Key Answer

Class: 9 **Subject : Mathematics** **9/21**

I.
1. C) 3
2. D) 27
3. C) Infinitely many solutions
4. A) AC = BD
5. D) 75°
6. B) $\frac{4}{3}\pi r^3$ cubic units
7. A) $\frac{2}{3}$
8. B) II

(8×1=8)

II. 9. $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ **(1)**

10. $p(x) = x - 5 = 0 \therefore x = 5$ **(1)**

11. Number of common points = 1 **(1)**

12. ar (ΔABC) = 2 × ar (ΔABD) **(½)**
$= 2 \times 30$
$= 60\ cm^2$ **(½)**

13. $PM = \frac{1}{2}PQ$ (∵ perpendicular drawn from the centre of circle to the chord bisects the chord)
$= \frac{1}{2} \times 6$ **(½)**
PM = 3 cm **(½)**

14. LSA of cube = $4a^2$ sq. units **(1)**

15. CSA of hemisphere = $2\pi r^2$
$= 2 \times \frac{22}{7} \times 7 \times 7$ **(½)**
$= 44 \times 7 = 308\ cm^2$ **(½)**

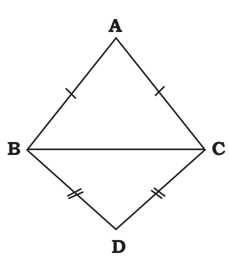
16. The point P(5, 2) is at a distance of 2 units from the x-axis. **(1)**

Note : Full marks can be given to the direct answers for the questions from 9 to 16.

III. 17. $x = 0.\bar{6} \therefore x = 0.6666......$
$10x = 6.6666.....$ **(½)** $10x - x = 6.0$ **(½)**
$9x = 6$ **(½)** $\therefore x = \frac{6}{9} \quad \therefore x = \frac{2}{3}$ **(½)**

18. $3y = ax + 7$
Since (3, 4) is a point on the graph of the equation,
$3(4) = a(3) + 7$ **(½)** $12 = 3a + 7$ **(½)**
$3a = 12 - 7$ **(½)** $3a = 5 \therefore a = \frac{5}{3}$ **(½)**

19.



$\angle ABC = \angle ACB$ – (1) (∵ angles opposite to equal sides are equal) **(½)**

$\angle DBC = \angle DCB$ – (2) (∵ angles opposite to equal sides are equal) **(½)**

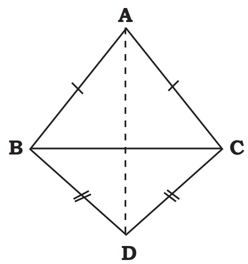
Adding equations (1) and (2)

$\angle ABC + \angle DBC = \angle ACB + \angle DCB$ **(½)**

$\angle ABD = \angle ACD$ **(½)**

P.T.O.

Alternate method :



Construction : Join AD

Proof : In ΔABD and ΔACD, **(½)**

AB = AC ($\because$ Given)

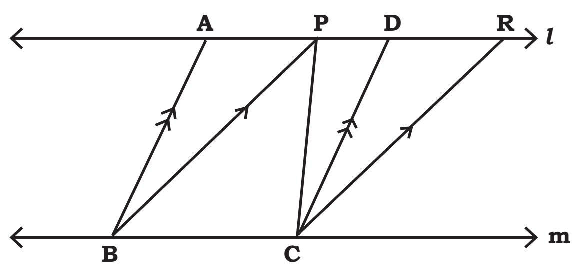
BD = DC ($\because$ Given)

AD = AD ($\because$ Common) **(1)**

$\therefore$ $\Delta ABD \cong \Delta ACD$ ($\because$ SSS)

$\angle ABD = \angle ACD$ ($\because$ CPCT) **(½)**

20.



ar (ΔCPR) = 24 cm^2, AD = 8 cm

Since BCRP and BCDA are parallelograms $\therefore$ BC = PR and BC = AD **(½)**

$\therefore$ ar (BCRP) = ar (ABCD) ($\because$ parallelograms are on equal bases and between same parallels)

$\therefore$ area (ABCD) = 2 × area (ΔCPR) **(½)**

= 2 × 24 = 48 cm^2 **(½)**

area (ABCD) = base × height $\therefore$ 48 = 8 × h $\therefore$ $h = \frac{48}{8}$ $\therefore$ h = 6 cm **(½)**

Note : Marks should be given to the correct alternative method.

21. $r = \frac{d}{2} = \frac{14}{2} = 7$ cm **(½)**

CSA of cone = πrl **(½)**

$= \frac{22}{\cancel{7}} \times \cancel{7} \times 25$ **(½)**

= 22 × 25 = 550 cm^2 **(½)**

22. r = 7 m

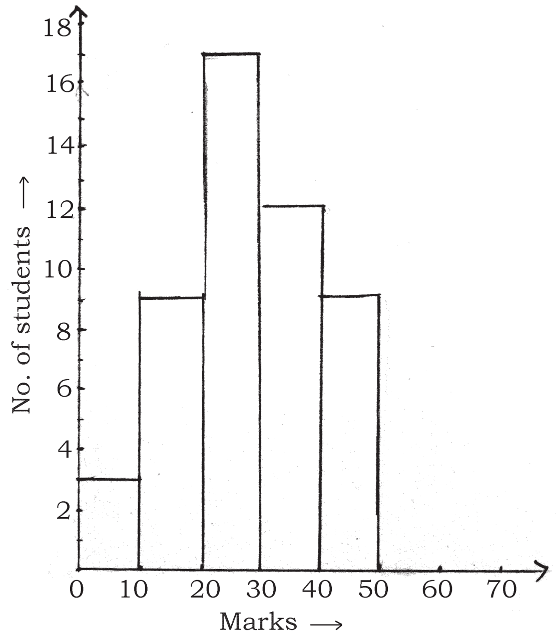
Area available for motor riding = CSA of sphere

CSA = $4\pi r^2$ **(1)**

$= 4 \times \frac{22}{\cancel{7}} \times 7 \times \cancel{7}$ **(½)**

= 88 × 7 = 616 m^2 **(½)**

23.



To draw x-axis and y-axis with suitable scale **(1)**
Construction of rectangles **(1)**

24. Probability that a student likes mathematics

$$= \frac{\text{Number of students who like mathematics}}{\text{Total number of students}}$$

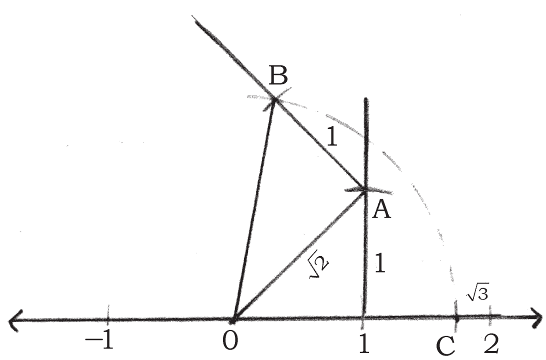
$$P(A) = \frac{135}{200}$$ **(1)**

Probability that a student does not like mathematics

$$= \frac{\text{Number of students who does not like mathematics}}{\text{Total number of students}}$$

$$P(B) = \frac{65}{200}$$ **(1)**

IV. 25.



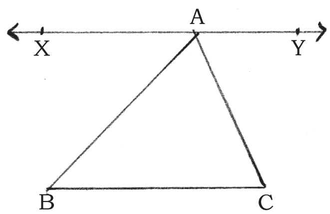
'C' represents $\sqrt{3}$

To draw $\sqrt{2}$ **(2)**

To locate $\sqrt{3}$ **(1)**

Note : Full marks should be given for correct alternate method.

26.



(½)

Data : ABC is a triangle. (½)

To prove : $\angle BAC + \angle ABC + \angle ACB = 180°$ (½)

Construction : Draw XY || BC passing through the point 'A'. (½)

Proof :

$\angle XAB = \angle ABC$ (1) [XY || BC, alternate angles]

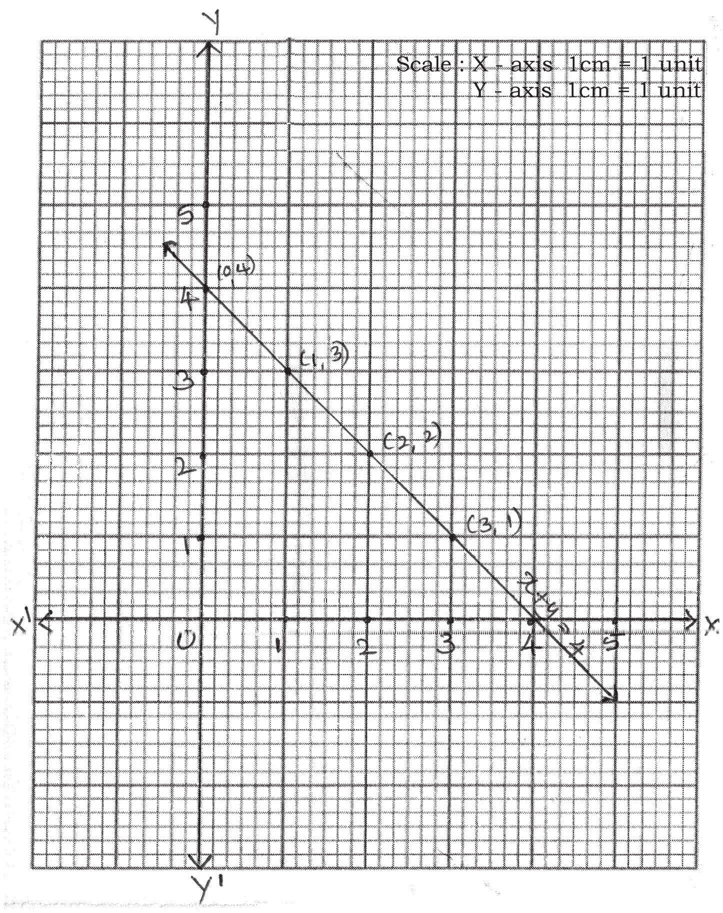
$\angle YAC = \angle ACB$ (2) [XY || BC, alternate angles] (½)

$\angle XAB + \angle BAC + \angle YAC = 180°$ ($\because$ XY is a straight line)

$\therefore \angle ABC + \angle BAC + \angle ACB = 180°$ ($\because$ from equation (1) and equation (2)) (½)

Hence proved.

27.



x + y = 4

x	0	1	2	3
y	4	3	2	1
(x, y)	(0,4)	(1, 3)	(2, 2)	(3, 1)

To draw x and y-axis with suitable scale (½) To write the table (1)

To mark the points (1) To draw the line x + y = 4 (½)

28. $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$ **(½)**

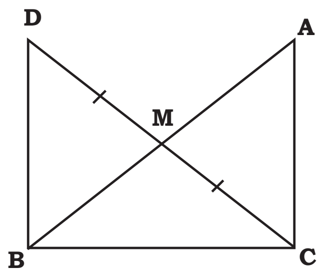
$27x^3 + y^3 + z^3 - 9xyz$

$= (3x)^3 + y^3 + z^3 - 3(3x)yz$ **(1)**

$= (3x + y + z)((3x)^2 + y^2 + z^2 - (3x)y - yz - (3x)z)$ **(½)**

$= (3x + y + z)(9x^2 + y^2 + z^2 - 3xy - yz - 3xz)$ **(1)**

29.



Data : $\angle C = 90°$, DM = CM and AM = BM

To prove : i) $\Delta AMC \cong \Delta BMD$ ii) $\angle DBC = 90°$

Proof : In ΔAMC and ΔBMD,

AM = BM (∵ Data)

$\angle AMC = \angle BMD$ (∵ vertically opp. angles)

CM = DM (∵ Data)

∴ $\Delta AMC \cong \Delta BMD$ (∵ SAS rule) **(2)**

∴ $\angle MAC = \angle MBD$ (∵ CPCT) **(½)**

⇒ AC || DM (∵ alternate angles equal) **(½)**

∴ $\angle DBC = \angle ACB = 90°$

30. The angles of quadrilateral are 3x, 5x, 9x and 13x. **(½)**

∴ $3x + 5x + 9x + 13x = 360°$ (∵ sum of four angles of quadrilateral) **(½)**

∴ $30x = 360°$ **(½)**

∴ $x = \frac{360°}{30}$

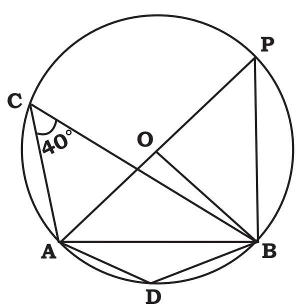
∴ $x = 12°$ **(½)**

∴ Angles of quadrilateral are

$3x = 3(12°) = 36°$, $5x = 5(12°) = 60°$,

$9x = 9(12°) = 108°$, $13x = 13(12°) = 156°$ **(1)**

31.



$\angle APB = \angle ACB$ (∵ Angles in the same segment)

∴ $\angle APB = 40°$ **(½)**

$\angle APB + \angle ADB = 180°$ (∵ ADBP is a cyclic quadrilateral) **(½)**

$40° + \angle ADB = 180°$

$\angle ADB = 180° - 40°$

$\angle ADB = 140°$ **(½)**

$\angle AOB = 2\angle APB$ ($\because$ Central angle is twice of the inscribed angle)

$\angle AOB = 2 \times 40°$

$\angle AOB = 80°$ **(½)**

In ΔOAB,

$\angle AOB + \angle OAB + \angle OBA = 180°$

$\angle AOB + 2\angle OAB = 180°$

$2\angle OAB = 180° - \angle AOB$

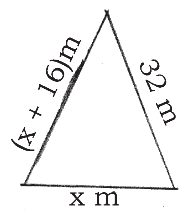
$= 180° - 80°$ **(½)**

$2\angle OAB = 100°$

$\angle OAB = \frac{100°}{2}$ **(½)**

$\angle OAB = 50°$

32.



Perimeter = 96 m

Let length of one side be 'x' m and other side will be (x + 16) m **(½)**

$\therefore$ x + x + 16 + 32 = 96

2x + 48 = 96

2x = 96 – 48

2x = 48

$x = \frac{48}{2}$

x = 24 m **(½)**

$\therefore$ sides of the triangle are 32 m, 24 m and 40m.

$\therefore S = \frac{a+b+c}{2} = \frac{32+24+40}{2} = \frac{96}{2} = 48$ m **(½)**

$\therefore$ Area of the triangular field

$= \sqrt{S(S-a)(S-b)(S-c)}$ **(½)**

$= \sqrt{48(48-32)(48-24)(48-40)}$

$= \sqrt{48(16)(24)(8)}$ **(½)**

$= \sqrt{16 \times 3 \times 16 \times 3 \times 8 \times 8}$

$= 3 \times 8 \times 16$

= 384 m^2 **(½)**

33. Arranging the goals scored by a team in ascending order,
we get 0, 1, 2, 3, 3, 3, 3, 4, 4, 5 **(½)**

$\text{Mean} = \frac{\text{Sum of the scores}}{\text{Number of scores}}$

$\bar{x} = \frac{\sum x}{N}$ **(½)**

$$\bar{x} = \frac{0+1+2+3+3+3+3+4+4+5}{10}$$

$= \frac{28}{10}$ **(½)**

$\bar{x} = 2.8$ **(½)**

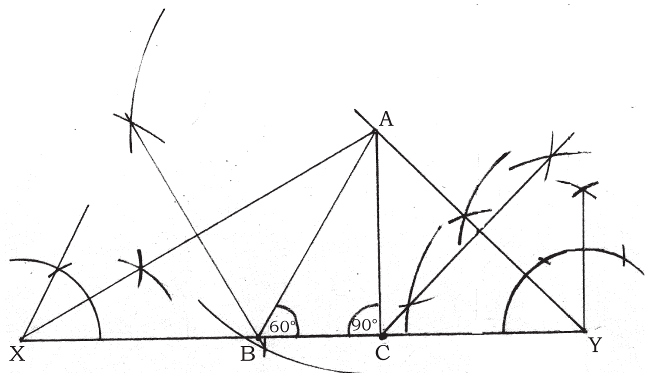
Median : Middle most score in a set of arranged score.

$\therefore$ Median $= \frac{3+3}{2}$ **(½)**

Median = 3

Mode = 3 **(½)**

V. 34.



To draw XY = 11 cm **(½)**

To construct 60° and 90° at X and Y **(1)**

To draw angular bisectors AX and AY **(1)**

To draw perpendicular bisectors to AX and AY **(1)**

To draw ΔABC **(½)**

35. $p(x) = x^2 - 13x + k$

since $(x - 4)$ is a factor of $p(x)$, $p(4) = 0$ **(½)**

$p(4) = 4^2 - 13(4) + k = 0$ **(½)**

$16 - 52 + k = 0$ **(½)**

$-36 + k = 0$ **(½)**

$k = 36$ **(½)**

$\therefore$ $p(x) = x^2 - 13x + k$

$= x^2 - 13x + 36$

$= \underline{x^2 - 9x} - \underline{4x + 36}$ **(½)**

$= x(x - 9) - 4(x - 9)$ **(½)**

$p(x) = (x - 9)(x - 4)$ **(½)**

$\therefore$ The other factor of $p(x)$ is $(x - 9)$

Note : Marks should be given to the correct alternate method.

36.

Class interval	Tallies	Frequency
0 – 5	~~IIII~~ ~~IIII~~	10
5 – 10	~~IIII~~ ~~IIII~~ III	13
10 – 15	~~IIII~~	05
15 – 20	II	02

(2)

Total 30

i) Two students watch T.V. for 15 or more hours. **(1)**

ii) Maximum number of students watch T.V. for 5 to 10 hours. **(1)**

37. Dimension of cuboid = 5 cm × 8 cm × 15 cm

Juice in cuboid packet = Volume of cuboid

$V = l \times b \times h$ **(½)**

$= 5 \times 8 \times 15$ **(½)**

$= 40 \times 15$

$V = 600\ cm^3$ **(½)**

Juice in cylindrical packet = Volume of cylinder

$V = \pi r^2 h$ **(½)**

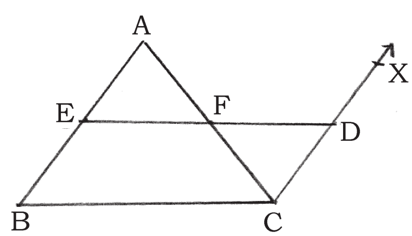
$= \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \frac{7}{\cancel{2}_{1}} \times \frac{\cancel{7}^{1}}{\cancel{2}_{1}} \times \cancel{16}^{8}$ **(½)**

$= 77 \times 8$ **(½)**

$V = 616\ cm^3$ **(½)**

Capacity of the cylindrical packet is more than cuboid. **(½)**

VI. 38. Mid-point theorem statement : "The line segment joining the mid-points of two sides of a triangle is parallel to the third side." **(1)**



(½)

Data : Points E and F are the mid-points of the sides AB and AC of ΔABC respectively. Join EF. **(½)**

To prove : EF || BC. **(½)**

Construction : Draw CX || BA, EF is produced to meet CX at D. **(½)**

Proof : In ΔAEF and ΔCDF,

$\angle AFE = \angle CFD$ (∵ vertically opp. angles)

AF = FC (∵ 'F' is mid-point of AC)

$\angle AEF = \angle CDF$ (∵ alternate angles)

BA || CX.

∴ ΔAEF ≅ ΔCDF (∵ ASA rule) **(1)**

∴ EF = DF (∵ CPCT)

AE = CD (∵ CPCT) **(½)**

But AE = BE (∵ Given)

∴ CD = BE also CD || BE

∴ BCDE is a parallelogram

∴ EF||BC (∵ ED || BC opp. sides of parallelogram) **(½)**

Hence proved