

COMMON QUARTERLY EXAMINATION - 2025-26

Time Allowed : 3.00 Hours]

MATHEMATICS

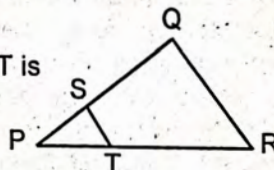
[Max. Marks : 100

PART - I

I. Choose the best answer:

14x1=14

1. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B . Then the number of elements in B is
a) 3 b) 2 c) 4 d) 8
2. Let $A = \{1, 2, 3, 4\}$, $B = \{4, 8, 9, 10\}$. A function $f: A \rightarrow B$ given by $f = \{(1, 4), (2, 8), (3, 9), (4, 10)\}$ is a
a) Many-one function b) Identify function c) one-to-one function d) Into function
3. Let $f(x) = \sqrt{1+x^2}$ then
a) $f(xy) = f(x) \cdot f(y)$ b) $f(xy) \geq f(x) \cdot f(y)$ c) $f(xy) \leq f(x) \cdot f(y)$ d) None of these
4. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \dots + 2^0$. which of the following is true?
a) B is 2^{64} more than A b) A and B are equal
c) B is larger than A by 1 d) A is larger than B by 1
5. The value of $1^3 + 2^3 + 3^3 + \dots + 15^3 - (1 + 2 + 3 + \dots + 15)$ is
a) 14400 b) 14200 c) 14280 d) 14520
6. $\frac{x}{x^2 - 25} - \frac{8}{x^2 + 6x + 5}$ gives
a) $\frac{x^2 - 7x + 40}{(x-5)(x+5)}$ b) $\frac{x^2 + 7x + 40}{(x-5)(x+5)(x+1)}$ c) $\frac{x^2 - 7x + 40}{(x^2 - 25)(x+1)}$ d) $\frac{x^2 + 10}{(x^2 - 25)(x+1)}$
7. The number of excluded values for the expression $\frac{x^3 - x^2 - 10x + 8}{x^4 + 8x^2 - 9}$
a) 1 b) 2 c) 3 d) 4
8. If in triangle ABC and EDF , $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when
a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle F$
9. In a given figure $ST \parallel QR$, $PS = 2\text{cm}$ and $SQ = 3\text{cm}$.
Then the ratio of the area of $\triangle PQR$ to area of $\triangle PST$ is
a) 25 : 4 b) 25 : 7
c) 25 : 11 d) 25 : 13



10. If slope of the line PQ is $1/\sqrt{3}$, then slope of the perpendicular bisector of PQ is
a) $\sqrt{3}$ b) $-\sqrt{3}$ c) $1/\sqrt{3}$ d) 0
11. The area of Quadrilateral formed by points (a, a) , $(-a, a)$, $(-a, -a)$, $(a, -a)$ is 64 sq.units. What is the value of a
a) 4 b) 6 c) 8 d) 12
12. $(2, 1)$ is the point of intersection of two lines
a) $x - y - 3 = 0$; $3x - y - 7 = 0$ b) $x + y = 3$; $3x + y = 7$ c) $3x + y = 3$; $x + y = 7$ d) $x + 3y - 3 = 0$; $x - y - 7 = 0$
13. The value of $\sin^2 \theta + \frac{1}{1 + \tan^2 \theta}$ is equal to
a) $\tan^2 \theta$ b) 1 c) $\cot^2 \theta$ d) 0
14. If $x = a \tan \theta$ and $y = b \sec \theta$ then
a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ c) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ d) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

PART - II

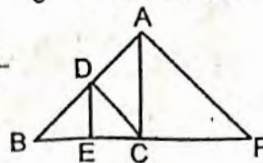
II. Answer any 10 questions. Question No.28 is compulsory.

10x2=20

15. Define identity function.
16. If $A = \{1, 3, 5\}$ $B = \{2, 3\}$ then (i) find $A \times B$ and $B \times A$.
17. Find K if $f(k) = 5$ where $f(k) = 2k - 1$.
18. Find the least positive value of x such that $5x \equiv 4 \pmod{6}$.
19. If $1 + 2 + 3 + \dots + n = 666$ then find n .
20. Simplify : $\frac{x^3}{x-y} + \frac{y^3}{y-x}$
21. Find the sum and product of the roots of the quadratic equation $3y^2 - y - 4 = 0$.

22. If the difference between a number and its reciprocal is $24/5$, find the number.

23. In the figure $DE \parallel AC$ and $DC \parallel AP$, Prove that $\frac{BE}{EC} = \frac{BC}{CP}$



24. Find the value of 'a' for which the given points are collinear (2, 3) (4, a) and (6, -3).

25. A cat is located at the point (-6, -4) in xy plane. A bottle of milk is kept at (5, 11). The cat wish to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milke.

26. Find the equation of a straight line which is parallel to the line $3x-7y=12$ and passing through the point (6, 4)

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

28. If an A.P. If a = -10, d=2 how many terms are needed to reach the term 0?

PART - III

III. Answer the following any 10 questions. Q.No.42 is compulsory.

10x5=50

29. Let A = The set of all natural numbers less than 8 B=The set of all prime numbers less than 8.

C=The set of even prime number. Verify that $(A \cap B) \times C = (A \times C) \cap (B \times C)$.

30. A function $f : [-5, 9] \rightarrow \mathbb{R}$ is defined as follows $f(x) = \begin{cases} 6x + 1; & -5 \leq x < 2 \\ 5x^2 - 1; & 2 \leq x < 6 \\ 3x - 4; & 6 \leq x \leq 9 \end{cases}$ Find

i) $f(-3) + f(2)$

ii) $f(7) - f(1)$

iii) $2f(4) + f(8)$

iv) $\frac{2f(-2) - f(6)}{f(4) + f(-2)}$

31. If $f(x) = 2x+3$, $g(x) = 1-2x$ and $h(x)=3x$. Prove that $fo(goh)=(fog)oh$.

32. Find the HCF of 396, 504, 636.

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

34. Find the values of m and n if the polynomial is perfect square $36x^4-60x^3+61x^2-mx+n$.

35. Solve : $pq x^2 - (p - q)^2 x + (p + q)^2 = 0$.

36. State and prove Basic proportionality theorem.

37. Find the area of the quadrilateral whose vertices are at (-9, -2), (-8, -4), (2, 2) and (1, -3).

38. Find the equation of a straight line through the point of intersection of the lines $8x+3y=18$, $4x+5y=9$ and bisecting the line segment joining the points (5, -4) and (-7, 6).

39. A mobile phone is put to use when the battery power is 100%. The percent of battery power 'y' (in decimal) remaining after using the mobile phone for x hours is assumed as $y=-0.25x+1$.

(i). Find the number of hours elapsed if the battery power is 40%

(ii) How much time does it take so that the battery has no power.?

40. A man joined a company as Assistant Manager. The company gave him a starting of ₹60,000 and agreed to increase his salary 5% annually. What will be his salary after 5 years?

41. Prove that $\sin^2 A \cos^2 B + \cos^2 A \sin^2 B + \cos^2 A \cos^2 B + \sin^2 A \sin^2 B = 1$.

42. If $f(x)=x^4-1$, $g(x)=x^3-1$ verify that $f(x) \times g(x) = \text{LCM}(f(x), g(x)) \times \text{GCD}(f(x), g(x))$.

PART - IV

IV. Answer all of the following.

2x8=16

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to $7/3$ of the corresponding sides of the triangle PQR (scale factor $7/3 > 1$) (OR)

b) Draw a triangle ABC of base BC=8cm, $\angle A=60^\circ$ and the bisector of $\angle A$ meets BC at D such that BD=6cm.

44. a) A company initially started with 40 worker to complete the work by 150 days. Later it decided to fastern up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

(i) Graph the above data and identify the type of variation.

(ii) From the graph find the number of days required to complete the work if the company decides to opt for 120 worker?

(iii) If the work has to be completed by 200 days how many workers are required? (OR)

b) A garment shop announces a flat 50% discount on every purchase of items for their customers. Draw the graph for the relation between the marked price and the discount. Hence find

(i) the marked price when a customer gets a discount of ₹3250 (from graph)

(ii) the discount when the marked price is ₹2500.

**SCHOOL EDUCATION DEPARTMENT - KALLAKURICHI DT
COMMON QUARTERLY EXAMINATION - 2025-2026
X STANDARD - MATHEMATICS - KEY ANSWERS**

Maximum Marks : 100

PART-I

Answer all the questions.

$14 \times 1 = 14$

Q.No	Option	Key Answer	Marks Alloted
1	(B)	2	1
2	(C)	One-to-one function	1
3	(C)	$f(xy) \geq f(x).f(y)$	1
4	(D)	4 cm	1
5	(C)	A is larger than B by 1	1
6	(C)	$\frac{x^2 - 7x + 40}{(x^2 - 25)(x + 1)}$	1
7	(A)	1	1
8	(C)	$\angle B = \angle D$	1
9	(A)	25 : 4	1
10	(B)	$-\sqrt{3}$	1
11	(A)	4	1
12	(B)	$x + y = 3, 3x + y = 7$	1
13	(B)	1	1
14	(A)	$\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$	1

PART-II

Answer any 10 questions. Q.No.28 is Compulsory

 $10 \times 2 = 20$

Q.No	Answers	Step Marks	Total Marks
15	<u>Identity Function</u> : Let A be a non-empty set. Then the function $f : A \rightarrow A$ defined by $f(x) = x$ for all $x \in A$ is called an identity function.	2	2
16	$A \times B = \{(, 2, (1, 3), (3, 2), (3, 3), (5, 2), (5, 3)\}$ $B \times A = \{(2, 1), (2, 3), (2, 5), (3, 1), (3, 3), (3, 5)\}$	1 1	2
17	$2(2k - 1) - 1 = 5$ $4k - 3 = 5$ $k = 2$	1 1	2
18	$5x - 4 = 6n$ for some integer n $x = \frac{6n + 4}{5}$ $\therefore$ The least positive value of $x = 2$	1 1	2
19	$\frac{n(n+1)}{2} = 666$ $n^2 + n - 1332 = 0$ $n = 36$	1 1	2
20	$\frac{x^3}{x-y} + \frac{y^3}{y-x} = \frac{x^3 - y^3}{x-y}$ $= \frac{(x-y)(x^2 + xy + y^2)}{x-y}$ $= x^2 + xy + y^2$	1 1	2
21	$a = 3, b = -1, c = -4$ Sum of the roots $= \frac{-b}{a} = \frac{1}{3}$ Product of the roots $= \frac{c}{a} = \frac{-4}{3}$	1 1	2
22	$x - \frac{1}{x} = \frac{24}{5}$ $5x^2 - 24x - 5 = 0$ $x = 5$ (or) $-\frac{1}{5}$	1 1	2

Q.No	Answers	Step Marks	Total Marks
23	In $\triangle BPA$, $DC \parallel AP \implies \frac{BC}{CD} = \frac{BD}{AD} \dots (1)$ In $\triangle BCA$, $DE \parallel AC \implies \frac{BE}{CE} = \frac{BD}{AD} \dots (2)$ From (1) and (2) $\frac{BE}{CE} = \frac{BC}{CD}$	1 1	2
24	$\frac{1}{2} \left \begin{array}{cccc} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{array} \right = 0$ $\frac{1}{2} \left \begin{array}{cccc} 2 & 4 & 6 & 2 \\ 3 & a & -3 & 3 \end{array} \right = 0$ $\left[(2a - 12 + 18) - (12 + 6a - 6) \right] = 0$ $2a + 6 - 6a - 6 = 0$ $a = 0$	1 1	2
25	$\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$ $\frac{y + 4}{11 + 4} = \frac{x + 6}{5 + 6}$ $11(y + 4) = 15(x + 6)$ $15x - 11y + 46 = 0$	1 1	2
26	The required line is $3x - 7y + k = 0$ This line passes through $(6, 4)$ $3(6) - 7(4) + k = 0$ $k = 10$ $\therefore$ The required line is $3x - 7y + 10 = 0$	1 1	2
27	$\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} \times \frac{1 + \sin \theta}{1 + \sin \theta}$ $= \sqrt{\frac{(1 + \sin \theta)^2}{1 - \sin^2 \theta}}$ $= \frac{1 + \sin \theta}{\cos \theta}$ $= \sec \theta + \tan \theta$	1 1	2

Q.No	Answers	Step Marks	Total Marks
28	In A.P. $a = -10$, $d = 2$, $t_n = 0$ $a + (n - 1)d = 0$ $-10 + (n - 1)2 = 0$ $n = 6$	1 1	2

PART-III

Answer any 10 questions. Q.No.42 is Compulsory

 $10 \times 5 = 50$

Q.No	Answers	Step Marks	Total Marks
29	$A = \{1, 2, 3, 4, 5, 6, 7\}$, $B = \{2, 3, 5, 7\}$, $C = \{2\}$ $A \cap B = \{2, 3, 5, 7\}$ $(A \cap B) \times C = \{(2, 2), (3, 2), (5, 2), (7, 2)\} \dots\dots (1)$ $A \times C = \{(1, 2), (2, 2), (3, 2), (4, 2), (5, 2), (6, 2), (7, 2)\}$ $B \times C = \{(2, 2), (3, 2), (5, 2), (7, 2)\}$ $(A \times C) \cap (B \times C) = \{(2, 2), (3, 2), (5, 2), (7, 2)\} \dots\dots (2)$ $(A \cap B) \times C = (A \times C) \cap (B \times C)$	1 1 1 1 1	5
30	$f(-3) = 6(-3) + 1 = -17$; $f(2) = 5(2^2) - 1 = 19$ $f(-3) + f(2) = -17 + 19 = 2$ $f(7) = 3(7) - 4 = 17$; $f(1) = 6(1) + 1 = 7$ $f(7) - f(1) = 17 - 7 = 10$ $f(4) = 5(4^2) - 1 = 79$; $f(8) = 3(8) - 4 = 20$ $2f(4) + f(8) = 2(79) + 20 = 178$ $f(-2) = 6(-2) + 1 = -11$; $f(6) = 3(6) - 4 = 14$ $\frac{2f(-2) - f(6)}{f(4) + f(-2)} = \frac{2(-11) - (14)}{79 + (-11)} = \frac{-36}{68} = \frac{-9}{17}$	1 1 1 2	5

Q.No	Answers	Step Marks	Total Marks
33	$S_1 = \frac{n}{2} [2a + (n-1)d]$ $S_2 = \frac{2n}{2} [2a + (2n-1)d]$ $S_3 = \frac{3n}{2} [2a + (3n-1)d]$ $S_2 - S_1 = \frac{2n}{2} [2a + (2n-1)d] - \frac{n}{2} [2a + (n-1)d]$ $= \frac{n}{2} [4a + 2(2n-1)d - 2a - (n-1)d]$ $= \frac{n}{2} [2a + (4n-2-n+1)d]$ $= \frac{n}{2} [2a + (3n-1)d]$ $3(S_2 - S_1) = \frac{3n}{2} [2a + (3n-1)d]$ $3(S_2 - S_1) = S_3$	1 1 1 1 1	5
34	$\begin{array}{cccccc} & & +6 & -5 & +3 & \\ & & \hline +6 & +36 & -60 & +61 & -m & +n \\ & +36 & & & & \\ & \hline +12 & -5 & -60 & +61 & & \\ & & -60 & +25 & & \\ & \hline +12 & -10 & +3 & +36 & -m & +n \\ & & & +36 & -30 & +9 \\ & & & \hline & & & & 0 & \\ & & & \hline \end{array}$ $-m = -30 \Rightarrow m = +30$ $n = +9$	2 1 1 1	5

Q.No	Answers	Step Marks	Total Marks
35	$a = pq, b = -(p+q)^2, c = (p+q)^2$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{(p+q)^2 \pm \sqrt{(p+q)^4 - 4pq(p+q)^2}}{2pq}$ $= \frac{(p+q)^2 \pm \sqrt{(p+q)^2[(p+q)^2 - 4pq]}}{2pq}$ $= \frac{(p+q)^2 \pm \sqrt{(p+q)^2(p-q)^2}}{2pq}$ $= \frac{(p+q)^2 \pm [(p+q)(p-q)]}{2pq}$ $= \frac{(p+q)[(p+q) \pm (p-q)]}{2pq}$ $= \frac{(p+q)[(p+q) + (p-q)]}{2pq}, \frac{(p+q)[(p+q) - (p-q)]}{2pq}$ $= \frac{(p+q)(p+q+p-q)}{2pq}, \frac{(p+q)(p+q-p+q)}{2pq}$ $= \frac{p+q}{q}, \frac{p+q}{p}$	 1 1 1 1	5
36	Statement Diagram Given, To Prove, Construction Proof <u>Note</u> : If the diagram is not drawn, marks should be awarded only for the statement.	 1 1 1 2	5
37	$\text{Area} = \frac{1}{2} \left \begin{array}{ccccc} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{array} \right \text{ sq.units}$ $= \frac{1}{2} \left \begin{array}{ccccc} -9 & -8 & 1 & 2 & -9 \\ -2 & -4 & -3 & 2 & -2 \end{array} \right $ $= \frac{1}{2} [(36 + 24 + 2 - 4) - (16 - 4 - 6 - 18)]$ $= \frac{1}{2} [58 - (-12)]$ $= \frac{1}{2} \times 70$ $= 35 \text{ sq.units}$	 1 1 1 1 1	5

Q.No	Answers	Step Marks	Total Marks
38	Solving the equations $8x + 3y = 18$, $4x + 5y = 9$ The intersecting point is $\left(\frac{9}{4}, 0\right)$ The midpoint is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ The midpoint of $(5, -4)$ and $(-7, 6)$ is $(-1, 1)$ The required line is $\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$ $\frac{y - 0}{1 - 0} = \frac{x - \frac{9}{4}}{-1 - \frac{9}{4}}$ $\frac{y}{1} = \frac{4x - 9}{-4 - 9}$ $4x + 13y - 9 = 0$	1 1 1 1 1	5
39	$y = -0.25x + 1$ If the battery power is 40%, then $y = 0.40$ $0.40 = -0.25x + 1 \implies 0.25x = 0.60$ $x = \frac{0.60}{0.25} \implies x = 2.4 \text{ hours}$ If the battery power is 0%, then $y = 0$ $0 = -0.25x + 1 \implies 0.25x = 1$ $x = \frac{1}{0.25} \implies x = 4 \text{ hours}$	1 1 1 1 1	5
40	The salary increase will be $60000, 60000\left(\frac{105}{100}\right), 60000\left(\frac{105}{100}\right)^2, \dots$ This form G.P. with $a = 60000$ and $r = \frac{105}{100}$ Salary after 5 years (6^{th} year) $= ar^{n-1}$ $= 60000 \times \left(\frac{105}{100}\right)^{6-1}$ $= 60000 \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100}$ After 5 years his salary = ₹ 76577	1 1 1 1 1	5

PART-IV

Answer the questions.

 $2 \times 8 = 16$

Q.No	Answers	Step Marks	Total Marks
43(A)	Rough Diagram Construction of $\triangle ABC$ Drawing ray and marking equal parts Drawing the first parallel line Drawing the second parallel line (OR)	1 1 2 2 2	8
43(B)	Rough Diagram Drawing a line segment Drawing circle Marking Bisector Construction of $\triangle ABC$	1 1 3 1 2	8
44(A)	X-axis, Y-axis Scale Plot the points and draw the curve Inverse variation The number of days = 50 The number of workers = 30 (OR)	1 1 3 1 1 1	8
44(B)	X-axis, Y-axis Scale Table Plot the points and draw the straight line The marked price = ₹ 6500 The discount = ₹ 1250	1 1 2 2 1 1	8