NARAYANA
IIT-JEE / NEET / FOUNDATIONS
(A Unit of NSPIRA Management Services Pvt. Ltd.)

43 YEARS OF EXCELLENCE

N-ACST-2022

CLASS – X: - (Mental Ability, Mathematics & Science)
(Class IX Moving to X)

(SET-1)
N-ACST (12-06-2022)

Time Duration: 1 Hour   *Maximum marks: 140*

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

INSTRUCTIONS:

1. This question paper contains **35** questions: **Mental Ability (Q. No. 1 to Q. No. 7), Mathematics (Q. No. 8 to Q. No. 14), Physics (Q. No. 15 to Q. No. 21), Chemistry (Q. No. 22 to Q. No. 28) & Biology (Q. No. 29 to Q. No. 35).**

2. There will be individual qualifying cut-offs for all sections.

3. **For Each correct answer 4 marks will be awarded. No Negative Marking.**

4. Use OMR-Sheet for answering.

5. Use HB Pencil / Pen to darken the circles.

6. If you wish to change your answer, erase the already darkened circle completely and then darken the appropriate circle.

7. Use of a calculator and mobile phone is strictly prohibited during the exam.

<u>TO BE FILLED IN CAPITAL LETTERS</u>

NAME OF THE STUDENT : _____

FATHER'S NAME : _____

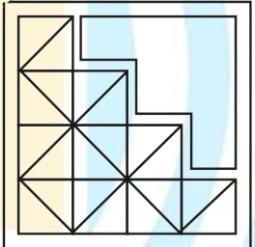CONTACT NUMBER:_____ SCHOOL NAME :_____

ROLL NO. :_____TEST CENTRE : _____

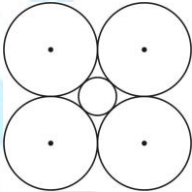| I have read all the instructions and shall abide by them	I have verified all the information filled in by the Candidate
……..………………………………… **Signature of Candidate**	……………………………………………… **Signature of Invigilator**

MENTAL ABILITY (MAT)

1. Aahna, facing north, goes in her left-hand direction, then goes to the south. She then goes in her right-hand direction and then again moves to the south. Finally, she goes west and then moves to her left direction. The present direction of Aahna w.r.t. her initial position is
    (A) Southwest   (B) Southeast
    (C) Northeast   (D) Northwest

2. Pointing towards a girl in a photograph, a person says to his friend. "She is the granddaughter of the elder brother of my father". How is the girl in the photograph related to the person?
    (A) Sister in law   (B) Sister
    (C) Maternal aunt   (D) Niece

3. Complete the following series: 5, 21, 81, 241,
    (A) 481   (B) 120
    (C) 581   (D) 98

4. If * = +, # = −, @ = =, $ = x; & =÷, then which of the following options is true?
    (A) (7 # 2) & 5 @ 10 $ 1   (C) (70 & 10) * 3 # 5 @ 10 # 5
    (B) (81 # 80) * 2 & 3 * 4 @ 3   (D) (12 & 3) # 12 $ 5 @ 76 $ 1

5. How many squares are there in the following figure?

    (A) 15   (B) 16
    (C) 22   (D) 12

6. Find the missing figure in (?)

    (A)   (B)   (C)   (D)

7. In a certain code if language '479' means 'fruit is sweet', '248' means 'very sweet voice' and '637' means 'eat fruit daily'. Which digit stands for 'is' in that code?
    (A) 7   (B) 9
    (C) 4   (D) Can't be determined

MATHEMATICS

8. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. Then the probability that the ticket drawn has a number which is a multiple of 3 or 5 is:

(A) $\dfrac{1}{2}$ (B) $\dfrac{2}{5}$ (C) $\dfrac{8}{15}$ (D) $\dfrac{9}{20}$

9. In the adjoining figure, if the radius of each of the four outer circles is r, then the radius of the inner circle is

(A) $\dfrac{2r}{(\sqrt{2}+1)}$ (B) $\dfrac{r}{\sqrt{2}}$ (C) $\left(\sqrt{2}-1\right)r$ (D) $\sqrt{2}r$

10. A rational number between $\sqrt{2}$ and $\sqrt{3}$ is:

(A) 1.5   (B) $\dfrac{\sqrt{2}+\sqrt{3}}{2}$ (C) $\dfrac{\sqrt{2}\sqrt{3}}{2}$ (D) 1.8

11. If, $2^x = 3^y = 6^{-z}$, then the value of $\dfrac{1}{x}+\dfrac{1}{y}+\dfrac{1}{z}$ is:

(A) -1   (B) 0   (C) 1   (D) 2

12. The radii of two right circular cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 4, then the ratio of their curved surface areas is:

(A) 3 : 4   (B) 5 : 6   (C) 1 : 2   (D) 5 : 8

13. The factors of the expression

$$36+11\left(z-\dfrac{y}{3}+x\right)-12\left(z-\dfrac{y}{3}+x\right)^2+\left(4z-\dfrac{4}{3}y+4x-9\right)(5+3z-y+2x)$$ is/are

(A) $\left(1-x\right)\left(4z-\dfrac{4y}{3}+4x-9\right)$ (B) $\left(1+x\right)\left(4z-\dfrac{4y}{3}+4x-9\right)$

(C) $\left(1-x\right)\left(4z+\dfrac{4y}{3}+4x-9\right)$ (D) $\left(1+x\right)\left(4z+\dfrac{4y}{3}+4x+9\right)$

14. ABCD is a square. X and Y are points on sides AD and BC respectively such that AY = BX, then the value of $\dfrac{BY}{AX}$ and $\dfrac{\angle BAY}{\angle ABX}$ respectively are

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

Space For Rough Work

PHYSICS

15. A body of mass 0.1 kg is dropped from a height of 10m at a place where $g = 10\,\text{ms}^{-2}$. Its K.E. just before it strikes the ground is:

    (A) 1J　　　　　(B) 1.04 J　　　　　(C) 3.5 J　　　　　(D) 10 J

16. Velocity of sound is maximum in:

    (A) Iron　　　　　(B) Mercury　　　　　(C) Water　　　　　(D) Air

17. A ball strikes the floor vertically with a speed 'u' and rebounds at the same speed. The change in velocity would be:

    (A) u　　　　　(B) 3u　　　　　(C) 2u　　　　　(D) zero

18. Two bodies moving in circular paths of radii 1 : 2, take the same time to complete their circles. The ratio of their linear speeds is:

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

19. The ratio of SI unit and CGS unit of retardation is:

    (A) 10^{-2}　　　　　(B) 10^{2}　　　　　(C) 10^{0}　　　　　(D) 10^{-1}

20. A Diwali rocket is ejecting 0.05 kg of gases per second at a velocity of $400\,\text{ms}^{-1}$. The accelerating force on the rocket is:

    (A) 20 dyne　　　　　　　　　　(B) 20 Newton

    (C) 20 kg wt.　　　　　　　　　　(D) Sufficient data not given.

21. If two bodies of mass M_1 and M_2 are placed a distance r apart they have a force of gravitation F between them. If both of the masses are reduced to half the force of gravitation would be:

    (A) $\dfrac{F}{2}$　　　　　(B) 2F　　　　　(C) $\dfrac{F}{4}$　　　　　(D) F

Space For Rough Work

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CHEMISTRY

22. The formula of chloride of a metal M is MCl_3, the formula of the phosphate of metal M will be:

(A) MPO_4 (B) M_2PO_4 (C) M_3PO_4 (D) $M_2(PO_4)_3$

23. Which of the following contains the maximum number of molecules?

(A) 1g of CO_2 (B) 1g of N_2 (C) 1g of H_2 (D) 1g of CH_4

24. Which among the following is not a homogenous mixture?
(A) Solder   (B) Aqueous solution of $NaCl$
(C) Sulphur in Carbon Disulphide   (D) Sulphur in water.

25. From the following, the gas present in dry ice is:
(A) NH_3 (B) CO_2
(C) Solid Sulphur Dioxide   (D) Solid Carbon Dioxide

26. Which of the following statements is false?
(A) Bohr's theory explains only the spectra of single-electron species.
(B) The energy of an electron remains constant during the electronic transition.
(C) The angular momentum of an electron is quantized.
(D) According to Bohr's theory, electrons revolve around the nucleus in circular orbits.

27. Rate of diffusion of a gas is:
(A) Directly proportional to its density.
(B) Directly proportional to its molecular mass.
(C) Inversely proportional to the square root of its density.
(D) Inversely proportional to its molecular mass.

28. If two naturally occurring isotopes of an element are $_7X^{15}$, $_7X^{11}$; what will be the percentage composition of each isotope of X occurring, respectively, if the average atomic weight accounts for 14?
(A) 95, 5   (B) 80, 20   (C) 75, 25   (D) 65, 35

Space For Rough Work

BIOLOGY

29. Ozone layer is found in _____
   (A) Stratosphere   (B) Troposphere   (C) Thermosphere (D) Mesosphere

30. Pteridophytes differ from bryophytes in possessing:
   (A) Spores   (B) Archegonia
   (C) Vascular tissue   (D) Alternation of Generation

31. Which of the following organelles is enclosed in a single membrane?
   (A) Nucleus   (B) Lysosomes   (C) Chloroplasts   (D) Mitochondria

32. From the followings, identify the protein factories of the cell.
   (A) Lysosomes   (B) Chloroplasts   (C) Mitochondria   (D) Ribosomes

33. Hierarchical system of classification of living organisms was proposed by
   (A) Linnaeus   (B) Whittaker   (C) Theophrastus   (D) Aristotle

34. The energy currency of the cell is _____.
   (A) Mitochondria   (B) ATP   (C) FAD   (D) Glucose

35. Tracheal rings are made up of _____ tissue.
   (A) Bone   (B) Muscle   (C) Cartilage   (D) Adipose

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