Monthly Progressive Test

Class: X (S)

Subject: PCMB
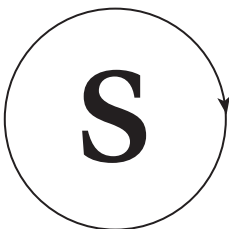
Solutions (Set-S)

Physics

1. Ⓓ

Alnico (Aluminium, nickel and cobalt)

2. Ⓐ

Horizontal parallel equispaced lines.

3. Ⓒ

For circular coil.

4. Ⓑ

5. Ⓒ

Field lines emit from N pole and reaches south pole out side the barmagnet.

$A \rightarrow N$

$B \rightarrow S$

6. Ⓑ

$N \rightarrow S$

7. Ⓑ

Strong magnetic field strength.

8. Ⓐ

In case of Solenoid

9. Ⓐ

In case of long solenoid

10. Ⓑ

Length is greater than its diameter

11. Ⓐ

Each turn produces magnetic field

12. Ⓑ

13. Ⓐ

14. Ⓐ

Clockwise current produces inward magnetic field. ⊗

15. Ⓑ

Anticlockwise current produces outward magnetic field. ⊙

16. Ⓓ

3.57 e fails quantisation of charge.

17. Ⓐ

$$P = \frac{100}{f \text{ (cm)}}$$

18. Ⓓ

$D = 180° - 2 \times 30° = 120°$

19. Ⓒ

ri of water is least among kerosene, glass, water.

20. Ⓑ

6D – 2D = 4D (converging power)

21. Ⓐ

Using right hand grip rule $\odot$

22. Ⓒ

$$\frac{B_1}{B_2} = \frac{\left(\dfrac{i}{r}\right)}{\left(\dfrac{2i}{r/2}\right)} = \frac{1}{4}$$

$$\frac{B_2}{B_1} = \frac{4}{1}$$

23. Ⓓ

$$\frac{B_1}{B_2} = \frac{(i/R)}{(i/2R)} = \frac{2}{1}$$

24. Ⓒ

$$\frac{B_1}{B_2} = \frac{B_1}{B_i/2} = \frac{2}{1}$$

25. Ⓐ

$$B_{\text{net}} = \frac{B}{2} - \frac{B}{2} = 0 \text{ T}$$

━━━━━━━━━━━━━━ **Chemistry** ━━━━━━━━━━━━━━

26. Ⓑ

As_2O_3 is an amphoteric oxide

N_2O is a neutral oxide

CaO and Fe_2O_3 are basic oxide

27. Ⓒ

Electronic configuration of the element is 2, 8, 8, 2. In the modern periodic table it is at 4th period and 2nd group. Number of orbit gives the number of period. Valence electron gives the group number.

28. Ⓐ

Correct order of atomic radius is N > O > F. Atomic radius decreases across the period from left to right.

29. Ⓐ

Nitrogen is used as a food preservative.

30. Ⓑ

Sodium is metal

Iodine is solid non-metal

Bromine is the only non-metallic liquid

Oxygen is gas

31. Ⓐ

Assertion : Zinc can release H_2 gas from dilute H_2SO_4 but Cu cannot. This is correct.

Reason : In activity series Zn is placed higher than hydrogen and Cu is placed lower. This is also true and so Cu can not displaces hydrogen from dilute H_2SO_4.

32. Ⓑ

Assertion : NaCl has higher melting point then CCl_4. This is correct.

Reason : NaCl is soluble in water. This is also correct but not the correct explanation of Assertion.

33. Ⓑ

Cs can release electron(s) most easily.

34. Ⓒ

In modern periodic table Group 17 is acidic.

35. Ⓐ

Assertion : Atomic number is more fundamental property than atomic weight.

Reason : Atomic number deals with the number of electrons which is responsible for the chemical properties of the elements. This is also correct and correct explanation of assertion.

36. Ⓐ

If we move from top to bottom in a group then radius increases. This is correct.

If we move from top to bottom in a group then new shells are introduced. This is also correct and the correct explanation of assertion.

37. Ⓐ

When radius increases, then force of attraction between nucleus and the outermost shell decreases.

38. Ⓑ

If we move from top to bottom then atomic radius increases.

39. Ⓐ

Metal can release electron(s) very easily, hence they act as strong reducing agents.

40. Ⓓ

Isotopes have same number of protons but different number of neutrons. Hence, the group and period for the isotopes of a particular element are same. Eka-Aluminium is gallium and the formula of the chloride of this element is ECl_3 [$GaCl_3$].

In the periodic table, atomic masses of the elements do not increase in a regular manner. With strong metals hydrogen forms anion.

e.g. $NaH \longrightarrow Na^{\oplus} + H^{\ominus}$

With strong non-metals hydrogen forms cation

$HCl \longrightarrow H^{\oplus} + Cl^{\ominus}$

41. Ⓒ

Chemical formula of Glauber salt is $Na_2SO_4 \cdot 10H_2O$.

42. Ⓑ

When CO_2 gas comes in contact with aqueous $Ca(OH)_2$ then the correct product is white coloured $CaCO_3$.

Eqn: $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3\downarrow + H_2O$
(Milky white ppt)

43. Ⓐ

CH_3COOH is a monobasic acid as it dissociates to give only one H^+ ion per molecule in aqueous solution

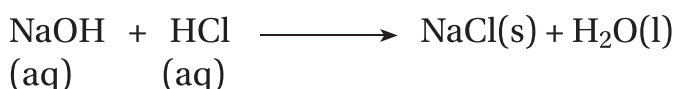$CH_3COOH \underset{(aq)}{\rightleftharpoons} CH_3COO^{\ominus} + H^+$

44. Ⓓ
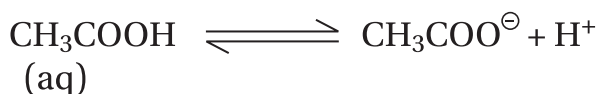
When sodium metal is exposed in air sodium chloride does not form.

Evaporation of sea water gives sodium chloride.

Reaction between dil. NaOH and dil. HCl gives sodium chloride.

$\underset{(aq)}{NaOH} + \underset{(aq)}{HCl} \longrightarrow NaCl(s) + H_2O(l)$

Reaction between sodium carbonate and dil. HCl gives sodium chloride.

$Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2\uparrow$

45. Ⓒ

Plaster of Paris containing packets are properly sealed when it comes in contact with air then it becomes very hard as gypsum is formed.

46. Ⓓ

Ionic compound conduct electricity in solutions or in molten state but not in solid state as it does not have free ion.

47. Ⓑ

Ionic compounds are soluble in water.

48. Ⓑ

Ionic compounds are made up of positive and negative ions. There is a strong electrostatic force of attraction between them. A lot of heat energy is required to break this force of attraction and to melt or boil the ionic compound. As a result ionic compound have high melting point.

49. Ⓐ

Reactivity series is an arrangement of element based on their reactivity in the increasing or the decreasing order and this series is used to separate elements based on their reactivity. Thus both assertion and reason are correct and reason is the correct explanation of the assertion.

50. Ⓑ

Steel is an alloy of mainly iron, which contain carbon as a non-metal.
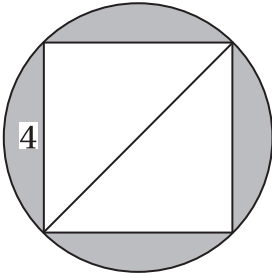
Mathematics

51. Ⓑ

$x^2 = 121 \Rightarrow x = 11$ cm

Perimeter $= 4 \times 11 = 44$ cm

$2\pi r = 44 \Rightarrow r = \dfrac{44}{2\pi} = 7$ cm

$\text{Area} = \pi r^2 = \dfrac{22}{7} \times 7 \times 7 \text{ cm}^2 = 154 \text{ cm}^2$

52. Ⓑ

Diameter $= 4\sqrt{2}$ $\qquad r = \dfrac{4\sqrt{2}}{2} = 2\sqrt{2}$

Required Area $= \pi r^2 - a^2 = \left(\dfrac{22}{7} \times 2\sqrt{2} \times 2\sqrt{2} - 4^2\right)\text{cm}^2 = \left(\dfrac{176-112}{7}\right)\text{cm}^2 = \dfrac{64}{7}\text{ cm}^2 = 9\dfrac{1}{7}\text{ cm}^2$

53. Ⓐ

$\dfrac{30°}{360°}\pi r_1^2 - \dfrac{30°}{360°}\pi r_2^2 = \dfrac{30}{360}\pi\left(7^2 - 3.5^2\right)\text{m}^2 = \dfrac{30}{360}\times\dfrac{22}{7}\times 36.75\text{ m}^2 = \dfrac{77}{8}\text{ m}^2 = 9.625\text{ m}^2$

54. Ⓐ

$t_n = 3 + 2n$

$S_n = \displaystyle\sum_{n=1}^{20} t_n = \sum_{n=1}^{20}(3+2n) = 3\times 20 + 2\times\sum_{n=1}^{20}n = 60 + 2\times\dfrac{20\times 21}{2} = 480$

55. Ⓐ

$\dfrac{ar(\Delta ABC)}{ar(\Delta DBC)} = \dfrac{\frac{1}{2}\times BC\times AL}{\frac{1}{2}\times BC\times DM} = \dfrac{AL}{DM}$ $\qquad\qquad$ … (1)

Again $\quad \Delta AOL \sim \Delta DOM \quad$ (by AA)

$\dfrac{AO}{DO} = \dfrac{OL}{OM} = \dfrac{AL}{DM}$ $\qquad\qquad$ … (2)

From (1) & (2) : $\dfrac{ar(\Delta ABC)}{ar(\Delta DBC)} = \dfrac{AL}{DM} = \dfrac{AO}{OD}$ (proved)

56. Ⓐ

$ax + by + c = 0;$ $\qquad$ … (1) $\qquad 2b = a + c \quad$ as a, b, c are in AP

$a - 2b + c = 0;$ $\qquad$ … (2) $\qquad a - 2b + c = 0$

Subtracting, $a(x-1) + b(y+2) = 0$

$\Rightarrow x - 1 = 0 \quad$ and $\quad y + 2 = 0 \quad \Rightarrow x = 1 \quad$ and $\quad y = -2$

$(1, -2)$ is the fixed point.

57. Ⓑ

$$\frac{x^2}{y} = \frac{\sin^4\theta \cdot \cos^2\theta}{\cos^2\theta \cdot \sin\theta} = \sin^3\theta \quad \Rightarrow \left(\frac{x^2}{y}\right)^{\frac{1}{3}} = \sin\theta \qquad \dots (1)$$

Similarly, $\quad \left(\frac{y^2}{x}\right)^{\frac{1}{3}} = \cos\theta \qquad \dots (2)$

Squaring and adding (1) and (2)

$$\left(\frac{x^2}{y}\right)^{\frac{2}{3}} + \left(\frac{y^2}{x}\right)^{\frac{2}{3}} = 1$$

58. Ⓐ

Diameter $= 20$ cm $\quad \Rightarrow r = 10$ cm
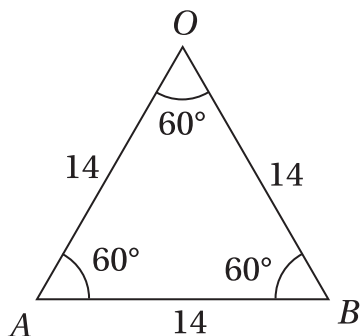
Shaded area $= \left(\dfrac{\pi r^2}{2} - \dfrac{1}{2} \times 12 \times 16\right)$ cm^2 $= \left(\dfrac{3.142 \times 10 \times 10}{2} - \dfrac{1}{2} \times 12 \times 16\right)$ cm^2 $= 61.1$ cm^2

A : is true

R : is true and correct explanation of A.

59. Ⓓ

$r = 14$ cm

$ar(\Delta OAB) = \dfrac{\sqrt{3}}{4} \times 14^2$ cm^2

For six triangles $= 6 \times \dfrac{\sqrt{3}}{4} \times 14 \times 14 \text{ cm}^2 = 6 \times \dfrac{1.7}{4} \times 14 \times 14 \text{ cm}^2 = 499.8 \text{ cm}^2$

A is false

R is true

60. Ⓐ

$r = \dfrac{7}{2} \text{ cm}$

Area of $\boxed{\begin{matrix} + & + & + \\ + & + & + \end{matrix}} = \pi r^2 = \dfrac{22}{7} \times \dfrac{7}{2} \times \dfrac{7}{2} \text{ cm}^2 = 38.5 \text{ cm}^2$

61. Ⓑ

Area of $\boxed{\begin{matrix} \times & \times & \times \\ \times & \times & \times \end{matrix}}$ = Area of semicircle with radius 7 – Area of the ΔABC

$= \left(\dfrac{1}{2} \pi \cdot 7^2 - \dfrac{1}{2} \times 14 \times 7 \right) \text{ cm}^2 = \left(\dfrac{1}{2} \times \dfrac{22}{7} \times 7 \times 7 - \dfrac{1}{2} \times 14 \times 7 \right) \text{ cm}^2 = 28 \text{ cm}^2$

62. Ⓓ

Area of $\boxed{\begin{matrix} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{matrix}} = \dfrac{1}{2} \times 14 \times 7 \text{ cm}^2 = 49 \text{ cm}^2$

63. Ⓐ

Let the A.P be $a, a + d, a + 2d, \ldots$ to $(2n + 1)$ terms

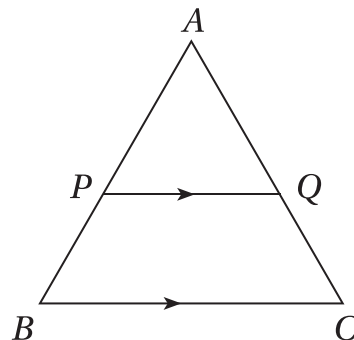$\therefore$ Sum of odd terms $= \dfrac{(n+1)}{2}(2a + 2nd)$

Sum of even terms $= \dfrac{n}{2}\{2(a+d) + (n-1)2d\} = \dfrac{n}{2}(2a + 2nd)$

$\therefore$ Ratio $= \dfrac{\dfrac{(n+1)}{2}(2a + 2nd)}{\dfrac{n}{2}(2a + 2nd)} = \dfrac{n+1}{n}$

64. Ⓒ

$\dfrac{ar(\Delta APQ)}{ar(\Delta ABC)} = \left(\dfrac{AP}{AB} \right)^2 = \dfrac{\left(\dfrac{3}{4} AB \right)^2}{(AB)^2} = \dfrac{9}{16}$

$\Rightarrow \dfrac{ar(\Delta ABC)}{ar(\Delta APQ)} = \dfrac{16}{9}$ ... (1)

$$\Rightarrow \frac{ar(\Delta ABC) - ar(\Delta APQ)}{ar(\Delta APQ)} = \frac{16-9}{9} = \frac{7}{9}$$

$$\Rightarrow \frac{ar(\text{trap. } PQCB)}{ar(\Delta APQ)} = \frac{7}{9} \qquad \ldots (2)$$

$(1) \div (2):$

$$\frac{ar(\Delta ABC)}{ar(\text{trap. } PQCB)} = \frac{\frac{16}{9}}{\frac{7}{9}} = \frac{16}{7} = 16:7$$

65. Ⓓ

ATQ,

$$(0,0) = \left(\frac{a+b+c}{3}, \frac{a+b+c}{3} \right)$$

$$\therefore a+b+c = 0 \quad \Rightarrow a^3 + b^3 + c^3 = 3abc$$

66. Ⓒ

$$f(x) = (x-2)^2 + 4 \ge 4$$

$\therefore f(x)$ cannot be zero for any real value of x.

$\therefore$ No zero.

67. Ⓒ

ATQ:

$$\frac{x+1}{y+1} = \frac{4}{5} \quad \Rightarrow 5x+5 = 4y+4 \quad \Rightarrow 5x-4y = -1 \qquad \ldots (1)$$

$$\frac{x-5}{y-5} = \frac{1}{2} \quad \Rightarrow 2x-10 = y-5 \quad \Rightarrow 2x-y = 5 \qquad \ldots (2)$$

Solving (1) and (2)

$x = 7, \quad y = 9$

68. Ⓐ

$$ax^2 + bx + c = 0 \diagdown^{\alpha}_{\beta}$$

$$\alpha + \beta = \frac{1}{\alpha} \cdot \frac{1}{\beta} \quad \Rightarrow \frac{-b}{a} = \frac{a}{c} \quad \Rightarrow a^2 = -bc \quad \Rightarrow a^2 + bc = 0$$

69. ©

$2+5+8+11+\cdots+98$

$3+8+13+18+\cdots+198$
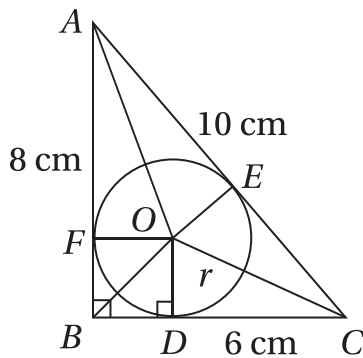
First term which is common = 8

LCM (d_1, d_2) = LCM(3, 5) = 15

8, 23, 38, 53, 68, 83, 98

Total number of terms is 7.

70. Ⓑ

$ar(\Delta BOC)+ar(\Delta COA)+ar(\Delta AOB)=ar(\Delta ABC)$

$\Rightarrow \frac{1}{2}\times 6\times r+\frac{1}{2}\times 10\times r+\frac{1}{2}\times 8\times r=\frac{1}{2}\times 8\times 6 \Rightarrow \frac{1}{2}(6r+10r+8r)=\frac{1}{2}\times 48 \Rightarrow 24r=48 \Rightarrow \boxed{r=2}$
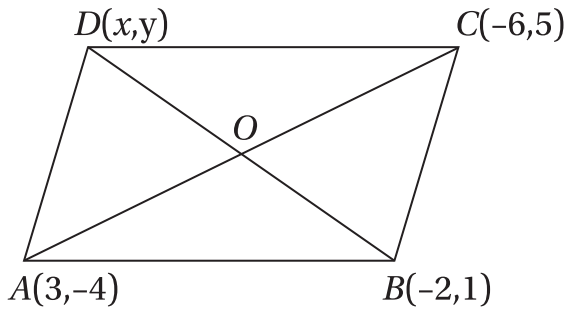
$\therefore$ Radius = 2 cm

71. ©

Radius of bigger semi-circle $=\frac{(7+3)}{2}$ cm = 5 cm

Required shaded area $=\left[\frac{1}{2}\pi\cdot 5^2-\frac{1}{2}\times\pi\times 3.5^2+\frac{1}{2}\times\pi\times 1.5^2\right]$ cm^2

$=\left(\frac{\pi}{2}\times 25-\frac{\pi}{2}\times 12.25+\frac{\pi}{2}\times 2.25\right)$ cm$^2=\frac{\pi}{2}(25-12.25+2.25)$ cm^2

$=\frac{\pi}{2}(25-10)$ cm$^2=\frac{22}{2\times 7}\times 15$ cm$^2=23.6$ cm^2

72. Ⓐ

D(x,y) C(−6,5)

O

A(3,−4) B(−2,1)
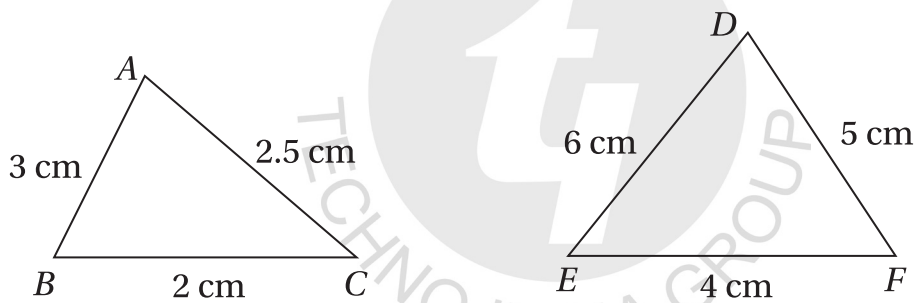
∵ Diagonals of parallelogram bisect each other,

$$\frac{-2+x}{2}=\frac{-6+3}{2}\ \Rightarrow x=-1$$

$$\frac{y+1}{2}=\frac{5-4}{2}\ \Rightarrow y=0$$

73. Ⓑ

A

3 cm 2.5 cm

B 2 cm C

D

6 cm 5 cm

E 4 cm F

Perimeter of $\Delta DEF=(4+6+5)$ cm $=15$ cm

74. Ⓑ

$$a_1+a_{19}=a_2+a_{18}=a_3+a_{17}=\cdots$$

$$(a_1+a_{19})+(a_8+a_{12})=224\ \Rightarrow 2(a_1+a_{19})=224$$

$$\Rightarrow a_1+a_{19}=112\ \Rightarrow a_1+a_1+18d=112\ \Rightarrow 2a_1+18d=112\ \Rightarrow a_1+9d=56$$

$$\therefore \sum_{i=1}^{19}=\frac{19}{2}\{2a_1+18d\}=\frac{19}{2}\times 2(a_1+9d)=19\times 56=1064$$

75. Ⓓ

$$ax^2+bx+c=0 \quad \nearrow \sin\phi \quad \searrow \cos\phi$$

$$\sin\phi + \cos\phi = -\frac{b}{a} \qquad \dots (1)$$

$$\sin\phi \cdot \cos\phi = \frac{c}{a} \qquad \dots (2)$$

$$(\sin\phi + \cos\phi)^2 = \frac{b^2}{a^2} \quad \Rightarrow \sin^2\phi + \cos^2\phi + 2\sin\phi \cdot \cos\phi = \frac{b^2}{a^2} \quad \Rightarrow 1 + \frac{2c}{a} = \frac{b^2}{a^2}$$

$$\Rightarrow a^2 + 2ac = b^2 \quad \Rightarrow a^2 + 2ac + c^2 = b^2 + c^2 \quad \Rightarrow \boxed{(a+c)^2 - c^2 = b^2}$$

Biology

76. Ⓑ

Walter Cannon

77. Ⓓ

Every cell in body

Due to metabolism in every cell, excretory materials are generated.

78. Ⓓ

Ureter

Ureters connects the kidneys to the urinary bladder.

79. Ⓑ

Coordination and movement

80. Ⓒ

Plasma

Urea is created in liver, transported through plasma to kidney.

81. Ⓓ

Both A and B

82. Ⓐ

Thyroxine

83. Ⓐ

Simple diffusion

Diffusion causes movement of substances along the concentration gradient.

84. Ⓐ

Liver

85. Ⓒ

ADH

Urine is concentrated by reabsorption of water from the nephric filtrate in the collecting duct, in the presence of ADH.

86. Ⓑ

Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

The Reason does not explain the importance of variations.

87. Ⓐ

Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

A condom forms a physical barrier between the sperm and ovum.

88. Ⓑ

Hormones

89. Ⓐ

Pituitary gland

Pituitary gland controls the development and function of other endocrine glands.

90. Ⓒ

The cerebrospinal fluid provides buoyancy.

91. Ⓑ

Lipase and glycerol, respectively.

92. Ⓐ

Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

93. Ⓑ

Both A and R are true but R is not the correct explanation of A.

94. Ⓒ

Vegetative propagule -- Node

95. Ⓓ

Ovary

96. Ⓓ

Water, urea, uric acid, creatinine.

97. Ⓒ

Menstruation

98. Ⓑ

Controlling voluntary movements and maintaining posture.

99. Ⓓ

Midbrain, pons and medulla oblongata

100. Ⓓ

No, she cannot have another baby as the eggs will not be produced any more.
As ovulation will not occur, so fertilization will also not occur.