10^{th} STD. Common Quarterly Examination - 2019

Mathematics (With Answers)

Time : 2.30 Hours] [Maximum Marks : 100

Introductions :

(a) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(b) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams

PART - I

Note : (i) Answer all the 14 questions **[14 × 1 = 14]**

(ii) Choose the most suitable answer from the given **four** correct alternatives and write the option code with the corresponding answer.

(iii) Each Question carries 1 mark.

1. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is

(a) linear (b) cubic
(c) reciprocal (d) quadratic

2. If $n(A) = p$ and $n(B) = q$ then $n(A\times B) =$ _______

(a) $p+q$ (b) $p-q$
(c) $p\times q$ (d) $\frac{p}{q}$

3. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is

(a) 3 (b) 5 (c) 6 (d) 8

4. $y^2 + \frac{1}{y^2}$ is not equal to

(a) $\frac{y^4+1}{y^2}$ (b) $\left(y+\frac{1}{y}\right)^2$
(c) $\left(y-\frac{1}{y}\right)^2+2$ (d) $\left(y+\frac{1}{y}\right)^2-2$

5. Product of the roots of the quadratic equation $x^2 + 3x = 0$

(a) –3 (b) 3 (c) 0 (d) 1

6. $7^{4k} \equiv$ _____ (mod 100)

(a) 1 (b) 2 (c) 3 (d) 4

7. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$ is

(a) $\frac{1}{24}$ (b) $\frac{1}{27}$ (c) $\frac{2}{3}$ (d) $\frac{1}{81}$

8. A sequence is a function defined on the set of _____.

(a) Real numbers (b) Natural numbers
(c) Whole numbers (d) Integers

9. In ΔLMN, $\angle L = 60°$, $\angle M = 50°$. if $\Delta LMN \sim \Delta PQR$ then the value of $\angle R$ is

(a) 40° (b) 70° (c) 30° (d) 110°

10. If in ΔABC, DE || BC, AB = 3.6 cm, AC = 2.4 cm and AD = 2.1 cm then the length of AE is

(a) 1.4 cm (b) 1.8 cm
(c) 1.2 cm (d) 1.05 cm

11. The area of triangle formed by the points (–5,0) (0, –5) and (5,0) is

(a) 0 sq.units (b) 25 sq.units
(c) 5 sq.units (d) none of these

12. The inclination of a line whose slope = 1 is

(a) 0° (b) 30° (c) 45° (d) 60°

13. $\tan\theta \csc^2\theta - \tan\theta$ is equal to

(1) $\sec\theta$ (2) $\cot^2\theta$
(3) $\sin\theta$ (4) $\cot\theta$

14. The range of the data 8, 8, 8, 8, 8. . . 8 is

(1) 0 (2) 1
(3) 8 (4) 3

Section - II

(i) Answer any **TEN** questions.
(ii) Question number **20** is compulsory.
(iii) Each question carries 2 marks

10 × 2 = 20

15. If $B\times A=\{(-2, 3),(-2, 4),(0, 3),(0, 4),(3, 3),(3, 4)\}$ find A and B.

16. A relation 'f' is defined by $f(x) = x^2-2$ where, $x \in \{-2,-1,0, 3\}$ (i) List the elements of f (ii) Is f a function?

17. Find the greatest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.

18. Which term of the A.P. 16, 11, 6, 1,... is –54 ?

19. Reduce the rational expressions $\frac{x^2-16}{x^2+8x+16}$ to its lowest form

20. Determine the quadratic equations, whose sum and product of roots are $\frac{-3}{2}$ and –1.

21. If ΔABC is similar to ΔDEF such that BC = 3 cm, EF = 4 cm and area of $\Delta ABC = 54\ cm^2$. Find the area of ΔDEF.

22. Prove that $\frac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$

23. The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the coefficient of variation.

24. What is the slope of a line whose inclination is 30°?

25. The line through the points $(-2, a)$ and (9, 3) has slope $-\frac{1}{2}$. Find the value of a.

26. Let A = {1,2,3,4,5}, B = W and f: A→B is defined by $f(x) = x^2 -1$ find the range of f.

27. If a clock strikes once at 1 o'clock, twice at 2 o'clock, thrice at 3 o'clock and so on, how many times will it strike in a day?

28. Find the zeros of the quadratic expression $x^2 + 2x - 143$.

Section - III

(i) Answer any **TEN** questions.
(ii) Question number **42** is compulsory.

10 × 5 = 50

29. Given A ={1, 2, 3}, B = {2, 3, 5}, C = {3, 4} and D = {1, 3, 5}, check if $(A\cap C) \times (B\cap D) = (A\times B)\cap (C \times D)$ is true?

30. If $f(x) = 3x-2$, $g(x) = 2x + k$ and if $fog = gof$, then find the value of k.

31. The sum of first n, $2n$ and $3n$ terms of an A.P. are S_1, S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$

32. Find the sum of the following series

$6^2 + 7^2 + 8^2 + ... + 21^2$

33. Find the GCD of the given polynomials

$3x^4 + 6x^3 - 12x^2 - 24x,\ 4x^4 + 14x^3 + 8x^2 - 8x$

34. Find the square root of the expression

$$\frac{x^2}{y^2}-10\frac{x}{y}+27-10\frac{y}{x}+\frac{y^2}{x^2}$$

35. State and prove angle bisector theorem.

36. If the points A(–3, 9) , B(a, b) and C(4,–5) are collinear and if $a + b = 1$, then find a and b.

37. Using slope concept, show that the points(1,–4), (2, –3) and (4, –7) form a right angled triangle.

38. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \text{cosec}\,\theta = q$ then prove that $q(p^2 - 1) = 2p$

39. The time taken (in minutes) to complete a homework by 8 students in a day are given by 38, 40, 47, 44, 46, 43, 49, 53. Find the coefficient of variation.

40. The number of books read by 8 students during a month are 2,5,8,11,14,6,12 and 10. Calculate the standard deviation of the data.

41. Solve the quadratic equation $5x^2 - 6x - 2 = 0$ by completing the square method.

42. If the 4th and 7th term of Geometric Progression are 54 and 1458 respectively, find the Geometric Progression.

Section - IV

Answer *all* questions. **2 × 8 = 16**

43. (a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR.

(OR)

(b) In ΔABC, if DE || BC, AD = x, DB = x–2, AE = x + 2 and EC = x – 1then find the length of the sides AB and AC.

44. **(a)** Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$.

(OR)

(b) Solve $\frac{1}{3}(x + y - 5) = y - z = 2x - 11 = 9 - (x + 2z)$.

ANSWERS

PART - I

1. (d) quadratic
2. (c) $p \times q$
3. (b) 5
4. (b) $\left(y+\frac{1}{y}\right)^2$
5. (c) 0
6. (a) 1
7. (b) $\frac{1}{27}$
8. (b) Natural numbers
9. (b) 70°
10. (a) 1.4 cm
11. (b) 25 sq.units
12. (c) 45°
13. (4) cot θ
14. (1) 0

PART - II

15. Solution :

$B \times A = \{(-2, 3), (-2, 4), (0, 3), (0, 4), (3, 3), (3, 4)\}$

$A = \{3, 4), B = \{ -2, 0, 3\}$

16. Solution :

$f(x) = x^2 - 2$ where $x \in \{-2,- 1,0,3\}$

(i) $f(-2) = (-2)^2 - 2 = 2;$

$f(-1) = (-1)2 - 2 = -1$

$f(0) = 0^2 - 2 = -2$

$f(3) = 3^2 - 2 = 9 - 2 = 7$

$\therefore f = \{(-2, 2), (-1, -1), (0, -2), (3,7)\}$

(ii) We note that each element in the domain of f has a unique image. Therefore f is a function.

17. Solution :

Since the remainders are 4, 5 respectively the required number is the HCF of the number 445–4 = 441, 572 – 5 = 567.

Hence, we will determine the HCF of 441 and 567. Using Euclid's Division algorithm,

We have

$567 = 441 \times 1 + 126$

$441 = 126 \times 3 + 63$

$126 = 63 \times 2 + 0$

Therefore HCF of 441, 567 = 63 and so the required number is 63.

18. Solution :

A.P = 16, 11, 6, 1, . . .

It is given that

$t_n = -54$

$a = 16, d = t_2 - t_1 = 11 - 16 = -5$

$\therefore t_n = a + (n-1)d$

$-54 = 16 + (n-1)(-5)$

$-54 = 16 - 5n + 5$

$21 - 5n = -54$

$-5n = -54 - 21$

$-5n = -75$

$n = \frac{75}{5} = 15$

∴ 15th term is –54.

19. Solution :

$$\frac{x^2-16}{x^2+8x+16} = \frac{(x+4)(x-4)}{(x+4)^2} = \frac{x-4}{x+4}$$

20. Solution :

Sum of the roots $= \frac{-3}{2}$

$\alpha+\beta = \frac{-3}{2}$

Product of the roots $(\alpha\beta) = (-1)$

Required equation $= x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$$x^2 - \left(\frac{-3}{2}\right)x - 1 = 0$$

$$2x^2 + 3x - 2 = 0$$

21. Solution : Since the ratio of area of two similar triangles is equal to the ratio of the squares of any two corresponding sides, we have

$$\frac{\text{Area}(\Delta ABC)}{\text{Area}(\Delta DEF)} = \frac{BC^2}{EF^2}$$

gives $\frac{54}{\text{Area}(\Delta DEF)} = \frac{3^2}{4^2}$

$$\text{Area }(\Delta DEF) = \frac{16\times 54}{9} = 96 \text{ cm}^2$$

22. Solution :

$$\text{L.H.S} = \frac{\cos\theta}{1+\sin\theta}$$

(Multiplying Numerator and denominator by $(1-\sin\theta)$)

$$= \frac{\cos\theta}{1+\sin\theta}\times\frac{1-\sin\theta}{1-\sin\theta} = \frac{\cos\theta-\cos\theta\sin\theta}{1-\sin^2\theta}$$

$$= \frac{\cos\theta-\cos\theta\sin\theta}{\cos^2\theta} = \frac{1}{\cos\theta}-\frac{\sin\theta}{\cos\theta}$$

$= \sec\theta - \tan\theta =$ R.H.S

23. Solution :

Co-efficient of variation C.V $= \frac{\sigma}{\bar{x}}\times 100$

$\sigma = 6.5, \bar{x} = 12.5$

$\therefore$ C.V $= \frac{6.5}{12.5}\times 100\%$

$= 52\%$.

24. Solution :

Here $\theta = 30°$

slope $m = \tan\theta$

$\therefore$ slope $m = \tan 30° = \frac{1}{\sqrt{3}}$

25. Solution : A line joining the points $(-2, a)$ and $(9, 3)$ has slope $m = \frac{-1}{2}$.

$$m = \frac{y_2-y_1}{x_2-x_1} = \frac{3-a}{9-(-2)} = \frac{-1}{2}$$

$2(3-a) = -1\ (11) \Rightarrow -2a = -11-6 = -17$

$a = \frac{17}{2}$.

26. Solution : $f(1) = 0$; $f(2) = 3$; $f(3) = 8$; $f(4) = 15$; $f(5) = 24$

Range of $f = \{0,3,8,15,24\}$

27. Solution :

$S_n = 2(1+2+3+.........+12) = 2\left(\frac{12}{2}(1+12)\right)$

Number of times clock strikes in a day = 156 times.

28. Solution :

$P(x) = (x+13)(x-11)$

$P(-13) = 0; P(11) = 0$

Zeros of $P(x)$ are -13 and 11

PART - III

29. Solution :

LHS $= (A\cap C)\times(B\cap D)$

$A\cap C = \{3\}$

$B\cap D = \{3, 5\}$

$(A\cap C)\times(B\cap D) = \{(3, 3)\ (3, 5)\}$ ...(1)

RHS $= (A\times B)\cap(C\times D)$

$A\times B = \{(1, 2), (1, 3), (1, 5), (2, 2), (2, 3), (2, 5), (3, 2), \underline{(3, 3)}, \underline{(3, 5)}\}$

$C\times D = \{(3, 1), \underline{(3, 3)}, \underline{(3, 5)}, (4, 1), (4, 3), (4, 5)\}$

$(A\times B)\cap(C\times D) = \{(3, 3), (3, 5)\}$ ...(2)

$\therefore (1) = (2)$ $\therefore$ It is true.

30. Solution :

$f(x) = 3x-2,\ g(x) = 2x+k$

$fog(x) = f(g(x)) = f(2x+k)$

$= 3(2x+k)-2 = 6x+3k-2$

Thus, $fog(x) = 6x+3k-2$

$gof(x) = g(3x-2) = 2(3x-2)+k$

Thus, $gof(x) = 6x - 4 + k$

Given that $fog = gof$

$\therefore \quad 6x + 3k - 2 = 6x - 4 + k$

$6x - 6x + 3k - k = -4 + 2 \Rightarrow k = -1$

31. Solution :

If S_1, S_2 and S_3 are sum of first n, $2n$ and $3n$ terms of A.P. respectively then

$$S_1 = \frac{n}{2}[2a+(n-1)d], \quad S_2 = \frac{2n}{2}[2a+(2n-1)d]$$

$$S_3 = \frac{3n}{2}[2a+(3n-1)d]$$

Consider

$$S_2 - S_1 = \frac{2n}{2}[2a+(2n-1)d] - \frac{n}{2}[2a+(n-1)d]$$

$$= \frac{n}{2}[[4a+2(2n-1)d]-[2a+(n-1)d]]$$

$$S_2 - S_1 = \frac{n}{2}\times[2a+(3n-1)d]$$

$$3(S_2 - S_1) = \frac{3n}{2}\times[2a+(3n-1)d]$$

$$3(S_2 - S_1) = S_3$$

32. Solution :

$6^2 + 7^2 + 8^2 + \ldots + 21^2$

$= (1^2 + 2^2 + \ldots + 21^2) - (1^2 + 2^2 + \ldots + 5^2)$

$$= \sum_{1}^{21} n^2 - \sum_{1}^{5} n^2$$

$$= \left(\frac{n(n+1)(2n+1)}{6}\right)_{n=21} - \left(\frac{n(n+1)(2n+1)}{6}\right)_{n=5}$$

$$= \left(\frac{\cancel{21}^{7} \times \cancel{22}^{11} \times 43}{\cancel{6}_{2}}\right) - \left(\frac{5\times\cancel{6}\times 11}{\cancel{6}}\right)$$

$= 3311 - 55$

$= 3256$

33. Solution :

$3x^4 + 6x^3 - 12x^2 - 24x,\ 4x^4 + 14x^3 + 8x^2 - 8x$

$4x^4 + 14x^3 + 8x^2 - 8x = 2\,(2x^4 + 7x^3 + 4x^2 - 4x)$

Let us divide

$2x^4 + 7x^3 + 4x^2 - 4x$ by $x^4 + 2x^3 - 4x^2 - 8x$

$$\begin{array}{r|l} & 2 \\ \hline x^4 + 2x^3 - 4x^2 - 8x & 2x^4 + 7x^3 + 4x^2 - 4x \\ & 2x^4 + 4x^3 - 8x^2 - 16x \\ & (-)\quad (-)\quad (+)\quad (+) \\ \hline & 3x^3 + 12x^2 + 12x \div 3 \end{array}$$

$(x^3 + 4x^2 + 4x) \neq 0$

Now let us divide

$x^4 + 2x^3 - 4x^2 - 8x$ by $x^3 + 4x^2 + 4x$

$$\begin{array}{r|l} & x-2 \\ \hline x^3 + 4x^2 + 4x & x^4 + 2x^3 - 4x^2 - 8x \\ & x^4 + 4x^3 + 4x^2 \\ & (-)\quad (-)\quad (-) \\ \hline & -2x^3 - 8x^2 - 8x \\ & -2x^3 - 8x^2 - 8x \\ & (+)\quad (+)\quad (+) \\ \hline & 0 \end{array}$$

$\therefore x^3 + 4x^2 + 4x$ is the G.C.D of

$3x^4 + 6x^3 - 12x^2 - 24x,\ 4x^4 + 14x^3 + 8x^2 - 8x$

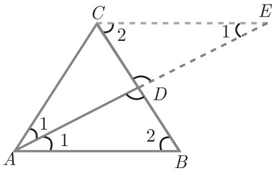
$\therefore$ Ans $x\,(x^2 + 4x + 4)$

34. Solution :

$$\begin{array}{r|l} & \frac{x}{y} - 5 + \frac{y}{x} \\ \hline \frac{x}{y} & \frac{x^2}{y^2} - 10\frac{x}{y} + 27 - 10\frac{y}{x} + \frac{y^2}{x^2} \\ & \frac{x^2}{y^2} \\ & (-) \\ \hline 2\frac{x}{y} - 5 & -10\frac{x}{y} + 27 \\ & -10\frac{x}{y} + 25 \\ & (+)\quad (-) \\ \hline 2\frac{x}{y} - 10 + \frac{y}{x} & 2 - 10\frac{y}{x} + \frac{y^2}{x^2} \\ & 2 - 10\frac{y}{x} + \frac{y^2}{x^2} \\ & (-)(+)\quad (-) \\ \hline & 0 \end{array}$$

$$\therefore \sqrt{\frac{x^2}{y^2} - 10\frac{x}{y} + 27 - 10\frac{y}{x} + \frac{y^2}{x^2}} = \left|\frac{x}{y} - 5 + \frac{y}{x}\right|$$

35. Solution :



Statement

The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.

Proof

Given : In ΔABC, AD is the internal bisector

To prove : $\frac{AB}{AC} = \frac{BD}{CD}$

Construction : Draw a line through C parallel to AB. Extend AD to meet line through C at E

No	Statement	Reason
1.	∠AEC = ∠BAE = ∠1	Two parallel lines cut by a transversal make alternate angles equal.
2.	Δ ACE is isosceles AC = CE....(1)	In Δ ACE, ∠CAE = ∠CEA
3.	ΔABD ~ ΔECD $\frac{AB}{CE} = \frac{BD}{CD}$	By AA Similarity
4.	$\frac{AB}{AC} = \frac{BD}{CD}$	From (1) AC =CE. Hence proved.

36. Solution :

$$\begin{array}{ccc} A(-3, 9), & B(a, b) & C(4, -5), \\ \downarrow & \downarrow & \downarrow \\ (x_1, y_1) & (x_2, y_2) & (x_3, y_3) \end{array}$$

are collinear points, $a + b = 1$ (given)

∴ Area of the Δ

$$= \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_4 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix} \text{ sq. units}$$

$$= \frac{1}{2}\begin{vmatrix} -3 & a & 4 & -3 \\ 9 & b & -5 & 9 \end{vmatrix} = 0$$

(∵ points are collinear)

$$(-3b - 5a + 36) - (9a + 4b + 15) = 0$$

$$(-3b - 4b) + (-5a - 9a) + (36 - 15) = 0$$

$$-7b - 14a = -21$$

$$-7(b + 2a) = -21$$

$$b + 2a = 3$$

$$(b + a) + a = 3$$

$$1 + a = 3$$

$$a = 2 \Rightarrow b = 1 - 2 = -1$$

$$\boxed{\begin{array}{l} a = 2 \\ b = -1 \end{array}}$$

37. Solution :

Let the given points be A(1,-4) , B(2,-3) and C(4,-7) .

The slope of AB $= \frac{-3+4}{2-1} = \frac{1}{1} = 1$

The slope of BC $= \frac{-7+3}{4-2} = \frac{-4}{2} = -2$

The slope of AC $= \frac{-7+4}{4-1} = \frac{-3}{3} = -1$

Slope of AB × slope of AC = (1)(–1) = –1

AB is perpendicular to AC. ∠A = 90°

∴ Δ ABC is a right angled triangle.

38. Solution :

$$p = \sin\theta + \cos\theta$$

$$p^2 = \underbrace{\sin^2\theta + \cos^2\theta}_{1} + 2\sin\theta\cos\theta$$

$$p^2 - 1 = 2\sin\theta\cos\theta$$

$$q = \sec\theta + \operatorname{cosec}\theta = \frac{1}{\cos\theta} + \frac{1}{\sin\theta}$$

$$= \frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta}$$

$$\therefore \text{ L.H.S } q(p^2 - 1) = \frac{\sin\theta + \cos\theta}{\cancel{\sin\theta\cos\theta}} \times 2\cancel{\sin\theta\cos\theta}$$

$$= 2(\sin\theta + \cos\theta)$$

$$= 2p = \text{R.H.S}$$

39. Mean $= \bar{x} = \frac{\Sigma x}{n}$

$$= \frac{38 + 40 + 47 + 44 + 46 + 43 + 49 + 53}{8}$$

$$= \frac{360}{8}$$

$$= 45$$

$$\sigma = \sqrt{\frac{\Sigma d^2}{n}} = \sqrt{\frac{164}{8}} = \sqrt{20.5}$$
$$= 4.53$$

Co-efficient of variation

$$\text{C.V.} = \frac{\sigma}{\bar{x}}\times 100 = \frac{4.53}{45}\times 100 = 10.07\%$$

x	$d = x - \bar{x}$	d^2
38	–7	49
40	–5	25
47	2	4
44	–1	1
46	1	1
43	–2	4
49	4	16
53	8	64
360	0	164

40. $\Sigma x = 68$; $\Sigma x^2 = 690$

$$\sigma = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$$

$$\sigma = \sqrt{14} \cong 3.74$$

41. $x^2 - 2\left(\frac{3}{5}\right)x =$

$$x^2 - 2\left(\frac{3}{5}\right)x + \frac{9}{25} = \frac{9}{25} + \frac{2}{5}$$

$$\left(x - \frac{3}{5}\right)^2 = \frac{19}{25}$$

$$x - \frac{3}{5} = \pm\frac{\sqrt{19}}{5}$$

$$x = \frac{3+\sqrt{19}}{5} ; x = \frac{3-\sqrt{19}}{5}$$

42. $ar^3 = 54$; $ar^6 = 1458$

$$\frac{ar^6}{ar^3} = \frac{1458}{54}$$

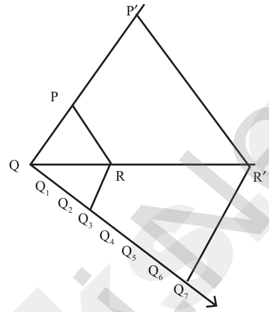
$r = 3; \Rightarrow a = 2$

Required G.P is 2,6,18,54,.........

PART - IV

43. (a) Solution :

Given a triangle ΔPQR. We have to construct another triangle whose sides are $\frac{7}{3}$ of the corresponding sides of the given ΔPQR.



Steps of construction:

(1) Draw any ray QX making an acute angle with QR on the opposite side to the vertex P.

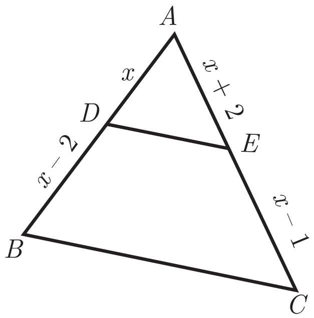
(2) Locate 7 points (the greater of 7 and 3 in $\frac{7}{3}$) Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, and Q_7 so that $QQ_1 = Q_1Q_2 = Q_2Q_3 = Q_3Q_4 = Q_4Q_5 = Q_5Q_6 = Q_6Q_7$

(3) Join Q_3 to R and draw a line segment through Q_7 parallel to Q_3R intersecting the extended line segment QR at R′.

(4) Draw a line segment through R′ parallel to PR intersecting the extended line segment QP at P′.

Then ΔP′QR′ is the required triangle each of whose sides is $\frac{7}{3}$ of the corresponding sides of the given triangle.

(b) Solution :



In ΔABC we have DE||BC.

By Thales theorem, we have $\frac{AD}{DB} = \frac{AE}{EC}$

$\frac{x}{x-2} = \frac{x+2}{x-1}$ gives $x(x-1) = (x-2)(x+2)$

Hence, $x^2 - x = x^2 - 4$ so, $x = 4$

When $x = 4$, AD = 4, DB = $x - 2 = 2$,

AE = $x + 2 = 6$, EC = $x - 1 = 3$.

Hence, AB = AD + DB = 4 + 2 = 6,

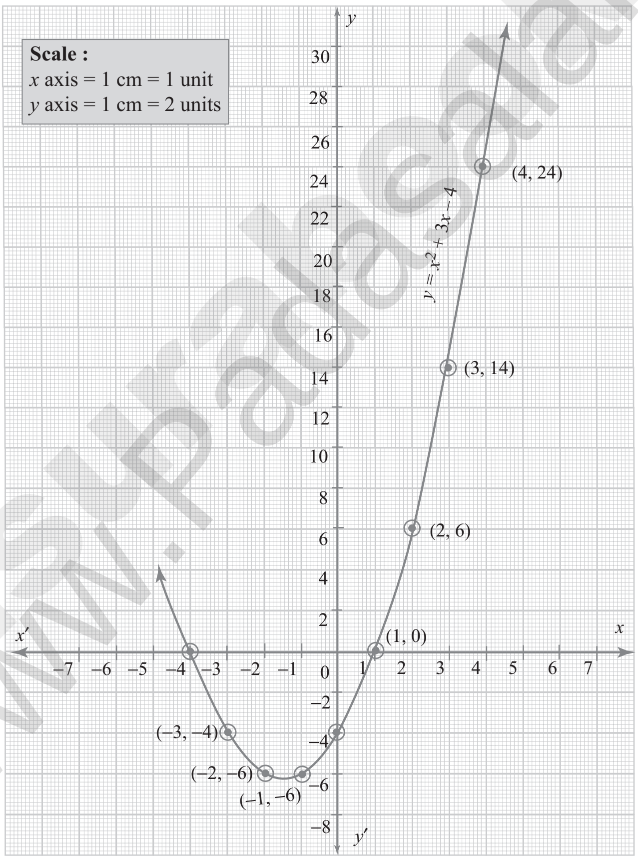
AC = AE + EC = 6 + 3 = 9.

Therefore, AB = 6, AC = 9.

44. **(a) Solution :**

x	–4	–3	–2	–1	0	1	2	3	4
x^2	16	9	4	1	0	1	4	9	16
$3x$	–12	–9	–6	–3	0	3	6	9	12
–4	–4	–4	–4	–4	–4	–4	–4	–4	–4
$y = x^2 + 3x - 4$	0	–4	–6	–6	–4	0	6	14	24

Draw the parabola using the points (–4, 0), (–3, –4), (–2, –6), (–1, –6), (0, –4), (1, 0), (2, 6), (3, 14), (4, 24).



To solve: $x^2 + 3x - 4 = 0$ subtract $x^2 + 3x - 4 = 0$ from $y = x^2 + 3x - 4$

$$y = x^2 + 3x - 4$$
$$0 = x^2 + 3x - 4$$
$$(-)\ (-)\ (+)$$

$y = 0$ is the equation of the x axis.

The points of intersection of the parabola with the x axis are the points (–4, 0) and (1, 0), whose x - co-ordinates (–4, 1) is the solution, set for the equation $x^2 + 3x - 4 = 0$.

(OR)

(b) Given

A B C D

$\frac{1}{3}(x + y - 5) = y - z = 2x - 11 = 9 - (x + 2z)$

From A & B, $\frac{1}{3}(x + y - 5) = y - z$

$\Rightarrow x + y - 5 = 3y - 3z \Rightarrow x - 2y + 3z = 5$ ....(1)

From B & C, $y - z = 2x - 11$

$\Rightarrow 2x - y + z = 11$ ....(2)

From C & D, $2x - 11 = 9 - x - 2z$

$\Rightarrow 3x + 2z = 20$ ....(3)

(1) $\rightarrow$ $x - 2y + 3z = 5$

(2) × 2 $\rightarrow$ $4x - 2y + 2z = 22$

(–) (+) (–) (–)

$-3x + z = -17$ ....(4)

(3) $\rightarrow$ $3x + 2z = 20$

$3z = 3 \Rightarrow z = 1$

$\therefore$ (3) becomes, $3x + 2 = 20 \Rightarrow 3x = 20 - 2 = 18$

$x = \frac{18}{3} = 6$

$\therefore$ (1) becomes, $6 - 2y + 3(1) = 5 \Rightarrow 9 - 2y = 5$

$\Rightarrow 9 - 5 = 2y \Rightarrow 2y = 4$

$\therefore y = \frac{4}{2} = 2$

$\therefore$ Solution set is {6, 2, 1}.

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