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

NSAT
NARAYANA SCHOLASTIC APTITUDE TEST
ASPIRE • ASSESS • ACHIEVE

NSAT-2024

CLASS – X (Mental Ability, Mathematics, Physics & Chemistry)
(Class X Moving to XI-PCM)

NARAYANA SCHOLASTIC APTITUDE TEST (NSAT)

SAMPLE PAPER

Time: 1:00 Hr. ***Maximum marks: 160***

IMPORTANT INSTRUCTIONS:

1. **The test Booklet consists of 40 questions. The maximum marks are 160.**
2. **There are five parts in the question paper of MAT (Q. No. 1 to 8) Mathematics (Q. No. 9 to 20), Physics (Q. No. 21 to 30) & Chemistry (Q. No. 31 to 40) having 40 questions. Each question is allotted +4 (four) marks for each correct response & -1 for each incorrect answer**
3. **Mark only one correct answer out of four alternatives.**
4. **Use Blue/Black Ball Point Pen only for writing particulars/marking.**
5. **Use of Calculator is not allowed.**
6. **Dark the circle in the space provided only.**
7. **Use of white fluid or any other material which damage the answer sheet, is not permissible on the Answer Sheet.**

TO BE FILLED IN CAPITAL LETTERS

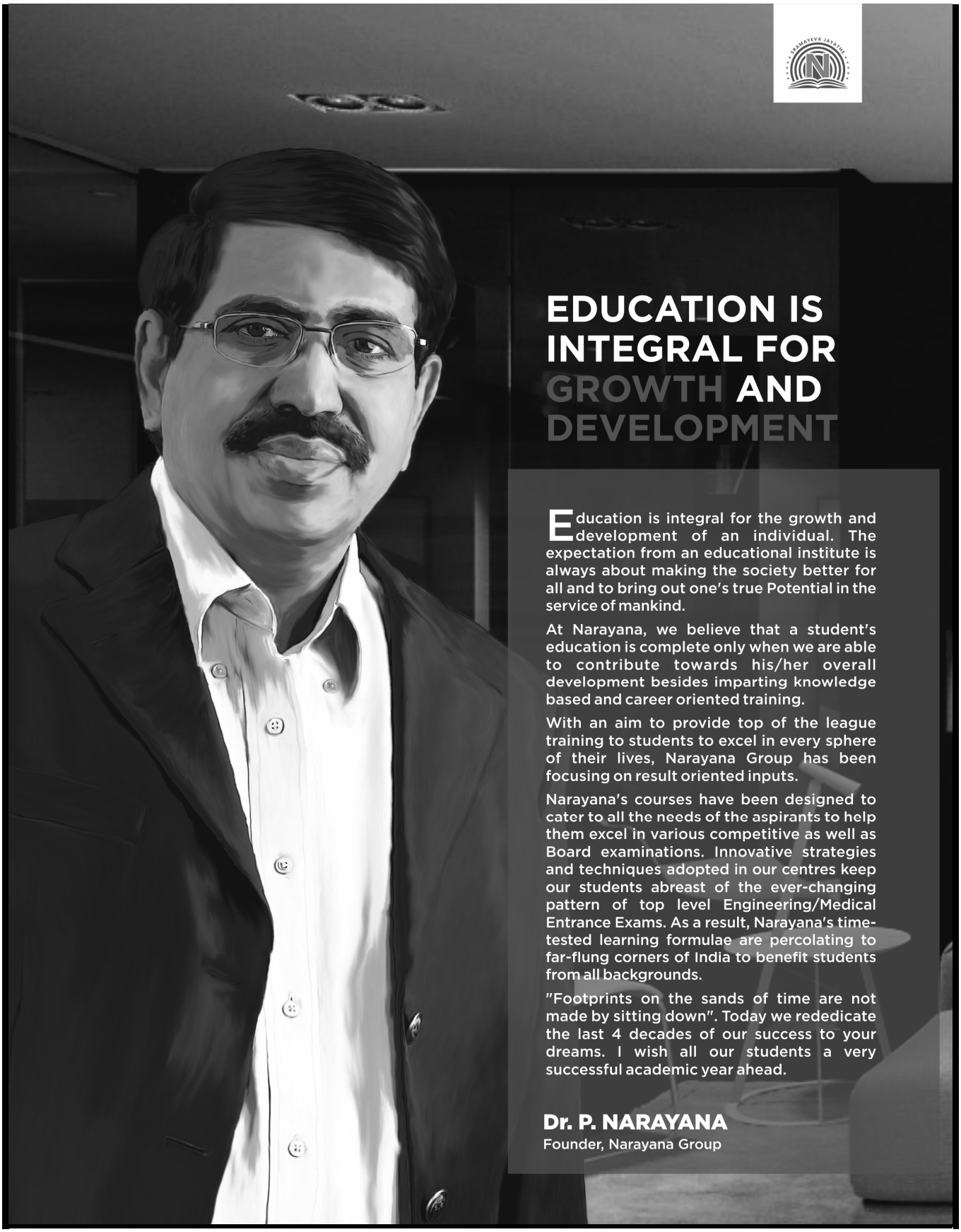
NAME OF THE STUDENT : _____

FATHER'S NAME : _____

CONTACT NUMBERS:_____**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 the Candidate	**Signature of the Invigilator**



EDUCATION IS INTEGRAL FOR GROWTH AND DEVELOPMENT

Education is integral for the growth and development of an individual. The expectation from an educational institute is always about making the society better for all and to bring out one's true Potential in the service of mankind.

At Narayana, we believe that a student's education is complete only when we are able to contribute towards his/her overall development besides imparting knowledge based and career oriented training.

With an aim to provide top of the league training to students to excel in every sphere of their lives, Narayana Group has been focusing on result oriented inputs.

Narayana's courses have been designed to cater to all the needs of the aspirants to help them excel in various competitive as well as Board examinations. Innovative strategies and techniques adopted in our centres keep our students abreast of the ever-changing pattern of top level Engineering/Medical Entrance Exams. As a result, Narayana's time-tested learning formulae are percolating to far-flung corners of India to benefit students from all backgrounds.

"Footprints on the sands of time are not made by sitting down". Today we rededicate the last 4 decades of our success to your dreams. I wish all our students a very successful academic year ahead.

Dr. P. NARAYANA
Founder, Narayana Group

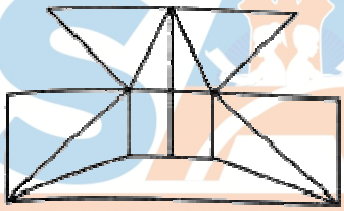
MENTAL ABILITY

1. In a certain code, REFRIGERATOR is coded as ROTAREGIRFER, which would be coded as NOITINUMMA?
(A) ANMOMIUTNI (B) AMNTOMUIIN
(C) AMMUNITION (D) NMMUNITION

2. Choose the correct analogous word for:
Anaemia : Blood :: Anarchy : ?
(A) Lawlessness (B) Government (C) Monarchy (D) Disorder

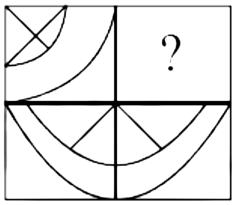
3. Choose the correct analogous pair of number.
10 : 500 :: ?
(A) 8 : 256 (B) 7 : 374 (C) 9 : 243 (D) 5 : 75

4. The minimum number of straight lines required to make the given figure is/are

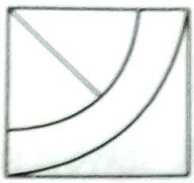
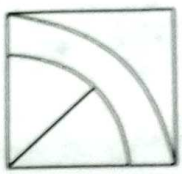
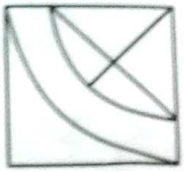
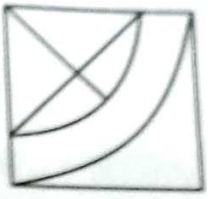


(A) 16 (B) 17 (C) 18 (D) 19

5. Complete the missing portion of the given pattern by selecting from the given alternatives (A), (B), (C), (D).



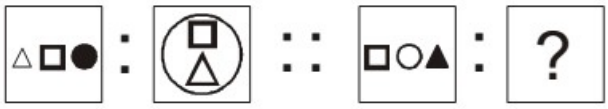
(X)

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

Space for rough work

6. In the following question, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.
9, 27, 31, 155, 161, 1127, ?
(A) 316 (B) 1135 (C) 1288 (D) 2254

7 There are two pairs of figures. In the first pair, one figure is related to the other in a certain manner. If the same relation have to exist in the second pair, which answer choice should come in place of?



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

8. In certain code, BOXER is written as AQWGQ. How VISIT is written in that code?
(A) UKRKU (B) UKRKS (C) WKRKU (D) WKRKS

Space for rough work

MATHEMATICS

9. $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta+\cos^4\theta)$ is equal to

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

10. If a, b, c are all positive integers, then the minimum value of the expression

$$\frac{(a^2+a+1)(b^2+b+1)(c^2+c+1)}{abc}$$

(A) 3 (B) 9 (C) 27 (D) 1

11. Value of x, y which satisfies 3x + 5y = 12 xy and 7x–2y = 4xy are

(A) $x=\frac{37}{31}, y=\frac{41}{31}$ (B) $y=\frac{41}{44}, x=\frac{41}{72}$ (C) x = 1, y = 2 (D) $y=\frac{32}{41}, x=\frac{44}{41}$

12. If we draw the graph of a cubic polynomial, then it will intersect the axis of x at least in

(A) zero point (B) one point (C) Two points (D) Three points

13. If A + B = 225°, then the value of (1 + tan A) (1 + tan B) is

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

14. If $\tan\alpha = n\tan\beta$ and $\sin\alpha = m\sin\beta$, then $\frac{m^2-1}{n^2-1}$

(A) $\cos^3\alpha$ (B) $\sin^3\alpha$ (C) $\sin^2\alpha$ (D) $\cos^2\alpha$

15. The degree of polynomial $\frac{x^3+x^4-x^6}{x^2}$

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

16. If α, β be the zeroes of the polynomial $2x^2+5x+k$ such that $\alpha^2+\beta^2+\alpha\beta=\frac{21}{4}$, then k=?

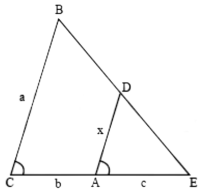
(A) 3 (B) -3 (C) -2 (D) 2

Space for rough work

17. The first term of an A.P. of consecutive integers is $p^2 + 1$. The sum of $(2p + 1)$ terms of this series can be expressed as

(A) $(p+1)^2$ (B) $(2p+1)(p+1)^2$ (C) $(p+1)^3$ (D) $p^3+(p+1)^3$.

18. Using the following figure $\angle BCE = \angle DAE$, then the value of x is



(A) $\frac{ac}{b+c}$ (B) $\frac{ac}{b-c}$ (C) $\frac{b+c}{ac}$ (D) $\frac{2ac}{b+c}$

19. The ratio in which the line $x + 2y – 4 = 0$ divides the line segment joining the points $(– 1, 3)$ and $(3, –1)$ is

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

20. The angle of elevation of the top of a tower standing on a horizontal plane from a point A is α. After walking a distance d towards the foot of the tower the angle of elevation is found to be β . The height of the tower is:

(A) $\frac{d}{\cot\alpha + \cot\beta}$ (B) $\frac{d}{\cot\alpha - \cot\beta}$ (C) $\frac{d}{\tan\beta - \tan\alpha}$ (D) $\frac{d}{\tan\beta + \tan\alpha}$

Space for rough work

PHYSICS

21. Two resistors are in the ratio of 1:4. If these are connected in parallel, their total resistance becomes 20Ω. Then value of each resistance is

(A) 25Ω, 100Ω (B) 30Ω, 60Ω

(C) 100Ω, 20Ω (D) 60Ω, 90Ω

22. Refractive index of glass with respect to air is 1.5 and refractive index of water with respect to air is 4/3. What will be the refractive index of glass with respect to water?

(A) 1 (B) 1.5 (C) 1.125 (D) –10

23. A thick lens is made with a material having refractive index $\mu = 1.5$. Both the side are convex. It is dipped in water ($\mu = 1.33$), it will be have like:

(A) A convergent lens (B) A divergent lens

(C) A rectangular slab (D) A prism

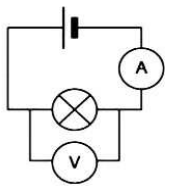
24. A wire of resistance R is cut into n equal parts. These parts are then connected in parallel. The equivalent resistance of combination will be:

(A) nR (B) R/n (C) n/R (D) R/n^2.

25. A ray of light in incident normally on a rectangular piece of glass. The value of angle of refraction will be

(A) 180° (B) 90° (C) 0° (D) 45°

26. Consider the closes circuit represented below. How will the ammeter and voltmeter readings change, if the bulb burns out? (Both meters are ideal)



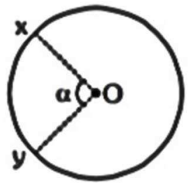
Ammeter reading Voltmeter reading

(A) Increases, Increases (B) Becomes zero, Becomes zero

(C) Does not change, Does not change (D) Becomes zero, Does not change

Space for rough work

27. A wire of resistance 'R' is bent into a circular ring of radius r. Equivalent resistance between two point 'x' and 'y' on its circumference, when angle XOY is α, can be given by



(A) $\frac{R\alpha}{4\pi^2}(2\pi-\alpha)$ (B) $\frac{R}{2\pi}(2\pi-\alpha)$ (C) $R(2\pi-\alpha)$ (D) $\frac{4\pi}{R\alpha}(2\pi-\alpha)$

28. The defect of myopia can be corrected by using
(A) Either concave or convex (B) Convex lens
(C) Concave lens (D) Combination of lenses

29. In an electrical circuit two resistors of 2Ω and 4Ω respectively are connected parallel to a 6v battery. The heat dissipated by the 4Ω resistors in 5s will be
(A) 45 J (B) 20 J (C) 60 J (D) 65 J

30. A person has near point 60 cm. What power should corrective less have to allow to see an object clearly at a distance of 20 cm.
(A) +3.33D (B) -3.33D (C) +2.2D (D) -2.2.2D

Space for rough work

CHEMISTRY

31. Which of the following chemical reaction is/are not possible ?

(A) $Cu(s) + ZnSO_4(aq) \Rightarrow CuSO_4(aq) + Zn(s)$
(B) $2AgNO_3 + Cu \Rightarrow Cu(NO_3)_2 + 2Ag$
(C) $BaSO_4 + 2NaCl \Rightarrow BaCl_2 + Na_2SO_4$
(D) Both (A) & (B)

32. The product obtained on passing excess carbon dioxide through lime water is
(A) $CaCO_3$ (B) $Ca(HCO_3)_2$ (C) $CaHCO_3$ (D) Ca_2CO_3

33. Formula of Gypsum is:
(A) $CaSO_4.3H_2O$ (B) $CaSO_4$ (C) $CaSO_4.2H_2O$ (D) $MgSO_4.2H_2O$

34. Which of the following reaction will not occur?

(A) $Mg+H_2SO_4 \rightarrow MgSO_4 + H_2$.

(B) $Cu+H_2SO_4 \rightarrow CuSO_4 + H_2$.

(C) $2Al + HCl \rightarrow 2AlCl_3+3H_2$.

(D) $Fe+2HCl \rightarrow FeCl_2+ H_2$.

35. Some substances are given below:
I. Magnesium oxide II. Carbon dioxide
III. Sulphur dioxide IV. Calcium oxide
Which of the above substances, when dissolve in water, turn blue litmus to red? Select the correct alternative.
(A) I and II (B) II and III (C) II and IV (D) I and IV

36. Phenolphthalein is:
(A) yellow in acidic medium, pink in basic medium
(B) pink in acidic medium, colourless in basic medium
(C) colourless in acidic medium, pink in basic medium
(D) pink in acidic medium, yellow in basic medium

37. The colour of pH strip turned red when it was dipped in a sample. The sample could be
(A) dilute sodium carbonate solution (B) tap water
(C) dilute sodium hydroxide solution (D) dilute hydrochloric acid

Space for rough work

38. Plaster of Paris $\left(CaSO_4.\frac{1}{4}H_2O\right)$ on mixing with water sets to form

(A) $CaSO_4.H_2O$ (B) $CaSO_4.1\frac{1}{2}H_2O$ (C) $CaSO_4.2H_2O$ (D) $CaSO_4.2\frac{1}{2}H_2O$

39. 10^{-6} M HCl is diluted to 100 times. Its pH is

(A) 6.0 (B) 8.0 (C) 6.95 (D) 9.5

40. On electrolysis of brine water, the products formed are
(A) Sodium and chlorine
(B) Hydrogen, chlorine and oxygen
(C) Hydrogen, chlorine and sodium hydroxide
(D) Sodium hydroxide, chlorine and oxygen

Space for rough work