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SRIKAKULAM
HOLIDAY HOMEWORK

CLASS- XII Subject: Mathematics (041)

Q No	QUESTION	MARKS
	RELATIONS AND FUNCTIONS	
	SECTION-A (*This section comprises of multiple-choice questions (MCQs) of 1 mark each*)	
1	The function f : R→R defined by f(x) = x – 4 is …… (A) Bijective (B) Surjective but not Injective (C) Injective but not Surjective (D) Neither Surjective nor Injective	1
2	If $A = \{1,3,5,7\}$ and $B = \{1,2,3,4,5,6,7,8\}$, then the number of one-one functions from A into B is …… (A) 1340 (B) 1860 (C) 1430 (D) 1680	1
3	If A and B are two equivalence relations defined on set C, then (A) A ∪ B is an equivalence relation (B) A ∩ B is not an equivalence relation (C) A ∩ B is an equivalence relation (D) none of the above	1
4	$Let\ A = \{a, b, c\}$ then the number of reflexive relations on A is …… (A) 64 (B) 32 (C) 8 (D) 81	1
5	A relation R is defined on a set of human beings as $R = \{(x, y): x\ is\ 5\ cm\ shorter\ than\ y\}$ then R is…… (A) Reflexive only (B) Reflexive and Transitive (C) Symmetric and Transitive (D) Neither reflexive nor symmetric nor transitive	1
6	A function $f: R \to R\ defined\ by\ f(x) = x^2$ is ____________ (A) One- one (B) Onto (C) Bijective (D) Neither one-one nor onto	1
7	Which of the following is an example of a one-one and onto function? (A) $f: R \to R, f(x) = x^2$ (B) $f: R \to R, f(x) = x + 1$ (C) $f: Z \to Z, f(x) = 2x$ (D) None of these	1
8	In the set Z of all integers, which of the following relation R is a symmetric relation2 (A) xRy : if x ≤ y (B) xRy : if 'x-y is an even positive integer' (C) xRy : if x = y (D) xRy : if x is a factor of y	1
9	The number of relations on the set $A = \{1, 2, 3\}$ are (A) 9 (B) 2^3 (C) 3 (D) 2^9	1

	Questions below are Assertion and Reason based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the codes (A),(B),(C) and (D) as given below. A) Both Assertion (A) and Reason (R) are true and R is the correct explanation of the Assertion (A) B) Both Assertion (A) and Reason (R) are true and R is not the correct explanation of the Assertion (A) C) Assertion (A) is true, but (R) is false D) Assertion (A) is false, but (R) is true	
10	Assertion (A) : The relation f : {1,2,3, 4} → {x, y, z, p} defined by f = {(1, x), (2, y), (3,z)} is a bijective function. Reason (R) : The function f : {1,2,3} → {x, y, z, p} such that f = {(1, x), (2, y), (3, z)} is one-one.	1
11	Assertion (A) : The relation $R = \{(1, 2)\}$ on the set $A = \{1, 2, 3\}$ is transitive. Reasoning (R): A relation R on a non-empty set A is said to be transitive if $(a, b), (b, c) \in R \Rightarrow (a, c) \in R, for\ all\ a, b, c \in A$.	1
12	Assertion (A) : The relation R in a set $A = \{1, 2, 3, 4\}$ defined by $R = \{(x, y): 3x - y = 0)\}$ has the domain $= \{1, 2, 3, 4\}$ and range $= \{3, 6, 9, 12\}$ Reason (R): Domain & range of the relation (R) is respectively the set of all first & second entries of the distinct ordered pair of the relation.	1
13	Let A = {1, 2, 3, 4, 6}. If R is the relation on A defined by {(a, b): a, b ∈A, b is exactly divisible by a}. Assertion (A): The relation R in Roster form is {(6, 3), (6, 2), (4, 2)}. Reason (R): The domain and range of R is {1, 2, 3, 4, 6}.	1
14	Assertion (A) : The Relation R defined on A = {a,b,c} and given by R = {(a,a), (b,b), (c,c), (a,b), (b,a), (a,c), (c,a)} is an equivalence relation. Reason (R) : A relation R is said to be equivalence relation if it is Reflexive, Symmetric and Transitive.	1
15	Assertion (A): The relation R on the set $N \times N$ defined by $(a, b)R(c, d) \Leftrightarrow a + d = b + c$, for all $(a, b), (c, d) \in N \times N$ is an equivalence relation. Reason (R) : Any relation is an equivalence relation, if it is reflexive, symmetric and transitive	1
16	Assertion (A): The function f : R→R, given by $f(x) = x^3$ is injective. Reason (R) :The function f : X → Y is injective, if f(x) = f(y) ⇒ x = y for all x,y ЄX	1
17	Assertion (A): The number of onto functions from a set P containing 5 elements to a set Q containing 2 elements is 30. Reason (R) : Number of onto functions from a set containing m elements to a set containing n elements is n^m.	1

18	Assertion (A) : The $f: R \rightarrow R$given by f(x) = [x] is bijection. Reason (R) : A function is said to be bijection, if it is both one-one and onto.	1
19	Let W be the set of words in the English dictionary. A relation R is defined on W as R = {(x, y) ∈W x W such that x and y have at least one letter in common} Assertion (A) : R is reflexive. Reason (R) : R is symmetric.	1
20	Assertion (A) : If R is the relation defined in set {1, 2, 3, 4, 5, 6} as R = {(a, b) :b = a + 1} , then R is reflexive Reason (R) : No integer is equal to it's successor	1
	SECTION – B *This section comprises very short answers (VSA) type questions of 2 marks each.*	
22	Show that the relation R on **R**x**R** defined as $R = \{(a, b): (a \leq b)\}$, is reflexive and transitive but not symmetric.	2
23	Let a relation R on the set N of natural numbers defined by R = { (x,y) : $3x^2 - 7xy + 4y^2 = 0$, x,y ∈ N}. Check whether R is an equivalence relation or not?	2
24	Show that the relation S on the set of real numbers defined as S = { (a,b): $a \leq b^2$, where a,b ∈ **R**} is neither reflexive nor symmetric.	2
	SECTION-C *This section comprises Long answers (LA) type questions of 5 marks each*	
25	Let N be the set of natural numbers and R be the relation on $N \times N$ defined by $(a, b)\ R\ (c, d)$ iff $ad = bc$ for all $a, b, c, d \in N$. Show that R is an equivalence relation.	5
26	Show that the function $f: N \rightarrow N$ defined by $f(x) = x^2 + x + 1$ is one-one but not onto.	5
27	Let $f: R - \left\{-\frac{4}{3}\right\} \rightarrow R$ be a function defined as $(x) = \frac{4x}{3x+4}$. Show that f is a one one function. Also check whether f is an onto function or not.	5
28	Let A = {1, 2, 3, 4, …, 9} be the set and R be a relation on A X A defined by: (a , b) R (c , d) ⇔ a + d = b + c for all (a , b) , (c , d) ∈ N x N . Show that R is an equivalence relation on A X A. Also, find the equivalence class of (2,6).	5
29	A function f: [0, ∞) → [-5, ∞) be defined by $f(x) = 3x^2 + 9x - 5$. Prove that the function is a one-one and on-to function.	5
30	Show that $f : R^+ \rightarrow [-9, \infty]$ defined by $f(x) = 5x^2 + 6x - 9$ is bijective function.	5
31	Show that the relation R on the set Z of all integers defined by $(x, y) \in R \Rightarrow (x - y)\ is\ divisible\ by\ 3$ is an equivalence relation.	5

SECTION E

This section comprises of case-study/passage-based questions of 4 marks each with subparts.

32 Consider the mapping f : A → B is defined by $f(x) = \frac{x-1}{x-2}$ such that f is a bijection

Based on the above information, solve the following questions:

(i) Domain of f is: 1

(A) R - {2} (B) R (C) R - {1, 2} (D) R – {0}

(ii) Range of f is: a. R

(A) R (B) R – {1} (C) R - {0} (D)R - {1,2} 1

(iii) If g : R - {2} → R - {1} is defined by g(x) = 2f(x) - 1, then g(x) in terms of x is:

(A) $\frac{x+2}{x}$ (B) $\frac{x+1}{x-2}$ (C) $\frac{x-2}{x}$ (D) $\frac{x}{x-2}$ 2

(OR)

The function g defined above, is:

(A) one-one (B) many-one (C) into (D) None of these

33 Raja visited the Exhibition along with her family. The Exhibition had a huge swing, which attracted many children. Raja found that the swing traced the path of a Parabola as given by $y = x^2$.

Based on the above information, answer the following questions.

(i) Let $f: N \to R$ be defined by $f(x) = x^2$. Find the Range of the function f? 1

(ii) Check the injectivity of the function $f: N \to N$ be defined by $f(x) = x^2$ 1

(iii) Let $f: R \to R$ be defined by $f(x) = x^2$. Check if f is one-one or not. 2

(OR)

A. Let $f: R \to R$ be defined by $f(x) = x^2$. Check if f is onto or not

34 An organization conducted bike race under 2 different categories boys and girls. In all there were 250 participants. Among all of them finally three from category 1 and 2 from category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college projects. Let B = {b_1, b_2, b_3}, G = {g_1, g_2} where B represents for the set of boys selected and G the set of all girls who were selected for the final race. Ravi decides to explore these two sets for various types of

	relations and functions. On the basis of the above information, answer the following questions: (i) Ravi wishes to form all the relations possible from B to G. 4How many such relations possible? (ii) Write smallest equivalence relation on G. (iii) (a) Ravi defines a relation from B to B as $R_1 = \{(b_1,b_2),(b_2,b_1)\}$.Write the minimum ordered pairs to be added to R_1 so that it becomes (A) reflexive but not symmetric,(B) reflexive and symmetric but not transitive. OR (b) If the track of the final race (for biker b_1) follows the curve x^2 = 4y,(where $0 \le x \le 20\sqrt{2}$ and $0 \le y \le 200$),then state whether the track represents one-one and onto or not.justify?	1 1 2
35	The students of Class 12 of a school planned to plant saplings along straight lines, parallel to each other to one side of the playground ensuring that they had enough play area. Let us assume that they planted one of the rows of the sapling along the line y = 2x + 4 . Let L be the set of all lines which are parallel to each other in ground and R be a relation in L. Let the relations R_1 and R_2 are defined on L as follows. $R_1 = \{ (L_1, L_2): L_1 \parallel L_2, Where\ L_1, L_2 \in L\}$ $R_2 = \{ (L_1, L_2): L_1 \perp L_2, Where\ L_1, L_2 \in L\}$ Answer the following questions using the above information: **(i)** Verify whether R_1 satisfies reflexive, symmetric and transitive or not? **(ii)** Verify whether R_2 satisfies reflexive, symmetric and transitive or not?	2 2
36	A scout master wants to make different groups of students so that they can be given different tasks. Students started making groups with their friends, then the scout master interfere and told them to make groups as per a rule "a student will make group with roll number in such a way that the difference of roll number is divisible by 3.  (i)Write a relation R in set-builder form for the rule told by the scout master. (ii) Which roll number of students will be in the group of students with roll number 2, if there are 30 students in the class? (iii)Which roll number of students will be in the group of students with roll number 3, if there are 30 students in the class?	1 1 2
37	An organization c conducted bike race under two different categories – Boys and Girls. There were 82 participants in all. Among all of them, finally two from Category 1 and three from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project.	

Let $B = \{b_1, b_2\}$ and $G = \{g_1, g_2, g_3\}$, where B represents the set of Boys and G represents set of Girls selected for the final race.
Based on the above information answer the following questions.

(i) How many relations are possible from B to G? 1

(ii) Among all possible relations from B to G, how many functions can be formed from B to G? 1

(iii) Let $R: B \rightarrow B$ *be defined by* $R = \{(x, y)/x \text{ and } y \text{ are students of same sex}\}$. Check whether R is equivalence relation or not. 2

OR

Let $f: G \rightarrow B$ *be defined by* $f = \{(g_1, b_1), (g_2, b_2), (g_3, b_1)\}$. Check whether f is bijective or not. Justify your answer.

38 A school is organizing a debate competition with participants as speakers $S = \{S_1, S_2, S_3, S_4\}$ and these are judged by judges J=$J_1, J_2, J_3\}$. Each speaker can be assigned one judge. Let R be a relation from set S to J defined as $R = \{(x, y): \text{speaker } x \text{ is judged by judge } y, x \in S, y \in J\}$.

Based on the above, answer the following :

(i) How many relations are possible from S to J? 1

(ii) A student identifies a function from S to J as $f = \{(S_1, J_1), \{(S_2, J_2), \{(S_3, J_2), \{(S_4, J_3)\}$. Check if it is bijective 1

(iii) How many one-one functions can be there from set S to set J?

OR 2

Another student considers a relation $R_1 = \{(S_1, S_2), (S_2, S_4)\}$ in set S. Write minimum ordered pairs tom be included in R_1 so that R_1 is reflexive but not symmetric.

An organization conducted bike race under 2 different categories-boys and girls. In

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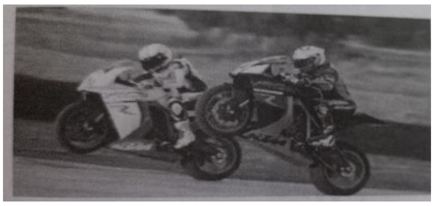
39	all, there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project. Let B = $\{b_1, b_2, b_3\}$, G = $\{g_1, g_2\}$ where B represents the set of boys selected and G the set of girls who were selected for the final race. Ravi decides to explore these sets for various types of relations and functions. On the basis of the above information, answer the following questions: (i) Ravi wishes to form all the relations possible from B to G. How many such relations are possible? (ii) Write the smallest equivalence relation on G. iii) (a) Ravi defines a relation from B to B as R1 = $\{(b_1, b_2), (b_2, b_1)\}$. Write the minimum ordered pairs to be added in R1 so that it becomes (A) reflexive but not symmetric, (B) reflexive and symmetric but not transitive. **OR** (iii) (b) If the track of the final race (for the biker b_1) follows the curve $x^2 = 4y$; (where $0 \le x \le 20\sqrt{2}$ & $0 \le y < 200$), then state whether the track represents a one-one and onto function or not. (Justify).	1 1 2
40	Sherlin and Dhanju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted the possible outcomes of the throw every time belongs to set {1 ,2, 3, 4, 5, 6}.  Let A be the set of players while B be the set of all possible outcomes. $A = \{S,\}$, B = {1 ,2, 3, 4, 5, 6}. Answer the following questions based on the given information: (i) Raji wants to know the number of relations possible from A to B. Find the number of all possible relations. (ii) Raji wants to know the number of functions from A to B. Find the number of all possible functions. (iii) Let R be a relation on B defined by R = { (1,2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)}. Verify R is symmetric and transitive? **(OR)** Let $R: B \rightarrow B$ be defined by $R = \{(x, y): y \text{ is divisible by } x\}$. Verify that whether R is symmetric and transitive.	1 1 2

41	An organization conducted bike race under two different categories – Boys and Girls. There were 28 participants in all. Among all of them, finally three from category 1 and two from category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project.  Let B = $\{b_1, b_2, b_3\}$ and G = $\{g_1, g_2\}$, where B represents the set of boys selected and g the set of girls selected for the final race. Based on the above information, answer the following questions. (i) How many relations are possible from B to G (ii) Among all the possible relations from B to G, how many functions can be formed from B to G? (iii) Let $R: B \rightarrow B$ be defined by $R = \{(x, y): x \text{ and } y \text{ are students of the same sex}\}$. Check if R is an equivalence relation. (OR) A function $f: B \rightarrow G$ be defined by $f = \{(b_1, g_1), (b_2, g_2), (b_3, g_1)\}$. Check if f is bijective. Justify your answer	1 1 2
42	In class 6, the teacher conducted a survey on the fruits and vegetables the students like most.The class leader is asked to record the data . from the data it was found that the top most 3 fruits liked by most of them are Apple, Orange, Mango whereas the 3 vegetables most of them like are Tomatoes, Carrot, Cucumber.The teacher put it in 2 sets F={Apple, Orange, Mango } and V = { Tomatoes, Carrot, Cucumber}  (i) How many relations are possible from F to V? (ii) How many functions are possible from F to V? (iii) How many one to one functions are possible from F to V? OR How many bijections are possible from F to V?	1 1 2
43	An organisation conducted bike race under 2 different categories boys and girls. In all there were 250 participants. Among all of them finally three from category 1 and 2 from category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college projects. Let B = $\{b_1, b_2, b_3\}$, G = $\{g_1, g_2\}$ where B represents for the set of boys selected and G the set of all girls who were selected	

	for the final race. Ravi decides to explore these two sets for various types of relations and functions. On the basis of the above information, answer the following questions: (i) Ravi wishes to form all the relations possible from B to G. How many such relations possible? (ii) Write smallest equivalence relation on G. (iii) (a) Ravi defines a relation from B to B as $R_1 = \{(b_1,b_2),(b_2,b_1)\}$.Write the minimum ordered pairs to be added to R_1 so that it becomes (A) reflexive but not symmetric,(B) reflexive and symmetric. OR (b) If the track of the final race (for biker b_1) follows the curve $x^2 = 4y$,(where $0 \leq x \leq 20\sqrt{2}$ and $0 \leq y \leq 200$),then state whether the track represents one-one and onto or not. Justify?	1 1 2
44	Students of Grade 12, planned to plant saplings along straight lines, parallel to each other to one side of the playground ensuring that they had enough play area. Let us assume that they planted one of the rows of the saplings along the line $y = x - 4$. Let L be the set of all lines which are parallel on the ground and R be a relation on L. Answer the following using the above information. (i). Let relation R be defined by R = $\{(L_1, L_2): L_1 \parallel L_2$ where $L_1, L_2 \in L\}$ then R is______ relation. (ii). Let R = $\{(L_1, L_2) : L_1 \perp L_2$ where $L_1, L_2 \in L\}$ which of the following is true? (A) R is Symmetric but neither reflexive nor transitive (B) R is Reflexive and transitive but not symmetric (C) R is Reflexive but neither symmetric nor transitive (D) R is an Equivalence relation (iii). The function f: R→R defined by $f(x) = x - 4$ is___________ (A). Bijective (B). Surjective but not injective (C) . Injective but not Surjective (D). Neither Surjective nor Injective (OR) (iii). Let $f: R \rightarrow R$ be defined by $(x) = x - 4$. Then the range of $f(x)$ is _______	

INVERSE TRIGONOMETRIC FUNCTIONS

	SECTION-A (*This section comprises of multiple-choice questions (MCQs) of 1 mark each*)	
1	The domain of the function defined by $f(x) = \sin^{-1} x + \cos x$ is (A) [–1, 1] (B) $[-1, \pi+1]$ (C) $(-\infty, \infty)$ (D) ϕ	1
2	The value of $\cos^{-1}(-1) - \sin^{-1}(1)$ is (A) π (B) $\frac{\pi}{2}$ (C) $\frac{3\pi}{2}$ (D) $-\frac{3\pi}{2}$	1

3	The value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$ is (a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $-\frac{\pi}{3}$ (d) $\frac{\pi}{6}$	1
4	The value of $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is (A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1	1
	Questions below are Assertion and Reason based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the codes (A),(B),(C) and (D) as given below. A) Both Assertion (A) and Reason (R) are true and R is the correct explanation of the Assertion (A) B) Both Assertion (A) and Reason (R) are true and R is not the correct explanation of the Assertion (A) C) Assertion (A) is true, but (R) is false D) Assertion (A) is false, but (R) is true	
5	Assertion (A) : The range of the function $f(x) = 2\sin^{-1}x + \frac{3\pi}{2}$, where $x \in [-1,1]$, is $[\frac{\pi}{2}, \frac{5\pi}{2}]$ Reason (R) : The range of the principal value branch of $\sin^{-1}x$ is $[0,\pi]$.	1
6	Assertion (A) : The Principal value of the function $f(x) = \sin^{-1}(\sin\frac{2\pi}{3}) + \cos^{-1}(\cos\frac{2\pi}{3})$,where $x \in [-1, 1]$ is π Reason (R): The range of the principal value branch of $\cos^{-1}x$ is $[0, \pi]$ and $\sin^{-1}x$ is $[-\frac{\pi}{2}, \frac{\pi}{2}]$	1
	SECTION – B *This section comprises very short answers (VSA) type questions of 2 marks each.*	
7	Find the principal value of $\left(\cos^{-1} cos\ \frac{13\pi}{6}\right)$.	2
8	Find the value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$	2
9	Find the value of $\left[\sin^{-1} sin\ \left(\frac{13\pi}{7}\right)\right]$	2
10	Simplify :$\tan^{-1} 1 + \cos^{-1}(-\frac{1}{2}) + \sin^{-1}(-\frac{1}{2})$	2
11	Find the principal value of $\cos^{-1}(1/2) - 2\sin^{-1}(-1/2)$.	2
12	If $\cos(\tan^{-1} x) = \sin\left(\cot^{-1}\left(\frac{3}{4}\right)\right)$, then find the value of x.	2
13	Simplify: $\tan^{-1}\left[2\cos\left\{2\sin^{-1}\left(\frac{1}{2}\right)\right\}\right]$	2

	SECTION-C *This section comprises Long answers (LA) type questions of 5 marks each*	
14	Solve for $x, cos^{-1} x + sin^{-1}\left(\frac{x}{2}\right) = \frac{\pi}{6}$.	3

MATRICES

	SECTION-A (*This section comprises of multiple-choice questions (MCQs) of 1 mark each*)	
1	If the matrix A is both symmetric and skew symmetric, then (A) A is a diagonal matrix (B) A is a zero matrix (C) A is a square matrix (D) None of these	1
2	Matrices A and B will be inverse of each other only if (A) AB = BA (B) AB = BA = 0 (C) AB = 0, BA = I (D) AB = BA = I	1
3	If $A = [a_{ij}]$ is an identity matrix, then which of the following is true? A. $a_{ij} = \{0, if\ i = j\ 1, if\ i \neq j$ B. $a_{ij} = 1, \forall i, j$ C. $a_{ij} = 0, \forall i, j$ $a_{ij} = \{0, if\ i \neq j\ 1, if\ i = j$	1
4	For any square matrix A, $(A - A^T)^T$ is always : A. An identity matrix B. A null matrix C. A skew symmetric matrix A symmetric matrix	1
5	If $P = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \end{bmatrix}$ and $Q = PP^T$, then the value of $\|Q\|$ is (a) 2 (b) -2 (c) 1 (d) 0	1
6	If A= $\begin{bmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$ such that A+A^T= I then find the value of θ a) $\frac{2}{\pi}$ b) $\frac{\pi}{3}$ c) $-\frac{2}{\pi}$ d) $-\frac{\pi}{3}$	1

7	If $\begin{bmatrix} x & 2 \\ 3 & x-1 \end{bmatrix}$ is a singular matrix, then the product of all possible values of x is: a) 6 b)0 c) -6 d) 7	1
8	If a matrix has 24 elements, the number of possible orders it can have, is A) 13 B) 3 C) 5 D) 8	1
9	If $\begin{bmatrix} x+y & 2 \\ 5 & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, then the value of ($\frac{24}{x}$ +$\frac{24}{y}$) is A) 7 B) 6 C) 8 D) 18	1
10	If A = $\begin{bmatrix} 3 & 4 \\ 5 & 2 \end{bmatrix}$ and 2A +B is null matrix, then B is equals to A) $\begin{bmatrix} 6 & 8 \\ 10 & 4 \end{bmatrix}$ B) $\begin{bmatrix} -6 & -8 \\ -10 & -4 \end{bmatrix}$ C) $\begin{bmatrix} 5 & 8 \\ 10 & 3 \end{bmatrix}$ D) $\begin{bmatrix} -5 & -8 \\ -10 & -3 \end{bmatrix}$	1
11	If $A = \begin{bmatrix} \sin\alpha & \cos\alpha \\ -\cos\alpha & \sin\alpha \end{bmatrix}$ then the value of the product AA^T is a) Null matrix b) I c) A^2 d) A	1
12	Let $A = \begin{bmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$, then the only correct statement about the matrix A is a) A^{-1} does not exist. b) $A^2 = I$ c) A is a zero matrix d) A = (-1) I , where I is identity matrix	1
13	If $A = \begin{bmatrix} 2 & 0 & -3 \\ 4 & 3 & 1 \\ -5 & 7 & 2 \end{bmatrix}$ is expressed as the sum of a symmetric and skew symmetric matrix, then the symmetric matrix is a) $A = \begin{bmatrix} 2 & 2 & -4 \\ 2 & 3 & 4 \\ -4 & 4 & 2 \end{bmatrix}$ b) $A = \begin{bmatrix} 2 & 4 & -5 \\ 0 & 3 & 7 \\ -3 & 1 & 2 \end{bmatrix}$ c) $A = \begin{bmatrix} 4 & 2 & -4 \\ 2 & 6 & 4 \\ -4 & 4 & 4 \end{bmatrix}$ d) $A = \begin{bmatrix} 4 & 4 & -8 \\ 4 & 6 & 8 \\ -8 & 8 & 4 \end{bmatrix}$	1
14	If A and B are two symmetric matrices of same order. Then, the matrix $AB - BA$ is equal to (a) a symmetric matrix (b) a skew-symmetric matrix (c) a null matrix	1

	(d) the identity matrix	
15	If A is a square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to a) A b) I – A c) I d) 3A	1
16	If $A = \begin{bmatrix} 2 & x-3 & x-2 \\ 3 & -2 & -1 \\ 4 & -1 & -5 \end{bmatrix}$ is a symmetric matrix then x is a) 3 (b) 6 (c) 8 (d) 0	1
17	If $\begin{bmatrix} 2x+5 & 3 \\ 5x+2 & 9 \end{bmatrix}$ is singular matrix then $x =$ a)13 b) 9 c) -9 d) -13	1
18	If $A = (a_{ij})$ is a square matrix of order 2 such that $a_{ij} = \begin{cases} 1, when\ i \neq j \\ 0, when\ i = j \end{cases}$, then A is: (A) $\begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$ (B) $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$ (C) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	1
19	Number of symmetric matrices of order 3x3 with each entry 1or-1 is (A) 256 (B) 64 (C) 512 (D) 4	1
20	If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^2 is equal to (a)$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (b)$\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$ (d $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$	1
	*Questions below are Assertion and Reason based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (*R*). Select the correct answer from the codes (*A),(B),(C*) and* (D*) as given below.* A) Both Assertion (A) and Reason (R) are true and R is the correct explanation of the Assertion (A) B) Both Assertion (A) and Reason (R) are true and R is not the correct explanation of the Assertion (A) C) Assertion (A) is true, but (R) is false D) Assertion (A) is false, but (R) is true	
21	Assertion: If $A = \begin{bmatrix} \sqrt{3} & 1 \\ 2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} x & y & z \\ a & b & c \end{bmatrix}$, then orders of $(A + B)$ is 2×3 Reason: If $[a_{ij}]$ and $[b_{ij}]$ are two matrices of the same order, then the order of $A + B$ is the same as the order of A or B	1
	<u>SECTION – B</u>	

Prepared by : K V RAMANAYYA (PGT Mathematics)

	This section comprises very short answers (VSA) type questions of 2 marks each.	
22	$If\ A = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix}$,then find a matrix X such that A^2-5A+4I+X=0	2
23	. If $\begin{bmatrix} 2x & 5 \\ 8 & x \end{bmatrix} = \begin{bmatrix} 6 & -2 \\ 7 & 3 \end{bmatrix}$, then write the value of x.	2
24	Given $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$, compute A^{-1} and show that $2A^{-1} = 9I - A$.	2
25	If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$be such that $A^{-1} = kA$, then find the value of k.	2
	SECTION-C *This section comprises Long answers (LA) type questions of 5 marks each*	
26	If A = $\begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ $and\ (A+B)^2 = A^2 + B^2$ then find the values of a and b	5

PM SHRI KV SRIKAKULAM HOLIDAY HOMEWORK

CLASS : X | SUB : MATHEMATICS | Extra Questions — CHAPTER 1 | Real Numbers

Topics: Fundamental Theorem of Arithmetic.
Irrationality of √2, √3, √5

Section A — Multiple Choice Questions (1 mark each)

1. The HCF of 96 and 72 is:

(a) 12 (b) 24

(c) 48 (d) 6

2. If HCF (a, b) = 12 and LCM (a, b) = 360, then a × b = ?

(a) 372 (b) 4320

(c) 432 (d) 3600

3. Which of the following is NOT a prime number?

(a) 31 (b) 37

(c) 49 (d) 41

4. The prime factorisation of 2520 is:

(a) $2^3 \times 3^2 \times 5 \times 7$ (b) $2^2 \times 3^3 \times 5 \times 7$

(c) $2^3 \times 3 \times 5 \times 7$ (d) $2 \times 3^2 \times 5^2 \times 7$

5. √5 is:

(a) A rational number (b) An integer

(c) An irrational number (d) A natural number

Section B — Short Answer Questions (2 marks each)

1. Find the HCF of 135 and 225.
2. Find the HCF and LCM of 12, 15 and 21 using prime factorisation. Verify: HCF × LCM = product of two numbers
3. Express 156 as a product of its prime factors.
4. Prove that √**3** is irrational.
5. The HCF of two numbers is 9 and their LCM is 2016. If one number is 54, find the other.

Section C — Long Answer Questions

1. Prove that **3 + 2**√**5** is irrational.

2. There are 104 students in Class X and 96 students in Class IX of a school. In a house examination, these students have to be seated in rows such that each row has the same number of students and each row has students of the same class only. Find the minimum number of rows required.
3. Find the largest positive integer that divides 245 and 1029 leaving remainder 5 in each case. (Hint: Find HCF of 240 and 1024.)

CHAPTER 2 | Polynomials

Topics: Zeros of a polynomial • Geometrical meaning of zeros • Relationship between zeros and coefficients of quadratic polynomials

Section A — Multiple Choice Questions (1 mark each)

1. The number of zeros of the polynomial $p(x) = (x - 2)^2(x + 5)$ is:

(a) 1 (b) 2

(c) 3 (d) 0

2. If α and β are zeros of $x^2 - 5x + 6$, then $\alpha + \beta = ?$

(a) –5 (b) 5

(c) 6 (d) –6

3. If α and β are zeros of $2x^2 - 5x + 3$, then $\alpha\beta = ?$

(a) 5/2 (b) –5/2

(c) 3/2 (d) –3/2

4. A quadratic polynomial whose zeros are –3 and 4 is:

(a) $x^2 - x - 12$ (b) $x^2 + x - 12$

(c) $x^2 - 7x + 12$ (d) $x^2 + 7x + 12$

5. If one zero of the polynomial $3x^2 + 8x + k$ is the reciprocal of the other, then $k = ?$

(a) 3 (b) –3

(c) 1/3 (d) –1/3

6. The sum of zeros of the polynomial $p(x) = -3x^2 + 5x - 2$ is:

(a) –5/3 (b) 5/3

(c) –2/3 (d) 2/3

Section B — Short Answer Questions (2 marks each)

1. Find the zeros of the quadratic polynomial $p(x) = x^2 - 3x - 4$ and verify the relationship between the zeros and coefficients.
2. If α and β are the zeros of the polynomial $f(x) = x^2 - px + q$, find the value of $\alpha^2 + \beta^2$.
3. Find a quadratic polynomial whose sum of zeros is 0 and product of zeros is –1.
4. Find the zeros of: $p(x) = 4x^2 - 4x - 3$.
5. If one zero of $2x^2 + 3x + k$ is 1/2, find k and the other zero.
6. If α and β are zeros of $x^2 - 6x + k$, find k if $3\alpha + 2\beta = 20$.

Section C — Long Answer Questions (3–4 marks each)

1. Find a quadratic polynomial whose zeros are $(3 + \sqrt{5})$ and $(3 - \sqrt{5})$. Also find its zeros and verify using the relationship between zeros and coefficients.
2. If α and β are zeros of the polynomial $6x^2 - 7x - 3$, form a quadratic polynomial whose zeros are 1/α and 1/β.
3. The graphs of y = p(x) are given below. In each case find the number of zeros of p(x) and write them (describe from the graph description): (i) Graph touches x-axis at exactly one point. (ii) Graph cuts x-axis at –1 and 3. (iii) Graph cuts x-axis at –2, 0 and 1. How many zeros in each case? What is the degree of the polynomial in each case?

Hint: For (iii) three distinct zeros → degree ≥ 3. For (i) one repeated zero → degree 2 or higher.

CHAPTER 3 | Pair of Linear Equations in Two Variables

Topics: Graphical method • Consistency / Inconsistency • Substitution • Elimination • Cross-Multiplication

Section A — Multiple Choice Questions (1 mark each)

1. The pair of equations x = 4 and y = 4 represents:

(a) Parallel lines	(b) Coincident lines
(c) Intersecting lines at (4, 4)	(d) None

2. For the pair 2x + 3y = 7 and 4x + 6y = 14, the system is:

(a) Inconsistent	(b) Consistent with unique solution
(c) Consistent with infinitely many solutions	(d) None

3. If the system 3x – ky = 8 and 6x – 8y = 16 has infinitely many solutions, then k = ?

(a) 2	(b) 4
(c) 8	(d) 6

4. The pair of equations 3x + 2y = 5 and 2x – 3y = 7 has:

(a) No solution	(b) Infinitely many solutions
(c) Unique solution	(d) Cannot determine

5. Graphically, the solution of 2x – y = 1 and x + y = 5 is:

(a) (2, 3)	(b) (3, 2)

(c) (1, 4) (d) (4, 1)

6. The value of k for which the system x + 2y = 3 and 5x + ky = 15 has no solution is:

(a) 2 (b) 6

(c) 10 (d) 5

Section B — Short Answer Questions (2 marks each)

1. Solve by substitution method:3x + 2y = 11 and 2x – y = 4
2. Solve by elimination method:4x + 3y = 24 and 5x – 3y = 6
3. Without solving, determine whether the pair x + 2y – 4 = 0 and 2x + 4y – 12 = 0 is consistent or inconsistent. Give reason.
4. The difference of two numbers is 26 and one number is three times the other. Find the numbers.
5. Solve :2x + y = 5 and 3x + 2y = 8
6. Find the value of k for which the equations 2x + 3y = 7 and (k+1)x + (2k–1)y = 4k+1 have infinitely many solutions.

Section C — Long Answer Questions

1. Solve graphically:2x + y = 6 and 2x – y = 2Find the vertices of the triangle formed by these two lines and the x-axis.
2. Five years ago, A was thrice as old as B. Ten years later, A will be twice as old as B. Find their present ages.
3. Solve the following pair by substitution and verify your answer:(x/2) + (2y/3) = –1 and x – (y/3) = 3

Case Study Questions (4 marks each — as per board pattern)

Case Study 1 — Chapter 1 (Real Numbers)

A school organises a sports day. 120 students of Class X and 180 students of Class IX are to march in separate rows, each row having the same number of students and only students of the same class.

- (i) Find the maximum number of students in each row. (1 mark)
- (ii) How many rows will Class X have? (1 mark)
- (iii) Express 180 as a product of prime factors. (1 mark)
- (iv) HCF of 120 and 180

Case Study 2 — Chapter 2 (Polynomials)

A rectangular park is designed such that its length exceeds its breadth by 5 m. The area of the park is represented by the polynomial $p(x) = x^2 + 5x – 36$, where x is the breadth in metres.

- (i) Find the zeros of p(x) by factorisation. (1 mark)
- (ii) Find the breadth and length of the park (take positive values). (1 mark)
- (iii) Verify: sum of zeros = –b/a and product of zeros = c/a. (1 mark)
- (iv) Write a polynomial whose zeros are 3 more than the zeros of p(x). (1 mark)

Case Study 3 — Chapter 3 (Pair of Linear Equations)

Two friends Arun and Bala go to a stationery shop. Arun buys 3 notebooks and 2 pens and pays Rs. 80. Bala buys 4 notebooks and 3 pens and pays Rs. 110.

- (i) Frame the pair of linear equations for the above situation. (1 mark)
- (ii) Solve the system to find the cost of one notebook and one pen. (2 marks)
- (iii) How much will 5 notebooks and 4 pens cost? (1 mark)

Wishing you a productive holiday! ★

MCQ WORKSHEET-I
CLASS IX : CHAPTER - 3
COORDINATE GEOMETRY

1. Point (–3, –2) lies in the quadrant:
(a) I (b) II (c) III (d) IV

2. Point (5, –4) lies in the quadrant:
(a) I (b) II (c) III (d) IV

3. Point (1, 7) lies in the quadrant:
(a) I (b) II (c) III (d) IV

4. Point (–6, 4) lies in the quadrant:
(a) I (b) II (c) III (d) IV

5. The point (–4, –3) means:
(a) x = –4, y = –3 (b) x = –3, y = –4 (c) x = 4, y = 3 (d) None of these

6. Point (0, 4) lies on the:
(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

7. Point (5, 0) lies on the:
(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

8. On joining points (0, 0), (0, 2), (2,2) and (2, 0) we obtain a:
(a) Square (b) Rectangle (c) Rhombus (d) Parallelogram

9. Point (–2, 3) lies in the:
(a) I quadrant (b) II quadrant (c) III quadrant (d) IV quadrant

10. Point (0, –2) lies:
(a) on the x-axis (b) in the II quadrant (c) on the y-axis (d) in the IV quadrant

11. Signs of the abscissa and ordinate of a point in the first quadrant are respectively:
(a) +, + (b) –, + (c) +, – (d) –, –

12. Signs of the abscissa and ordinate of a point in the second quadrant are respectively:
(a) +, + (b) –, + (c) +, – (d) –, –

13. Signs of the abscissa and ordinate of a point in the third quadrant are respectively:
(a) +, + (b) –, + (c) +, – (d) –, –

14. Signs of the abscissa and ordinate of a point in the fourth quadrant are respectively:
(a) +, + (b) –, + (c) +, – (d) –, –

15. Point (–1, 0) lies in the:
(a) on the negative direction of x – axis (b) on the negative direction of y – axis
(c) in the III quadrant (d) in the IV quadrant

MCQ WORKSHEET-II
CLASS IX : CHAPTER - 3
COORDINATE GEOMETRY

1. Point (0, –2) lies in the:
(a) on the negative direction of x – axis (b) on the negative direction of y – axis
(c) in the I quadrant (d) in the II quadrant

2. Abscissa of the all the points on x – axis is:
(a) 0 (b) 1 (c) –1 (d) any number

3. Ordinate of the all the points on x – axis is:
(a) 0 (b) 1 (c) –1 (d) any number

4. Abscissa of the all the points on y – axis is:
(a) 0 (b) 1 (c) –1 (d) any number

5. Ordinate of the all the points on y – axis is:
(a) 0 (b) 1 (c) –1 (d) any number

6. A point both of whose coordinates are negative will lie in:
(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

7. A point both of whose coordinates are positive will lie in:
(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

8. If y – coordinate of a point is zero, then this point always lies:
(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

9. If x – coordinate of a point is zero, then this point always lies:
(a) I quadrant (b) II quadrant (c) x – axis (d) y – axis

10. The point (1, –1), (2, –2), (4, –5), (–3,–4) lies in:
(a) II quadrant (b) III quadrant (c) IV quadrant
(d) do not lie in the same quadrant

11. The point (1, –2), (2, –3), (4, –6), (2,–7) lies in:
(a) II quadrant (b) III quadrant (c) IV quadrant
(d) do not lie in the same quadrant

12. The point (–5, 2) and (2,–5) lies in:
(a) same quadrant (b) II and III quadrant, respectively
(c) II and IV quadrant, , respectively (d) IV and II quadrant, respectively

13. The point whose ordinate is 4 and which lies on y – axis is:
(a) (4, 0) (b) (0, 4) (c) (1, 4) (d) (4, 2)

14. Abscissa of a point is positive in:
(a) I and II quadrant (b) I and IV quadrant
(c) I quadrant only (d) II quadrant only

15. The perpendicular distance of the point P(3,4) from the y – axis is:
(a) 3 (b) 4 (c) 5 (d) 7