

MOTION

Nurturing potential through education

NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

CLASS - IX

ANSWER KEY

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

SOLUTIONS

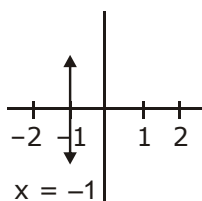
1. $x + y = 9$
 $10x + y + 9 = 10y + x$
 $= 61$

2. $x + w = 180$
 $y = z$
 $x + y = 180 - w + z$

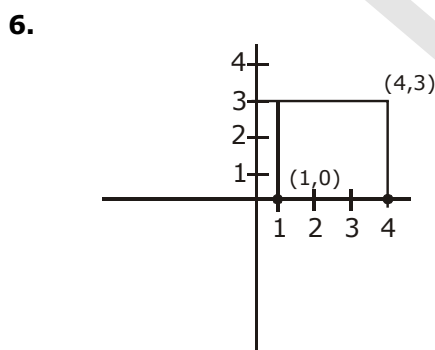
$$\left(x + \frac{1}{x}\right)^2 - 2\left(x + \frac{1}{x}\right)$$

3. $\left(x + \frac{1}{x}\right)\left[\left(x + \frac{1}{x}\right) - 2\right]$

4. $x = -1$
 Parallel to y-axis

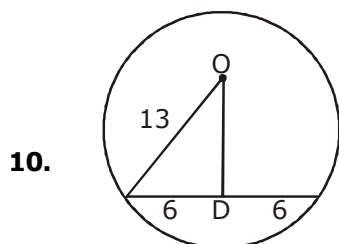


5. $(2^2 + 3^3) - (2^3 + 3^2)$
 $4 + 27 - 8 - 9$
 $= 14$



7. $3 + 6 > x$
 $4, 5, 6, 7, 8$

8. C.S.A. = $2\pi rh$ ($\frac{1}{2}$)
 C.S.A. = $2\pi rh$



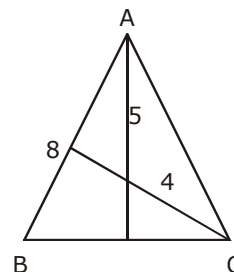
$$OD = \sqrt{169 - 144} = 5$$

11. $\angle B > \angle A$
 $\angle B > \angle C$
 $\angle B > \angle A > \angle C$

14. $\frac{1}{2} \times 8 \times 4 = \frac{1}{2} \times x \times 5$

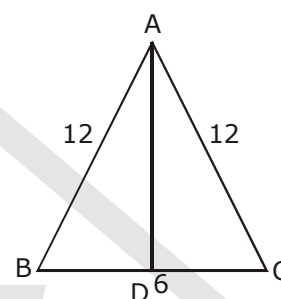
$$16 = \frac{5x}{2}$$

$$x = \frac{32}{5} = 6.4$$



15. $x \text{ kg} \times 50/\text{kg} + 35 \text{ kg} \times 60/\text{kg}$
 $= (x+35) \text{ kg} \times 57/\text{kg}$
 $x = 15 \text{ kg}$

16.



$$AD = \sqrt{144 - 9} = \sqrt{135}$$

$$AD = \frac{1}{2} \times 6 \times \sqrt{135} = 9\sqrt{15}$$

17. 
 $FN + 2FC = MN$

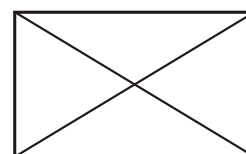
18. Let $a = 4$

$$\frac{4^{1/2} + 4^{-1/2}}{1-4} + \frac{1-4^{-1/2}}{1+\sqrt{4}}$$

$$= \frac{2}{-3} = \frac{2}{1-4}$$

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

20.



21. $3x^2 + 1 + 2x = 2x^2 + 1 + 3x + 6$
 $x^2 - x - 6 = 0$
 $x = 3, x = -2$
 $\angle ABC = 146$

22. $5x + 3x + 7x = 180$

$$x = \frac{180}{15} = 12$$

60, 36, 84

26. (A) Due to the reflection it becomes lossless.

27. (A) $a = 4 \text{ m/s}^2$

$$m^1 = 2m$$

$$m^1 a^1 = ma$$

$$2m \times a = m \times 4$$

$$a = 2 \text{ m/s}^2$$

28. (B) mass = 240 g

$$\text{volume} = 120 \text{ cm}^3 (6 \times 10 \times 2)$$

$$\text{density} = \frac{240}{120} = 2 \text{ g/cm}^3$$

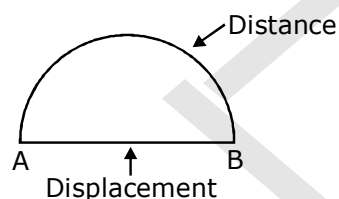
29. (C) $m = 1000 \text{ kg}$

$$V = 54 \text{ km/hr} = 54 \times \frac{5}{18} = 15 \text{ m/sec}$$

$$t = 5 \text{ sec.}$$

$$F = \frac{mv}{t} = \frac{1000 \times 15}{5} = 3000 \text{ N}$$

30. (C) (iii, i, ii)



31. (D)

$$r = 1 \text{ m}$$

half revolution means half cycle.

$$\text{Distance} = \pi r$$

$$= \pi m$$

$$\text{Displacement} = 2r = 2m$$

$$\text{Distance/Displacement} = \pi : 2$$

32. (C) Energy's unit is Joule.

Power's unit is Watt.

33. (B) Force \propto (volume flowing)²

34. (A) Distance = 30 m

$$\text{Speed} = 330 \text{ m/s}$$

$$t = \frac{30}{330} = 0.09 \text{ sec}$$

35. (B) 2min 20 sec = 120 + 20 = 140 sec.

in 120 sec the displacement is zero but in next 20 sec it will complete half revolution so.

$$\text{Displacement} = 2R$$

36. (C) $(\text{K.E.})_1 = \frac{1}{2} m_1 v^2$

$$\frac{1}{2} \times 2 \times v^2 = (\text{K.E.})_1$$

$$V_2 = (\text{K.E.})_1$$

$$(\text{K.E.})_2 = \frac{1}{2} m_2 v^2$$

$$= \frac{1}{2} \times 4 \times v^2$$

$$(\text{K.E.}) = 2v^2$$

$$\frac{(\text{K.E.})_1}{(\text{K.E.})_2} = \frac{v^2}{2v^2} = \frac{1}{2}$$

37. (B) $m = 300 \text{ kg}$

$$\text{Dimension} = 0.5 \times 1 \times 2 \text{ m}^3$$

$$= L \times B \times H$$

$$P = \frac{F}{A} = \frac{mg}{A} = \frac{3000}{1 \times 2} = 1500 \text{ Pa}$$

38. (C) $m = 45 \text{ kg}$

$$\text{height} = 24 \times 15$$

$$= 360 \text{ cm}$$

$$= 3.6 \text{ m}$$

$$t = 30 \text{ sec}$$

$$P = \frac{mgh}{t}$$

$$= \frac{45 \times 10 \times 3.6}{30}$$

$$= 54 \text{ W}$$

39. (B) Distance = 3,80,000 Km

$$\text{time} = 60 \text{ hour} = 2,16,000 \text{ sec}$$

$$\text{Avg Speed} = \frac{3,80,000}{2,16,000}$$

$$= 1.76 \text{ Km/sec}$$

40. (B) $v = 5 \text{ m/sec}$

as balanced forces act, no acceleration will be applied so particle will remain moving with the same speed.

41. (D)

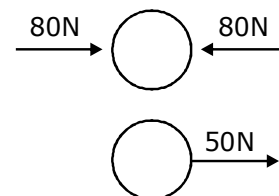
42. (C) mass at earth = $\frac{500}{10} = 50 \text{ kg}$

at moon weight changes

$$\text{So} = 50 \times 1.6 = 80 \text{ N}$$

43. (C) The speed of light is greater than the speed of sound.

44. (D)



45. (B) Density of the liquid = $\frac{180}{200} = 0.9 \text{ g/cm}^3$

as plastic foam and cork was less density than liquid so they will float.

46. (B) $S = 10 \text{ m}$
 $T = 100 \text{ N}$
 $W = FS \cos \theta$
 $= 100 \times 10 \times \cos 45^\circ$
 $= 100 \times 10 \times \frac{1}{\sqrt{2}}$
 $= 707.1 \text{ J}$
47. (C) Audiable range (20 Hz – 20 KHz)
 The piercing hoot of an owl (10 KHz)
48. (C) $h = \frac{1}{2} g T^2$
 $\frac{2h}{g} = T^2$
 $h' = \frac{1}{2} g T_1^2$
 $= \frac{1}{2} g \left(\frac{T}{2}\right)^2$
 $h' = \frac{1}{2} g \frac{T^2}{4}$
 $h' = \frac{1}{8} g T^2$
 $h' = \frac{1}{8} \times g \times \frac{2h}{g}$
 $h' = h/4$
 height from ground = $h - h'$
 $= h - h/4 = \frac{3h}{4}$
49. (D) $m = 3 \text{ kg}$
 $h = 250 \text{ m}$
 $u = 0$
 $v = ?$
 $t = 3 \text{ sec.}$
 $v = u + at$
 $u = 0 + 10 \times 3$
 $v = 29.4 \text{ m/sec}$
 $\text{K.E.} = \frac{1}{2} m v^2$
 $= \frac{1}{2} \times 3 \times 864.36$
 $= 1296.5 \text{ J}$
50. (A) $m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$
 $0.3 \times 4 + 0.2 \times 2 = (0.3 + 0.2)v$
 $1.2 \times 0.4 = (0.5)v$
 $\frac{1.6}{0.5} = v$
 $v = 3.2 \text{ m/s}$
51. (B) \therefore [no. of proton = no. of electron]
 (in neutral atom)
- $$\left[\begin{array}{l} \text{No. of } p^+ = 11 \\ \text{Q- atom} = \text{No. of } n^0 = 12 \\ \text{No. of } e^- = 12 \end{array} \right]$$
52. (C) Given mass of pure water = 72g
 Mass of oxygen contained = ?
 Formula of water = H_2O , molecular mass of $\text{H}_2\text{O} = 18$
 $\text{No. of moles of } \text{H}_2\text{O} = \frac{\text{given mass}}{\text{molecular mass}}$
 $= \frac{72}{18} = 4 \text{ mole}$
 Mass of oxygen in 4 mole of $\text{H}_2\text{O} = 16 \times 4 = 64 \text{ g}$
53. (B) The smell of cooking spreads to all the rooms in a house through **diffusion**.
54. (C) No. of molecules
 (One mole of ethanol & ethane contains 6.022×10^{23} molecules)
55. (D) Sports drink is a mixture of compounds.
56. (D) All the three
57. (B) Proton & electron
58. (A) Boiling point = increase
 Melting point = decrease
59. (B) F^- , Ne , Na^+ (same total no. of electron's)
60. (B) When black powder is heated with yellow powder R, a black solid forms.
61. (A) Cloud, Snow and wind
62. (C) No. of neutrons
63. (A) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 \therefore 56 kg of CaO produced by = 100 kg CaCO_3
 \therefore 1 kg CaO produced by = $\frac{100}{56}$
 \therefore 84 kg CaO produced by mass of CaCO_3
 $\Rightarrow \frac{100}{56} \times 84 = 150 \text{ kg}$
64. (A) Container (A) has the smallest volume of air in it.
65. (B) The properties of sodium chloride are different from those of sodium & chlorine.
66. (C) Sand is made up of silicon and hydrogen.
67. (B) It freezes at 0°C .
68. (C) Colourful.
69. Each $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ will make 1 Cu^{2+} ion, 1 SO_4^{2-} ions & $5\text{H}_2\text{O}$ molecules.
 Therefore each mole of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ will make 1 mole of Cu^{2+} ions, 1 mole of SO_4^{2-} ions & 5 moles of H_2O molecules.
 The total no. of moles of ions will be 2 moles
 The total no. of moles pr. in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} = 7 \text{ moles}$
70. (C) X-Nitrogen gas, Y-Cooking oil