

ANSWER KEY

MATHEMATICS - SEMESTER - I (2026)

Section A: (1mk)

infinitely many rational numbers

2. 6

3. x

4. -8

5. exactly one

6. 90°

7. 90°

8. 65°

9. every rectangle is a parallelogram

10. 45°

11. 4

12. 27

13. $(5-2x)(5+2x)$

14. 20°

15. 120°

16. 48°

17. 1

18. 0

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

20. Both, Assertion (A) and Reason (R) are true. Reason (R) explains Assertion (A) completely.

Section - B (2 Marks)

21. drawing the line seg and the extension ——— (1/2)
 finding the midpoint & drawing the semicircle ——— (1/2)
 constructing the tan to find $\sqrt{5.6}$ ——— (1/2)
 marking $\sqrt{5.6}$ on the number line ——— (1/2)

22. Let $x = 0.727272\ldots$ (i) ——— (1/2)

Multiply both sides by 100

$100x = 72.7272\ldots$ — (ii) ——— (1/2)

subtracting (i) from (ii)

$100x - x = 72.7272\ldots - 0.7272\ldots$

$99x = 72$ ——— (1/2)

$x = \frac{72}{99}$

$x = \frac{8}{11}$

$\therefore 0.\overline{72} = \frac{8}{11}$ ——— (1/2)

23. $2x^2 + 11x - 21$

OR

$10x^2 - 9x - 7$

$= 2x^2 + 14x - 3x - 21$ — (1)

$= 10x^2 - 14x + 5x - 7$ — (1)

$= 2x(x+7) - 3(x+7)$ — (1/2)

$= 2x(5x-7) + 1(5x-7)$ — (1/2)

$= (x+7)(2x-3)$ — (1/2)

$= (5x-7)(2x+1)$ — (1/2)

24. $27^{-\frac{1}{3}} \left(27^{\frac{2}{3}} - 27^{\frac{1}{3}} \right)$

$= 3^{3 \times (-\frac{1}{3})} \left(3^{3 \times \frac{2}{3}} - 3^{3 \times \frac{1}{3}} \right)$ — (1)

$= 3^{-1} (3^2 - 3)$

$= \frac{1}{3} \times 6$ — (1/2)

$= 2$ — (1/2)

25. Since $(x+1)$ is the factor of $p(x) = 4x^3 - 3x^2 + 5x + k$

$$\therefore p(-1) = 0$$

$$\therefore 4(-1)^3 - 3(-1)^2 + 5(-1) + k = 0$$

$$-4 - 3 - 5 + k = 0$$

$$\therefore k = \underline{12}$$

— $(\frac{1}{2})$
— $(\frac{1}{2})$
— $(\frac{1}{2})$
— $(\frac{1}{2})$

26. $x = 75^\circ$ and $y = 105^\circ \leftarrow (1+1)$

27. $(2x-y)^3$
 $= (2x)^3 - 3(2x)^2(y) + 3(2x)y^2 - y^3 \leftarrow (1)$
 $= 8x^3 - 12x^2y + 6xy^2 - y^3 \leftarrow (1)$

OR

$$101 \times 104$$

$$= (100+1)(100+4) \leftarrow (\frac{1}{2})$$

$$= 100^2 + (1+4)100 + 1(4) \leftarrow (1)$$

$$= \underline{10504} \leftarrow (\frac{1}{2})$$

28. Proof: $AB = DC$ - given $\leftarrow (\frac{1}{2})$

i) $AB + BC = DC + BC$ - if equals are added to equals the wholes are equal $\leftarrow (\frac{1}{2})$

ii) But $AB + BC = AC$ &
 $BC + BC = BD$ $\leftarrow (\frac{1}{2})$

iii) $\therefore AC = BD$ - Things which coincide with one another are equal to one another $\leftarrow (\frac{1}{2})$

~~20~~ $5 \tan^2 45^\circ \times 2 \cos^2 60^\circ$
 $= 5 \times 1^2 \times 2 \times (\frac{1}{2})^2 \leftarrow (1)$
 $= 5 \times 1 \times \frac{1}{2} \leftarrow (\frac{1}{2})$
 $= \frac{5}{2} \leftarrow (\frac{1}{2})$
 $=$

29. Proof: In $\triangle DEF$ & $\triangle FGD$

i) $\angle EFD = \angle GFD$ - alt angles (since $DEFG$ is a $\parallel gm$) $\leftarrow (\frac{1}{2})$

ii) $DF = DF$ - common side $\leftarrow (\frac{1}{2})$

iii) $\angle EDF = \angle GFD$ - alt angles $\leftarrow (\frac{1}{2})$

$\therefore \triangle DEF \cong \triangle FGD$ - By ASA congruence rule $\leftarrow (\frac{1}{2})$

Proof: i) $\angle POR + \angle QOR = 180^\circ$ - linear pair (ray OR stands on line PQ) - (i) $\rightarrow (1/2)$

ii) $\angle QOR + \angle QOS = 180^\circ$ - linear pair (ray OQ stands on line RS) - (ii) $\rightarrow (1/2)$

from (i) + (ii)

$$\angle POR + \angle QOR = \angle QOR + \angle QOS \quad \rightarrow (1/2)$$

$$\therefore \angle POR = \angle QOS \quad \rightarrow (1/2)$$

(SECTION C - 3 Marks)

$$a = 2 + \sqrt{3}$$

$$\therefore a = \frac{1}{a}$$

$$= (2 + \sqrt{3}) - \frac{1}{(2 + \sqrt{3})} \quad \rightarrow (1/2)$$

$$(2 + \sqrt{3}) - \frac{1}{(2 + \sqrt{3})} \times \frac{(2 - \sqrt{3})}{(2 - \sqrt{3})} \quad \rightarrow (1/2)$$

$$(2 + \sqrt{3}) - \frac{(2 - \sqrt{3})}{2^2 - (\sqrt{3})^2} \quad \rightarrow (1/2)$$

$$= (2 + \sqrt{3}) - \frac{(2 - \sqrt{3})}{4 - 3} \quad \rightarrow (1/2)$$

$$= \frac{(2 + \sqrt{3}) - (2 - \sqrt{3})}{2 + \sqrt{3} - 2 + \sqrt{3}} \quad \rightarrow (1/2)$$

$$= \frac{2\sqrt{3}}{2\sqrt{3}} \quad \rightarrow (1/2)$$

$$33. \quad \frac{4x^2 + 7x + 3}{x-1} \leftarrow (1/2)$$

$$x-1 \overline{) 4x^3 + 3x^2 - 4x - 11} \leftarrow (1/2)$$

$$\underline{4x^3 - 4x^2}$$

$$7x^2 - 4x - 11 \leftarrow (1/2)$$

$$\underline{7x^2 - 7x}$$

$$3x - 11 \leftarrow (1/2)$$

$$\underline{3x - 3}$$

$$-8$$

$$\therefore Q = 4x^2 + 7x + 3 \leftarrow (1/2)$$

$$R = -8 \quad \leftarrow (1/2)$$

34. i) $\angle BFE = 35^\circ$ — (1)	OR i) $\angle QTB = 25^\circ$ — (1)
ii) $\angle CFG = 180 - (35 + 48)$ $= 97^\circ$ — (1)	ii) $\angle PQT = 25 + 38$ $= 63^\circ$ — (1)
iii) $\angle BCF = 97^\circ$ — (1)	iii) $\angle RQT = 63^\circ$ — (1)

35. Proof: In $\triangle PRS$, $PR = PS$
 $\therefore \angle PRS = \angle PSR$ — angles opp to equal sides are equal — (1/2)
 $180 - \angle PRS = 180 - \angle PSR$
 $\therefore \angle PRQ = \angle PST$ — (i) — (1/2)

In $\triangle PRQ$ & $\triangle PST$

i) $\angle QPR = \angle TPS$ — given	— (1/2)
ii) $PR = PS$ — given	— (1/2)
iii) $\angle PRQ = \angle PST$ — from (i)	— (1/2)
$\therefore \triangle PRQ \cong \triangle PST$ By ASA congruence rule — (1/2)	

36. Proof: In $\triangle ABC$ & $\triangle DEF$

$AD = CF$ — given	— (1/2)
$\therefore AD + CD = CD + CF$	— (1/2)
$\therefore AC = DF$ — (i)	

In $\triangle ABC$ & $\triangle DEF$

i) $AB = DE$ — given	— (1/2)
ii) $\angle BAC = \angle EDF$ — given	— (1/2)
iii) $AC = DF$ — from (i)	— (1/2)
$\therefore \triangle ABC \cong \triangle DEF$ — By SAS congruence rule — (1/2)	

OR

Proof: In $\triangle BLD$ & $\triangle CMD$

$$i) \angle BLD = \angle CMD = 90^\circ - \text{BL \& CM are lars (given)} \quad \text{--- (1/2)}$$

$$ii) \angle LDB = \angle MDC - \text{vertically opposite Ls} \quad \text{--- (1/2)}$$

$$iii) BD = CD - D \text{ is the midpoint of BC (given)} \quad \text{--- (1/2)}$$

$$\therefore \triangle BLD \cong \triangle CMD - \text{By AAS congruence rule} \quad \text{--- (1)}$$

$$\therefore BL = CM - \text{cpct} \quad \text{--- (1/2)}$$

In $\triangle XYZ$; L, M & N are the mid points of

sides XY, XZ and YZ } (1/2)

 $\therefore$ By Mid point th

$$i) MN = \frac{1}{2} XY$$

$$= \frac{1}{2} \times 5.4$$

$$= \underline{2.7 \text{ cm}} \quad \text{--- (1/2)}$$

$$ii) LM = \frac{1}{2} YZ$$

$$= \frac{1}{2} \times 6.6$$

$$= \underline{3.3 \text{ cm}} \quad \text{--- (1/2)}$$

$$iii) LN = \frac{1}{2} XZ$$

$$= \frac{1}{2} \times 4.8$$

$$= \underline{2.4 \text{ cm}} \quad \text{--- (1/2)}$$

$$\therefore P(\triangle LMN) = MN + LM + LN$$

$$= 2.7 + 3.3 + 2.4 \quad \text{--- (1/2)}$$

$$= \underline{8.4 \text{ cm}} \quad \text{--- (1/2)}$$

$$38. PN = 15 \text{ cm}, AN = 9 \text{ cm}$$

i) $\therefore$ By Pyth th

$$PN^2 = PA^2 + AN^2$$

$$15^2 = PA^2 + 9^2$$

$$225 - 81 = PA^2$$

$$PA^2 = 144$$

$$PA = 12 \text{ cm} \quad \leftarrow (1)$$

$$ii) \sin N = \frac{PA}{PN} = \frac{12}{15} = \frac{4}{5} \quad \leftarrow (1)$$

$$iii) \tan P = \frac{AN}{PA} = \frac{9}{12} = \frac{3}{4} \quad \leftarrow (1)$$

39. i) $\angle A = 70^\circ$ (alt $\angle$ s) ——— (1)

ii) In $\triangle ABC$

$$70 + 60 + \angle ACB = 180$$

$$\angle ACB = 50$$

$$\therefore \angle OCB = \frac{1}{2} \times 50 = 25^\circ \text{ ——— (1)}$$

iii) In $\triangle OBC$

$$30 + 25 + \angle BOC = 180$$

$$\angle BOC = 125^\circ \text{ ——— (1)}$$

40. Proof: In $\triangle AMC$ & $\triangle BMD$

i) $AM = BM$ — M is the ^{mid} point of AB (given) ——— (1/2)

ii) $\angle AMC = \angle BMD$ — vertically opposite $\angle$ s ——— (1/2)

iii) $\angle CAM = \angle DBM$ — alternate angles ——— (1/2)

$$\therefore \triangle AMC \cong \triangle BMD \text{ — By ASA congruence rule — (1/2)}$$

$$\therefore CM = DM$$

$\therefore M$ is the mid point of CD .

$$\left. \begin{array}{l} \text{————— (1/2)} \\ \text{————— (1/2)} \end{array} \right\}$$

41. Proof: In $\triangle YZX$

$$\left. \begin{array}{l} C \text{ is the mid point of } YZ \text{ and } B \text{ is the mid point of } XY \\ \therefore CB \parallel ZX \\ + CB = \frac{1}{2} ZX \end{array} \right\} \text{ By mid point theorem — (i)} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{ (1)}$$

In $\triangle ZWX$

$$\left. \begin{array}{l} D \text{ is the mid point of } ZW \text{ and } A \text{ is the mid point of } WX \\ \therefore DA \parallel ZX \\ + DA = \frac{1}{2} ZX \end{array} \right\} \text{ By mid point theorem — (ii)} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{ (1)}$$

(PTO....)

∴ from (i) + (ii)

$$CB = DA$$

$$4 \quad CB \parallel DA$$

Since one pair of opposite sides are equal and parallel

□ ABCD is a parallelogram.

42. Let $p(x) = x^3 - 6x^2 + 3x + 10$

∴ factors of 10 are $\pm 1, \pm 2, \pm 5$ & ± 10 ——— (1/2)

By trial

$$p(-1) = (-1)^3 - 6(-1)^2 + 3(-1) + 10$$

$$= -1 - 6 - 3 + 10$$

$$= 0$$

∴ $(x+1)$ is the factor of $p(x) = x^3 - 6x^2 + 3x + 10$ ——— (1/2)

$$\begin{array}{r} x^2 - 7x + 10 \\ x+1 \overline{) x^3 - 6x^2 + 3x + 10} \\ \underline{x^3 + x^2} \end{array} \quad \text{] (1/2)}$$

$$\begin{array}{r} -7x^2 + 3x + 10 \\ -7x^2 - 7x \\ \hline 10x + 10 \end{array} \quad \text{] (1/2)}$$

$$\begin{array}{r} 10x + 10 \\ 10x + 10 \\ \hline 0 \end{array} \quad \text{] (1/2)}$$

$$\therefore p(x) = (x+1)(x^2 - 7x + 10) \quad \text{————— (1/2)}$$

$$= (x+1)(x^2 - 5x - 2x + 10) \quad \text{————— (1/2)}$$

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

43. Proof: In $\triangle APB$ & $\triangle APC$

i) $BP = CP$ - given

ii) $\angle APB = \angle APC = 90^\circ$ - given

iii) $AP = AP$ - common side — $(\frac{1}{2})$

$\therefore \triangle APB \cong \triangle APC$ - By SAS congruence rule — (1)

$\therefore AB = AC$ - cpct — (i) — $(\frac{1}{2})$

In $\triangle ADB$ & $\triangle AEC$

i) $BD = CE$ - given.

ii) $\angle D = \angle E = 90^\circ$ - given

iii) $AB = AC$ - from above (i)

$\therefore \triangle ADB \cong \triangle AEC$ - By RHS congruence rule — (1)

$\therefore AD = AE$ - cpct. — $(\frac{1}{2})$