SAMPLE PAPER

Aakash

YOUNG TALENT SEARCH EXAM

YTSE-2013

Science, Mathematics & Mental Ability

(for IX Studying Students)

Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Ltd.)

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Aakash Young Talent Search Exam. 2013
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SECTION-A : SCIENCE

1. A car accelerates uniformly from rest to attain a speed of 20 m/s after covering a distance of 80 m. It then decelerates uniformly and comes to rest after covering further a distance of 160 m. The total time taken for this journey is
   (1) 8 s (2) 16 s (3) 24 s (4) 12 s

2. The direction of momentum of an object is always along
   (1) The direction of its velocity (2) The direction of its acceleration
   (3) The direction of force acting on it (4) The direction of its weight

3. If two bodies A and B of masses m and 2m are moving with velocities 2v and v respectively, then
   (1) A requires more force to stop in a given time
   (2) B requires more force to stop in a given time
   (3) Both require same force to stop in a given time
   (4) Same force will accelerate them equally

4. A ball thrown up vertically returns to the thrower after 8 s. Its height above the ground after 6 s, will be
   [Take g = 10 m/s²]
   (1) 20 m (2) 40 m (3) 60 m (4) 80 m

5. A block of mass 750 g occupies a volume of 250 cm³. The relative density of the block is
   (1) 3 (2) 3 g/cm³ (3) 1.5 (4) 1.5 g/cm³

6. A sound wave is shown below graphically. If the distance between a crest and the adjacent trough is 60 cm then, the speed of the wave is
   (1) 60 m/s (2) 120 m/s (3) 360 m/s (4) 210 m/s

7. A bullet stops after travelling a distance of x m, under the action of a uniform retarding force. How far will it go before being stopped by the same force if its velocity is doubled?
   (1) x (2) 3x (3) 4x (4) 2.5x

8. Which of the following graphs correctly shows the variation of universal gravitational constant ‘G’ with the acceleration due to gravity ‘g’?

   (1) G (2) G (3) G (4) G

   g

Space for Rough Work
9. The pressure due to a liquid does not depend upon
   (1) The density of the liquid
   (2) Depth of the point below liquid surface
   (3) Acceleration due to gravity
   (4) Area of the surface on which it acts

10. Which of the following is a constant for sound in a
given medium?
   (1) Frequency
   (2) Wavelength
   (3) Speed
   (4) Amplitude

11. The rate of evaporation does not increase with
increasing
   (1) Surface area
   (2) Temperature
   (3) Humidity
   (4) Wind speed

12. Consider the following process :

   \[
   \text{Liquid} \xrightarrow{X} \text{Gas}
   \]

   X and Y are respectively
   (1) Vaporisation and sublimation
   (2) Vaporisation and condensation
   (3) Condensation and sublimation
   (4) Fusion and vaporisation

13. To prepare a 15% (w/w) aqueous sugar solution in
100 g water, how much sugar should be added?
   (1) 15.0 g
   (2) 11.5 g
   (3) 16.2 g
   (4) 17.6 g

14. Which of the following techniques is used to
separate different components of blood during its
diagnosis?
   (1) Centrifugation
   (2) Chromatography
   (3) Sublimation
   (4) Distillation

15. Which of the following is not an element?
   (1) Diamond
   (2) Brass
   (3) Mercury
   (4) Sulphur

16. The ratio by mass of carbon to oxygen in carbon
monoxide is
   (1) 3 : 8
   (2) 8 : 3
   (3) 1 : 4
   (4) 3 : 4

17. The correct molecular formula of sodium sulphite is
   (1) Na\(_2\)SO\(_4\)
   (2) Na\(_2\)S
   (3) Na\(_2\)SO\(_3\)
   (4) Na\(_2\)S\(_2\)O\(_3\)

18. Match the following :

<table>
<thead>
<tr>
<th>Element</th>
<th>Valency</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Nitrogen</td>
<td>(i) 1</td>
</tr>
<tr>
<td>b. Sodium</td>
<td>(ii) 2</td>
</tr>
<tr>
<td>c. Carbon</td>
<td>(iii) 3</td>
</tr>
<tr>
<td>d. Calcium</td>
<td>(iv) 4</td>
</tr>
</tbody>
</table>

   (1) a(iii), b(i), c(iv), d(ii)
   (2) a(iii), b(iv), c(i), d(ii)
   (3) a(iv), b(iii), c(ii), d(i)
   (4) a(ii), b(iii), c(iv), d(i)

19. Consider the following statements.

   **Statement-I** : Isotopes of elements are the atoms
   having same atomic mass but different atomic
   numbers.

   **Statement-II** : Isotope of cobalt is used as a fuel in
   nuclear reactors.

   Now, choose the correct option.

   (1) Statement-I is correct, Statement-II is incorrect
   (2) Statement-II is correct, Statement-I is incorrect
   (3) Both the statements are correct
   (4) Both the statements are incorrect

20. Total number of moles of oxygen gas present in its
2.4 \( \times \) 10\(^{22}\) number of molecules is, approximately
   (1) 0.02
   (2) 0.4
   (3) 0.04
   (4) 0.004
21. **Statement-1** : Plasma membrane is the outermost covering of all types of cells.

**Statement-2** : Plasma membrane is rigid and made up of organic molecules.

(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

22. All of the following elements of xylem are dead, except

(1) Tracheids  (2) Vessels
(3) Xylem fibres  (4) Xylem parenchyma

23. Match the name of animal (Column I) with one characteristic (Column II) and the phylum to which it belongs (Column III).

<table>
<thead>
<tr>
<th>Column I Animal</th>
<th>Column II Characteristics</th>
<th>Column III Phylum</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Holothuria</td>
<td>Water-driven tube system</td>
<td>Echinodermata</td>
</tr>
<tr>
<td>(2) Chiton</td>
<td>Presence of notochord</td>
<td>Mollusca</td>
</tr>
<tr>
<td>(3) Palamnaeus</td>
<td>Dorsiventrally flattened body</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>(4) Planaria</td>
<td>Jointed legs</td>
<td>Nematoda</td>
</tr>
</tbody>
</table>

24. Identify the division of plants on the basis of given information.

- The plant body is differentiated into roots, stem and leaves.
- The reproductive organs of these plants are very inconspicuous.

(1) Thallophyta  (2) Bryophyta
(3) Gymnospermae (4) Pteridophyta

25. Which of the following diseases are caused by viruses?

A. Japanese encephalitis
B. Typhoid
C. AIDS
D. Syphilis
E. Kala-azar

(1) A & C  (2) Only C
(3) A, B, C & D  (4) C, D & E

26. What do A, B, C and D represent in the given diagram?

(1) A : Nucleolus, B : ER, C : Chloroplast and D : Mitochondrion
(2) A : Vacuole, B : Mitochondrion, C : Plastid and D : ER
(3) A : Nucleus, B : ER, C : Golgi apparatus and D : Lysosome
(4) A : Nucleus, B : ER, C : Vacuole and D : Golgi apparatus

27. Which of the following statements is incorrect?

(1) Ligament connects two bones to each other
(2) Ligament is very inelastic and tough
(3) Tendons connect muscles to bones
(4) Tendons are fibrous tissue with great strength
28. Which of the following are sexually transmitted diseases?
   A. Syphilis
   B. AIDS
   C. Tuberculosis
   (1) Only A  (2) A, B & C  (3) Only C  (4) A & B

29. Which of the following tissues provides stiffness to plants?
   (1) Apical meristem  (2) Collenchyma  (3) Chlorenchyma  (4) Sclerenchyma

30. Which of the following taxa comes before family and after class?
   (1) Order  (2) Genus  (3) Phylum  (4) Division

31. If three vertices of a square \( PQRS \) are \( P(3, 4) \), \( Q(-2, 4) \) and \( R(-2, -1) \), then the area of the portion of the square lying in the fourth quadrant is
   (1) 12 sq. units  (2) 3 sq. units  (3) 25 sq. units  (4) 5 sq. units

32. In the given figure, a rope is tied around the circular rim of diameter 35 cm and a bucket is tied to the other end of the rope. Number of revolutions made by the circular rim if the bucket is raised by 22 m is
   (1) 43  (2) 35  (3) 15  (4) 20

33. If the sides of a triangular field are 37 m, 684 m and 685 m, then its area is
   (1) 12654 m\(^2\)  (2) 12672.5 m\(^2\)  (3) 12564 m\(^2\)  (4) 12762.5 m\(^2\)

34. If \((a + b + c) = 0\), then the value of \(\frac{a^2b^2 + b^2c^2 + c^2a^2}{a^2 + b^2 + c^2}\) is
   (1) 0  (2) \(\frac{1}{2}\)  (3) 1  (4) 2

35. On joining the points (1, 1), (5, -5) and (-1, 4), we get a/an
   (1) Isosceles triangle  (2) Equilateral triangle  (3) Scalene triangle  (4) Straight line

36. An equilateral triangle is cut from its three vertices to form a regular hexagon. The percentage of area wasted is
   (1) 25%  (2) 66.66%  (3) 33.33%  (4) 50%

37. \( PS \) is an altitude of an isosceles triangle \( PQR \) in which \( PQ = PR = 20 \) cm and \( QR = 26 \) cm. If a point \( O \) is marked on \( PS \) in such a way that \( \angle QOR = 90^\circ \), then the area of the quadrilateral \( PQOR \) is approximately equal to
   (1) 27 cm\(^2\)  (2) 31 cm\(^2\)  (3) 29 cm\(^2\)  (4) 30 cm\(^2\)
38. If in a right triangle \( PQR \), \( PQ = PR \) and the bisector of \( \angle R \) meets the side \( PQ \) at \( M \), then which of the following is true?

(1) \( PR + 2PM = QR \)
(2) \( PR + PM = QR \)
(3) \( 2PR + PM = QR \)
(4) \( PR + PM = \frac{QR}{2} \)

39. Which of the following statements is true?

(1) Point \((4, 0)\) lies in the first quadrant
(2) The perpendicular distance of the point \((-3, 4)\) from the \(y\)-axis is \(-3\) units
(3) The coordinates of a point whose ordinate is \(-\frac{1}{3}\) and abscissa is 2 are \((-\frac{1}{3}, 2)\)
(4) If a point lies on \(y\)-axis at a distance of 5 units from the \(x\)-axis, then its coordinates can be \((0, -5)\)

40. If \(2^x = 256^{2x}\), then the value of \(p\) is

(1) 0  (2) 1
(3) -1  (4) -2

41. If the sides of a triangle are 56 cm, 60 cm and 52 cm, then the length of its shortest altitude is

(1) 42.1 cm  (2) 44.8 cm
(3) 39.6 cm  (4) 46.4 cm

42. A large solid sphere of diameter 18 cm is melted and recast into several small spheres of diameter 3 cm. The percentage increase in the surface area of the smaller spheres over that of the larger sphere is

(1) 500%  (2) 350%
(3) 450%  (4) 545%

43. The graph of the equation \(4x + 5y = 20\) is

\[
\begin{array}{c}
\text{(1) I and IV} \\
\text{(2) Only III} \\
\text{(3) Only VI} \\
\text{(4) II and V}
\end{array}
\]

44. \(ABCD\) is a parallelogram in which \(\angle BAC = 30^\circ\) and \(\angle DOC = 110^\circ\). The measure of \(\angle ODC\) is

(1) 80°  (2) 90°
(3) 60°  (4) 40°

45. The graphs of the equations \(x + 3y - 4 = 0\) and \(6x + 2y - 5 = 0\)

(1) Coincide with each other
(2) Are parallel to each other
(3) Are perpendicular to each other
(4) Are intersect to each other
46. The mean of 7 numbers is 9. If one number is excluded, then their mean is 7. The excluded number is
   (1) 21    (2) 22
   (3) 23    (4) 24

47. If \( \text{ar}(\triangle ABC) = 21 \text{ cm}^2 \) and medians of \( \triangle ABC \) intersect at \( G \), then \( \text{ar}(\triangle AGC) \) is
   (1) 7 cm\(^2\)    (2) 4 cm\(^2\)
   (3) 10.5 cm\(^2\)  (4) 8 cm\(^2\)

48. The expression \((2a - 3b)^3 + (3b - 5c)^3 + (5c - 2a)^3\) is equal to
   (1) \(3(a - 3b)(b - 5c)(5c - 2a)\)
   (2) \(3(2a - 5c)(5c - 3b)(3b - 2a)\)
   (3) \(3(2a - 3b)(3b - 5c)(5c - 2a)\)
   (4) \(3(a - 3b)(3b - 2c)(2c - a)\)

49. If the difference between the greatest and smallest angles of a triangle is 60° and one of its angles is the average of the other two angles, then the triangle so formed is
   (1) Scalene    (2) Isosceles
   (3) Equilateral (4) Right angled

50. A quadrilateral in which diagonals are equal and bisect each other at right angles is a
   (1) Rectangle    (2) Square
   (3) Rhombus      (4) All of these

51. If each entry of a data is multiplied by 6, then the new mean is equal to
   (1) \(\frac{\text{Original mean}}{6}\)
   (2) \(6 \times \text{Original mean}\)
   (3) Remains the same
   (4) Cannot be determined

52. Which of the following points are collinear?
   (1) \((2, 1), (-2, 1), (0, 5)\)
   (2) \(\left(0, \frac{7}{3}\right), (4, 1), (6, 0)\)
   (3) \((1, 2), (3, 1), (5, 0)\)
   (4) \(\left(-\frac{5}{2}, 0\right), \left(6, \frac{1}{2}\right), (0, 1)\)

53. The median of the data : 43, 27, 35, 29, 60, 42, 38, 55, 48, 20 is
   (1) 40    (2) 51
   (3) 46    (4) 42

54. In the given figure, if \( SR \parallel PQ \) and \( AB \parallel PR \), then which of the following is true?

[Diagram]

   (1) \(\text{ar}(\triangle PSR) = \text{ar}(\triangle SRB)\)
   (2) \(\text{ar}(\triangle PSA) = \text{ar}(\triangle PRB)\)
   (3) \(\text{ar}(\triangle BAQ) = \frac{1}{2} \text{ar}(\triangle PBQ)\)
   (4) \(\text{ar}(\triangle PRB) = \text{ar}(\triangle PBA)\)

55. The expression \(343x^3 - 64y^3 - 588x^2y + 336xy^2\) is equivalent to
   (1) \((4y - 7x)^3\)    (2) \((4x - 7y)^3\)
   (3) \((7x - 4y)^3\)    (4) \((7y - 4x)^3\)

Space for Rough Work
56. Find the missing term.


(1) GHF  (2) HGF  (3) HRT  (4) GEF

Directions (Qs. 57 & 58) : Find the next term of the given series :

57. 196, 169, 144, 121, 100, ?

(1) 85  (2) 81  (3) 90  (4) 64

58. 8, 14, 26, 50, 98, ?

(1) 190  (2) 175  (3) 186  (4) 194

59. In the following question, some terms are replaced by (–). The missing letters/digit are given in proper sequence in one of the four alternatives given under each question. Mark the correct alternative in each case.

__ abbb __ b __ babb

(1) aba  (2) aab  (3) bab  (4) abb

Directions (Qs. 60 & 61) : Find the missing number.

60. 5 8 3 4 7 0 7 ? 5

(1) 4  (2) 1  (3) 3  (4) 2

61. 1 2 3 4 5 6 7 8 9

(1) 1  (2) 2  (3) 3  (4) 4

Directions (Qs. 62 to 64) : Five girls Sheela, Sarla, Shalini, Vini and Usha are serving in Yorkshire, Abu Dhabi, Jakarta, Paris and Bangkok. The places of service are not in the serial order as the names are mentioned. Sheela and Usha do not serve in Jakarta or Bangkok. Sarla and Shalini are not serving in Abu Dhabi or Paris. Vini has nothing to do with Jakarta or Abu Dhabi. Shalini is not in Jakarta neither Vini is in Bangkok or Paris.

62. Where is Sheela serving?

(1) Yorkshire  (2) Abu Dhabi or Paris  (3) Jakarta  (4) Bangkok

63. Where is Sarla serving?

(1) Yorkshire  (2) Abu Dhabi or Paris  (3) Jakarta  (4) Bangkok

64. Where is Shalini working?

(1) Yorkshire  (2) Abu Dhabi or Paris  (3) Jakarta  (4) Bangkok

65. If × stands for addition, ÷ stands for subtraction, + stands for multiplication and – stands for division, then

20 × 8 ÷ 8 – 4 + 2 = ?

(1) 80  (2) 24  (3) 25  (4) 12
Directions (Qs. 66 & 67): In the following figure, the smaller triangle represents doctors, the bigger triangle represents teachers, the circle represents females and the rectangle represents citizens of Delhi.

On the basis of the above diagram, answer the following questions:

66. Who among the following are doctors but not females?
   (1) D, E  (2) F, G  (3) A, B  (4) C, H

67. Who among the following teachers are neither females nor doctors?
   (1) C, H  (2) F, I  (3) E, G  (4) A, I

68. How many squares are there in the given figure?
   (1) 20  (2) 22  (3) 30  (4) 34

69. A three centimeter cube has been painted blue on all its faces. It is cut into one centimeter cubes. How many cubes will be there with only two sides painted blue?
   (1) 6  (2) 12  (3) 1  (4) 27

70. If species that live on land and the species that live in water are represented by two big circles and the animals that live on land and in water are represented by a small circle. The combination of these three can be best represented as
   (1)  (2)  (3)  (4)  

71. Five boys took part in a race. Roshan finished before Zafar but behind Saurav, Devesh finished before Rohan but behind Zafar. Who won the race?
   (1) Roshan  (2) Zafar  (3) Saurav  (4) Devesh

Directions (Qs. 72): Observe the figure X. Four alternatives are given below figure (X). You have to choose correct water image from alternatives.

72. 
   (X)
   (1)  (2)  (3)  (4) 

Space for Rough Work
Direction (Qs. 73): Choose the correct mirror image of Figure (X) from among the four alternatives.

73. 

(X)

(1)  

(2)  

(3)  

(4)  

74. Two positions of a die are shown below. If 1 is at the bottom, then which number will be on the top? [Assume that the dice contains 1 to 6 dots on all its faces]

(1) 2  

(2) 3  

(3) 4  

(4) 5  

75. A bus starts from city X. The number of women in the bus is half the number of men. In city Y, 10 men leave the bus and 5 women enter. Now, number of men and women are equal. In the beginning, the total number of passengers who boarded the bus is

(1) 15  

(2) 30  

(3) 35  

(4) 45
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