



Monthly Progressive Test

Class: IX

Subject: PCMB (S)

Test Booklet No.: MPT05

Test Date:

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Time: 180 mins

Full Marks: 200

Solutions

Physics

1. Ⓐ

$$u = 10 \text{ ms}^{-1}$$

$$v = 0$$

$$s = 4\text{m}$$

$$v^2 = u^2 - 2as$$

$$m = 1000 \text{ kg}$$

$$\Rightarrow a = \frac{u^2}{2s}$$

$$\therefore F = \frac{mu^2}{2s} = \frac{1000 \times 10 \times 10}{2 \times 4}$$

$$\Rightarrow F = 125000\text{N} = 12.5 \text{ kN}$$

2. Ⓓ

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

$$a = \frac{9-0}{3-0} = 3\text{ms}^{-2}$$

$$F = ma = 1 \times 3 = 3\text{N}$$

3. Ⓓ

$$F = 0$$

$$ma = 0$$

$$m \neq 0; a = 0$$

So body may be at rest or moving with uniform velocity.

4. (B)

5. (D)

$$x = \frac{u^2}{2a} = \frac{mu^2}{2F} = \frac{m^2u^2}{2Fm} = \frac{p^2}{2Fm}$$

$$\therefore \frac{x_1}{x_2} \frac{\frac{1}{2m}}{\frac{1}{2.2m}} = \frac{2}{1} = 2$$

6. (A)

$$u = at$$

$$t = \frac{u}{a} = \frac{mu}{F} = \frac{p}{F}$$

$$\therefore \frac{t_1}{t_2} = \frac{1}{1} = 1$$

7. (B)

$$a = \frac{F}{m}$$

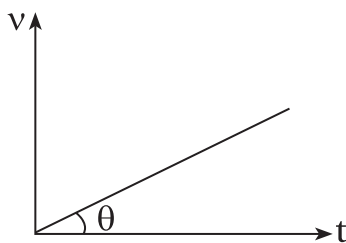
$$\frac{a_1}{a_2} = \frac{\frac{F}{m}}{\frac{F}{2m}} = \frac{2}{1} = 2$$

8. (B)

$$h = \frac{1}{2}gt^2 \quad (\text{as } u=0)$$

$$\Rightarrow t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \times 1}{10}} = \sqrt{\frac{1}{5}} = \sqrt{0.2} \text{ s}$$

9. (A)



$$\theta < 90^\circ$$

$$a > 0$$

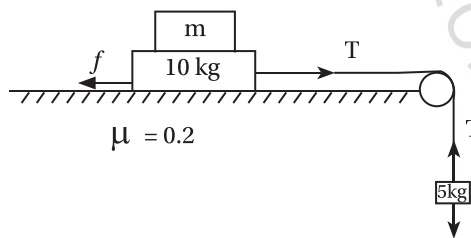
10. (B)

$$\begin{aligned}
 S &= ut + \frac{1}{2}at^2 \\
 &= t\left(u + \frac{1}{2}at\right) \\
 &= t\left(u + \frac{1}{2} \cdot \frac{v-u}{t} \cdot t\right) \\
 &= t\left(u + \frac{v}{2} - \frac{u}{2}\right) \\
 &= t\left(\frac{u}{2} + \frac{v}{2}\right) \\
 &= \frac{(u+v)t}{2}
 \end{aligned}$$

11. (B)

$$S_n = u + \frac{1}{2}a(2n-1)$$

12. (C)



$$T = 5g = 50 \text{ N}$$

$$f = T = 50$$

$$\mu(m+10) \cdot 10 = 50$$

$$0.2(m+10) \cdot 10 = 50$$

$$2m+20 = 50$$

$$2m = 30$$

$$m = 15$$

13. (B)

14. (A)

15. (A)

16. (B)

Initially velocity will decrease but remains positive as it goes up and then it will be zero at the topmost point then falls down with acceleration where velocity increases but remains negative as it comes down.

17. (A)

$$F = ma$$

for $a = \text{constant}$, $F \propto m$

$$\frac{F_1}{f_2} = \frac{m_1}{m_2}$$

$$\frac{F}{F_2} = \frac{2}{4} = \frac{1}{2}$$

$$F_2 = 2F$$

18. (A)

19. (B)

$$a = \frac{F}{m}$$

So, when $F = \text{constant}$

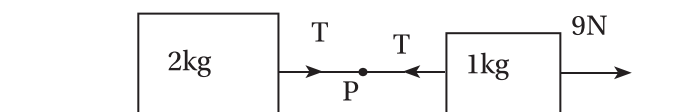
$$a \propto \frac{1}{m}$$

Smaller is the mass, greater is the acceleration to gain greater velocity.

20. (B)

$x = ut + \frac{1}{2}at^2$
 $\Rightarrow x = 6.6 - \frac{1}{2} \cdot 2 \cdot 6^2$
 $\Rightarrow x = 0$

21. (A)



$$a = \frac{9}{2+1} = \frac{9}{3} = 3 \text{ ms}^{-2}$$

22. (B)

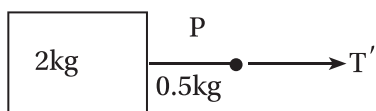
$$T = 2 \times 3 \text{ N} = 6 \text{ N}$$

23. (D)

$$a = \frac{9}{2+1+1} = \frac{9}{4} = 2.25 \text{ ms}^{-2}$$

24. (A)

$$T^1 = (2 + 0.5) 2.25 \text{ N}$$



$$= 2.5 \times 2.25 \text{ N}$$

$$= 5.625 \text{ N}$$

25. (B)

$$a = 3 \text{ ms}^{-2}$$

$$m = 2 \text{ kg}$$

$$t = 2 \text{ s}$$

$$v = at = 3 \times 2 = 6 \text{ ms}^{-1}$$

$$p = m v = 2 \times 6 \text{ kg ms}^{-1}$$

$$p = 12 \text{ kg. m.s}^{-1} = 12 \text{ Ns}$$

Chemistry

26. (A)

Valency of sodium = 1 and charge on sulphate radical = 2

So, Molecular formula of sodium sulphate is Na_2SO_4

27. (C)

Molecular formula $\text{C}_6\text{H}_{12}\text{O}_6$

So, molecular mass = $[(12 \times 6) + (12 \times 1) + (16 \times 6)] = 180$

28. (B)

When two different atoms combine with each other then a heteroatomic molecule is formed

29. (A)

The molecular formula of oxygen molecule is O_2 . Hence the molecular mass

$$= (16 \times 2) = 32 \text{ amu}$$

30. (B)

Carbon disulphide is a highly inflammable compound. Hence, it must be kept away from fire.

31. (B)

Magnet attract solids like iron, cobalt, nickel and thus they are known as magnetic solids. Thus magnetic separation method will be used to separate magnetic and non - magnetic solids when they are in a mixture.

32. (C)

At constant temperature, when helium gas is released then volume is increasing then the gas molecules are moving far away from each other thus inter atomic distance is increasing.

33. (D)

Oil does not mix with water properly and hence it is an example of liquid - liquid heterogeneous mixture. Brass is an alloy of copper and zinc. Alloy is a solution and is an example of solid - solid homogeneous mixture. Nitric acid can mix with water properly and thus a liquid - liquid homogeneous mixture is formed.

34. (B)

Formula of Nitrate radical is NO_3^- $X = 3$

Formula of Nitrite radical is NO_2^- $Y = 2$

So, $[(X + Y) - 2] = 3$

Compound	Charge on cation
Magnesium sulphate	+2
Ferric oxide	+3
Ferrous sulphide	+2
Calcium carbonate	+2

35. (A)

At the time of evaporation, the liquid absorbs heat from surrounding and thus surroundings become cooler.

36. (D)

Both oxygen and zinc have valencies 2 and hence the formula of zinc oxide is ZnO .

37. ©

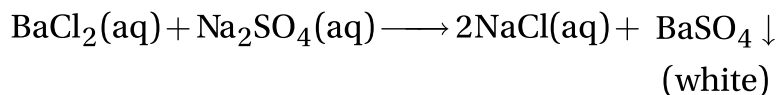
Pure components mix with each other to form an impure mixture.

38. Ⓓ

As the reaction is going on in closed container so, neither the product is moving out nor the reactant is moving inside. Hence, final mass and initial masses are equal.

39. Ⓓ

The balanced equation is



Thus, mass of reactants decrease and mass of products increase

40. Ⓓ

Compound	Molecular formula
Silver (I) carbonate	Ag_2CO_3
Sodium oxide	Na_2O
Magnesium bicarbonate	$\text{Mg}(\text{HCO}_3)_2$
Zinc nitride	Zn_3N_2

41. ©

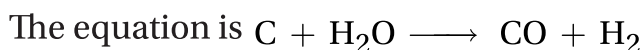
Formula of Nitrite radical is NO_2^- . So, for the compound $\text{M}(\text{NO}_2)_2$ the valency of the metal is 2. Now, the formula of dihydrogen phosphate ion is H_2PO_4^- . Hence the molecular formula of dihydrogen phosphate of the metal is $\text{M}(\text{H}_2\text{PO}_4)_2$.

42. Ⓑ

Boiling is a process where liquid turns into vapour when it is heated. Now, liquid to vapour conversion occurs at a particular temperature, known as boiling point and it occurs at atmospheric pressure.

43. Ⓓ

Steam and red hot coke reacts with each other to form carbon monoxide and hydrogen gas.



When HNO_3 is kept on standing then yellow - brown colour appears due to formation of nitrogen dioxide gas and it is an example of chemical change.

When P_2O_5 absorbs water then phosphoric acid is formed $P_2O_5 + 3H_2O \longrightarrow 2H_3PO_4$

When $CaCl_2$ absorbs water then it gets dissolved and chemical properties of the compound remain same. Hence it is an example of physical change.

44. Ⓑ

Fractional distillation is used to separate the components of solution which are miscible and the difference between their boiling point value $25^\circ C$. Kerosene oil and water do not mix with each other properly hence they cannot be separated by this method.

45. Ⓓ

Ammonium chloride (NH_4Cl) is a white solid and it is highly soluble in water. On heating it directly turns into vapour (sublimes) without stopping in the liquid state.

46. Ⓒ

Oxygen is highly reactive element and it can react with maximum elements and hence it is used to calculate the atomic weight values of other elements.

47. Ⓑ

Calcium carbonate $CaCO_3$, Zinc carbonate $ZnCO_3$, Magnesium carbonate $MgCO_3$. So, atomicity is 5 for all of them.

48. Ⓓ

Aluminium bicarbonate is $Al(HCO_3)_3$ and atomicity = $16 = X$

Aluminium sulphate is $Al_2(SO_4)_3$ and atomicity = $17 = Y$

Calcium phosphate is $Ca_3(PO_4)_2$ and atomicity = $13 = Z$

So, $Y > X > Z$

$$\frac{X+Y}{2} = \frac{33}{2} = 16.5 > Z$$

$$\frac{Z+Y}{2} = \frac{30}{2} = 15 < X$$

49. Ⓑ

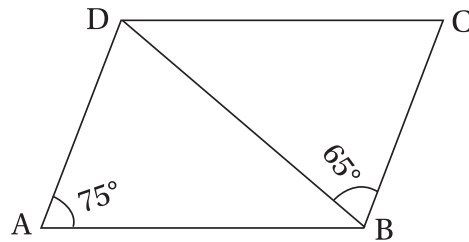
Colloid is a heterogeneous mixture and in case of emulsion, both components are liquid.

50. Ⓓ

Boron and iodine are solid at room temperature while boron is a metalloid but iodine is a non - metal.

Mathematics

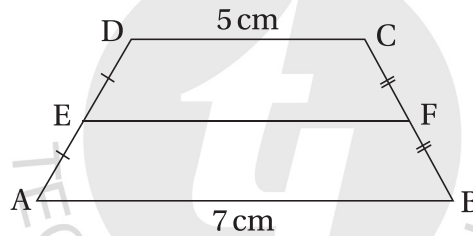
51. (A)



$$\angle A = \angle C = 75^\circ$$

$$\begin{aligned} \angle DBC = 65^\circ \therefore \angle BDC &= 180^\circ - (75^\circ + 65^\circ) \\ &= 180^\circ - 140^\circ = 40^\circ \end{aligned}$$

52. (C)



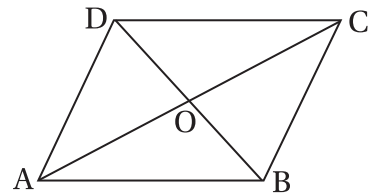
$$\begin{aligned} EF &= \frac{1}{2}(AB + DC) = \frac{1}{2}(7 + 5) \text{ cm} \\ &= 6 \text{ cm.} \end{aligned}$$

53. (B)

$$AO = 12 \text{ cm}$$

$$BO = 9 \text{ cm}$$

$$\begin{aligned} \therefore AB &= \sqrt{9^2 + 12^2} \text{ cm} \\ &= \sqrt{81 + 144} \text{ cm} \\ &= \sqrt{225} \text{ cm} \\ &= 15 \text{ cm} \end{aligned}$$



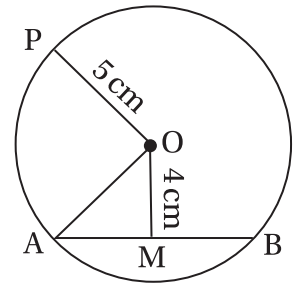
54. (A)

$$OA = OP = 5 \text{ cm}$$

$$OM = 4 \text{ cm}$$

$$\begin{aligned}\therefore AM &= \sqrt{(5)^2 - (4)^2} \text{ cm} \\ &= \sqrt{25 - 16} \text{ cm} \\ &= \sqrt{9} \text{ cm} \\ &= 3 \text{ cm}\end{aligned}$$

$$\therefore AB = 6 \text{ cm}$$



55. ⑥

$$OB = 5 \text{ cm}, AB = 6 \text{ cm}$$

$$\text{Let } OM = x \text{ cm}$$

$$AM = (5 - x) \text{ cm}$$

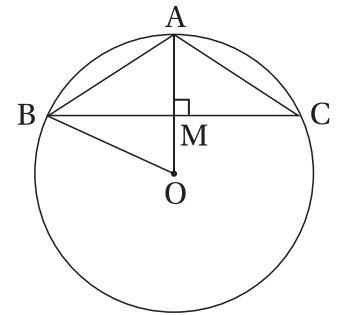
$$\begin{aligned}BM^2 &= OB^2 - OM^2 \\ &= (5)^2 - x^2 \\ &= (25 - x^2) \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Again, } BM^2 &= AB^2 - AM^2 \\ &= \{(6)^2 - (5 - x)^2\} \text{ cm}^2 \\ &= \{36 - 25 + 10x - x^2\} \text{ cm}^2 \\ &= \{11 + 10x - x^2\} \text{ cm}^2\end{aligned}$$

$$\therefore 25 - x^2 = 11 + 10x - x^2$$

$$\Rightarrow 10x = 14 \Rightarrow x = 1.4$$

$$\therefore OM = 1.4 \text{ cm}$$

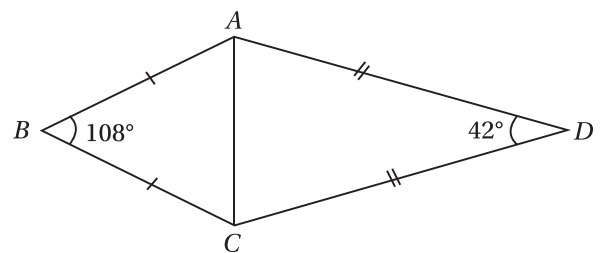


56. ⑥

$$\angle ACD = \angle CAD = \frac{180^\circ - 42^\circ}{2} = \frac{138^\circ}{2} = 69^\circ$$

$$\angle ACB = \angle CAB = \frac{180^\circ - 108^\circ}{2} = \frac{72^\circ}{2} = 36^\circ$$

$$\therefore \angle BCD = 69^\circ + 36^\circ = 105^\circ.$$



57. ⑥

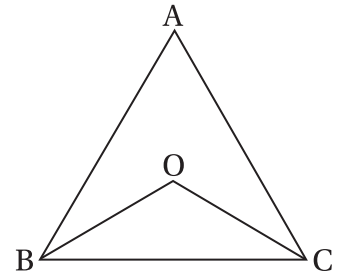
$$\angle BAC = 40^\circ$$

$$\angle ABC + \angle ACB = 180^\circ - 40^\circ = 140^\circ$$

$$\frac{1}{2}\angle ABC + \frac{1}{2}\angle ACB = 70^\circ$$

$$\Rightarrow \angle OBC + \angle OCB = 70^\circ$$

$$\Rightarrow \angle BOC = 180^\circ - 70^\circ = 110^\circ$$



58. Ⓐ

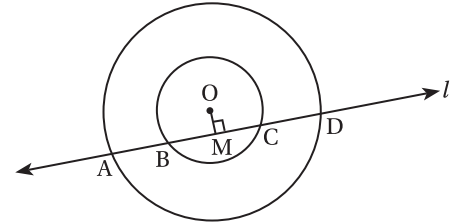
$$OM \perp BC \Rightarrow BM = MC$$

$$OM \perp AD \Rightarrow AM = DM$$

$$\therefore AM - BM = DM - MC$$

$$\Rightarrow AB = CD$$

\therefore (A) is true



(R): Perpendicular drawn from the centre bisects the chord which is true and (R) is the correct explanation of (A).

59. Ⓓ

$$CD = 4 \text{ cm}$$

$$AC = 5 \text{ cm}$$

$$\angle ADC = 90^\circ$$

$$\therefore AD = \sqrt{25 - 16} \text{ cm}$$

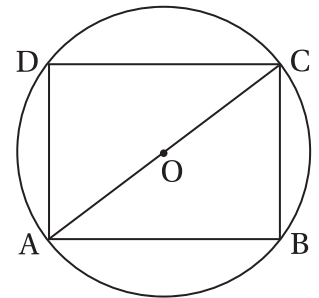
$$= \sqrt{9} \text{ cm} = 3 \text{ cm}$$

$$\therefore \text{Area of rectangle} = 12 \text{ cm}^2$$

\therefore (A) is false.

(R): Area of the rectangle = length \times breadth.

(R) is true



60. Ⓐ

\therefore R is mid-point of AB and $RQ \parallel BC$

\therefore RQ bisects AC at Q.

\therefore AQ = QC

61. ©

Applying mid-point theorem,

$$RQ = \frac{1}{2}BC = \frac{1}{2} \times 28 \text{ cm} = 14 \text{ cm}$$

62. Ⓐ

Length of garland = PQ + RQ + RP

$$= (12.5 + 14 + 13) \text{ cm}$$

$$= 39.5 \text{ cm}$$

63. Ⓐ

$$\angle KIE = \angle KEI = 40^\circ$$

$$\angle ITO = \angle ETO = 25^\circ$$

$$\therefore \angle TIE + \angle TEI = 180^\circ - 50^\circ = 130^\circ.$$

$$\text{But } \angle TIE = \angle TEI = \frac{130^\circ}{2} = 65^\circ.$$

$$\therefore \angle KIT = 40^\circ + 65^\circ = 105^\circ.$$

64. Ⓓ

$$\Delta STY \cong \Delta MEY$$

$$\therefore SY = MY, ST = ME$$

$$\therefore \text{In } \Delta SNM, XY = \frac{1}{2} NM.$$

$$\Rightarrow XY = \frac{1}{2}(NE - ME)$$

$$= \frac{1}{2}(NE - ST)$$

65. Ⓑ

$$CD = OB = OD = OC$$

 $\Rightarrow \Delta COD$ is equilateral triangle.

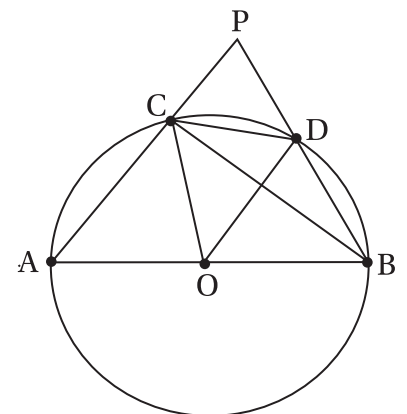
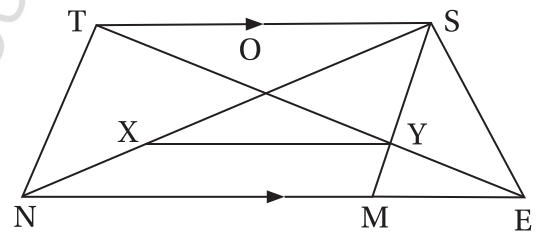
$$\therefore \angle COD = 60^\circ$$

$$\therefore \angle CBD = \frac{1}{2} \times 60^\circ = 30^\circ$$

$$\angle ACB = 90^\circ$$

$$\therefore \angle CPB = 90^\circ - 30^\circ = 60^\circ$$

$$\Rightarrow \angle APB = 60^\circ.$$



66. (A)

$$\angle ABD = 180^\circ - 110^\circ = 70^\circ$$

$$\therefore \angle ADB = \angle ABD = 70^\circ$$

$$\therefore Z^\circ + 50^\circ = 70^\circ$$

$$\Rightarrow Z^\circ = 20^\circ$$

$$\Rightarrow Z = 20$$

67. (B)

$$\angle C + \angle A = 90^\circ$$

$$2\angle A + \angle A = 90^\circ$$

$$3\angle A = 90^\circ$$

$$\angle A = 30^\circ$$

$$\therefore \angle C = 60^\circ$$

BD = BC constructed.

$$\triangle ABD \cong \triangle ABC \quad (\text{S-A-S})$$

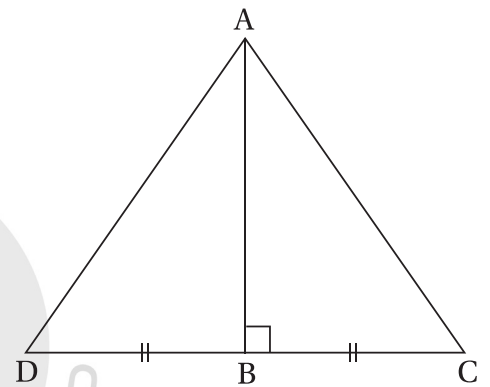
$$\therefore \angle ADB = \angle ACB = 60^\circ$$

$$\therefore \angle BAC = \angle BAD = 30^\circ$$

$$\therefore \angle CAD = 60^\circ$$

$\therefore \triangle ADC$ is equilateral triangle.

$$\therefore AC = DC = 2BC$$



68. (A)

$$\frac{4}{x} + 5y = 7 \quad \dots (1) \times 4$$

$$\frac{3}{x} + 4y = 5 \quad \dots (2) \times 5$$

$$\frac{16}{x} + 20y = 28$$

$$\frac{15}{x} + 20y = 25$$

$$\begin{array}{r} (-) \quad (-) \quad (-) \\ \hline \end{array}$$

$$\frac{1}{x} = 3 \Rightarrow x = \frac{1}{3}$$

$$\therefore \text{From (1), } 12 + 5y = 7$$

$$\Rightarrow 5y = -5$$

$$\Rightarrow y = -1$$

$$\therefore \left(\frac{1}{3}, -1\right)$$

69. Ⓓ

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$\Rightarrow (12)^2 = 50 + 2(ab + bc + ca)$$

$$\Rightarrow \frac{144 - 50}{2} = ab + bc + ca$$

$$\Rightarrow 47 = ab + bc + ca$$

70. Ⓐ

$$\sqrt{x} + \frac{1}{\sqrt{x}} = 2 \Rightarrow x + \frac{1}{x} + 2 = 4$$

$$\Rightarrow x + \frac{1}{x} = 2$$

$$\Rightarrow x^2 + 1 = 2x$$

$$\Rightarrow x^2 - 2x + 1 = 0$$

$$\Rightarrow (x - 1)^2 = 0$$

$$\Rightarrow x = 1$$

$$\therefore x^8 + \frac{1}{x^8} = (1)^8 + \frac{1}{(1)^8} = 1 + 1 = 2$$

71. Ⓒ

$$DE = \frac{1}{2}DC = \frac{1}{2}AB$$

$$AB : AD = 2 : 1$$

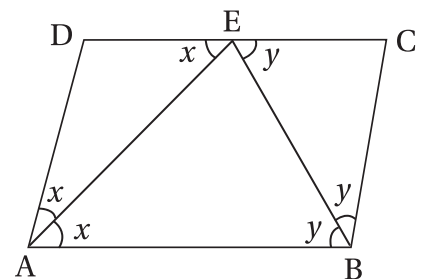
$$\Rightarrow \frac{AB}{AD} = \frac{2}{1}$$

$$\Rightarrow AD = \frac{1}{2}AB$$

$$\therefore AD = DE$$

$$\Rightarrow \angle DAE = \angle DEA = x$$

$$\text{Similarly } \angle CEB = \angle CBE = y$$



$$\therefore \angle EAB = x \text{ and } \angle EBA = y$$

$$\angle A + \angle B = 180^\circ$$

$$\Rightarrow 2x + 2y = 180^\circ$$

$$\Rightarrow x + y = 90^\circ$$

$$\therefore \angle AEB = 90^\circ$$

72. ©

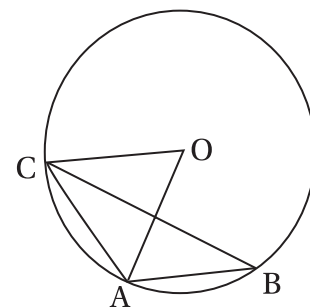
$$\angle ABC = \frac{1}{2} \angle COA$$

$$\therefore \angle COA = 60^\circ$$

$$\therefore \angle OCA + \angle OAC = 180^\circ - 60^\circ = 120^\circ$$

$$\text{But } \angle OCA = \angle OAC = \frac{120^\circ}{2} = 60^\circ$$

$$\therefore \angle CAO = 60^\circ$$



73. Ⓐ

$$\angle PQS = \angle TQR$$

$$\Rightarrow \angle PQS + \angle SQT = \angle TQR + \angle SQT$$

$$\Rightarrow \angle PQT = \angle SQR$$

In $\triangle PQT$ and $\triangle RQS$,

$$PQ = RQ$$

$$\angle PQT = \angle RQS$$

$$\angle TPQ = \angle SRQ$$

$$\therefore \triangle PQT \cong \triangle RQS \quad (\text{A-S-A})$$

$$\therefore QS = QT$$

74. Ⓓ

$$AB = AC \Rightarrow \angle ABC = \angle ACB$$

$$\angle ABC + \angle ACB = 180^\circ - 50^\circ = 130^\circ.$$

$$\therefore \angle ABC = \angle ACB = \frac{130^\circ}{2} = 65^\circ$$

$$\angle DBC + \angle DCB = 180^\circ - 80^\circ = 100^\circ$$

$$BD = DC \Rightarrow \angle DBC = \angle DCB = 50^\circ$$

$$\therefore \angle ABD = 65^\circ - 50^\circ = 15^\circ$$

75. Ⓓ

$$\angle 1 + \angle 4 = 180^\circ$$

$$\Rightarrow 2x + y + x + 2y = 180$$

$$\Rightarrow 3x + 3y = 180$$

$$\Rightarrow x + y = 60$$

$$\angle 4 = \angle 6 \Rightarrow x + 2y = 3y + 20$$

$$\Rightarrow x - y = 20$$

$$\therefore x + y = 60$$

$$x - y = 20$$

$$2x = 80$$

$$x = 40$$

$$\therefore y = 20$$

$$\therefore \angle 7 = \angle 1 = (2 \times 40 + 20)^\circ$$

$$= 100^\circ$$

Biology

76. Ⓓ

Fluid connective tissue

Blood has a fluid matrix, called plasma, and connects various parts of the body.

77. Ⓓ

Hyaline

It is a cartilage

78. Ⓐ

Articulation of bone and attachment of muscle.

Ligaments help in attaching bones at a joint. Tendons help to connect muscles to bones.

79. Ⓑ

Neuron

Neurons are cells that make up the nerve tissue.

80. Ⓒ

Cyton

It is the body of the cell.

81. ©

Transverse striations

82. Ⓐ

Dendrite

83. Ⓐ

Both A and R are true and R is the correct explanation of A

Cartilage is a rubber like tissue which prevents the rubbing surfaces of the bones from coming in contact with each other.

84. ©

A is true but R is false

Blood and lymph are connective tissue and so have a matrix between their cells.

85. Ⓐ

Skeletal

86. Ⓓ

None

87. Ⓑ

Smooth muscles

These muscles are not under the control of our will.

88. Ⓐ

Bone

89. Ⓑ

Squamous epithelial tissue

The squamous epithelial tissue helps to exchange gases and other substances between the blood and the cells.

90. Ⓑ

Adipose tissue



The stored fat works as an insulator

91. Ⓓ

All of these

92. Ⓑ

Diploid

Mitosis is an equational division

93. Ⓓ

Prophase → Metaphase → Anaphase → Telophase

94. Ⓓ

Vascular bundle

Vascular bundle is made up of xylem and phloem.

95. Ⓑ

Collenchyma

Pectin in the cell wall, provides flexibility

96. Ⓐ

Both A and R are true and R is the correct explanation of A.

97. Ⓒ

A is true but R is false

Surface of skin has stratified squamous epithelium.

98. Ⓒ

A is true but R is false

99. Ⓓ

Integument with muscle

100. Ⓐ

Axon of neurons