

Diagnostic cum Scholarship Tests

SAMPLE PAPER For Students of Class X

Paper 2

NTSE Science & Mathematics

Duration : 60 minutes

Paper Code: 910-2

Maximum Marks : 60

Please read the instructions and guidelines carefully :

Important Note : Please ensure to accurately input the details for the Question Paper Code as indicated at the top of this sheet (Side 2) into the corresponding columns / fields on the OMR sheet before proceeding with the paper. Incorrectly filled information regarding the class or paper may result in inaccurate outcomes or results.

"This paper has been scientifically designed to evaluate your potential – manifested and hidden for the target examinations mentioned in various sections of the paper. Thus, your adherence to the instructions is critical in the evaluation of the same"

1. This Question paper consists of 2 sections.
2. Student should devote allotted time for each section. If a section is easy, then it is easy for everyone & was meant to be like that with a goal in mind. Do not switch over to another section if you find the section to be easy. If a section is tough, then it is tough for everyone. You are advised to spend 30 Minutes on Section-I and 30 Minutes on Section-II. Dedicating the required time to finish each section successfully is essential. Opening the next section before completing the allotted time for the preceding section is not permitted. This adherence is crucial for assessing your true potential, as each section is meticulously crafted to evaluate your potential for the corresponding competitive examinations.
3. Candidate should open the seal of Section-II only after devoting 30 minutes on Section-I.
4. Sheets will be given to each candidate for rough work. Candidate must fill all details on the rough sheet and submit the same to invigilator along with OMR sheet. Candidate must mention the Question No. while doing the rough work in the sheet.
5. Please note candidates are not allowed to bring any prohibited items into the exam hall such as electronic devices, mobile phones, smart watch, earphones, calculators, books, notes, formula sheets, and bags.
6. Marking scheme is given in table below:

Section	Subject	Question no.	Marking Scheme for each question	
			Correct answer	Wrong answer
SECTION – I (NTSE-Science) Time Allotted: 30 Minutes	PHYSICS (Part-A)	1 to 10	+1	0
	CHEMISTRY (Part-B)	11 to 20	+1	0
	BIOLOGY (Part-C)	21 to 30	+1	0
SECTION – II (NTSE-Mathematics) Time Allotted: 30 Minutes	MATHEMATICS (Part-A)	31 to 60	+1	0

Section - I

Time: 30 Minutes

PHYSICS - (PART - A)

This part contains 10 Multiple Choice Questions number 1 to 10. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

- Name the physical quantity that is defined as the rate of change of displacement.
(A) Velocity (B) Acceleration
(C) Distance (D) Speed
- Newton's law of Gravitation is valid
(A) On the earth only (B) In the laboratory only
(C) On the moon only (D) Everywhere
- A bomb of mass 9 kg explodes into two pieces of masses 3 kg and 6 kg. The velocity of 3 kg mass is 16 m/s. The velocity of 6 kg mass is
(A) 4 m/s (B) 8 m/s
(C) 16 m/s (D) 32 m/s

4. Match the following entries of Column I and Column II

Column - I		Column - II	
(a)	Impulse equals	(p)	Rate of change of linear momentum
(b)	Force equals	(q)	Rate at which energy is consumed
(c)	Power is	(r)	Product of force and displacement
(d)	Work is	(s)	Change in linear momentum

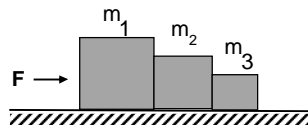
(A) (a - s), (b - p), (c - q), (d - r)

(B) (a - p), (b - r), (c - q), (d - s)

(C) (a - q), (b - s), (c - r), (d - p)

(D) (a - s), (b - r), (c - p), (d - q)

5. Three blocks of masses $m_1 = 3m$, $m_2 = 2m$ and $m_3 = m$ are placed in contact on a horizontal frictionless surface as shown in the figure below. A horizontal forces F is applied to mass m_1 as shown. Then match the items in **Column - I** with **Column - II**.



Column - I		Column - II	
(a)	Net force acting on m_2 if $F = 12$ N	(p)	1 N
(b)	Net force acting on m_2 if $F = 6$ N	(q)	3 N
(c)	Net force acting on m_3 if $F = 12$ N	(r)	2 N
(d)	Net force acting on m_3 if $F = 6$ N	(s)	4 N

(A) (a - s), (b - r), (c - q), (d - p)

(B) (a - s), (b - r), (c - r), (d - p)

(C) (a - q), (b - r), (c - s), (d - p)

(D) (a - p), (b - s), (c - r), (d - p)

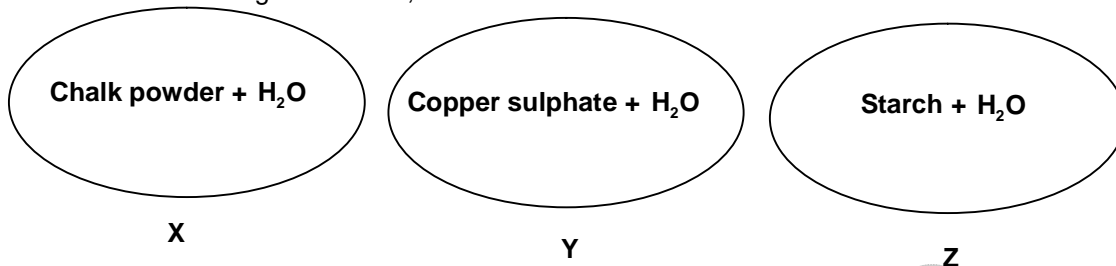
6. **Statement – 1:** Friction is self – adjusting force.
Statement – 2: The magnitude of static friction is less than the applied force.
(A) Both statement 1 and 2 are true and statement 2 is correct explanation of statement 1.
(B) Both statement 1 and 2 are true but statement is not a correct explanation of statement 1.
(C) Statement 1 is true and statement 2 is false.
(D) Statement 2 is true and statement 1 is false
7. The time period of a geostationary satellite is
(A) 24 hours (B) 12 hours
(C) 365 days (D) One month
8. When we jump out of a boat standing in water it moves
(A) Forward (B) Backward
(C) Sideways (D) None of these
9. Sonar works on the principle of
(A) reflection of sound waves (B) momentum of sound waves
(C) energy of sound waves (D) refraction of sound waves
10. Supersonic plane flies
(A) with the speed less than the speed of sound
(B) with the speed of sound
(C) with the speed greater than the speed of sound
(D) with the speed of light

CHEMISTRY – (PART – B)

This part contains **10 Multiple Choice Questions** number **11 to 20**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

11. Which of the following represents an incorrect chemical formula of a compound?
(A) Al P (B) CaS
(C) ZnO (D) MgN
12. Among the following, identify the sets in which all compounds undergo sublimation.
- Set a : Iodine, Camphor, Ammonium chloride**
- Set b : Dry ice, Naphthalene, Sodium hydroxide**
- Set c : Iodine, Dry ice, Naphthalene**
- Set d : Camphor, alcohol, Dry ice**
- (A) a and c (B) a and b
(C) c and d (D) b and d

13. Consider the following solutions X, Y and Z.



Scattering of light can be done by particles of

- (A) X only
(B) Z only
(C) Both X and Y
(D) Both X and Z
14. Intermixing of gases among one another is called diffusion. At higher temperatures, the rate (speed) of diffusion of a gas is higher. Which among the following gases would have the highest rate of diffusion?
(A) SO₃
(B) CO₂
(C) NH₃
(D) HCl

15. Match the following

Column – I		Column – II	
(a)	Blue vitriol	(p)	Element
(b)	Diamond	(q)	Heterogeneous mixture
(c)	Ornamental gold	(r)	Compound
(d)	Smog	(s)	Homogeneous mixture

(A) (a – s), (b – r), (c – q), (d – p)

(B) (a – r), (b – p), (c – s), (d – q)

(C) (a – s), (b – p), (c – r), (d – q)

(D) (a – r), (b – s), (c – q), (d – p)

16. Match the following

Compound		Ratio by mass	
(a)	CuO	(p)	3: 8
(b)	CO ₂	(q)	4: 1
(c)	SO ₂	(r)	3: 2
(d)	MgO	(s)	1: 1

(A) (a – r), (b – p), (c – s), (d – q)

(B) (a – s), (b – p), (c – r), (d – q)

(C) (a – r), (b – s), (c – q), (d – p)

(D) (a – q), (b – p), (c – s), (d – r)

17. **Statement – 1:** A gas in a gas colloid is not possible.

Statement – 2: A gas dissolved in a gas forms a homogeneous true solution system.

- (A) Both statement 1 and 2 are true and statement 2 is correct explanation of statement 1.
(B) Both statement 1 and 2 are true but statement is not a correct explanation of statement 1.
(C) Statement 2 is true and statement 1 is false.
(D) Statement 2 is false and statement 1 is true

18. **Statement – 1:** During Summer, water kept in an earthen pot becomes cool.
Statement – 2: The cooling of water in earthen pot is caused by the diffusion of water through the small pores of the pot.
 (A) Both statement 1 and 2 are true and statement 2 is correct explanation of statement 1.
 (B) Both statement 1 and 2 are true but statement is not a correct explanation of statement 1.
 (C) Statement 2 is true and statement 1 is false.
 (D) Statement 2 is false and statement 1 is true.
19. Naturally occurring thallium consists of two stable isotopes, Tl-203 and Tl-205 (atomic mass = 203.0) and 205.0, respectively) and has an average atomic mass of 204.4. What is percentage of Tl -205?
 (A) 14.0% (B) 30.1%
 (C) 50.0% (D) 70.0%
20. Barium sulphate (BaSO_4) dispersed in water used in diagnostic X-rays is a -
 (A) Aerosol (B) Solution
 (C) Suspension (D) Foam

BIOLOGY – (PART – C)

This part contains 10 Multiple Choice Questions number 21 to 30. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

21. Which one of the following pairs of diseases can spread through blood transfusion?
 (A) Cholera and Hepatitis (B) Hepatitis B and AIDS
 (C) Diabetes mellitus and Malaria (D) Hay fever and AIDS
22. Match the Column I Types of tissues with Column II Functions
- | Column – I
Types of tissues | | Column – II
Functions | |
|--------------------------------|--------------|--------------------------|----------------|
| 1. | Aerenchyma | I. | Stores food |
| 2. | Collenchyma | II. | Flexibility |
| 3. | Parenchyma | III. | Buoyancy |
| 4. | Chlorenchyma | IV. | Photosynthesis |
- (A) (1 – II), (2 – I), (3 – IV), (4 – III) (B) (1 – III), (2 – I), (3 – II), (4 – IV)
 (C) (1 – IV), (2 – I), (3 – II), (4 – III) (D) (1 – III), (2 – II), (3 – I), (4 – IV)
23. Which cell organelle/ organelles in eukaryotic cells contain 70 S ribosomes
 (A) Rough Endoplasmic Reticulum (B) Chloroplast only
 (C) Mitochondria only (D) Both Chloroplast and Mitochondria
24. The cause of cancer is by
 (A) Viral infections (B) Genetic abnormalities
 (C) Cephaleuros algae (D) Both (A) and (B)
25. Find out the correct statement/s from the options given below
 (i) Mitochondria are rod shaped or sausage shaped cell organelles which are commonly called as the power house of the cell.
 (ii) Mitochondria is a single membrane organelle and its wall is inwardly folded to form cristae.
 (iii) Cristae has specialized structures called Oxysomes which serve as the site of ATP synthesis.
 (iv) It has circular DNA and 80S type of ribosomes.
 (A) Only statement (i) is correct (B) Statement (i) and (iii) are correct
 (C) Statement (iii) and (iv) are correct (D) All the given statements are correct

26. A certain patient is suspected to be suffering from Acquired Immuno Deficiency Syndrome. Which diagnostic technique will you recommend for its detection?
 (A) WIDAL (B) ELISA
 (C) CT (D) MRI
27. Shrinkage of protoplast of a cell is called
 (A) Osmosis (B) Plasmolysis
 (C) Diffusion (D) Facilitated Diffusion
28. A species of insect was found to have developed resistance to a commonly used insecticide. Which of the following is the most likely explanation?
 (A) Insects learned how to avoid the pesticide, and these learned behaviours were passed on subsequent generations.
 (B) The original gene pool included genes that conferred resistance to the insecticide.
 (C) The insecticide stimulated development of resistance in certain individuals and this was inherited.
 (D) The insecticide caused a mutation that increased insect fitness and which was passed on to subsequent generations.
29. First vascular Cryptogams are
 (A) Bryophyta (B) Pteridophyta
 (C) Gymnosperm (D) Angiosperm
30. Nematocyst or stinging cells are present for defence in
 (A) Porifera (B) Nematoda
 (C) Cnidaria (D) Mollusca

Section - II

Time: 30 Minutes

MATHEMATICS - (PART - A)

This part contains 30 Multiple Choice Questions number 31 to 60. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

31. If $a = \frac{p-q}{p+q}$, $b = \frac{q-r}{q+r}$ and $c = \frac{r-p}{r+p}$, then the value of $\frac{(1+a)(1+b)(1+c)}{(1-a)(1-b)(1-c)}$ is
 (A) 1 (B) 0
 (C) 121 (D) 11
32. If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$, then the value of $\frac{1}{(P-Q)} - \frac{2Q}{P^2-Q^2}$ is
 (A) $\frac{x+y}{x-y}$ (B) 0
 (C) 1 (D) $\frac{x-y}{x+y}$

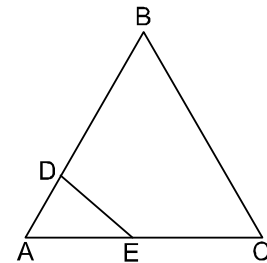
33. If p is any integer such that $xy = p$, $xz = p^2$ and $yz = p^3$. Also $x + y + z = 13$ and $x^2 + y^2 + z^2 = 91$ then value of $\frac{z}{y} =$
- (A) 3 (B) $\frac{7}{3}$
 (C) 13 (D) $\frac{13}{3}$

34. If $a + b + c = 3$, $a^2 + b^2 + c^2 = 6$ and $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$, where a, b, c are all non-zero, then 'abc' is equal to
- (A) $\frac{2}{3}$ (B) $\frac{3}{2}$
 (C) $\frac{1}{2}$ (D) $\frac{1}{3}$

35. If $5^p = 7^q = 35^{-r}$, then the value of $\frac{1}{p} + \frac{1}{q} + \frac{1}{r}$ is :
- (A) 0 (B) 1
 (C) -1 (D) $\frac{2}{3}$

36. If α, β are the roots of the equation $ax^2 + bx + c = 0$, then $\frac{\alpha}{a\beta + b} + \frac{\beta}{a\alpha + b} = ?$
- (A) $2/a$ (B) $2/b$
 (C) $2/c$ (D) $-2/a$

37. If each side of triangle ABC is of length 4 and if AD is 1 cm and $ED \perp AB$. What is area of region BCED :
- (A) $8\sqrt{3}$ cm² (B) $4\sqrt{3}$ cm²
 (C) $4.5\sqrt{3}$ cm² (D) $3.5\sqrt{3}$ cm²



38. Find A, where

$$A = \frac{1}{\sqrt{5}+2} + \frac{1}{\sqrt{6}+\sqrt{5}} + \frac{1}{\sqrt{7}+\sqrt{6}} + \frac{1}{\sqrt{8}+\sqrt{7}} + \frac{1}{\sqrt{9}+\sqrt{8}} + \frac{1}{\sqrt{10}+\sqrt{9}} + \frac{1}{\sqrt{11}+\sqrt{10}} + \frac{1}{\sqrt{12}+\sqrt{11}}$$

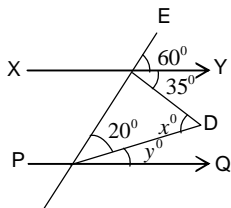
(A) 0 (B) 1
 (C) $2\sqrt{3}$ (D) $2(\sqrt{3}-1)$

39. It is given that $a, b,$ and c are any positive real numbers such that $abc = 1$. What is the value of following $\frac{a}{ab+a+1} + \frac{b}{bc+b+1} + \frac{c}{ca+c+1} = ?$
- (A) -1 (B) 1
 (C) 0 (D) None of these

40. In a garden trees are planted in rows. In each row there are as many trees as the number of rows in the garden. Each tree bears as many fruits as the number of trees in each row. The sum of the total number fruits on the trees is n . Then
 (A) n is a perfect square (B) n is perfect cube
 (C) n is always an even number (D) n is always an odd number
41. In triangle ABC , point E lies on AB and point D lies on AC . Lines BD and CE meet at F . The areas of triangles BEF , CDF and BCF are 5, 8, and 10, respectively. What is the area of quadrilateral $AEFD$?
 (A) 20 (B) 21
 (C) 22 (D) 25
42. Two candles of the same height are lighted at the same time. The first is consumed in 8 hours and the second in 6 hours. Assuming that each candle burns at a constant rate, in how many hours after being lighted, the ratio between the first and second candles becomes 2:1.
 (A) 2 hours 24 minutes (B) 1 hour 12 minutes
 (C) 4 hours (D) 4 hours 48 minutes
43. If $x^3 + \frac{1}{3x^4} = 5$ and $x^4 + \frac{1}{3x^3} = 10$, $x \neq 0$, then find the value of $3x^4 + 3x^3$.
 (A) 144 (B) 36
 (C) 50 (D) 72
44. If $x^2 - 2y = -13$, $y^2 - 4z = 14$, $z^2 + 6x = -15$, then the value of $xy + xz + 2yz$
 (A) -2 (B) -5
 (C) 0 (D) 1
45. Fresh grapes contain 90% water by weight while dried grapes contain 20% water by weight. What is the weight of dry grapes available from 20 kg of fresh grapes?
 (A) 2 kg (B) 2.4 kg
 (C) 2.5 kg (D) none of these
46. P is a point on the graph of $y = 5x + 3$. The coordinates of a point Q are $(3, -2)$. If M is the mid point of PQ , then M must lie on the line represented by
 (A) $y = 5x + 1$ (B) $y = 5x - 7$
 (C) $y = \frac{5}{2}x - \frac{7}{2}$ (D) $y = \frac{5}{2}x + \frac{1}{2}$
47. The centre of the circle passing through the points $(6, -6)$, $(3, -7)$ and $(3, 3)$ is
 (A) $(3, 2)$ (B) $(-3, -2)$
 (C) $(3, -2)$ (D) $(-3, 2)$
48. If α, β are the roots of the equation $2x^2 - 5x + 16 = 0$, then the value of $\left(\frac{\alpha^2}{\beta}\right)^{1/3} + \left(\frac{\beta^2}{\alpha}\right)^{1/3}$ is :
 (A) $\frac{1}{4}$ (B) $\frac{5}{4}$
 (C) $\frac{1}{3}$ (D) $\frac{5}{12}$

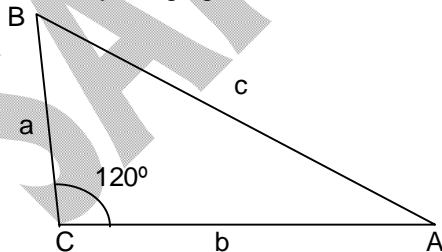
49. The L.C.M. of the polynomials $(x+3)^2(x-2)(x+1)^2$ and $(x+1)^3(x+3)(x^2-4)$ is
 (A) $(x+1)^3(x+3)(x^2-4)$ (B) $(x+3)^2(x+1)^3(x^2-4)$
 (C) $(x+3)^2(x+1)^3(x+2)$ (D) $(x+3)^2(x+1)^2(x-2)$
50. If l , m and n are the zeroes of polynomial $f(x) = 2x^3 + 5x^2 + 6x + 10$, then the value of $\frac{1}{l} + \frac{1}{m} + \frac{1}{n}$ is:
 (A) $-\frac{5}{2}$ (B) $-\frac{3}{5}$
 (C) $-\frac{5}{3}$ (D) $-\frac{2}{5}$

51. In the given diagram $XY \parallel PQ$ find $\angle x^\circ$ and $m\angle y^\circ$



- (A) 75° and 40° (B) 45° and 60°
 (C) 75° and 45° (D) 60° and 45°
52. The ratio of income of two persons is $11 : 7$ and the ratio of their expenditures is $9 : 5$. If each of them manage to save Rs. 400 per month, then the sum of their monthly income is :
 (A) Rs 3600 (B) Rs 3200
 (C) Rs 2800 (D) Rs 1700
53. If $x - \frac{\sqrt{5}}{\sqrt{x}} = 6$, then the value of $x - \sqrt{5x}$ is
 (A) 3 (B) -1
 (C) 1 (D) 53

54. In the adjoining figure,



$\angle BCA = 120^\circ$ and $AB = c$, $BC = a$ and $AC = b$, then :

- (A) $c^2 = a^2 + b^2 + ba$ (B) $c^2 = a^2 + b^2 - ba$
 (C) $c^2 = a^2 + b^2 - 2ba$ (D) $c^2 = a^2 + b^2 + 2ba$

55. If $f(x)$ is a biquadratic polynomial having leading coefficient 5 such that $f(1) = 1$, $f(2) = 16$, $f(-2) = 16$ and $f(3) = 81$ the $f(-3) =$
(A) 201 (B) 681
(C) 81 (D) 561
56. If $a^3 - 3a + 4 = 0$, Then $\sqrt[3]{a + (2 - \sqrt{3})^{1/3}} + (2 + \sqrt{3})^{1/3}$
(A) 1 (B) 2
(C) 3 (D) 0
57. Angle between the internal bisector of one base angle and the external bisector of the other base angle of a triangle is equal to $\frac{2}{k}$ of the vertical angle. What is the value of k ?
(A) 2 (B) 4
(C) 6 (D) 8
58. Abscissa of orthocenter of $\triangle ABC$ formed by vertices $A(1, 6)$, $B(5, 2)$ and $C(12, 9)$ is
(A) 2 (B) 4
(C) 6 (D) 5
59. The vertices of a triangle are $(1, 2)$, $(h, -3)$ and $(-4, k)$. Find the value of $\frac{\sqrt{(h+k)^2 + (h+3k)^2}}{4}$, if the centroid of the triangle is at the point $(5, -1)$.
(A) 2 (B) 5
(C) 6 (D) 8
60. LCM of $\frac{4}{5}$ and $\frac{5}{9}$ is
(A) $\frac{4}{9}$ (B) $\frac{2}{3}$
(C) 20 (D) $\frac{1}{45}$

FIITJEE

Diagnostic cum Scholarship Tests SAMPLE PAPER For Students of Class X

Paper 2

NTSE Science & Mathematics

Paper Code: 910-2

ANSWER KEY

1.	A	2.	D	3.	B	4.	A
5.	B	6.	C	7.	A	8.	B
9.	A	10.	C	11.	D	12.	A
13.	D	14.	C	15.	B	16.	D
17.	A	18.	D	19.	D	20.	C
21.	B	22.	D	23.	D	24.	D
25.	B	26.	B	27.	B	28.	B
29.	B	30.	C	31.	A	32.	C
33.	A	34.	B	35.	A	36.	D
37.	D	38.	D	39.	B	40.	B
41.	C	42.	D	43.	D	44.	B
45.	C	46.	B	47.	C	48.	B
49.	B	50.	B	51.	C	52.	A
53.	C	54.	A	55.	D	56.	D
57.	B	58.	D	59.	B	60.	C