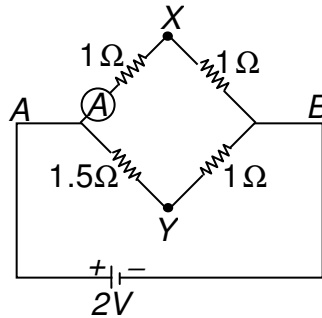


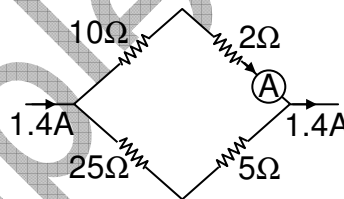
PHYSICS

CHOOSE THE CORRECT OPTION:

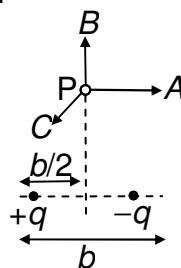
- Two copper wires, one of length 1 m and the other of length 9 m, are found to have the same resistance. Their diameters are in the ratio :
(A) 3 : 1 (B) 1 : 9 (C) 9 : 1 (D) 1 : 3
- Reading of ammeter in ampere for the following circuit is :



- (A) 0.8 (B) 1 (C) 0.4 (D) 2
- An electric iron of heating element of resistance $88\ \Omega$ is used at 220 volt for 2 hours. The electric energy spent, in unit, will be :
(A) 0.8 (B) 1.1 (C) 2.2 (D) 8.8
 - You are given three bulbs 25 W, 40 W and 60 W. Which of them has the lowest resistance?
(A) 25 watt bulb (B) 40 watt bulb (C) 60 watt bulb (D) insufficient data
 - Reading of ammeter (A) in ampere



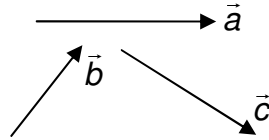
- (A) 0.4 (B) 1 (C) 0.6 (D) 1.2
- The resistance of a wire of cross-section 'a' and length 'l' is R ohm. The resistance of another wire of the same material and of the same length but cross-section '4a' will be
(A) 4R (B) $\frac{R}{4}$ (C) $\frac{R}{16}$ (D) 16R
 - An electric current of 2.0 A passes through a wire of resistance $25\ \Omega$. How much heat (in joule) will be developed in 1 minute?
(A) 6 (B) 6000 (C) 50 (D) 10
 - Two charges +q and -q are placed at a distance 'b' apart as shown in the figure below. The electric field at a point 'P' on the perpendicular bisector as shown as :



- (A) along vector \vec{A} (B) along vector \vec{B}
(C) along vector \vec{C} (D) Zero

9. The mass 'm' of the heaviest stone that can be moved by the water flowing in a river depends on 'v', the speed of water, density (d) of water and the acceleration due to gravity (g). Then 'm' is proportional to
 (A) v^2 (B) v^4 (C) v^6 (D) v^8
10. For a body in a uniformly accelerated motion, the distance of the body from a reference point at time 't' is given by $x = at + bt^2 + c$ where a, b and c are constants of motion. The dimensions of c are the same as those of
 (A) x, at, bt^2 (B) a/b (C) ab (D) b/a

11. a, b and c are three vectors having magnitudes 8, 3 and 5 as shown in the figure. Then,



- (A) $a = b + c$ (B) $a > b + c$ (C) $a < b + c$ (D) None of these
12. A vector $A = a_x i + a_y j + a_z k$ has zero magnitude. Then,
 (A) $a_x + a_y = -a_z$ (B) $a_x + a_z = 0, a_y = 0$
 (C) $a_x + a_y = 0, a_z = 0$ (D) $a_x = a_y = a_z = 0$
13. Two particles having charges q_1 and q_2 when kept at a certain distance, exert force F on each other. If distance is reduced to half, force between them becomes :
 (A) $\frac{F}{2}$ (B) $2F$ (C) $4F$ (D) $\frac{F}{4}$
14. $\frac{4}{25}$ Coulomb of charge contains _____ electrons :
 (A) 10^{15} (B) 10^{18} (C) 10^{20} (D) None of these
15. There are three resistance 5Ω , 6Ω and 8Ω connected in parallel to a battery of 15 V and of negligible resistance. The potential drop across 6Ω resistance is :
 (A) 10 V (B) 15 V (C) 20 V (D) 8 V
16. A body goes from A to B with a velocity of 40 kmh^{-1} and returns from B to A with a velocity of 60 kmh^{-1} . What is the average velocity of the body during the whole journey ?
 (A) 50 kmh^{-1} (B) 45 kmh^{-1} (C) 55 kmh^{-1} (D) zero
17. A stone is dropped from a height of 125 m. If $g = 10 \text{ ms}^{-2}$, what is the ratio of the distances travelled by it during the first and the last second of its motion ?
 (A) 1 : 9 (B) 2 : 9 (C) 1 : 3 (D) 4 : 9
18. The angle between two vectors A and B is θ . Vector R is the resultant of the two vectors. If R makes an angle $\frac{\theta}{2}$ with A, then
 (A) $A = 2B$ (B) $A = \frac{B}{2}$ (C) $A = B$ (D) $AB = 1$
19. A body moves from a position $r_1 = (2\hat{i} - 3\hat{j} - 4\hat{k})$ metre to a position $r_2 = (3\hat{i} - 4\hat{j} + 5\hat{k})$ metre under the influence of a constant force $F = (4\hat{i} + \hat{j} + 6\hat{k})$ Newton. The work by the force is
 (A) 60 J (B) 59 J (C) 58 J (D) 57 J

20. A stone is dropped from the top of a tower. The height through which it falls in the first 3 seconds of its motion equals the height through which it falls in the last second of its motion. If $g = 10 \text{ ms}^{-2}$, how long does the stone take to reach the ground?

- (A) 4 s (B) 5 s (C) 6 s (D) 7 s

21. In Q. 20, what is the height of the tower ?

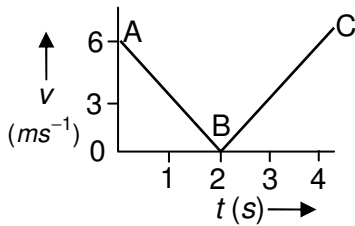
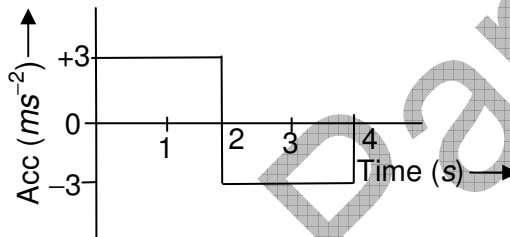
- (A) 75 m (B) 100 m (C) 125 m (D) 150 m

22. A ball is thrown vertically downward with a velocity ' u ' from the top of a tower. It strikes the ground with a velocity $3u$. The time taken by the ball to reach the ground is given by

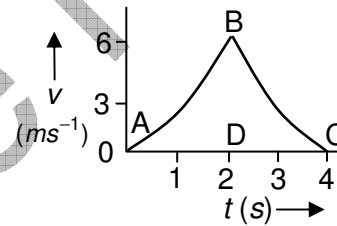
- (A) $\frac{u}{g}$ (B) $\frac{2u}{g}$ (C) $\frac{3u}{g}$ (D) $\frac{4u}{g}$

23. A body starts from rest at time $t = 0$ and undergoes an acceleration as shown in figure.

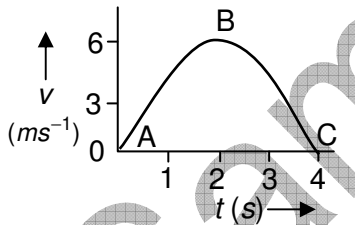
Which of the graph represents the velocity-time ($v - t$) graph of the motion of the body from $t = 0 \text{ s}$ to $t = 4 \text{ s}$?



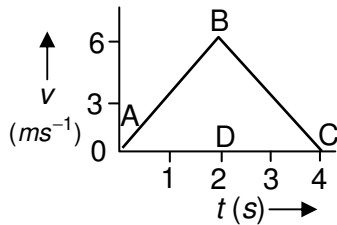
(A)



(B)



(C)



(D)

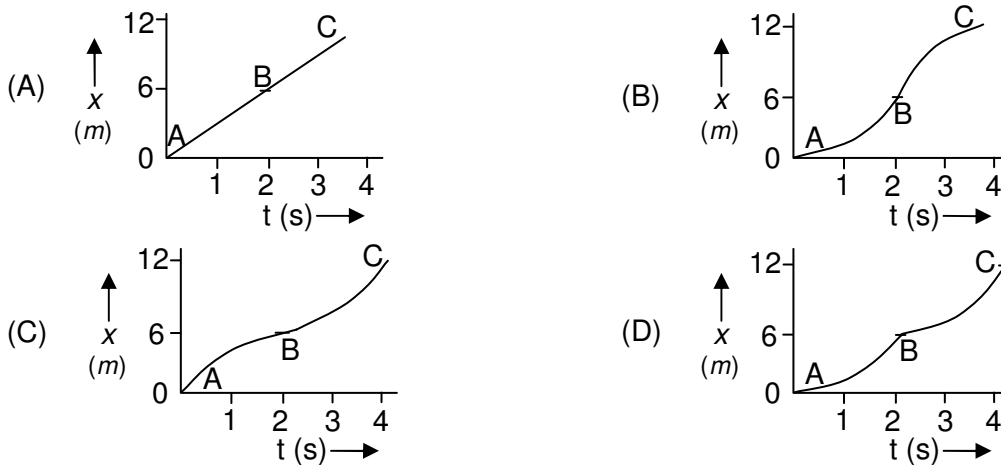
24. In Q. 23, what is the velocity of the body at time $t = 2.5 \text{ s}$?

- (A) 2.5 ms^{-1} (B) 3.5 ms^{-1} (C) 4.5 ms^{-1} (D) 5.5 ms^{-1}

25. In Q. 23, how much distance does the body cover from $t = 0$ to $t = 4 \text{ s}$?

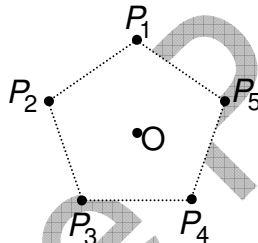
- (A) 6 m (B) 9 m (C) 12 m (D) 15 m

26. In Q. 23, which of the graph represents the displacement-time ($x - t$) graph of the motion of the body from $t = 0$ s to $t = 4$ s ?



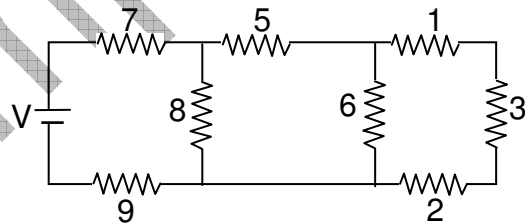
27. 5 charges each of magnitude $10^{-5} C$ and mass $1 kg$ are placed (fixed) symmetrically about a movable central charges of magnitude $5 \times 10^{-5} C$ and mass $0.5 kg$ as shown. The charges at P_1 is removed. The acceleration of the central charge is :

[Given $OP_1 = OP_2 = OP_3 = OP_4 = OP_5 = 1 m$; $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ in SI units]



- (A) $9 ms^{-2}$ upwards (B) $9 ms^{-2}$ downwards
 (C) $4.5 ms^{-2}$ upwards (D) $4.5 ms^{-2}$ downwards

28. In the ladder network shown, current through the resistor 3Ω is $0.25 A$. The input voltage 'V' is equal to



- (A) 10 V (B) 20 V (C) 5 V (D) $\frac{15}{2}$ V

29. A uniform wire of resistance R is uniformly compressed along its length, until its radius becomes ' n ' times the original radius. Now, the resistance of the wire becomes :

- (A) R/n (B) R/n^4 (C) R/n^2 (D) nR

30. We are given ' n ' resistors, each of resistance R . The ratio of the maximum to minimum resistance that can be obtained by combining them is

- (A) n^n (B) n (C) n^2 (D) None of these



CHOOSE THE CORRECT OPTION:

31. The strongest hydrogen bond is present in
 (A) $\text{H} - \text{F} \cdots \text{H} - \text{F}$ (B) $\text{H} - \text{O} \cdots \text{H} - \text{O}$
 (C) $\text{H} - \text{Cl} \cdots \text{H} - \text{Cl}$ (D) $\text{H} - \text{N} \cdots \text{H} - \text{N}$
32. Hybridisation of I in I_3^- is same as in
 (A) I in ICl_2^+ (B) I in ICl_4^- (C) Xe in XeOF_4 (D) Xe in XeO_2F_2
33. Rate of diffusion of nitrogen gas is 9 ml/sec and for another gas 'X', the rate of diffusion is 6 ml/sec. Molecular weight of X is
 (A) 63 (B) 126 (C) 31.5 (D) 56
34. At different pressures, the rate of diffusion of two gases is given by
 (A) $\frac{r_1}{r_2} = \frac{P_1}{P_2} \sqrt{\frac{M_1}{M_2}}$ (B) $\frac{r_1}{r_2} = \frac{P_1}{P_2} \sqrt{\frac{M_2}{M_1}}$ (C) $\frac{r_1}{r_2} = \sqrt{\frac{P_1 M_1}{P_2 M_2}}$ (D) $\frac{r_1}{r_2} = \sqrt{\frac{P_1 M_2}{P_2 M_1}}$
35. A vessel is filled with a mixture of oxygen and nitrogen. At what ratio of the partial pressure will the masses of the gases be identical
 (A) $P_{\text{O}_2} = P_{\text{N}_2}$ (B) $P_{\text{O}_2} = 0.5 P_{\text{N}_2}$ (C) $P_{\text{O}_2} = 0.875 P_{\text{N}_2}$ (D) $P_{\text{O}_2} = 1.14 P_{\text{N}_2}$
36. At what temperature, the average velocity of helium atoms has the same average velocity as that of H_2 molecules at 0°C
 (A) 273°C (B) 37°C (C) 273K (D) 546°C
37. Density of oxygen gas at 1 atm pressure is 0.01429 g/c.c at a given temperature. The r.m.s. Velocity of oxygen is
 (A) $4.612 \times 10^4 \text{ cm/s}$ (B) $1.45 \times 10^4 \text{ cm/s}$
 (C) $4.612 \times 10^3 \text{ cm/s}$ (D) $1.45 \times 10^3 \text{ cm/s}$
38. Which of the following contains the maximum number of atoms?
 (A) 1g of hydrogen (B) 2g of nitrogen (C) 4g of oxygen (D) 11g of carbondioxide
39. The density of a gas at STP is 1.5g / L at STP. Its molecular weight is
 (A) 22.4 (B) 34.6 (C) 33.6 (D) 44.8
40. The mass of 5×10^{19} molecules of a hydrocarbon is 2.5 mg. The hydrocarbon is
 (A) C_3H_8 (B) C_2H_2 (C) C_2H_6 (D) C_2H_4
41. The oxidation number of 'N' in HN_3 is
 (A) +1/3 (B) 0 (C) -1/3 (D) 1
42. How many atoms of carbon has a young man given to his bride to be if the engagement ring contains 0.5 carat diamond? (1 carat = 200 mg)
 (A) 6.023×10^{23} (B) 5.02×10^{21} (C) 3×10^{21} (D) 6×10^{21}
43. Which of the following is a redox reaction?
 (A) $\text{NaCl} + \text{KNO}_3 \rightarrow \text{NaNO}_3 + \text{KCl}$ (B) $\text{CaC}_2\text{O}_4 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{C}_2\text{O}_4$
 (C) $\text{Mg}(\text{OH})_2 + 2\text{NH}_4\text{Cl} \rightarrow \text{MgCl}_2 + 2\text{NH}_4\text{OH}$ (D) $\text{Zn} + 2\text{AgCN} \rightarrow 2\text{Ag} + \text{Zn}(\text{CN})_2$

44. Which one of the following can act as both an oxidizing and a reducing agent?
 (A) H_2S (B) H_2SO_4 (C) HNO_2 (D) HNO_3
45. According to Bohr's theory the radius of electron in an orbit described by principal quantum number n and atomic number Z is proportional to :
 (A) Z^2n^2 (B) $\frac{Z^2}{n^2}$ (C) $\frac{Z^2}{n}$ (D) $\frac{n^2}{Z}$
46. $\text{H}_3\text{PO}_4 + 2\text{KOH} \rightarrow \text{K}_2\text{HPO}_4 + 2\text{H}_2\text{O}$, Based on this reaction equivalent weight of H_3PO_4 is
 (A) 196 (B) 98 (C) 49 (D) 32.67
47. The equivalent weight of MnSO_4 is half of its molecular weight when it is converted to
 (A) Mn_2O_3 (B) MnO_2 (C) MnO_4^- (D) MnO_4^{2-}
48. 5 lit of N_2 and 2 lit of H_2 are reacted. The volume of ammonia formed (all volumes are measured under similar conditions)
 (A) 2 lit (B) 3 lit (C) 1.33 lit (D) 5 lit
49. A compound contains 3% of carbon. The minimum molecular weight of the compound is
 (A) 600 (B) 800 (C) 1000 (D) 300
50. The molecular weight of an organic compound is 180. Its empirical formula is CH_2O . The molecular formula is
 (A) $\text{C}_6\text{H}_{12}\text{O}_6$ (B) $\text{C}_7\text{H}_{16}\text{O}_5$ (C) $\text{C}_8\text{H}_4\text{O}_5$ (D) $\text{C}_5\text{H}_8\text{O}_7$
51. The number of protons, electrons and neutrons in SCN^{-1} radical are
 (A) 30, 29, 29 (B) 29, 30, 29 (C) 29, 28, 31 (D) 30, 31, 29
52. The difference in angular momentum associated with the electron in two successive orbits of hydrogen atom is
 (A) $\frac{h}{2\pi}$ (B) $\frac{h}{\pi}$ (C) zero (D) 1
53. The radii ratio of first orbits of H , He^+ and Li^{2+} is
 (A) 1 : 2 : 3 (B) 6 : 3 : 2 (C) 1 : 1 : 1 (D) 1 : 4 : 9
54. Four particles A, B, C, D have masses 1 gm, 2 gm, 3 gm, 4 gm respectively. The ratio of their wave lengths; if they have equal momentum is
 (A) 1 : 1 : 1 : 1 (B) 1 : 2 : 3 : 4 (C) 4 : 3 : 2 : 1 (D) 1 : 4 : 9 : 16
55. Which one of the following constitutes a group of the isoelectronic species?
 (A) C_2^{2-} , O_2^- , CO , NO (B) NO^+ , C_2^{2-} , CN^- , N_2
 (C) CN^- , N_2 , O_2^{2-} , C_2^{2-} (D) N_2 , O_2^- , NO^+ , CO
56. The electronic configurations for four elements A, B, C, D are $1s^2; 1s^2 2s^2 2p^2$, $1s^2 2s^2 2p^5$ and $1s^2 2s^2 2p^6$ respectively. The tendency to form ionic bond is largest in
 (A) A (B) B (C) C (D) D
57. Electronegativities of four elements A, B, C & D respectively 2.1, 3.0, 3.5, 4.0. Which one of the following bonds is more polar.
 (A) A – B (B) A – C (C) A – D (D) B – C

58. In the dative bond formation between NH_3 & BF_3
- (A) NH_3 is lewis acid
 (B) Hybridisation of N changes from sp^2 to sp^3
 (C) Hybridisation of B changes from sp^2 to sp^3
 (D) Bond angle at N remains $107^\circ.28'$
59. The formal charges on the three oxygen atoms in O_3 molecule are
- (A) 0, 0, 0 (B) 0, 0, -1 (C) 0, 0, +1 (D) 0, +1, -1
60. If Z - axis is the molecular axis, then π - molecular orbitals are formed by the overlap of
- (A) $s + P_z$ (B) $P_x + P_y$ (C) $P_z + P_z$ (D) $P_x + P_x$

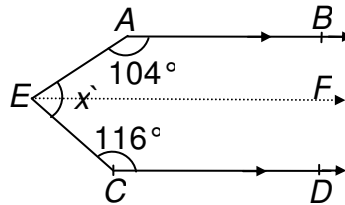
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MATHEMATICS

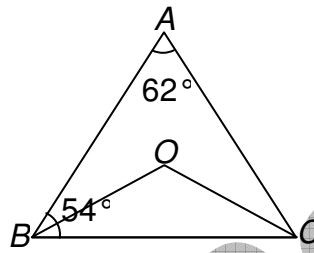
CHOOSE THE CORRECT OPTION:

61. Simplify : $\frac{x^a}{x^b} \cdot \frac{x^b}{x^c} \cdot \frac{x^c}{x^a}$
- (A) 2 (B) 1 (C) 5 (D) 3
62. Given $a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$, then $(a + b + c)^3 =$
- (A) $27 abc$ (B) $64 abc$ (C) $36 abc$ (D) $9 abc$
63. Given that $a^x(bc)^{-1} = a$, $b^y(ca)^{-1} = b$ and $c^z(ab)^{-1} = c$ then $xyz - xy - yz - zx =$
- (A) 1 (B) -1 (C) 0 (D) 2
64. If $x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots \infty}}}$, then the root of this equation is :
- (A) 6 (B) -6 (C) 3 (D) -2
65. The highest power of 7 in $70!$ is :
- (A) 10 (B) 11 (C) 12 (D) 13
66. Find the number of zeros in $4^8 \cdot 5^{10}$.
- (A) 10 (B) 12 (C) 11 (D) 9
67. Find $\angle ABC$, if $AB \parallel CD$ and $BC \parallel ED$, given $\angle CDE = 160^\circ$
- (A) 30° (B) 15° (C) 20° (D) 10°
68. Given $AB \parallel CD$ and EF is the transversal. If $\triangle AEF$ is equilateral, find $\angle DFG?$
- (A) 130° (B) 125° (C) 110° (D) 120°

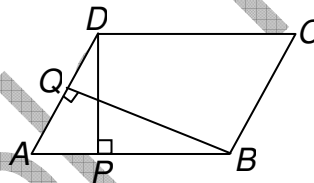
69. Find the value of x from figure in which $AB \parallel CD$.



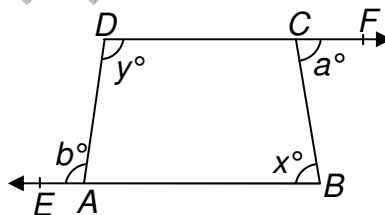
- (A) 110° (B) 140° (C) 130° (D) 120°
70. Two angles of a triangle are equal and the third angle is greater than each of these by 30° . Find the angles of the triangle.
- (A) $50^\circ, 50^\circ, 80^\circ$ (B) $60^\circ, 30^\circ, 90^\circ$ (C) $45^\circ, 45^\circ, 90^\circ$ (D) None of these
71. In the given figure, $\angle A = 62^\circ$, $\angle ABC = 54^\circ$. If BO and CO are the bisectors of $\angle B$ and $\angle C$, find $\angle BOC$.



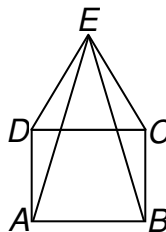
- (A) 121° (B) 120° (C) 123° (D) 125°
72. In the given figure, $ABCD$ is a parallelogram $DP \perp AB, BQ \perp AD$. If $DC = 14$ cm, $DP = 9$ cm and $BQ = 12$ cm. Find AD .



- (A) 10.6 (B) 10.4 (C) 10.7 (D) 10.5
73. The sides BA and DC of quadrilateral $ABCD$ are produced as shown in the figure below. Then $x + y =$

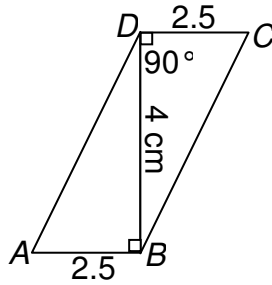


- (A) $a - b$ (B) $b - a$ (C) $a + b$ (D) a / b
74. $ABCD$ is a square and $\triangle EDC$ is an equilateral triangle. Then $\angle DAE$ is

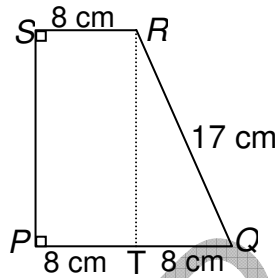


- (A) 15° (B) 14° (C) 16° (D) 13°

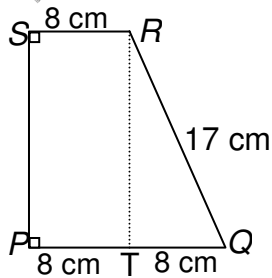
75. $ABCD$ is a quadrilateral and BD is one of its diagonals; as shown in the figure quadrilateral $ABCD$ is a parallelogram then find its area.



- (A) 10 sq. units (B) 9 sq. units (C) 11 sq. units (D) None of these
76. The area of a rhombus is 20 cm^2 . If one of its diagonals is 5 cm, the other diagonal is
- (A) 5 cm (B) 6 cm (C) 8 cm (D) 10 cm
77. The area of trapezium $PQRS$ in the adjoining figure is

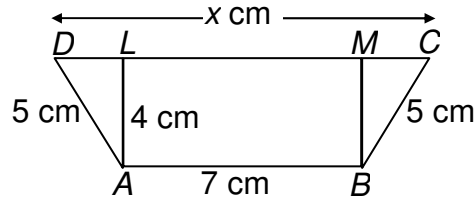


- (A) 112 cm^2 (B) 120 cm^2 (C) 160 cm^2 (D) 180 cm^2
78. The area of a trapezium whose parallel sides are 9 cm and 16 cm and the distance between these sides is 8 cm, is
- (A) 60 cm^2 (B) 72 cm^2 (C) 56 cm^2 (D) 100 cm^2
79. In $\triangle ABC$, D is the midpoint of AB . P is any point of BC . $CQ \parallel PD$ meets AB in Q . then $ar(\triangle BPQ)$ is equal to
- (A) $\frac{1}{3} ar(\triangle ABC)$ (B) $\frac{1}{2} ar(\triangle ABC)$ (C) $ar(\triangle ABC)$ (D) $2ar(\triangle ABC)$
80. The area of trapezium $PQRS$ is $k \text{ sq. cm}$. Then value of $(k / 18) - 2$ is



- (A) 10 (B) 8 (C) 6 (D) 12
81. D is the mid-point of side BC of $\triangle ABC$ and E is the mid-point of BD . If O is the mid-point of AE , then $ar(\triangle BOE) = \frac{1}{k} ar(\triangle ABC)$. Then k equals
- (A) 9 (B) 7 (C) 10 (D) 8

82. In the given figure, $ABCD$ is a trapezium in which $AB = 7$ cm, $AD = BC = 5$ cm, $DC = x$ cm, and distance between AB and DC is 4 cm. The area of trapezium $ABCD$ is l sq. cm. The value of $l/8$ is



- (A) 5 (B) 6 (C) 4 (D) 3
83. $\sin^2 \frac{\pi}{18} + \sin^2 \frac{\pi}{9} + \sin^2 \frac{7\pi}{18} + \sin^2 \frac{4\pi}{9} =$
 (A) 2 (B) 1 (C) 0 (D) $1/2$
84. $\tan 225^\circ \cdot \cot 405^\circ + \tan 765^\circ \cdot \cot 675^\circ =$
 (A) $1/\sqrt{2}$ (B) -1 (C) 0 (D) None of these
85. If A, B, C, D be the angles of a cyclic quadrilateral, taken in order, then $\cos(180^\circ - A) + \cos(180^\circ + B) + \cos(180^\circ + C) - \sin(90^\circ + D) =$
 (A) 0 (B) 1 (C) $1/2$ (D) None of these
86. If $\cos \theta = -\frac{1}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, find the value of $4 \tan^2 \theta - 3 \operatorname{cosec}^2 \theta$
 (A) 8 (B) 10 (C) 12 (D) 16
87. If $\sec \theta = \sqrt{2}$ and $\frac{3\pi}{2} < \theta < 2\pi$, find the value of $\frac{1 + \tan \theta + \operatorname{cosec} \theta}{1 + \cot \theta - \operatorname{cosec} \theta}$.
 (A) 1 (B) 0 (C) -1 (D) None of these
88. $\frac{1 - \sin A \cos A}{\cos A (\sec A - \operatorname{cosec} A)} \cdot \frac{\sin^2 A - \cos^2 A}{\sin^3 A + \cos^3 A} =$
 (A) $\sin A$ (B) $\sin A \cos A$ (C) $\frac{1}{\sin A \cos A}$ (D) $\cos A$
89. $3(\sin \theta - \cos \theta)^4 + 6(\sin \theta + \cos \theta)^2 + 4(\sin^6 \theta + \cos^6 \theta) - 13 =$
 (A) 0 (B) 1 (C) -1 (D) None of these
90. In $\triangle ABC$, $3\angle A = 2\angle B$ and $2\angle A = \angle C$. Find the angles of the triangle.
 (A) $30^\circ, 60^\circ, 90^\circ$ (B) $40^\circ, 60^\circ, 80^\circ$ (C) $45^\circ, 45^\circ, 90^\circ$ (D) None of these

□□□

Answer Key

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

□□□

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