NTSE STAGE-I (2013)

CLASS-X [SAT]

HINTS & SOLUTIONS

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	3	4	1	1	4	1, 3	4	3	1	3	1	3	3	1	2
Ques.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	3	1	4	1	2	2	3	1	2	4	4	1	2	1	2
Ques.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans	4	3	2	4	4	2	1	4	3	3	2	1	3, 4	4	1
Ques.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	4	1	2	4	4	3	1	3	2	1	1	2	3	4	2
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans	3	4	2	1	1	1	2	1	4	1	2	1	2	3	4
Ques.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans	2	4	1	4	1	1	4	4	2	3	3	2	1	3	1

PHYSICS

9. $R = \frac{V^2}{P} = \frac{(60)^2}{220}$

$= 806.66\ \Omega$

$I = \frac{P}{V}$

$= \frac{60}{220}$

$= 0.27$

CHEMISTRY

16. Isotopes have same atomic number, but diffferent mass number. They have different number of neutrons.

17. $2\,Cu + O_2 \xrightarrow{\Delta} 2CuO$

(x) Brown & Bright (y) Black

$CuO + H_2 \longrightarrow Cu + H_2O$

21. Atomic number of argon is 18. Hence electronic configuration

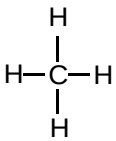
Ar = 2, 8, 8

22. Element aluminium has atomic number 13. Electronic configuration is 2, 8, 3

Valency = 3

$2Al + 3Cl_2 \longrightarrow 2\,AlCl_3$

23. Structure of methane



It has 4 covalent bonds.

MATHEMATICS

36. $y = x^2 - 3x - 4$

$x^2 - 3x = y + 4$

$\left(x - \frac{3}{2}\right)^2 = y + 4 + \frac{9}{4}$

$\left(x - \frac{3}{2}\right)^2 = y + \frac{25}{4}$

Graph of equation will be parabola.

37. $2x + 3y = 7$
$(a - b)x + (a + b)y = 3a + b - 2$
For infinite solution

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{2}{a-b} = \frac{3}{a+b} = \frac{7}{3a+b-2}$$

$\Rightarrow \quad \frac{2}{a-b} = \frac{3}{a+b}$
$\Rightarrow \quad 2a + 2b = 3a - 3b$
$\Rightarrow \quad a = 5b$

$$\frac{3}{a+b} = \frac{7}{3a+b-2}$$

$\Rightarrow \quad 9a + 3b - 6 = 7a + 7b$
$\Rightarrow \quad 2a - 4b = 6$
$\Rightarrow \quad 2(5b) - 4b = 6 \qquad [\because a = 5b]$
$\Rightarrow \quad 10b - 4b = 6$
$\Rightarrow \quad 6b = 6 \Rightarrow b = 1$
$\Rightarrow \quad a = 5$

38. Roots will be $\frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$.

39. $a_3 + a_7 = 6$
$\Rightarrow \quad a + 2d + a + 6d = 6$
$\Rightarrow \quad 2a + 8d = 6$
$\Rightarrow \quad a + 4d = 3$
$\Rightarrow \quad a = 3 - 4d$
$(a_3)(a_7) = 8$
$\Rightarrow \quad (a + 2d)(a + 6d) = 8$
$\Rightarrow \quad [3 - 4d + 2d][3 - 4d + 6d] = 8$
$\Rightarrow \quad (3 - 2d)(3 + 2d) = 8$
$\Rightarrow \quad 9 - 4d^2 = 8$
$\Rightarrow \quad 4d^2 = 1$

$\Rightarrow \quad d^2 = \frac{1}{4}$

$\Rightarrow \quad d = \pm \frac{1}{2}$.

40. $\frac{OA}{OC} = \frac{OB}{OD} \Rightarrow \frac{2}{5} = \frac{x-2}{2x+5}$
$\Rightarrow 4x + 10 = 5x - 10$
$\Rightarrow x = 20$

41. (x, 0), (0, y) and (1, 1) are collinear
Then, area of $\Delta ABC = 0$

$\frac{1}{2}[x(y - 1) + 0 + 1(0 - y)] = 0$

$xy - x - y = 0$
$x + y = xy$

42. $\sin(A + B) = \frac{\sqrt{3}}{2}$

$\sin(A + B) = \sin 60°$
$A + B = 60° \qquad \ldots. (1)$

$\cos(A - B) = \frac{\sqrt{3}}{2}$

$\cos(A - B) = \cos 30°$
$A - B = 30° \qquad \ldots (2)$
solving (1) & (2)
$A = 45°, B = 15°$

43. Length of shadow decreases and will be zero.

44. Perimeter of square = Perimeter of circle
$4a = 2\pi r$

$r = \frac{4a}{2\pi}$

Given : $a^2 = 121$
$a = 11$

$\therefore r = \frac{4 \times 11}{2 \times 22} \times 7$

$r = 7$ m
Area of circle $= \pi r^2 = 49\ \pi m^2$

45. Volume of frustum $= \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

$= \frac{1}{3} \times \frac{22}{7} \times 14\ (2^2 + 1^2 + 2)$

$= \frac{1}{3} \times 22 \times 2 \times 7$

$= \frac{308}{3} = 102\ \frac{2}{3}\ cm^3$

46. Median = 525, Mode = 500
Mode = 3 median – 2mean
$500 = 3(525) - 2\text{mean}$
$2\ \text{mean} = 1575 - 500$

$\text{mean} = \frac{1075}{2} = 537.5$

47. The author of the book "The book on games of chance is given by J. Cardon

48. $\frac{5}{\sqrt{3}-\sqrt{5}}$

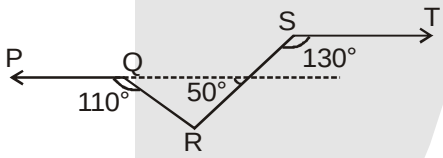
$= \frac{5}{\sqrt{3}-\sqrt{5}} \times \frac{\sqrt{3}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

$= \frac{5(\sqrt{3}+\sqrt{5})}{3-5} = -\frac{5}{2}(\sqrt{3} + \sqrt{5})$

49. $\frac{2^{100}}{2}$ **$= 2^{100-1} = 2^{99}$**

50. 1 line

51.



$\angle QRS = 110° - (50°) = 60°$

52. Rectangle.

53. Diameter

54. $S = \frac{24+40+32}{2} = \frac{96}{2} = 48$ m

Area $= \sqrt{S(S-a)(S-b)(S-c)}$

$= \sqrt{48\times(48-24)(48-40)(48-32)}$

$= \sqrt{48\times24\times8\times16}$

$= \sqrt{24\times2\times24\times8\times16}$

$= 24 \times 16 = 384$ m^2

55. $2\pi rh = 4.4$

$2 \times \frac{22}{7} \times 0.7\ h = 4.4$

$h = 1$ m.