) 0
   (2) $13^{36}$
   (3) 1
   (4) $13^{18}$
46. If Deepika ate 3 oranges out of 12 oranges kept in a basket, then the percentage of oranges she ate is
   (1) 25%    (2) 15%
   (3) 30%    (4) 33%

47. The square root of 10 upto 2 places of decimal is
   (1) 3.17    (2) 3.16
   (3) 3.14    (4) 3.18

48. The perimeter of a rhombus whose diagonals are of lengths 10 cm and 24 cm is
   (1) 34 cm    (2) 48 cm
   (3) 36 cm    (4) 52 cm

49. The value of
   \[\frac{(12345678 + 14236789)^2 - (12345678 - 14236789)^2}{12345678 \times 14236789}\]
   is
   (1) 2    (2) 16
   (3) 4    (4) 8

50. The cube root of 1.728 \(a^3b^9\) is
    (1) 1.4 \(a^3b\)    (2) 1.2\(a^3b\)
    (3) 1.2\(ab^3\)    (4) 1.4\(ab^3\)

51. If \(3x^2 - 1 = 81\), then the value of \(x\) is
    (1) 2.5    (2) 3.5
    (3) 1.5    (4) 2

52. In an examination, a student requires 50% marks to pass. If Ranbir scores 87 marks and the maximum marks of that examination is 200, then he fails by
    (1) 23 marks    (2) 5 marks
    (3) 10 marks    (4) 13 marks

53. The value of \(\sqrt{4082 + 188 + \sqrt{64}}\) is
    (1) 66    (2) 54
    (3) 46    (4) 64

54. If the adjacent angles of a parallelogram are in the ratio 2 : 7, then the smaller of the two angles is of measure
    (1) 50º    (2) 60º
    (3) 20º    (4) 40º

55. If \((5)^a = 625\), where \(a\) is any integer, then the value of \(a\) is
    (1) 1    (2) 3
    (3) 4    (4) 2

56. If \(x = \sqrt{123.21}\), then the value of \(x\) is
    (1) 11.0    (2) 11.1
    (3) 12.1    (4) 111.1

57. In the given figure, \(ABCD\) is a square. The value of \(z\) is
   (1) 121º    (2) 123º
   (3) 125º    (4) 127º

58. The sum of the expressions \(5x^2y + y^2z\) and \(3yx^2 - 2y^2z\) is equal to
    (1) \(2y^2z + 8x^2y\)    (2) \(2x^2y - y^2z\)
    (3) \(8x^2y - y^2z\)    (4) \(8x^2y + y^2z\)

59. If Kishan’s salary is 10% less than Baldev’s salary, then by what percentage is Baldev’s salary more than Kishan’s salary?
    (1) \(1\frac{1}{9}\)%    (2) 10%
    (3) \(1\frac{2}{9}\)%    (4) \(1\frac{3}{4}\)%

60. The sum of the digits of the smallest number by which 6144 is to be divided, so that the quotient becomes a perfect cube is
    (1) 6    (2) 3
    (3) 7    (4) 5
61. Find the missing term to complete the sequence.
1, 4, 9, 16, ?, 36
(1) 35 (2) 20
(3) 25 (4) 31

62. XMLR : ZOPV :: CRLQ : ?
(1) ETPU (2) EUPU
(3) FTUP (4) ETPV

63. Complete the following series
6, 10, 17, 27, 40, ?
(1) 49 (2) 56
(3) 58 (4) 52

64. 5 : 50, 12 : 288, 9 : 162, 7 : ?
(1) 98 (2) 81
(3) 126 (4) 128

66. If C & E and F & A interchanged their places then A is ? to the left of F.
(1) Second (2) Fourth
(3) Third (4) Fifth

67. How many persons were sitting between F and A?
(If viewed clockwise from F to A)
(1) Four (2) Two
(3) One (4) Three

68. Find the odd one out.
(1) Pen Drive (2) Computer
(3) Mobile (4) TV

69. Find the odd one out.
(1) Indore (2) Delhi
(3) Jaisalmer (4) Kanpur

Directions for Q.65 to Q.72: A series is given in the sequence of:
1 2 3 4 5 6 4 5 6 7 8 a b c d e

70. The value of ‘b’ is
(1) 6 (2) 5
(3) 8 (4) 9

71. The value of ‘d’ is
(1) 6 (2) 7
(3) 8 (4) 9

72. Find the value in the sequence of ‘cadeb’
(1) 78965 (2) 75869
(3) 78596 (4) 75896
Directions for Q.73 & Q.74: See the below given figure carefully and answer the questions based on it.

73. How many quadrilaterals are there in the figure?
   (1) 6  (2) 4  
   (3) 5  (4) 7

74. How many triangles are there in the figure?
   (1) 16  (2) 14  
   (3) 15  (4) 13

75. Find the odd one out.
   (1) 2916  (2) 529  
   (3) 1024  (4) 785

76. If “DELIBERATE” is coded as “fgnkdgtcvg” then “KNOWLEDGE” is coded as
   (1) “mpyngfig”  (2) “mpqzohfig”  
   (3) “npqzogfi”  (4) “mpxngfgg”

78. Find the figure which is embedded in the question figure.

79. A waiter’s salary consists of his basic pay and tips.
   During one month, his tips were $\frac{4}{5}$ of his basic pay.
   What fraction of his income comes from tips?
   (1) $\frac{4}{9}$  (2) $\frac{5}{9}$  
   (3) $\frac{4}{7}$  (4) $\frac{5}{4}$

80. 
   (1)  (2)  
   (3)  (4)
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