

**NTSE-2016 (Stage-I)
SOLUTIONS****SAT**

Time allowed : One & half hours (90 Minutes)

Maximum Marks : 90

1. (4)

Sol. Average speed = $\frac{\text{Total Distance}}{\text{Total Time}} = \frac{80}{\frac{40}{80} + \frac{40}{40}} = \frac{80}{\frac{3}{2}} = \frac{160}{3} = 53 \text{ Km/Hr.}$

2. (2)

3. (3)

Sol. Work done = Change in kinetic energy

$$= \frac{1}{2} \times 5(10^2 - 6^2) = \frac{1}{2} \times 5 \times 64 = 160 \text{ J}$$

4. (4)

5. (3)

6. (2)

Sol. Distance between compression and rarefaction is $\frac{\lambda}{2} = \frac{3}{2} = 1.5 \text{ M.}$

7. (2)

Sol. $R = \frac{\rho l}{A}$ and resistance for conductor is proportional to temperature thus for minimum resistance wire is thick, short and cool.

8. (1)

Sol. In series potential difference divide equally thus potential difference is 5 volt.

9. (1)

Sol. Magnetic lines of force are closed loop.

10. (3)

Sol. When light enters from X to Y as shown in figure bent towards the normal thus both speed and wave length decreases.

11. (1)

12. (4)

13. (3)

Sol. Milk of magnesia is a "sol" with solid dispersed phase in liquid dispersion medium

14. (1)

Sol. Mass of Al_2O_3 is 0.051 grams

$$\text{Moles of Al ions} = 2 \times \frac{0.051}{102} = 0.001 \text{ moles}$$

15. (2)

Sol. Electronic configuration of Cl is 2,8,7, hence 7 valence electrons

16. (3)
Sol. Isotopes of an element have same number of protons but different mass numbers, hence different number of neutrons
17. (3)
Sol. C_3H_6 is propene ($CH_3-CH=CH_2$) which is unsaturated hydrocarbon and hence can show Addition reactions.
18. (3)
Sol. On going from left to right across the period, the tendency to loose the outermost electrons decreases due to increase in effective nuclear charge.
19. (1)
Sol.
$$\begin{array}{c} \text{H} \quad \text{O} \\ | \quad || \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ | \\ \text{H} \end{array}$$
 acetic acid has 8 covalent bonds.
20. (1)
Sol. $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$ high melting point ionic solid.
 $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$ solution.
21. (4)
Sol. Metals in the middle of the activity series can be easily extracted from their oxides.
22. (4)
Sol. Pb is higher than Cu in activity series, so in the given reaction it is displacing copper from its solution so it is displacement reaction.
23. (3)
Sol. ${}_{11}^{23}\text{Na} + {}_2^4\text{He} \rightarrow {}_{13}^{27}\text{Al}$
24. (3)
25. (1)
26. (4)
27. (1)
28. (1)
29. (2)
30. (4)
31. (1)
32. (3)
33. (3)
34. (2)
35. (1)
36. (2)
Sol. $1^2 + 2^2 + 3^2 + \dots + 12^2 = 650$
multiply both side by 2^2
we have
 $2^2 + 4^2 + 6^2 + \dots + 24^2 = 2600$
37. (3)

Sol. $y = x^{(a+b)^2}$ so $\sqrt{y} = x^{(a+b)^2/2}$

38. (1)

Sol. as $(x + 2)$ is factor so $x = -2$ in given equation $2(-2)^3 - 5(-2) + k = 0$.
 $k = 6$

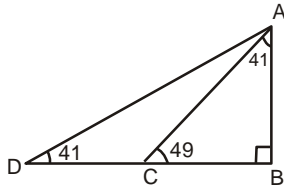
39. (3)

Sol. For No-solution we have $\frac{3}{P} = \frac{P}{3} \neq \frac{7}{15}$

$9 = P^2$
 $\pm 3 = P$

40. (2)

Sol.



Let $AB = x$
 $BC = 36$ (given)
 $BD = 49$

In $\triangle ABC$ $\tan 41 = \frac{36}{x}$ so, $(36)(49) = x^2$

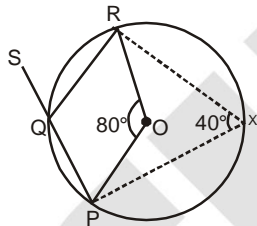
In $\triangle ABD$ $\tan 41 = \frac{x}{49}$ $42 = x$

41. (3)

Sol. $\angle B = 180^\circ - a$, $\angle D = 180^\circ - b$
 $\angle A + \angle B + \angle C + \angle D = 360^\circ$
 $x + y + 180^\circ - a + 180^\circ - b = 360^\circ$
 $x + y = a + b$.

42. (2)

Sol.



The $\angle PXR = 40^\circ$
 $\angle PQR = 180^\circ - 40^\circ = 140^\circ$
 So $\angle RQS = 40^\circ$

43. (3)

Sol. Area depends on sides as suppose length is a, b, c and if length is double then side is $2a, 2b, 2c$ then area of will be four times the previous area. So ratio is $1 : 4$

44. (4)

Sol. $x - y = 5$
 $x^2 - y^2 = 30$
 so $(x + y) = 6$

45. (1)

Sol. For real & distinct roots $D > 0$
 $4 - 4(-2)(a) > 0$
 $4 + 8a > 0$

$$a > -\frac{1}{2}$$

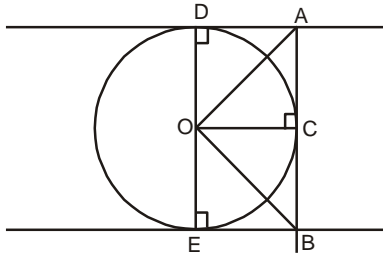
46. (3)

Sol. If $a + b + c = 0$ then $a^3 + b^3 + c^3 = 3abc$
 $a + b = -c$ $a + c = -b$ $b + c = -a$

$$\frac{(-c)^2}{ab} + \frac{(-a)^2}{bc} + \frac{(-b)^2}{ac} = \frac{c^3 + a^3 + b^3}{abc} = 3$$

47. (2)

Sol.



So $\angle AOB = 90$ as $ADOC$ & $BEOC$ is square.

48. (1)

Sol.
$$\frac{\cos^2 \theta}{\cos - \sin} - \frac{\sin^2}{\cos - \sin} = \cos \theta + \sin \theta$$

49. (2)

Sol. In red card total ace = 2

$$\text{so } = \frac{2}{52} = \frac{1}{26}$$

50. (4)

Sol. $\tan 20 \tan 50 \tan 40 \tan 70$
 as $\tan 20 = \cot 70$
 $\tan 40 = \cot 50$
 so answer is 1

51. (3)

Sol. $T_n + T_{n-1} = 60$
 $a + (n-1)d + a + (n-2)d = 60$
 as $a = 11$ $d = 2$
 $22 + 2(2n-3) = 60$
 $2n - 3 = 19$
 $n = 11$

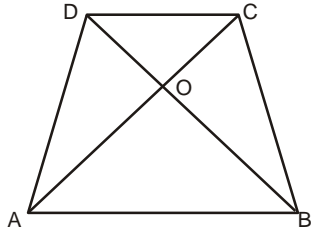
52. (3)

Sol. Let radius is r
 then $2\pi r - 2r = 60$
 $r = \frac{30}{15} \times 7 = 14$
 so area = $\pi r^2 = 196\pi$

53. (2)

Sol. $lb = a^2$
 $bh = b^2$
 $lh = c^2$
 $l^2 b^2 h^2 = (abc)^2$
 $l b h = abc$ so volume is (abc)

54. (4)



abcd is trapezium doc is = BOA

$$\text{so area of } \frac{AOB}{COD} = \frac{AB^2}{DC^2} = \frac{3^2}{2^2} = \frac{9}{4}$$

55. (2)

Sol. $\frac{5+9+x+7+4+y}{6} = 7$

$$x + y = 42 - 25$$

$$x + y = 17$$

56. (1)

57. (2)

58. (2)

59. (3)

60. (1)

61. (2)

62. (3)

63. (2)

64. (1)

65. (2)

66. (1)

67. (2)

68. (1)

69. (2)

70. (2)

71. (3)

72. (4)

73. (2)

74. (2)

75. (2)

76. (3)

77. (1)

78. (3)
 79. (3)
 80. (4)
 81. (2)
 82. (3)
 83. (2)
 84. (1)
 85. (4)
 86. (2)
 87. (3)
 88. (1)
 89. (4)
 90. (2)
 91. (1)
 Sol.



92. (2)
 Element 'X' has valency 2 in XCl_2 also Mg has valency 2 – so X would belong to the same group of periodic table as Mg.
93. (3)
 Sol. $\frac{8}{32} \times 6.023 \times 10^{23}$
 $= 1.51 \times 10^{23}$ No. of molecules
94. (4)
 95. (2)
 96. (2)
 97. (NA)
 98. (4)
 99. (3)
 100. (2)

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