QUARTERLY SEPTEMBER 2023
10TH MATHS KEY ANSWER (CHENNAI)

I CHOOSE THE CORRECT ANSWER

1. c 3
2. a (8, 6)
3. d Quadratic
4. b 2
5. a 1
6. b k^2
7. b $\left(y+\frac{1}{y}\right)^2$
8. c $-1, 2$
9. d $5\sqrt{2}$
10. a 1.4 cm
11. b Parallel to Y – axis
12. d $-\frac{a}{b}$
13. b x + y = 3, 3x + y = 7
14. d cot θ

II ANSWER ANY 10 ONLY

15. Domain = { 0, 1, 2, 3, 4, 5 }
    Range = { 3, 4, 5, 6, 7, 8 }
16. $\Rightarrow f(x^2) = (f(x))^2$
    $\Rightarrow 3 - 2x^2 = (3 - 2x)^2$
    $\Rightarrow x^2 - 2x + 1 = 0$
    $\Rightarrow (x - 1)(x - 1) = 0$ $\therefore$ **x = 1**
17. image of 1 = **5** & image of 2 = **8**
    Preimage of 29 is **9** & Preimage of 53 is **17**
18. $2^a \times 3^b = 13824$
    $2^a \times 3^b = 2^9 \times 3^3$
    $\therefore$ **a = 9 and b = 3**
19. $a_8 = \frac{63}{11}$ & $a_{15} = \frac{225}{31}$
20. Here a =3 and $r = \frac{t_2}{t_1} = \frac{1}{3}$
    $\Rightarrow S_\infty = \frac{a}{1-r} = \frac{3}{1-\frac{1}{3}}$
    $\Rightarrow S_\infty = \frac{3}{1} \times \frac{3}{2} = \frac{9}{2}$
21. x(x + 3) (x – 2) = 0
    Therefore excluded values are **x = 0, 2 & – 3**
22. $x^2 - (SOR)x + POR = 0$
    $x^2 + 9x + 20 = 0$
23. $\frac{Area\ (\Delta ABC)}{Area\ (\Delta DEF)} = \frac{BC^2}{EF^2} \Rightarrow \frac{54}{Area\ (\Delta DEF)} = \frac{3^2}{4^2}$
    Area (Δ DEF) = $\frac{16 \times 54}{9}$ **= 96cm²**
24. $\frac{AD}{AB} = \frac{AE}{AC} = \frac{3}{4} = \frac{x}{15-x}$
    $3(15 - x) = 4x \Rightarrow x = \frac{45}{7}$ **= 6.43cm.**
25. $\frac{3-a}{9+2} = \frac{-1}{2}$ **a** $= \frac{17}{2}$
26. x – intercept = – 9
    Y – intercept = 4
27. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \sqrt{\frac{1+\cos\theta}{1-\cos\theta} \times \frac{1+\cos\theta}{1+\cos\theta}}$
    $= \sqrt{\frac{(1+\cos\theta)^2}{1-\cos^2\theta}} = \sqrt{\left(\frac{1+\cos\theta}{\sin\theta}\right)^2}$
    $= \frac{1+\cos\theta}{\sin\theta} = \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta}$
    = cosecθ + cotθ = RHS
28. $\Rightarrow \frac{1}{2}\begin{Bmatrix} p^2 & 0 & 1 & p^2 \\ 0 & q^2 & 1 & 0 \end{Bmatrix} = 0$
    $\Rightarrow \frac{1}{2}[(p^2q^2 + 0 + 0) - (0 + q^2 + p^2)] = 0$
    $\Rightarrow \frac{1}{p^2} + \frac{1}{q^2} = 1$

III ANSWER ANY 10 ONLY

29. (B U C)= { 2, 3, 4 } U { 3, 5 } = { 2, 3, 4, 5 }
    A x (B U C) = { 0, 1 } x { 2, 3, 4, 5 }
    = { (0,2),(0,3),(0,4),(0,5),(1,2),(1,3),(1,4),(1,5)
    (A x B) = {(0,2),(0,3),(0,4),(1,2),(1,3),(1,4)}
    (A x C) = { (0,3),(0,5),(1,3),(1,5) }
    (A x B) U (A x C)
    ={ (0,2),(0,3),(0,4),(0,5),(1,2),(1,3),(1,4),(1,5)}
30. (i) **f(4)** = 3x – 2 = 3(4) – 2 **= 10**
    (ii) **f(-2)** = x^2- 2 = $(-2)^2 - 2$ **= 2**
    (iii) f(4) + 2 f(1)
    2f(1) = $x^2 - 1$ = 2 [$(1)^2 - 2$] = –2
    f(4) + 2 f(1) = 10 – 2 = 8
    (iv) $\frac{f(1) - 3f(4)}{f(-3)} = \frac{-1-3(10)}{1} = \frac{-1-30}{1}$ **= –31**
31. fog = (x – 1)o(3x + 1) $\Rightarrow$ (3x + 1) – 1 **= 3x**
    (fog)oh = (3x)o(x^2) $\Rightarrow$ **$3x^2$**
    goh = (3x + 1)o(x^2) **= $3x^2$ + 1**
    fo(goh) = (x – 1)o($3x^2$ + 1) $\Rightarrow$ **$3x^2$**
32. **a = 7, d = ± 2, $\therefore$ Numbers are 1, 5, 9, 13**
33. 3 + 33 + 333 + ... + n
    $S_n = \frac{3}{9}$ (9 + 99 + 999 + ...+ n terms)
    $S_n = \frac{3}{9}\left(\frac{10(10^n-1)}{9} - n\right)$
    $S_n = \frac{10(10^n-1)}{27} - \frac{n}{3}$

D.S.GNANADASON – MATHS TEACHER (MCCHSS) 9940359935

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34. $\Sigma 24^2 - \Sigma 9^2 = 4900 - 285 =$ **4615**

35. **x = 2, y = – 1, z = 4**

36. **m = 30** and **n = 9**

37. $\Delta = b^2 - 4ac$

$= [2(pr + qs)]^2 - 4(p^2 + q^2)(r^2 + s^2)$

$= -1[(ps - qr)^2] < 0 \therefore$ the roots are not real

If ps = qr then $\Delta = -4(ps - qr)^2 =$

$= -4(qr - qr)^2 \quad \therefore \Delta = 0$ and so the roots will be the real and equal.

38. Angle Bisector Theorem.

39. Area of quadrilateral

$= \frac{1}{2}\begin{Bmatrix} 8 & 5 & -5 & -4 & 8 \\ 6 & 11 & 12 & 3 & 6 \end{Bmatrix} = \frac{1}{2}(109 + 49)$

$= \frac{1}{2}(158)$ **= 79 Sq. Units.**

40. **Mid point of AB** $= \left(\frac{6-4}{2}, \frac{-4+2}{2}\right) =$ **(1, -1)**

Slope of AB $(m_1) = \frac{-4-2}{6+4} = \frac{-3}{5}$

Therefore the slope of perpendicular to AB is

$(m_2) = \frac{5}{3}$

$\Rightarrow$ Equation of the line perpendicular to AB is

$\Rightarrow (y + 1) = \frac{5}{3}(x - 1) \Rightarrow$ **5x – 3y – 8 = 0**

41. $\Rightarrow a = \frac{1+\sin\theta}{\cos\theta}$

$\Rightarrow a^2 = \frac{1+\sin^2\theta+2\sin\theta}{\cos^2\theta}$

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

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

$= \frac{2\sin\theta(1+\sin\theta)}{2(1+\sin\theta)} =$ **sinθ**

42. $\frac{1}{x+2} + \frac{1}{x-2} = 6\left(\frac{1}{4x+7}\right)$

$\frac{x-2+x+2}{(x+2)(x-2)} = \frac{6}{4x+7}$

$\Rightarrow x^2 + 7x + 12 = 0$

$\Rightarrow (x + 3)(x + 4) = 0$

$\therefore$ **x = – 3 & – 4**

GEOMETRY & GRAPH

43. (a)

Time taken (hr) – x	1	2	3	4	5	6
Distance (km) – y	50	100	150	200	250	300

Equation:

$\Rightarrow y = kx \Rightarrow k = \frac{y}{x}$

(i) Constant of variation $\Rightarrow k = \frac{5}{6}$

(ii) The distance travelled for 1 ½ hours (90 minutes) **= 75 km**

(iii) The time taken to cover 300 km **= 6 hours = 360 minutes.**

(b)

X	1	2	3	4	6	8	12	24
y	24	12	8	6	4	3	2	1

Variation : **Indirect Variation**

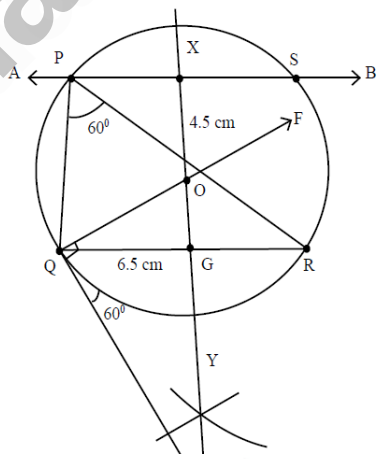
Equation : xy = k

Solution: From the graph

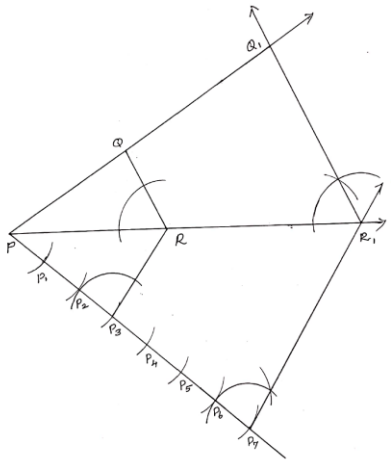
(i) If x = 3 then, **y = 8**

(ii) If y = 6 then, **x = 4**

44. (a)



(b)



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