

SECTION - A (1 Mark Each)

1. a real number

2. $0.130130013000\dots$

NOTE: Any alternative method unless otherwise specified should be considered for full marks.

3. 2

4. -14

5. Exactly one

6. 144° 7. 360° 8. 40°

9. parallelogram

10. 60° 11. $\sin \theta \div \cos \theta = \tan \theta$

12. 27

13. $\frac{1}{49}$ 14. 40° 15. 80° 16. $80^\circ, 150^\circ$ 17. $\frac{\sqrt{3}}{2}$

18. 0

19. Assertion (As) is false but Reason (R) is true.

20. Both, Assertion (As) and Reason (R) are true.

Reason (R) explains Assertion (As) completely.

SECTION - B21. drawing the line seg and the extension — ($\frac{1}{2}$)finding the midpoint & drawing the semicircle — ($\frac{1}{2}$)constructing the $\perp$ as to find $\sqrt{3.7}$ — ($\frac{1}{2}$)marking $\sqrt{3.7}$ on the number line — ($\frac{1}{2}$)22. Let $x = 0.242424\dots$ — (i)

Multiply both sides by 100

 $100x = 24.2424\dots$ — (ii)— ($\frac{1}{2}$)

Subtracting (i) from (ii)

$$24.24 \dots - 0.2424 \dots \quad \text{--- } (1/2)$$

$$= 24 \quad \text{--- } (1/2)$$

$$= \frac{24}{99}$$

$$x = \frac{8}{33} \quad \text{OR}$$

$$\therefore 0.\overline{24} = \frac{8}{33} \quad \text{--- } (1/2)$$

23. $2x^2 - 7x - 15$

OR $4x^2 + 12x - 7$

$$= 2x^2 - 10x + 3x - 15 \quad \text{--- } (1)$$

$$= 4x^2 + 14x - 2x - 7 \quad \text{--- } (1)$$

$$= 2x(x-5) + 3(x-5) \quad \text{--- } (1/2)$$

$$= 2x(2x+7) - 1(2x+7) \quad \text{--- } (1/2)$$

$$= (x-5)(2x+3) \quad \text{--- } (1/2)$$

$$= (2x+7)(2x-1) \quad \text{--- } (1/2)$$

24. $81^{\frac{1}{2}} \times (64^{\frac{1}{3}} + 125^{\frac{1}{3}})$

$$= 9^{\frac{2 \times 1}{2}} \times (4^{\frac{3 \times 1}{3}} + 5^{\frac{3 \times 1}{3}}) \quad \text{--- } (1)$$

$$= 9 \times (4+5) \quad \text{--- } (1/2)$$

$$= 9 \times 9$$

$$= 9^2 = \underline{\underline{81}} \quad \text{--- } (1/2)$$

25. $x-1$ is the factor of $p(x) = 2x^3 - 3x^2 + 6x - 5$ if $p(1) = 0$

$$\therefore p(1) = 2(1)^3 - 3(1)^2 + 6(1) - 5 \quad \text{OR}$$

$$= 2 - 3 + 6 - 5 \quad \text{--- } (1/2)$$

$$= 0 \quad \text{--- } (1/2)$$

 $\therefore x-1$ is the factor of $2x^3 - 3x^2 + 6x - 5 \quad \text{--- } (1/2)$

$$\begin{aligned} 26. \quad 5x + x &= 180 \\ 6x &= 180 \\ x &= 30 \end{aligned} \quad \text{--- } (1)$$

$$\begin{aligned} x + y &= 180 \\ 30 + y &= 180 \\ y &= 180 - 30 = 150 \end{aligned}$$

$$\begin{aligned}
 27. & (3x - y + 2z)^2 \\
 &= (3x)^2 + (-y)^2 + (2z)^2 + 2(3x)(-y) + 2(-y)(2z) + 2(2z)(3x) \quad \text{--- (1)} \\
 &= 9x^2 + y^2 + 4z^2 - 6xy - 4yz + 12xz \quad \text{--- (1)}
 \end{aligned}$$

OR

$$\begin{aligned}
 & (102)^3 \quad \text{--- (1)} \\
 & (100 + 2)^3 \quad \text{--- (1/2)} \\
 &= 100^3 + 2^3 + 3(100)^2 \cdot 2 + 3(100) \cdot 2^2 \quad \text{--- (1/2)} \\
 &= 1000000 + 8 + 61200 \quad \text{--- (1/2)} \\
 &= 1061208 \quad \text{--- (1/2)}
 \end{aligned}$$

$$28 \quad PT = QT \text{ --- (i) given}$$

$$PT + PT = QT + PT \text{ adding PT both sides. --- (1/2)}$$

$$2PT = PQ \text{ --- (1/2)}$$

If equals are added to equals,
the wholes are equal --- Euclid's axiom

$$\frac{2PT}{2} = \frac{PQ}{2} \text{ --- dividing both sides by 2}$$

Things which are halves of the same
things are equal --- (1/2)

$$\therefore PT = \frac{1}{2} PQ \text{ --- (1/2)}$$

$$29. \text{ Proof: In } \triangle WPK \text{ and } \triangle YQZ$$

$$i) \angle WPK = \angle YQZ = 90^\circ \text{ --- } WP \perp YQ \text{ are lars (given) --- (1/2)}$$

$$ii) \angle WKP = \angle YQZ \text{ --- alternate angles are equal --- (1/2)}$$

(WXYZ is a $\parallel^m$)

$$iii) WK = YZ \text{ --- opp sides of } \parallel^m WXYZ \text{ --- (1/2)}$$

$$\therefore \triangle WPK \cong \triangle YQZ \text{ --- By AAS congruence rule --- (1/2)}$$

$$30. 3 \tan^2 30^\circ + 8 \sin^2 45^\circ$$

$$= 3 \times \left(\frac{1}{\sqrt{3}}\right)^2 + 8 \times \left(\frac{1}{\sqrt{2}}\right)^2 \quad \text{--- (1)}$$

$$= 3 \times \frac{1}{3} + 8 \times \frac{1}{2} \quad \text{--- (1/2)}$$

$$= 1 + 4$$

$$= 5 \quad \text{--- (1/2)}$$

21. Proof:

$$\angle 4 + \angle 3 + \angle 5 = 180^\circ \text{ --- (i) since AB is a line } \left(\frac{1}{2}\right)$$

Since $AB \parallel CD$

$$\begin{aligned} \angle 4 &= \angle 1 \\ \angle 5 &= \angle 2 \end{aligned} \quad \left. \begin{array}{l} \text{alternate angles are equal} \\ \left(\frac{1}{2}\right) + \left(\frac{1}{2}\right) \end{array} \right\}$$

$\therefore$ By subs in (i)

$$\angle 4 + \angle 3 + \angle 5 = 180^\circ$$

$$\therefore \angle 1 + \angle 3 + \angle 2 = 180^\circ \text{ --- } \left(\frac{1}{2}\right)$$

SECTION C

$$32. \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$$

$$= \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} \times \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} + \sqrt{3}} \text{ --- } \left(\frac{1}{2}\right)$$

$$= \frac{5 + \sqrt{15} + \sqrt{15} + 3}{5 - 3} \text{ --- } \left(\frac{1}{2}\right)$$

$$= \frac{8 + 2\sqrt{15}}{2} \text{ --- } \left(\frac{1}{2}\right)$$

$$= \frac{2(4 + \sqrt{15})}{2} \text{ --- } \left(\frac{1}{2}\right)$$

$$= 4 + \sqrt{15} \text{ --- } \left(\frac{1}{2}\right)$$

$$\therefore a = 4 \text{ and } b = 1 \text{ --- } (1)$$

$$33. \begin{array}{r} 2x^2 - 3x + 1 \\ x^2 - 2 \overline{) 2x^4 - 3x^3 - 3x^2 + 6x - 11} \\ \underline{2x^4} \quad \quad \quad \underline{+4x^2} \quad \quad \quad \left(\frac{1}{2}\right) \\ -3x^3 + 1x^2 + 6x - 11 \end{array}$$

$$\begin{array}{r} \underline{-3x^3} \quad \quad \quad \underline{+6x} \quad \quad \quad \left(\frac{1}{2}\right) \\ 1x^2 \quad \quad \quad -11 \end{array}$$

$$\begin{array}{r} \underline{-1x^2} \quad \quad \quad \underline{+2} \quad \quad \quad \left(\frac{1}{2}\right) \\ \quad \quad \quad -9 \end{array}$$

$$\therefore Q = 2x^2 - 3x + 1$$

$$\therefore R = -9 \text{ --- } \left(\frac{1}{2}\right)$$

$$34. i) \angle AED = 32^\circ \text{ ————— (1)}$$

$$ii) \angle DEF = 180 - (32 + 66)$$

$$= 180 - 98$$

$$= 82^\circ \text{ ————— (1)}$$

$$iii) \angle PDQ = 82^\circ \text{ — (1)}$$

OR

$$i) \angle ACB = 45^\circ \text{ ————— (1)}$$

$$ii) \angle FBC = 180 - (70 + 45)$$

$$= 180 - 115$$

$$= 65^\circ \text{ ————— (1)}$$

$$iii) \angle FAD = 65^\circ \text{ — (1)}$$

Proof:

35. In $\triangle YXB$ & $\triangle YZC$

$$i) \angle YXB = \angle YZC = 90^\circ - \text{given } YX \text{ and } YZ \text{ are } \perp \text{ to } PB \text{ \& } PC \text{ ————— (1/2)}$$

$$ii) XY = ZY \text{ — given}$$

$$iii) BY = CY \text{ — given}$$

$$\therefore \triangle YXB \cong \triangle YZC \text{ — By RHS congruence rule — (1/2) + (1/2)}$$

$$\therefore \angle B = \angle C \text{ — cpct ————— (1/2)}$$

$$\therefore PB = PC \text{ — sides opp to equal angles are equal (1/2)}$$

36. Proof: In $\triangle PQB$ and $\triangle PRA$

$$i) \angle P = \angle P \text{ — common angle ————— (1/2)}$$

$$ii) PQ = PR \text{ — given ————— (1/2)}$$

$$iii) \angle PQB = \angle PRA \text{ — given ————— (1/2)}$$

$$\therefore \triangle PQB \cong \triangle PRA \text{ — By ASA congruence rule — (1/2) + (1/2)}$$

$$\therefore QB = RA \text{ — cpct ————— (1/2)}$$

OR

Proof: In $\triangle POQ$ and $\triangle SOR$

i) $PO = SO$ - given (PS is bisected) - (1/2)

ii) $\angle POQ = \angle SOR$ - vertically opposite angles are equal - (1/2)

iii) $OQ = OR$ - given (RQ is bisected) - (1/2)

$\therefore \triangle POQ \cong \triangle SOR$ - By SAS congruence rule - (1/2)

$\therefore \angle OPQ = \angle OSR$ - alternate ^{cpct} $\angle$ s are equal - (1/2)

$\therefore PQ \parallel RS$ - (1/2)

37. In $\triangle ABC$

$AB = AC$, D & E are the midpoints of AB & AC

$AD = DB = 6.5 \text{ cm}$ - (1/2)

$\therefore AB = AD + DB = 6.5 + 6.5 = 13 \text{ cm}$

So $AC = 13 \text{ cm}$ - (1/2)

Since D & E are mid points of AB & AC

$\therefore DE \parallel BC$ & $DE = \frac{1}{2} BC$ - (1/2)

$4.5 = \frac{1}{2} BC$ - mid point th - (1/2)

$\therefore BC = 9 \text{ cm}$ - (1/2)

$\therefore P(\triangle ABC) = AB + AC + BC = 13 + 13 + 9 = 35 \text{ cm}$ - (1)

38. $AT = 24 \text{ cm}$, $MT = 25 \text{ cm}$

By Pyth th

$$MT^2 = AT^2 + MA^2$$

$$25^2 = 24^2 + MA^2 \quad \text{--- (1/2)}$$

$$625 - 576 = MA^2$$

$$49 = MA^2$$

$$MA = 7 \text{ cm} \quad \text{--- (1/2)}$$

$$\text{ii) } \cos M = \frac{MA}{MT} = \frac{7}{25} \quad \text{--- (1)} \quad \text{iii) } \tan T = \frac{7}{24} \quad \text{--- (1)}$$

39. In $\triangle ABL$

$$\angle BAL + \angle ALB + \angle B = 180^\circ \quad \text{--- (1/2)}$$

$$\angle BAL + 90^\circ + \angle B = 180^\circ$$

$$\angle BAL + \angle B = 90^\circ \quad \text{--- (1/2)}$$

$$\angle BAL = 90^\circ - \angle B \quad \text{--- (i) --- (1/2)}$$

In $\triangle ABC$

$$\angle A + \angle B + \angle ACB = 180^\circ \quad \text{--- (1/2)}$$

$$90^\circ + \angle B + \angle ACB = 180^\circ$$

$$\angle B + \angle ACB = 90^\circ \quad \text{--- (1/2)}$$

$$\angle ACB = 90^\circ - \angle B \quad \text{--- (ii) --- (1/2)}$$

from (i) + (ii)

$$\therefore \angle BAL = \angle ACB \quad \text{--- (1/2)}$$

40. In $\triangle ABQ$ and $\triangle CDP$

$$\text{i) } \angle ABQ = \angle CDP = 90^\circ \quad \text{--- given } AB \perp BD \text{ + } CD \perp BD \quad \text{--- (1/2)}$$

$$\text{ii) } AQ = CP \quad \text{--- given --- (1/2)}$$

$$\text{iii) } BP + PQ = DP + PQ \quad \therefore BP = DP \quad (PQ \text{ --- common}) \quad \text{--- (1/2)}$$

$$\therefore BQ = DP$$

$$\therefore \triangle ABQ \cong \triangle CDP \quad \text{--- By RHS congruence rule --- (1/2) + (1/2)}$$

41. Proof: In $\triangle ADC$, E is the mid point of AD

$$\left. \begin{array}{l} EG \parallel DC \quad \therefore G \text{ is the mid point of AC} \\ \therefore EG = \frac{1}{2} DC \quad \text{--- By mid point th --- (i)} \end{array} \right\} \text{--- (1)}$$

In $\triangle ABC$, F is the mid point of BC + $\therefore G$ is the mid point of AC

$$\therefore GF = \frac{1}{2} AB \quad \text{--- By mid point th --- (ii) --- (1)}$$

Adding (i) + (ii)

$$EG + GF = \frac{1}{2} DC + \frac{1}{2} AB$$

$$\therefore EF = \frac{1}{2} (DC + AB) \quad \text{--- (1)}$$

42. Let $p(x) = x^3 - 6x^2 + 11x - 6$

$\therefore$ all the factors of -6 are $\pm 1, \pm 2, \pm 3$ & ± 6

By trial

$$p(1) = 1^3 - 6(1)^2 + 11(1) - 6 \quad \text{--- } (1/2)$$

$$= 1 - 6 + 11 - 6$$

$$= 0$$

$\therefore (x-1)$ is the factor of $p(x)$ --- $(1/2)$

$$\begin{array}{r}
 x^2 - 5x + 6 \\
 x-1 \overline{) x^3 - 6x^2 + 11x - 6} \\
 \underline{x^3 - x^2} \\
 -5x^2 + 11x - 6 \\
 \underline{-5x^2 + 5x} \\
 6x - 6 \\
 \underline{6x - 6} \\
 0
 \end{array}
 \quad \left. \begin{array}{l} \text{--- } (1/2) \\ \text{--- } (1/2) \\ \text{--- } (1/2) \end{array} \right\}$$

$$\therefore p(x) = (x-1)(x^2 - 5x + 6) \quad \text{--- } (1/2)$$

$$= (x-1)(x^2 - 3x - 2x + 6) \quad \left. \begin{array}{l} \text{--- } (1/2) \\ \text{OR} \end{array} \right\}$$

$$= (x-1)(x(x-3) - 2(x-3)) \quad \text{--- } (1/2)$$

$$= (x-1)(x-3)(x-2) \quad \text{--- } (1/2)$$

43. In $\triangle ABC$ —

$$AB = AC$$

$\therefore \angle ACB = \angle ABC$ — (i) angles opp to equal sides are equal — (1)

$$AB = AD$$

$$AD = AC$$

$\therefore \angle ACD = \angle ADC$ — (ii) angles opp to equal sides are equal — (1)

Adding (i) and (ii)

$$\angle ACB + \angle ACD = \angle ABC + \angle ADC$$

$$\angle BCD = \angle ABC + \angle ADC \quad \text{————— (1/2)}$$

~~Add~~ Adding $\angle BCD$ both sides

$$\angle BCD + \angle BCD = \angle ABC + \angle ADC + \angle BCD \quad \text{————— (1/2)}$$

$$2 \angle BCD = 180^\circ \quad \text{— Angle sum property —}$$

$$\angle BCD = \frac{180}{2} \quad \text{————— (1/2)}$$

$$\angle BCD = 90^\circ$$

Q.No	SET -- A	SET -- B	SET -- C	SET -- D
1	a real number	144°	$\sin \theta \div \cos \theta = \tan \theta$	$80^\circ, 150^\circ$
2	0.130130013000....	360°	27	$\frac{\sqrt{3}}{2}$
3	2	40°	$\frac{1}{49}$	0
4	-14	parallelogram	40°	Assertion(A) is false but Reason (R) is true.
5	Exactly one	60°	80°	Both, Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely.
6	144°	$\sin \theta \div \cos \theta = \tan \theta$	$80^\circ, 150^\circ$	a real number
7	360°	27	$\frac{\sqrt{3}}{2}$	0.130130013000....
8	40°	$\frac{1}{49}$	0	2
9	parallelogram	40°	Assertion(A) is false but Reason (R) is true.	-14
10	60°	80°	Both, Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely.	Exactly one
11	$\sin \theta \div \cos \theta = \tan \theta$	$80^\circ, 150^\circ$	a real number	144°
12	27	$\frac{\sqrt{3}}{2}$	0.130130013000....	360°
13	$\frac{1}{49}$	0	2	40°
14	40°	Assertion(A) is false but Reason (R) is true.	-14	parallelogram
15	80°	Both, Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely.	Exactly one	60°
16	$80^\circ, 150^\circ$	a real number	144°	$\sin \theta \div \cos \theta = \tan \theta$
17	$\frac{\sqrt{3}}{2}$	0.130130013000....	360°	27
18	0	2	40°	$\frac{1}{49}$
19	Assertion(A) is false but Reason (R) is true.	-14	parallelogram	40°
20	Both, Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely.	Exactly one	60°	80°