WAY TO SUCCESS PUBLICATIONS

Quaterly Exam - 2019 - 10^{th} Maths

ANSWER KEY

Part-I

1. d) quadratic Ex. 1.6 15
2. c) $p \times q$ Note page 3
3. b) 5 Ex. 3.19 3
4. b) $(y + \frac{1}{y})^2$ Ex. 3.19 5
5. c) 0 Ex. 3.9 - 2 (ii)
6. a) 1 Ex. 2.10 6
7. b) $\frac{1}{27}$ Ex. 2.10 13
8. b) Natural numbers Progress check 2 pg 54
9. b) 70° Ex. 4.2 2
10. b) 1.4 cm Ex. 4.5 6
11. b) 25 sq. units Ex. 5.5 1
12. c) 45° Ex. 5.2 2 (ii)
13. d) $\cot\theta$ Ex. 6.5 2
14. a) 0 Ex. 8.5 2

Part-II

15. $B = \{-2, 0, 3\}$ Ex. 1.1. 3

$A = \{3, 4\}$

16. (i) $f(-2) = 2$, $f(-1) = -1$

$f(0) = -2$, $f(3) = 7$ Eg 1.7

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

(ii) Each element in the domain of f has a unique image

$\therefore$ f is a function

17. $445 - 4 = 441$ Eg 2.5

$572 - 5 = 567$.

we will determine HCF of 441 and 567.

using Euclid's Division Algorithm

$567 = 441 \times 1 + 126$

$441 = 126 \times 3 + 63$

$126 = 63 \times 2 + 0$, $HCF(441, 567) = 63$

$\therefore$ Required number $= 63$

18. $a = 16$, $d = -5$ Ex. 2.5 5

$t_{15} = -54$

19. Eg 3.13 $\frac{x^2 - 16}{x^2 + 8x + 16} = \frac{(x+4)(x-4)}{(x+4)^2} = \frac{(x-4)}{(x+4)}$

20. $\alpha + \beta = -\frac{3}{2}$, $\alpha\beta = -1$ Ex. 3.9 1 (iii)

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

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

21. $\frac{\text{Area}(\Delta ABC)}{\text{Area}(\Delta DEF)} = \frac{BC^2}{EF^2}$ Eg 4.8

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

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

22. $\frac{\cos\theta}{1+\sin\theta} = \frac{\cos\theta}{1+\sin\theta} \times \frac{1-\sin\theta}{1-\sin\theta}$ Ex. 6.1 2 (ii)

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

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

$= \sec\theta - \tan\theta$

23. $\sigma = 6.5,\ \bar{x} = 12.5,$ Ex. 8.2 (1)

$C.V = \frac{\sigma}{\bar{x}} \times 100\%$

$= \frac{6.5}{12.5} \times 100\%$

$= 52\%$

24. $\theta = 30^\circ$ Eg 5.8 (i)

$m = \tan\theta$

$m = \tan 30^\circ = 1/\sqrt{3}$

25. $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-a}{9-(-2)} = \frac{3-a}{11}$

Ex. 5.2 (7)

$\frac{3-a}{11} = -\frac{1}{2}$ (given)

$2(3-a) = -11$

$a = 17/2$

26. $A = \{1, 2, 3, 4, 5\}$

$B = W = \{0, 1, 2 \ldots\}$ Creative

$f : A \to B$

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

$f(1) = 1^2 - 1 = 0$

$f(2) = 2^2 - 1 = 3$

$f(3) = 3^2 - 1 = 8$

$f(4) = 4^2 - 1 = 15$

$f(5) = 5^2 - 1 = 24$

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

27. Number of times the clock strikes each hour form an AP

The first 12 hours, the arithmetic series

$1 + 2 + 3 + \cdots + 12$ Creative

$S_n = \frac{n}{2}[a + l]$

$S_{12} = \frac{12}{2}[1 + 12] = 6 \times 13 = 78$

∴ The clock strikes in a day [24 hrs]

$= 2 \times 78 = 156$ times.

28. $x^2 + 2x - 143 = 0$ Creative

$(x+13)(x-11) = 0$

-143: $+13$, -11; 2

$x = 13,\ x = 11$

Part - III

29. $A \cap C = \{2, 3\}$ Ex. 1.1 (5)

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

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

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

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

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

From (1), (2)

$(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$ is true

30. $f(x) = 3x - 2$ Eg 1.22

$g(x) = 2x + k$

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

$f \circ g(x) = 6x + 3k - 2$

$g(f(x)) = 6x - 4 + k$

$g \circ f(x) = 6x - 4 + k$

given that $f \circ g = g \circ f$

$6x + 3k - 2 = 6x - 4 + k$

$\Rightarrow k = -1$

31. $S_1 = \frac{n}{2}[2a + (n-1)d]$, Eg 2.39

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

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

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

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

$3(S_2 - S_1) = S_3$

32. $6^2+7^2+8^2+\cdots+21^2$

Ex. 2.9 (1)

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

$$\boxed{1^2+2^2+\cdots+n^2 = \frac{n(n+1)(2n+1)}{6}}$$

$= \frac{21(21+1)(2(21)+1)}{6} - \frac{5(5+1)(2(5)+1)}{6}$

$= 3311 - 55$

$= 3256$

33. $f(x) = 3x^4+6x^3-12x^2-24x$

Ex. 3.2 1 (iii)

$f(x) = 3x[x^3+2x^2-4x-8] \rightarrow (1)$

$g(x) = 4x^4+14x^3+8x^2-8x$

$g(x) = 2x[2x^3+7x^2+4x-4] \rightarrow (2)$

GCD of 3 and 2 is 1

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

3 is not a divisor of $g(x)$

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

$\therefore$ GCD of $f(x)$ and $g(x)$ is

$x[x^2+4x+4]$

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

Ex. 3.8 (2)

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

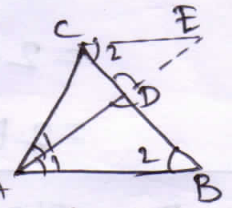
$\therefore \sqrt{\frac{x^2}{y^2} - \frac{10y}{x} + 27 - \frac{10y}{x} + \frac{y^2}{x^2}}$

$= \left| \frac{x}{y} - 5 + \frac{y}{x} \right|$

35. 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

Theorem (3) pg 170

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

$\angle AEC = \angle BAE = \angle 1$.

ΔACE is isosceles $\Rightarrow AC = CE \rightarrow (1)$

$\Delta ABD \sim \Delta ECD$

$\frac{AB}{CE} = \frac{BD}{CD}$

$\therefore \frac{AB}{AC} = \frac{BD}{CD}$ (From (1))

Hence Proved

36. $\frac{1}{2}\begin{bmatrix} -3 & 9 & 4 & -3 \\ 9 & b & -5 & 9 \end{bmatrix} = 0$

Ex.5.1 (8)

$2a+b=3 \longrightarrow (1)$

$a+b=-1$ (given) $\longrightarrow (2)$

From (1), (2)

$\boxed{a=2}$

sub $a=2$ in (2) $\boxed{b=-1}$

37. $A(1,-4)$, $B(2,-3)$, $C(4,-7)$

Eg 5.15

Slope of AB = 1

Slope of BC = −2

Slope of AC = −1

Slope of AB × Slope of AC

$= (1)(-1) = -1$

∴ AB is Perpendicular to AC

$\angle A = 90°$

∴ ΔABC is a right angled triangle

38. $P = \sin\theta + \cos\theta$

Ex.6.1 9(i)

$q = \sec\theta + \mathrm{cosec}\,\theta$

$q(p^2-1) = (\sec\theta + \mathrm{cosec}\,\theta).$

$((\sin\theta+\cos\theta)^2 - 1)$

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

$= 2P$

39. $\bar{x} = \frac{360}{8} = 45$

Ex.8.2 (6)

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

$\Sigma d^2 = 164$

$\sigma = \sqrt{\frac{\Sigma d^2}{n}} = \sqrt{\frac{164}{8}} = 4.527$

$C.V = \frac{\sigma}{\bar{x}} \times 100\%$.

$= \frac{4.528}{45} \times 100\%$.

$= 10.06\%$

40.

creative

x	x^2
2	4
5	25
6	36
8	64
10	100
11	121
12	144
14	196
$\Sigma x = 68$	$\Sigma x^2 = 690$

$n = 8$

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

$= \sqrt{\frac{690}{8} - \left(\frac{68}{8}\right)^2}$

$= \sqrt{86.25 - (8.5)^2}$

$= \sqrt{14}$

$\simeq 3.74$

41. $5x^2 - 6x - 2 = 0$

Creative

$x^2 - \frac{6}{5}x - \frac{2}{5} = 0$

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

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

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

$x - \frac{3}{5} = \pm\sqrt{19/25}$

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

The solution $\left\{\frac{3+\sqrt{19}}{5}, \frac{3-\sqrt{19}}{5}\right\}$

42. $t_4 = 54$, $t_7 = 1458$

Creative

$t_n = ar^{n-1}$

$\frac{t_7}{t_4} = \frac{ar^6}{ar^3} = \frac{1458}{54} \Rightarrow r^3 = 27 \Rightarrow r = 3$

$ar^3 = 54 \Rightarrow a(3)^3 = 54 \Rightarrow a = 2$

Hence, the required G.P

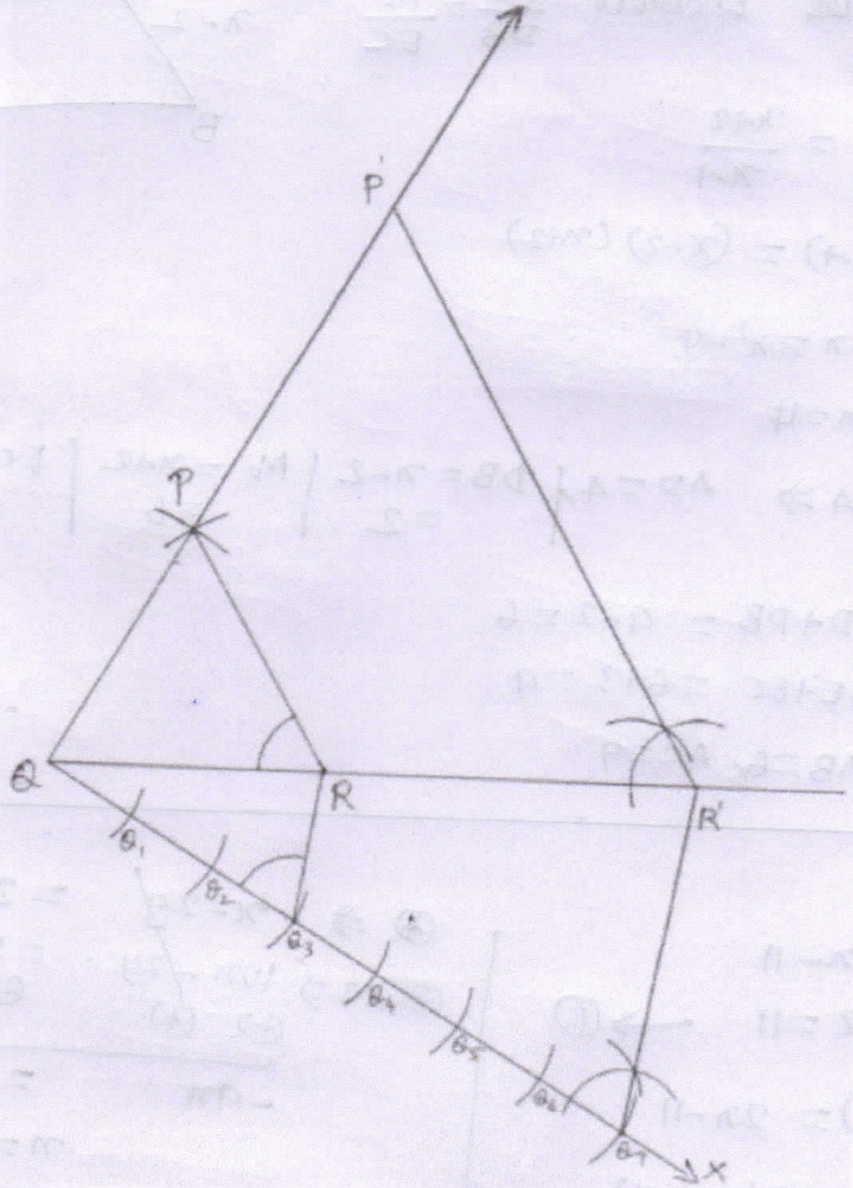
$2, 2(3), 2(3)^2, 2(3)^3 \ldots$

$2, 6, 18, 54, \ldots$

Part - IV

43)

Ex. 4.1 (13)



Construction:

1. Construct a ΔPQR with any measurement.
2. Draw a ray QX making an acute angle with QR on the side opposite to vertex P.
3. Locate 7 points (the greater of 7 and 3 in $\frac{7}{3}$) $Q_1,\ Q_2,\ Q_3,\ Q_4,\ Q_5,\ Q_6$ & Q_7 on QX so that
   $QQ_1 = Q_1Q_2 = Q_2Q_3 = Q_3Q_4 = Q_4Q_5 = Q_5Q_6 = Q_6Q_7$
4. Join Q_3 (the 3rd point, 3 being smaller of 7 and 3 in $\frac{7}{3}$) to P and draw a line through Q_7 parallel to Q_3R intersecting the extended line segment QR at R'
5. Draw a line through R' parallel to RP intersecting the extended line segment QP at P'.
   Then $P'QR'$ is the required triangle each of whose sides is seven-third of the corresponding sides of ΔPQR.

44)

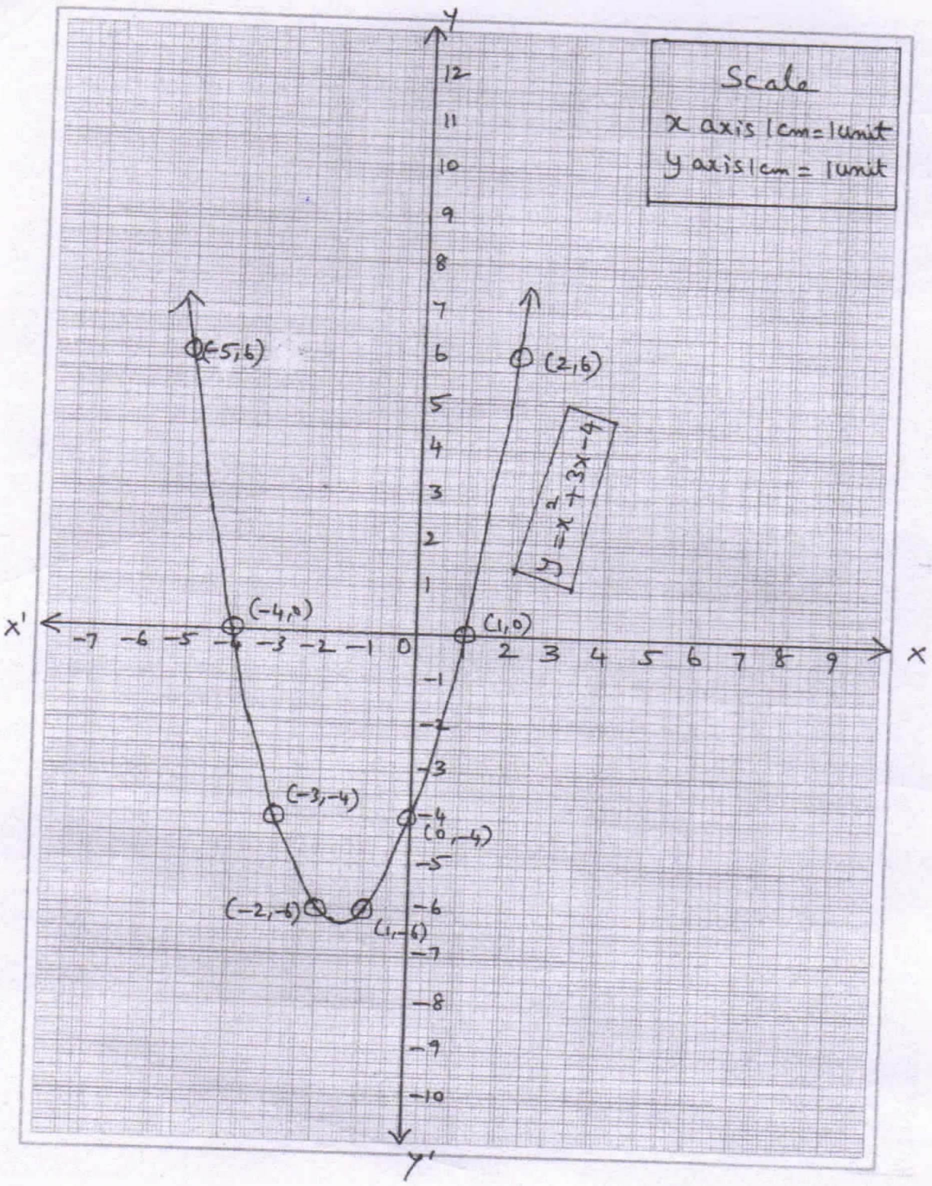
Ex. 3.15 (5)

$y = x^2 + 3x - 4$

x	-5	-4	-3	-2	-1	0	1	2
x^2	25	16	9	4	1	0	1	4
$3x$	-15	-12	-9	-6	-3	0	3	6
-4	-4	-4	-4	-4	-4	-4	-4	-4
$y = x^2 + 3x - 4$	6	0	-4	-6	-6	-4	0	6

Points: $(-5,6), (-4,0), (-3,-4), (-2,-6), (-1,-6), (0,-4), (1,0), (2,6)$

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

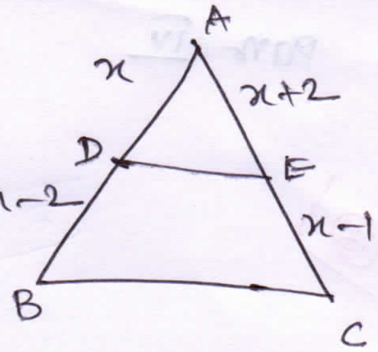


Solution: $\boldsymbol{x = \{-4, 1\}}$

43. (or)

In ΔABC, we have $DE \parallel BC$

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



Eg 4.12

$$\frac{x}{x-2} = \frac{x+2}{x-1}$$

$$x(x-1) = (x-2)(x+2)$$

$$x^2 - x = x^2 - 4$$

$$\Rightarrow x = 4$$

when $x = 4 \Rightarrow$ $AD = 4$ | $DB = x-2 = 2$ | $AE = x+2 = 6$ | $EC = x-1 = 3$

$$AB = AD + DB = 4+2 = 6$$

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

$$\therefore AB = 6, AC = 9$$

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44 (or)

Unit Ex-3 (1)

$$y - z = 2x - 11$$

$$2x - y + z = 11 \longrightarrow (1)$$

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

$$x+y-5 = 3(2x-11)$$

$$5x - y = 28 \longrightarrow (2)$$

$$y - z = 9 - (x+2z)$$

$$x+y+z = 9 \rightarrow (3)$$

$$(3) \Rightarrow x + y + \cancel{z} = 9$$

$$(1) \Rightarrow 2x - y + \cancel{z} = 11$$

$$(-)\ (+)\ (-)\ (-)$$

$$-x + 2y = -2$$

$$x - 2y = 2 \rightarrow (4)$$

$$(4) \Rightarrow x - \cancel{2y} = 2$$

$$(2)\times 2 \Rightarrow 10x - \cancel{2y} = 56$$

$$(-)\ (+)\ (-)$$

$$-9x = -54$$

$$x = \frac{54}{9} = 6$$

Sub $x = 6$ in (4)

$$x - 2y = 2$$

$$6 - 2y = 2$$

$$y = 2$$

$x = 6, y = 2$ Sub in (1)

$$2x - y + z = 11$$

$$2(6) - 2 + z = 11$$

$$z = 1$$

$$\therefore x = 6, y = 2, z = 1$$

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