NTSE STAGE-II (2014)
CLASS-X [SAT]

HINTS & SOLUTIONS

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	4	2	3	1	4	2	3	2	4	3	4	4	1	2	3
Ques.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	2	2	3	4	2	4	4	4	3	4	2	2	2	4	4
Ques.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans	4	1	3	1	1	1	2	3	4	1	1	4	4	3	3
Ques.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	2	2	4	3	3	2	3	1	3	3	4	3	1	3	1
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans	3	1	4	3	4	2	4	2	3	2	1	2	3	2	4
Ques.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans	3	2	4	1	3	1	2	3	3	4	3	2	1	3	4
Ques.	91	92	93	94	95	96	97	98	99	100					
Ans	1	2	2	4	3	3	3	1	3	4					

CHEMISTRY

15. 15. Noise, vaccume and light flash not example of matter.

16. X — 100 ML → water 20ºC; 0ºC → 100 g ← water; cooling

Y — 100 ml → water; 100 g ice ← 0ºC; ↓ more

y is colder than x

17. At 313 k it from saturated solution. therefore all 50 gm. will be dissolve.
when temperature down to 283 K (62 – 21 = 41 gm.)
will be crystall cut.

18. A = Al; z = 13; valency = 3

B; z = 8; valency = 2

$= Al_2O_3$

formula mass = 27 × 2 + 16 × 3
= 102

19. $C_{(g)} + O_2 \longrightarrow CO_{2\,(g)}$

mole of = $\frac{3}{12}$ mole of $O_2 = \frac{32}{32}$

$= \frac{1}{4}$ = 1

→ LR

∵ 12 gm C give CO_2 = 44 gm

∴ 3 gm C give $CO_2 = \frac{44}{12} \times \frac{3}{1}$

= 11 gm

20. X → K, L, M ∵ M shell is the valency shell
2,8,7 therefore valency = 7
X = Cl

21. $O_2 + H_2 \rightarrow H_2O_{(g)}$
O.S. of O_2 become ⟶ zero to – 2
∵ it will be reduced
and Oxidation state of H_2 becomes zero to + 1
it will be oxidised
∵ therefore reaction will be redox

22. $NH_4OH + CH_3COOH \rightarrow CH_3COONH_4 + H_2O$
base acid salt
(neutralisation reaction)

$2AgCl \xrightarrow{h\nu} 2Ag + Br_2$ (Photo chemical decom-position)

$ZnCO_3 \xrightarrow{\Delta} ZNO + CO_2$ (thermla decompostion)
$2Al + Fe_2O_3 \rightarrow Al_2O_3 + 2Fe$ (Thermite reaction)

23. Order of acidic strength

H_2SO_4 > HCl > NH_4OH > NaOH

Strongest **strong** **Weak** base **strong**

base

acid acid

24. Na, K, Ca, Mg

(i) ∵ these matals can lose e^- easily as compared to C therefore these are better reducing agent as compare to C.

(ii) due to strong electropositive behaviour of these metals having strong tendency to react with oxygen.

25. Molecular formula $\rightarrow C_6H_{12}$

cyclohexane

26. M.F. C_4H_8O

$CH_3-CH_2-CH_2-\overset{\overset{\large O}{\|}}{C}-H$

an aldehyde

$CH_3-\overset{\overset{\large O}{\|}}{C}-CH_2-CH_3$

a ketone

27. (a) Atomic no 18

it will be Ar → inert gas

valency = zero

(c) 9, 17, 35, all are belong same group that is

17 and have same valency.

(d) atomic no. 17 is Cl

atomic no. 16 is S

atomic no. 35 is Br

∵ Cl is more electronegative

PHYSICS

28. Body moving with constant speed can have acceleration only if it moves along a curved path.

29. m = 20 Kg, u = 2 m/s, v = 0, S = 5 m

$v^2 = u^2 - 2aS$

0 = 4 - 2a x 5

a = 0.4 m/s^2

F = ma = 20 x 0.4 = 8 N

30. **F** = $\dfrac{G(m)(4m)}{(100\times10^3)^2}$

for smaller mass

$m(1) = \dfrac{G(m)(4m)}{(10^{10})}$

$Gm = \dfrac{10^{10}}{4}$

for bigger mass

$(4\text{ m})\,(a) = \dfrac{G(m)(4m)}{(25\times10^3)^2}$

$a = \dfrac{Gm}{625\times10^{10}}$

$a = \dfrac{10^{10}}{4\times625\times10^6}$

$a = \dfrac{10^4}{2500}$

a = 4 m/s^2

31. Buoyant force

B = 0.02

$\rho_\ell\, g\, v' = 0.02$

$100 \times 10 \times V' = 0.02$

$V' = 0.02 \times 10^{-4}\ m^3$

= 2 cm^3

32. Given :F = 10 N, m = 1 kg, t = 2s, u = 0

W = ?

s = 0 + 1/2 (10/1) $(2)^2$ = 20 m

W = 10×20 = 200 J

33. Stethoscope is based on multiple reflection of sound.

34. $\dfrac{\sin i}{\sin r} = \dfrac{v_1}{v_2} = n_{21}$

35. $f_1 = 0.5$ m, $P_1 = \dfrac{1}{0.5} = 2$ D

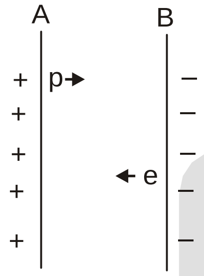
$P_1 + P_2 = 1.5$

$2 + P_2 = 1.5$

$P_2 = -0.5$ D

$\therefore f_2 = \dfrac{1}{-0.5} = -2$ m

36. Myopia, means person can see nearby objects.

37. 

W = ΔKE

5(q) = 1/2 mv^2

$v^2 = \frac{10q}{m}$

$m_p > m_e$

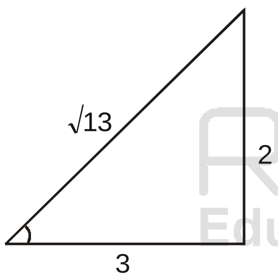
$\therefore v_e > v_p$

38. Magnetic filed line are continuous lines passing inside and outside the magnet, only one field line passes through a point

39. DC generator has split ring (commutator), whereas AC generator does not.

40. Energy of star is due to Nuclear Fusion.

MATHEMATICS

41. 

$$\left(\frac{1+\frac{2}{3}}{\frac{2}{\sqrt{13}}+\frac{3}{\sqrt{13}}}\right)\left(\frac{1-\frac{3}{2}}{\frac{\sqrt{13}}{3}+\frac{\sqrt{13}}{2}}\right)$$

$$= \left(\frac{\frac{5}{3}}{\frac{5}{\sqrt{13}}}\right)\left(\frac{\frac{-1}{2}}{\frac{5\sqrt{13}}{6}}\right)$$

$$= \frac{\sqrt{13}}{3} \times \left(\frac{-1}{2}\right) \times \frac{6}{5\sqrt{13}}$$

$$= -\frac{1}{5}$$

42. $\frac{1}{\sqrt{6}-\sqrt{5}} - \frac{3}{\sqrt{5}-\sqrt{2}} - \frac{4}{\sqrt{6}+\sqrt{2}}$

$\Rightarrow \sqrt{6} + \sqrt{5} - \sqrt{5} - \sqrt{2} - \sqrt{6} + \sqrt{2}$

$\Rightarrow 0$

43. $p(x) = 3x^2 - 5x + 2$

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

$= 3[x^2 - \frac{5}{3}x + \left(\frac{5}{6}\right)^2 - \left(\frac{5}{6}\right)^2 + \frac{2}{3}]$

$= 3\left[\left(x-\frac{5}{6}\right)^2 - \frac{25}{36} + \frac{2}{3}\right]$

$= 3\left[\left(x-\frac{5}{6}\right)^2 + \frac{-25+24}{36}\right]$

$= 3\left[\left(x-\frac{5}{6}\right)^2 - \frac{1}{36}\right]$

$= 3\left(x-\frac{5}{6}\right)^2 - \frac{1}{12}$

so minimum value is $-\frac{1}{12}$

44. Let |x| = y

$y^2 + y - 6 = 0$

(y + 3) (y – 2) = 0

y = – 3 or y = 2

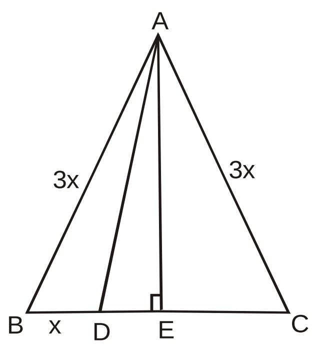
|x| = – 3 which is not possible

|x| = 2

∴ x = ± 2

The product of the roots is –4

45. 3x =12 , x = 4



AE = $\frac{\sqrt{3}}{2}$ (3x)

DE = AE – AD

$= \frac{3x}{2} - x$

$= \frac{x}{2}$

$AD = \sqrt{AE^2 + DE^2}$

$= \sqrt{\frac{27}{4}x^2 + \frac{x^2}{4}}$

$= \sqrt{\frac{28x^2}{4}} = \sqrt{7x^2} = \sqrt{7}\,x = 4\sqrt{7}$

46. $\left(\frac{BX}{AB}\right)^2 = \frac{1}{2}$

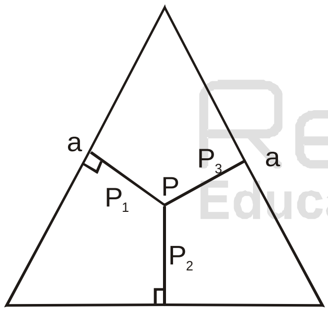
$\frac{BX}{AB} = \frac{1}{\sqrt{2}}$

$1 - \frac{BX}{AB} = 1 - \frac{1}{\sqrt{2}}$

$\frac{AB - BX}{AB} = \frac{\sqrt{2}-1}{\sqrt{2}}$

$\frac{AX}{AB} = \frac{2-\sqrt{2}}{2}$

47.

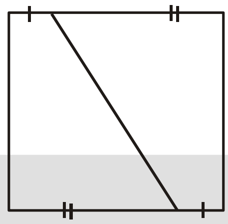


area equilateral D $= \frac{\sqrt{3}}{4}a^2 = \frac{1}{2}a\,(P_1 + P_2 + P_3)$

$\frac{\sqrt{3}}{4}a^2 \times \frac{2}{a} = P_1 + P_2 + P_3$

$\frac{\sqrt{3}a}{2} = P_1 + P_2 + P_3$

48.



infinite tripazium can be made

49.

1 + 1 + 1 + 1 + 1 + 1	1 way
2 +1 + 1 + 1 + 1	5 way
3 + 1 + 1 + 1	4 way
4 + 1 + 1	3 way
5 + 1	2 way
2 + 3 + 1	6 way
2 + 4	2 way
3 + 3	1 way
2 + 2 + 2	1 way
2 + 2 + 1 + 1	6 way

50. $n^2 - 3n + 3 = m^2$ ....(1)

$n^2 - 3n + 3 - m^2 = 0$

this eq. have integer roots. if a = 1, b,c $\in I$

D is perfect sq.

$\therefore\ 9 - 4.1\,.\,(3 - m^2) = k^2$

$4m^2 - k^2 = 3$

$(2m + k)(2m - k) = 3 \times 1$

$2m + k = 3$

$2m - k = 1$

on solving we get m = 1

Put m = 1 in equ.(1)

$n^2 - 3n + 3 = 1$

$(n - 2) \times (n - 1) = 0$

n = 2,1

so two values of n are possible

51. $N_1 = 15x$

$N_2 = 15y$ x and y are coprime

$LCM \times HCF = N_1 \times N_2$

$225 \times 15 = 15x\ 15y$

xy = 15

3.5 = 15

1.15 = 15

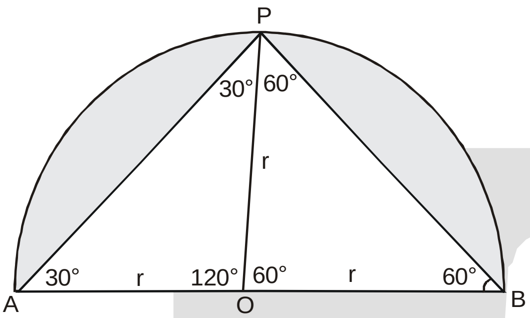
So, $N_1 = 3 \times 15 = 45$ or $N_1 = 1 \times 15 = 15$

$N_2 = 5 \times 15 = 75$ $N_2 = 15 \times 15 = 225$

(45, 75) , (15, 225)

two such pair exist

52.



Let radius = r
area of sector APO

$= \frac{120}{360} \times \pi pr^2 = \frac{1}{3}\pi r^2$

area of sector PBO = $\frac{60}{360} \times \pi r^2$

$= \frac{1}{6}\pi r^2$

Now area of ΔAOP = $\frac{1}{2} \times \frac{\sqrt{3}r}{2} \times \frac{r}{2}$

$= \frac{\sqrt{3}r^2}{4}$

Now area of DBOP = $\frac{\sqrt{3}}{4} r^2$

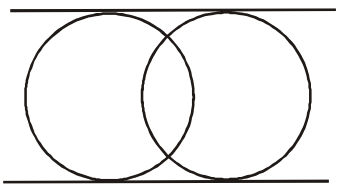
area of major shaded area : Area of minor shaded area

$= \left(\frac{1}{3}\pi r^2 - \frac{\sqrt{3}}{4} r^2\right) : \left(\frac{1}{6}\pi r^2 - \frac{\sqrt{3}}{4} r^2\right)$

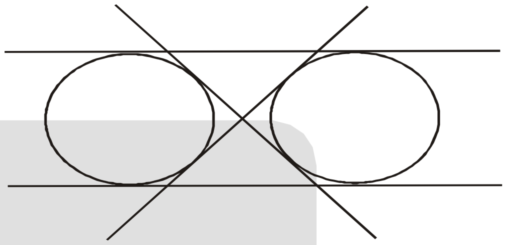
$= \frac{4\pi - 3\sqrt{3}}{2\pi - 3\sqrt{3}}$

54. $x^2 + y^2 = 250$
$a^2 + b^2 + c^2 = 250$
$\therefore$ x = 13
y = 9
a = 5
b = 12
c = 9

57. (1)



(2)



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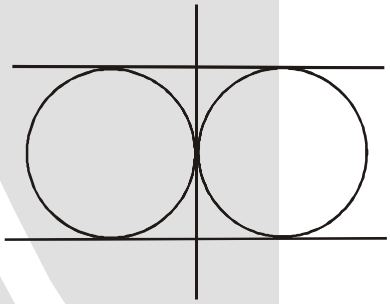
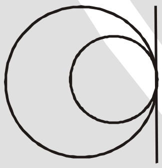
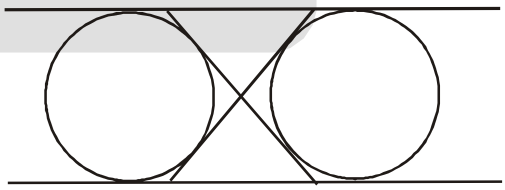




(4)



58. $s = \frac{20 + 21 + 29}{2} = 35$

$\Delta = \sqrt{35 \times 15 \times 14 \times 6}$

$= \sqrt{5 \times 7 \times 3 \times 5 \times 7 \times 2 \times 2 \times 3}$

$= 5 \times 7 \times 3 \times 2$

= 210

$210 = \frac{1}{2} A_1 20$ $210 = \frac{1}{2} A_2 29$

$A_1 = 21$ $A_2 = \frac{420}{29}$

$210 = \frac{1}{2} A_3 \times 21$

$A_3 = 20$

$A_1 + A_2 + A_3 = 21 + 20 + \frac{420}{29}$

$= 41 + \frac{420}{29}$

$$= \frac{1189 + 420}{29} = \frac{1609}{29}$$

59. Let 4^{th} term $= x + 3d = a$ ..(1)

7^{th} term $= x + 6d = b$ ..(2)

10^{th} term $= x + 9d = c$

on solving (1) & (2) we get

$x = 2a - b$

$$\& \ d = \frac{a - (2a - b)}{3}$$

10^{th} term $= x + 9d = C$

$$2a - b + 9\left(\frac{a - (2a - b)}{3}\right) = C$$

$= 2a - b + 3a - 6a + 3b = C$

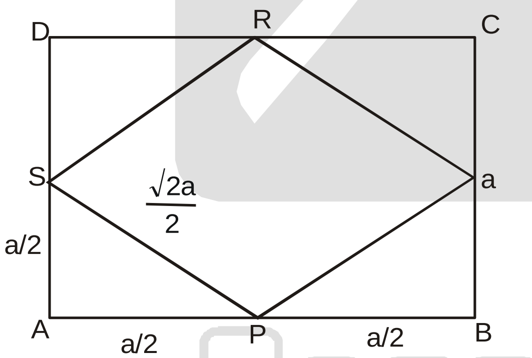
$-a + 2b = C$

$2b = a + c$

sum of roots of equation $ax^2 - 2bx + c = 0$

$$\text{sum of roots} = \frac{2b}{a} = \frac{a + c}{a}$$

60.



$$\frac{\text{area of square PQRS}}{\text{area of square PABCD}} = \frac{\frac{a^2}{2}}{a^2} = \frac{1}{2}$$