

MATHS CONTENT
CLASS-XI
CHAPTER: SETS

MCQS – SETS

Q.1	The set of intelligent students in a class is : (a) A null set (c) A finite set				(b) A singleton set (d) Not a well defined collection							
Q.2	If the sets A and B are given by $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8, 10\}$ and the universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, then: (a) $(A \cup B)' = \{5, 7, 9\}$ (c) $(A \cap B)' = \{1, 3, 5, 6, 7, 8\}$								(b) $(A \cap B)' = \{1, 3, 5, 6, 7\}$ (d) None of these			
Q.3	If $A = \{1, 2, 3, 4\}$, $B = \{2, 3, 5, 6\}$ and $C = \{3, 4, 6, 7\}$, then (a) $A - (B \cap C) = \{1, 3, 4\}$ (c) $A - (B \cup C) = \{2, 3\}$								(b) $A - (B \cap C) = \{1, 2, 4\}$ (d) $A - (B \cup C) = \{\emptyset\}$			
Q.4	The set $\{x : x \text{ is an even prime number}\}$ can be written as: (a) $\{2\}$ (b) $\{2, 4\}$ (c) $\{2, 14\}$ (d) $\{2, 4, 14\}$											
Q.5	The number of the proper subset of $\{a, b, c\}$ is: (a) 3 (b) 8 (c) 6 (d) 7											
Q.6	Which one is different from the others? (i) empty set (ii) void set (iii) zero set (iv) null set : (a) (i) (b) (ii) (c) (iii) (d) (iv)											
Q.7	Given the sets $A = \{1, 3, 5\}$, $B = \{2, 4, 6\}$ and $C = \{0, 2, 4, 6, 8\}$. Which of the following may be considered as universal set for all the three sets A, B and C: (a) $\{0, 1, 2, 3, 4, 5, 6\}$ (c) $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$								(b) $\emptyset$ (d) $\{1, 2, 3, 4, 5, 6, 7, 8\}$			
Q.8	Which of the following collections is a set ? (a) The collection of all the days of a week (b) A collection of 11 best hockey player of India. (c) The collection of all rich person of Delhi (d) A collection of most dangerous animals of India.											
Q.9	If $A \cup B = \emptyset$ then $n(A \cup B)$ is equal to: (a) $n(A) + n(B) - n(A \cap B)$ (c) $n(A) + n(B) + n(A \cap B)$								(b) $n(A) - n(B) + n(A \cap B)$ (d) $n(A) - n(B) - n(A \cap B)$			

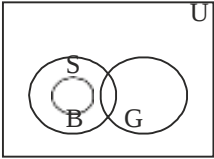
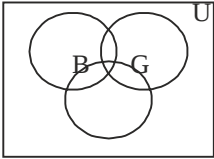
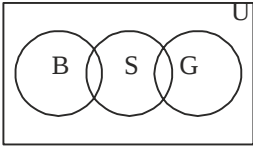
Q.10	Let $V = \{a, e, i, o, u\}$ and $B = \{a, i, k, u\}$ then value of $(V - B)$ and $(B - V)$ are respectively: (a) $\{e, o\}$ and $\{k\}$ (c) $\{o\}$ and $\{k\}$ (b) $\{e\}$ and $\{k\}$ (d) $\{e, o\}$ and $\{k, i\}$
Q.11	Let $A = \{a, b\}$, $B = \{a, b, c\}$ then $A \cup B$ is: (a) $\{a, b\}$ (b) $\{a, c\}$ (c) $\{a, b, c\}$ (d) $\{b, c\}$
Q.12	The number of subsets of a set containing n elements is: (a) n (b) 2^{n-1} (c) n^2 (d) 2^n
Q.13	If $A = \{1, 2, 3\}$, $B = \{1, 4, 6, 9\}$, and R is a relation from A to B defined by 'x is greater than y' the range of R is: (a) $\{1, 4, 6, 9\}$ (b) $\{4, 6, 9\}$ (c) $\{1\}$ (d) none of these
Q.14	Let R be a relation from a set A to set B then: (a) $R = A \cup B$ (b) $R = A \cap B$ (c) $R \leq A \times B$ (d) $R \leq B \times A$
Q.15	The number of subsets of a set containing n elements is: (a) n (b) 2^{n-1} (c) n^2 (d) 2^n
Q.16	If $A = \{1, 2, 3\}$, $B = \{1, 4, 6, 9\}$, and R is a relation from A to B defined by 'x is greater than y' the range of R is: (a) $\{1, 4, 6, 9\}$ (b) $\{4, 6, 9\}$ (c) $\{1\}$ (d) None of these
Q17	Set $A = \{0, 7, 26, 63\}$ in set-builder form is: (a) $\{x: x \in \mathbb{N}, x = n^3 - 1 \text{ and } n \leq 7\}$ (c) $\{x: x \in \mathbb{N}, x = n^2 - 1 \text{ and } n < 4\}$ (b) $\{x: x \in \mathbb{N}, x = n^2 - 1 \text{ and } n \leq 5\}$ (d) $\{x: x \in \mathbb{N}, x = n^3 - 1 \text{ and } n \leq 4\}$
Q18	Let A, B, C be three sets. If $A \in B$ and $B \subset C$, then: (a) $A \subset C$ (b) $A \not\subset C$ (c) $A \in C$ (d) $A \not\in C$
Q19	If $B = \{\emptyset\}$ then: (a) B is an empty set (c) B is an infinite set (b) B is a finite set (d) B is not a set
Q20	If $A = \{3, 5, 7, 9, 11\}$, $B = \{7, 9, 11, 13\}$, $C = \{11, 13, 15\}$ and $D = \{15, 17\}$, Then $(A \cup B) \cap C$ is: (a) $\{11, 13, 15\}$ (b) $\{9, 11, 13, 15\}$ (c) $\{9, 11, 13\}$ (d) $\{11, 13\}$
Q21	If $n(A) = 2$ then $n[P(P(A))]$ is: (a) 8 (b) 4 (c) 12 (d) 16

Q22	Let P be a set of squares, Q be set of parallelograms, R be a set of quadrilaterals and S be a set of rectangles. Consider the following : (I) $P \subset Q$ (II) $R \subset P$ (III) $P \subset S$ (IV) $S \subset R$ Which of the above are correct? (a) I, II and III (b) I, III and IV (c) I, II and IV (d) III and IV																														
Q23	$A = \{1, 2, 3, 4\}$, $B = \{-1, 1, 0, -2, 2\}$, $C = \{1, 3, 4\}$ are subset of which set? (a) $[1, 4]$ (b) $[-1, 4]$ (c) $[-2, 2]$ (d) $[-2, 4]$																														
Q24	Let $A = \{(1, 2), (3, 4), 5\}$, then which of the following is incorrect? (a) $\{3, 4\} \notin A$ as $(3, 4)$ is an element of A (b) $\{5\}, \{(3, 4)\}$ are subsets of A but not elements of A (c) $\{1, 2\}, \{5\}$ are subsets of A (d) $\{(1, 2), (3, 4), 5\}$ is a subset of A																														
Q25	Match the following sets in column I with the intervals in column II: Codes: <table><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>(a) 4</td><td>1</td><td>2</td><td>3</td></tr><tr><td>(b) 2</td><td>3</td><td>4</td><td>1</td></tr><tr><td>(c) 1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>(d) 3</td><td>4</td><td>2</td><td>1</td></tr></table> <table><tr><th>Column – I</th><th>Column – II</th></tr><tr><td>A. $\{x : x \in R, a < x < b\}$</td><td>1. $(a, b]$</td></tr><tr><td>B. $\{x \in R : a \leq x \leq b\}$</td><td>2. $[a, b)$</td></tr><tr><td>C. The set of real numbers x such that $a \leq x < b$</td><td>3. (a, b)</td></tr><tr><td>D. $\{x : x \in R \text{ and } a < x \leq b\}$</td><td>4. $[a, b]$</td></tr></table>	A	B	C	D	(a) 4	1	2	3	(b) 2	3	4	1	(c) 1	2	3	4	(d) 3	4	2	1	Column – I	Column – II	A. $\{x : x \in R, a < x < b\}$	1. $(a, b]$	B. $\{x \in R : a \leq x \leq b\}$	2. $[a, b)$	C. The set of real numbers x such that $a \leq x < b$	3. (a, b)	D. $\{x : x \in R \text{ and } a < x \leq b\}$	4. $[a, b]$
A	B	C	D																												
(a) 4	1	2	3																												
(b) 2	3	4	1																												
(c) 1	2	3	4																												
(d) 3	4	2	1																												
Column – I	Column – II																														
A. $\{x : x \in R, a < x < b\}$	1. $(a, b]$																														
B. $\{x \in R : a \leq x \leq b\}$	2. $[a, b)$																														
C. The set of real numbers x such that $a \leq x < b$	3. (a, b)																														
D. $\{x : x \in R \text{ and } a < x \leq b\}$	4. $[a, b]$																														
Q26	Two finite sets have m and n elements. The number of elements in the power set of first set is 48 more than the total number of elements in power set of the second set. Then the value of m and n are: (A) 7, 6 (B) 6, 3 (C) 6, 4 (D) 7, 4																														
Q27	Which of the following is correct? I. Number of non-empty subsets of a set having n elements are $2^n - 1$. II. The number of non-empty subsets of the set $\{a, b, d\}$ are 15: (a) Only I is false (b) Only II is false (c) Both I and II are false (d) Both I and II are true																														
Q28	Which of the following is not a null set? (a) Set of odd natural numbers divisible by 2 (b) Set of even prime numbers (c) $\{x: x \text{ is a natural number, } x > 5 \text{ and } x < 6\}$ (d) $\{y: y \text{ is a point common to any two parallel lines}\}$																														
Q29	If $n(A) = 4$, how many proper subsets does the set A has: (a) 15 (b) 16 (c) 3 (d) 14																														

Q30	A and B are not singleton sets and $n(A \times B) = 21$. If $A \subset B$ then $n(B)$ is equal to: (a) 3 (b) 7 (c) 21 (d) 1
Q31	Which of the following are disjoint sets: (a) $\{a, b, c\}$ & $\{b, c, a\}$ (b) $\{a, e, b, d\}$ & $\{d, a, b, e\}$ (c) $\{2, 5, m, n\}$ & $\{n, m, 5, 2\}$ (d) $\{(2, 4, 6, 8)\}$ & $\{x: x \text{ is an even number}\}$
Q32	A and B are non-empty sets, then $P(A) \cup P(B)$ is equal to: (a) $P(A \cup B)$ (b) $P(A \cap B)$ (c) $P(A) = P(B)$ (d) None of these
Q33	Consider the sets $A = \{0\}$, $B = \{x : x > 15 \text{ and } x < 5\}$, $C = \{x : x - 5 = 0\}$, $D = \{x : x^2 = 25\}$ and $E = \{x : x \text{ is an integral positive root of the equation } \{x^2 - 2x - 15 = 0\}$ Choose the pair of equal sets: (a) A and B (b) C and D (c) C and E (d) B and C
Q34	If $U = \{1, 2, 3, 4, \dots, 10\}$ is the universal set of the sets $A = \{2, 4, 6, 8, 10\}$ and $B = \{4, 6\}$, then given sets can be represented by Venn diagram as: (a) (b) (c) (d)
Q35	The shaded region in the given figure is (a) $B \cap (A \cup C)$ (b) $B \cup (A \cap C)$ (c) $B \cap (A - C)$ (d) $B - (A \cup C)$
Q36	Which of the following sets is a finite set? (a) $A = \{x : x \in \mathbb{Z} \text{ and } x^2 - 5x + 6 = 0\}$ (b) $B = \{x : x \in \mathbb{Z} \text{ and } x^2 \text{ is even}\}$ (c) $D = \{x : x \in \mathbb{Z} \text{ and } x > -10\}$ (d) All of these

Q37	Which of the following has only one subset: (a) $\{ \}$ (b) $\{4\}$ (c) $\{4, 5\}$ (d) $\{0\}$
Q38	If A and B be any two sets, then $A \cap (A \cup B)'$ is equal to: (a) A (b) B (c) $\emptyset$ (d) None of these
Q39	A survey shows that 63% of the people watch a news channel whereas 76% watch another channel. If x% of the people watch both channel, then: (a) $x = 35$ (b) $x = 63$ (c) $39 \leq x \leq 63$ (d) $x = 39$
Q.40	$A = \{x : x \neq x\}$ represents: (a) $\{x\}$ (b) $\{1\}$ (c) $\{ \}$ (d) $\{0\}$
Q41	In a group of 52 persons, 16 drink tea but not coffee, while 33 drink tea. How many persons drink coffee but not tea: (a) 17 (b) 36 (c) 23 (d) 19
Q42	There are 600 student in a school. If 400 of them can speak Telugu, 300 can speak Hindi, then the number of students who can speak both Telugu and Hindi is: (a) 100 (b) 200 (c) 300 (d) 400
Q43	Which one of the following is an infinite set : (a) The set of human beings on the earth (b) The set of water drops in a glass of water (c) The set of trees in a forest (d) The set of all primes
Q44	If $\emptyset$ denotes the empty set, then which one of the following is correct: (a) $\emptyset \in \emptyset$ (b) $\emptyset \in \{\emptyset\}$ (c) $\{\emptyset\} \in \{\emptyset\}$ (d) $0 \in \emptyset$
Q45	If $B = \{x: x \text{ is a student presently studying in both classes X and XI}\}$. Then, the number of elements in set B are: (a) finite (b) infinite (c) zero (d) None of these
Q46	The set $\{x : x \text{ is a positive integer less than 6 and } 3^x - 1 \text{ is an even number}\}$ in roster form is: (a) $\{1, 2, 3, 4, 5\}$ (b) $\{1, 2, 3, 4, 5, 6\}$ (c) $\{2, 4, 6\}$ (d) $\{1, 3, 5\}$
Q47	If $A \subset B$ and $A \neq B$, then: (a) A is called a proper subset of B (b) A is called a super set of B (c) A is not a subset of B (d) B is a subset of A

Q48	Which of the following is true: (a) $a \in \{\{a\}, b\}$ (b) $\{b, c\} \subset \{a, \{b, c\}\}$ (c) $\{a, b\} \subset \{a, \{b, c\}\}$ (d) None of these
Q49	The set of real numbers $\{x : a < x < b\}$ is called: (a) open interval (b) closed interval (c) semi-open interval (d) semi-closed interval
Q50	The set of all letters of the word 'SCHOOL' is represented by: I. $\{S, C, H, O, O, L\}$ II. $\{S, C, H, O, L\}$ III. $\{C, H, L, O, S\}$ IV. $\{S, C, H, L\}$ The correct code is: (a) I and II (b) I, II and III (c) II and III (d) I, II, III and IV
Q.51	The empty set is represented by: I. $\emptyset$ II. $\{\emptyset\}$ III. $\{\}$ IV. $\{\{\}\}$ (a) I and II (b) I and III (c) II and III (d) I and IV
Q.52	Which of the following is correct? I. Number of non-empty subsets of a set having n elements are $2^n - 1$. II. The number of non-empty subsets of the set $\{a, b, c, d\}$ are 15. (a) Only I is false (b) Only II is false (c) Both I and II are false (d) Both I and II are true
Q53	Let $A = \{(1, 2), (3, 4), 5\}$, then which of the following is incorrect: (a) $\{3, 4\} \not\subset A$ as $(3, 4)$ is an element of A (b) $\{5\}, \{(3, 4)\}$ are subsets of A but not elements of A (c) $\{1, 2\}, \{5\}$ are subsets of A (d) $\{(1, 2), (3, 4), 5\}$ are subset of A
Q54	From 50 students taking examination in Mathematics, Physics and Chemistry, each of the students has passed in at least one of the subject, 37 passed Mathematics, 24 Physics and 43 Chemistry. Atmost 19 passed Mathematics and Physics, atmost 29 Mathematics and Chemistry and atmost 20 Physics and Chemistry. Then, the largest numbers that could have passed all three examinations, are: (a) 12 (b) 14 (c) 15 (d) 16

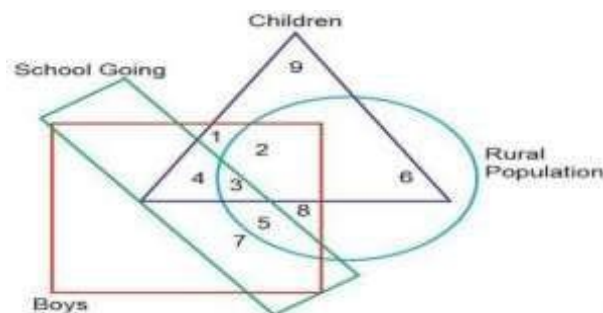
Q55	Let U be the set of all boys and girls in school. G be the set of all girls in the school. B be the set of all boys in the school and S be the set of all students in the school who take swimming. Some but not all students in the school take swimming:  (a)  (b)  (c) (d) None of these
	<u>ASSERTION & REASON TYPE QUESTIONS</u>
	Directions : Each of these questions contains two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below. (a) Assertion is correct, reason is correct; reason is a correct explanation for assertion. (b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion (c) Assertion is correct, reason is incorrect (d) Assertion is incorrect, reason is correct.
Q56	Assertion : The number of non-empty subsets of the set {a, b, c, d} are 15. Reason : Number of non-empty subsets of a set having n elements are $2^n - 1$.
Q57	Suppose A, B and C are three arbitrary sets and U is a universal set. Assertion : If $B = U - A$, then $n(B) = n(U) - n(A)$. Reason : If $C = A - B$, then $n(C) = n(A) - n(B)$.
Q58	Assertion : Let $A = \{1, \{2, 3\}\}$, then $P(A) = \{\{1\}, \{2, 3\}, \emptyset, \{1, \{2, 3\}\}\}$. Reason : Power set is set of all subsets of A.
Q59	Assertion : The subsets of the set $\{1, \{2\}\}$ are $\{\}, \{1\}, \{\{2\}\}$ and $\{1, \{2\}\}$. Reason : The total number of proper subsets of a set containing n elements is $2^n - 1$.
Q60	Assertion : For any two sets A and B, $A - B \subset B'$ Reason : If A be any set, then $A \cap A' = \emptyset$
	<u>INTEGER TYPE QUESTIONS</u>

	Directions : This section contains integer type questions. The answer to each of the question is a single digit integer, ranging from 0 to 9. Choose the correct option.
Q61	If $X = \{1, 2, 3, \dots, 10\}$ and 'a' represents any element of X, then the set containing all the elements satisfy $a + 2 = 6$, $a \in X$ is: (a) {4} (b) {3} (c) {2} (d) {5}
Q62	If a set is denoted as $B = \emptyset$, then the number of element in B is: (a) 3 (b) 2 (c) 1 (d) 0
Q63	The number of non-empty subsets of the set $\{1, 2, 3, 4\}$ is $3 \in a$. The value of 'a' is: (a) 3 (b) 4 (c) 5 (d) 6
Q64	If $X = \{1, 2, 3\}$, then the number of proper subsets is: (a) 5 (b) 6 (c) 7 (d) 8
Q65	If $A = \{(x, y) : x^2 + y^2 = 25\}$ and $B = \{(x, y) : x^2 + 9y^2 = 144\}$ then the number of points, $A \cap B$ contains is: (a) 1 (b) 2 (c) 3 (d) 4

CASE BASED QUESTIONS

Venn diagrams were invented by a logician John Venn as a way of picturing relationships between different groups of things. These diagrams, also called Set diagrams or Logic diagrams, are widely used in mathematics, statistics, logic, teaching, linguistics, computer science and business

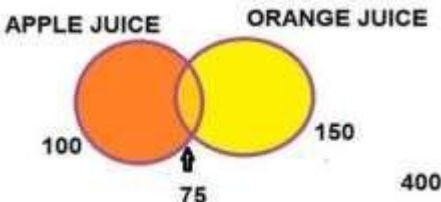
In the following diagram, triangle shows children, circle shows rural population, rectangle shows school going population & square shows boys.



Based on the answer the below

information stated above given questions:-

Q66	(i) The rural boys not going to school are denoted by which number? (a) 1 (b) 2 (c) 1,2 (d) 2,8
-----	---

Q67	(ii) The children from rural population not going to school are denoted by which number? (a)1 (b) 2 (c) 6 (d) 2,6
Q68	(iii) What is represented by number 4? (a) Children who are not from rural population (b) Children who are boys (c) School going boys (d) School going boys who are not from rural population
Q69	(iv) School going boys from village are denoted by which number? (a) 3 (b) 3,5 (c) 3,4 (d) 3, 4, 5,7
Q70	(v) Number of children who are not from rural population? (a) 8 (b) 2 (c) 7 (d) 9
	In D.A.V School, Bahadurgarh, a survey was done on 400 students it was found that 100 like to take apple juice , 150 like to take orange juice and 75 like both apple as well as orange juice.  Based on above information, answer the following questions:
Q71	(i) Number of students who like either of the drink : (a) 400 (b) 175 (c) 250 (d) 325
Q72	(ii) Number of students who likes neither apple juice nor orange juice : (a) 225 (b) 325 (c) 75 (d) 25
Q73	(iii) Number of students who likes only apple juice: (a) 125 (b) 75 (c) 100 (d) 25
Q74	(iv) Number of students who likes only orange juice : (a) 75 (b) 25 (c) 100 (d) 125
Q75	(v) Which information we get from the given data : (a) $n(A \cup B) = n(A) + n(B)$ (b) $n(A \cup B) < n(A \cap B)$ (c) $n(A \cup B) < n(U)$ (d) $n(A \cap B) = n(A) + n(B)$

	<u>1 MARK QUESTIONS</u>
Q76	Write down the set $\{5, 25, 125, 625\}$ in the set builder form
Q77	If $n(A) = 2$ then find $n[P(P(A))]$
Q78	Define equal sets with example.
Q79	Write down $\{x: x \in \mathbb{R}, -4 < x \leq 6\}$ as interval.
Q80	If $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{2, 4, 6, 8\}$, find $A - B$.
Q81	Write the set $A = \{x: x \in \mathbb{R}, 2x + 11 = 15\}$ in the roaster form.
Q82	Define disjoint sets with example.
Q83	What universal set would you propose for the set of rectangles.
Q84	If A and B are two sets such that $A \subset B$, then what is $A \cup B$?
Q85	Write down the power set for the set $\{a, b\}$
Q86	If $S = \{x: x \text{ is a positive multiple of 3 less than 100}\}$ and $P = \{x: x \text{ is a prime number less than 20}\}$. Then find $n(S) + n(P)$
Q87	Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. Find the values of m and n.
Q88	Let S = the set of all triangles, P = the set of all isosceles triangles, Q = the set of all equilateral triangles, R = the set of all right-angled triangles. What do the sets $P \cap Q$ and $R - P$ represents respectively ?
Q89	Let $V = \{a, e, i, o, u\}$, $V - B = \{e, o\}$ and $B - V = \{k\}$. Find the set B.
Q90	If $A = \{a, \{b\}\}$, then find $P(A)$

	<u>2 MARKS QUESTIONS</u>
Q91	Write down all the subsets of the set $\{1, 2, 3\}$
Q92	Draw appropriate venn diagram for each of the following: (a) $(A \cup B)'$ (b) $A - B$
Q93	Write the set $A = \{5, 25, 125, 625\}$ in set-builder form
Q94	Prove that $A = B$ if $P(A) = P(B)$
Q95	A survey shows that 63% of Indians like cheese where as 76% like apples. If $x\%$ of Indians like cheese and apples. Find the value of x .
Q96	If $n(A) = 4$, how many proper subsets does the set A has?
Q97	Using properties of sets prove that $(A \cup B)' = A' \cap B'$.
Q98	Using Venn Diagram prove that: $A \cap (B - C) = (A \cap B) - (A \cap C)$.
Q99	For all sets A, B and C , if $A \subset B$, then $A \cup C \subset B \cup C$
Q100	For all sets A and B , $(A - B) \cup (A \cap B) = A$
	<u>4 MARK QUESTIONS</u>
Q101	If $A = \{3, 5, 7, 9, 11\}$, $B = \{7, 9, 11, 13\}$, $C = \{11, 13, 15\}$, $D = \{15, 17\}$, Find (a) $(A \cup B) \cap C$ (b) $C - D$ (c) $(A \cap B) \cap (B \cup C)$ (d) $B \cap D$
Q102	If S and T are two sets such that S has 21 elements, T has 32 elements, and $S \cap T$ has 11 elements, how many elements does $S \cup T$ have?
Q103	In a survey of 100 students the number of students studying the various languages were found to be: English only 18, English but not Hindi 23, English and Sanskrit 8, English 26, Sanskrit 48, Sanskrit and Hindi 8, no language 24. Find (i) How many students were studying Hindi? (ii) How many students were studying English and Hindi? (iii) How many students were studying Sanskrit only?
Q104	Define the following with the help of an example: (a) Null set (b) Singleton Set (c) Sub-Set (d) Power Set.

Q105	In each of the following, determine whether the given statement is true or false. If true prove it, and if false, give an example. (a) If $x \in A$ and $A \in B$, then $x \in B$ (b) If $x \in A$ and $A \subseteq B$, then $x \in B$
Q106	In a survey of 25 students of a school it was found that 15 study Mathematics, 12 study Physics, 11 study Chemistry, 9 study both Mathematics & Physics, 4 study both Physics & Chemistry, 5 study both Chemistry and Mathematics and 3 students all of the above three subjects. Find the number of students who study: (a) Only Mathematics (b) At least one of the three subjects.
Q107	In a group of students, 100 students know Hindi, 50 know English and 25 know both. Each of the students know either Hindi or English. How many students are there in the group.
Q108	If $n(A - B) = 18$, $n(A \cup B) = 70$ and $n(A \cap B) = 25$, then find $n(B)$.
Q109	If $L = \{1, 2, 3, 4\}$, $M = \{3, 4, 5, 6\}$ and $N = \{1, 3, 5\}$, then verify that $L - (M \cup N) = (L - M) \cap (L - N)$.
Q110	If A, B and C be sets. Then, show that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

MATHS CONTENT
CLASS: XI
CHAPTER: RELATIONS AND FUNCTIONS

	MCQs
Q1	If $A \times B = \{(a, 1), (b, 3), (a, 3), (b, 1), (a, 2), (b, 2)\}$, then set B is (a) $\{a\}$ (b) $\{a, b\}$ (c) $\{1, 2\}$ (d) $\{1, 2, 3\}$
Q2	If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$, find the values of x and y respectively are: (a) 3,3 (b) 1,2 (c) 2,1 (d) 3/2,2
Q3	$U = \{1, 2, 3, 4\}$ and relation $R = \{(x, y) : y > x; x, y \in U\}$ then range of R is (a) $\{1, 2, 3, 4\}$ (b) $\{2, 3, 4\}$ (c) $\{4\}$ (d)
Q4	If $A = \{1, 2, 3\}$ and $B = \{4, 5\}$ then number of relations from A to B is: (a) 6 (b) 8 (c) 9 (d) 64
Q 5	If set A has 2 elements and set B has 4 elements then how many relations are possible? (a) 32 (b) 128 (c) 256 (d) 64
Q 6	If $A \times B = \{(5, 5), (5, 6), (5, 7), (8, 6), (8, 7), (8, 5)\}$, then the set A: (a) $\{5\}$ (b) $\{8\}$ (c) $\{5, 8\}$ (d) $\{5, 6, 7, 8\}$
Q 7	Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 3, 5, 7, 9\}$. Which of the following relation is a function from A to B? (a) $R_1 = \{(x, y) \mid y = 2 + x, x \in A, y \in B\}$ (b) $R_2 = \{(1, 1), (2, 1), (3, 3), (4, 3), (5, 5)\}$ (c) $R_3 = \{(x, y) \mid y = 5 - x, x \in A, y \in B\}$ (d) $R_4 = \{(1, 3), (2, 5), (2, 4), (7, 9)\}$

Q 8	$A = \{5, 10, 15, 20\}$, $B = \{2, 4, 6, 8, 10\}$. Out of the following, which is a function? (a) $\{(5, 2), (10, 4), (15, 6), (20, 9)\}$ (b) $\{(5, 2), (10, 4)\}$ (c) $\{(5, 2), (10, 4), (15, 6), (20, 10)\}$ (d) $\{(5, 1), (5, 10), (15, 6), (20, 9)\}$
Q 9	If A is the set of even natural number less than 8 and B is the set of prime number less than 7, then the number of relations from A to B is (a) 2^9 (b) 9^2 (c) 3^2 (d) $2^9 - 1$
Q10	Let O be the set of odd natural numbers and E be the set of even natural numbers. Relation S from O to E defined as $S = \{(a, b): a, b \text{ even number}\}$. What is the Range of S? (a) E (b) O (c) N (d) None of these
Q11	Let $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = \frac{x}{x^2+1}$ Range of f is ... (a) $(-1, 0)$ (b) $(-1, 1)$ (c) $[0, 1)$ (d) $\{1\}$
Q 12	Let $A = \{9, 10, 11, 12, 13\}$ and $f: A \rightarrow \mathbb{N}$ defined by $f(n) =$ the highest prime factor of n. Range of f is (a) $\{2, 3, 5, 7\}$ (b) $\{3, 5, 11, 13\}$ (c) $\{11, 13\}$ (d) $\{13\}$
Q13	The relation f is defined by $f(x) = \{x^3, 0 \leq x \leq 3\}$ and $g(x) = \{9x, 3 \leq x \leq 10\}$ and the relation g is defined by $g(x) = \{x^2, 0 \leq x \leq 5\}$ and $h(x) = \{3x, 5 \leq x \leq 10\}$, then which one of the following is true? (a) f, g are functions (b) f is not a function and g is a function. (c) f is a function and g is not a function. (d) f and g both are not functions.
Q14	If $f(x) = 7 - 4x$ then $f(x-2) = \dots\dots\dots$ (a) $5 - 4x$ (b) $-1 - 4x$ (c) $15 - 4x$ (d) $9 - 4x$
Q15	If $f: \mathbb{N} \rightarrow \mathbb{N}$, $f(x) = 3x$ then image of 4 =, pre-image of 51 = (a) 12, 51 (b) 12, 17 (c) 17, 12 (d) 4, 51
Q16	The range of $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = x^2$ is... (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $\mathbb{R}^+ \cup \{0\}$ (d) $\mathbb{R} - \{0\}$

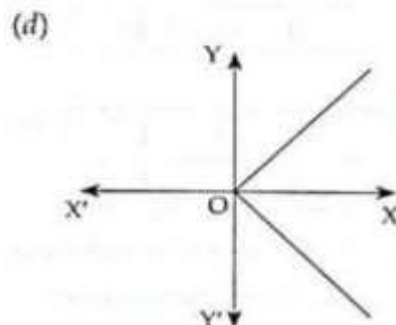
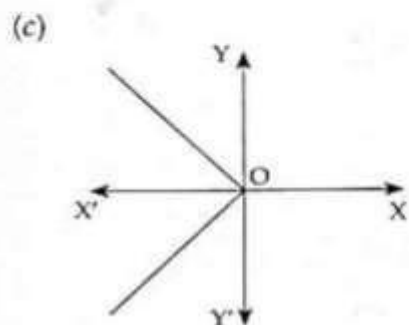
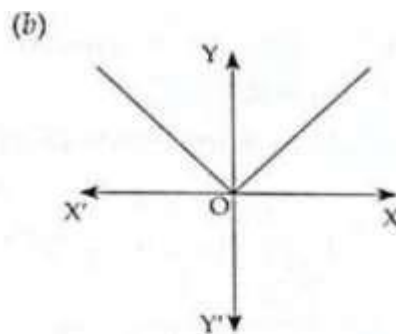
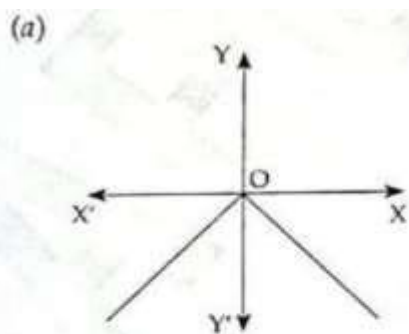
Q 17	If $t(c) = \frac{9c}{5} + 32$, then $t(-10)$: (a) 14 (b) 41 (c) 50 (d) None of these
Q 18	If the domain of function $f(x) = x^2 - 6x + 7$ is $\mathbb{R}$, then the range is (a) $(-\infty, \infty)$ (b) $[-2, \infty)$ (c) $(-2, 3)$ (d) $(-\infty, -2)$
Q 19	$f = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is defined is $f(x) = ax + b$, then values of a and b are respectivelyand (a) 2, -1 (b) -2, 1 (c) -1, 2 (d) 1, 2
Q 20	If $f(x) = \frac{1}{1-x}$ then $f[f(f(x))]$ = (a) $\frac{1}{x}$ (b) x (c) $\frac{1}{1+x}$ (d) $\frac{1}{1-x}$
CASE BASED/SOURCE BASED / PASSAGE BASED	
Q 21	Given two non-empty sets $A = \{x: x < 5, x \in \mathbb{N}\}$ and $B = \{x: x < 2, x \in \mathbb{W}\}$, based on this information answer the following questions: (i) $A \times B$ as set of ordered pairs is: (a) $\{(1, 0), (1, 1), (1, 2), (2, 0), (2, 1), (2, 2), (3, 0), (3, 1), (3, 2), (4, 0), (4, 1), (4, 2)\}$ (b) $\{(1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 2), (4, 1), (4, 2), (5, 1), (5, 2)\}$ (c) $\{(1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 2), (4, 1), (4, 2)\}$ (d) $\{(1, 0), (1, 1), (1, 2), (2, 0), (2, 1), (2, 2), (3, 0), (3, 1), (3, 2), (4, 0), (4, 1), (4, 2), (5, 0), (5, 1), (5, 2)\}$ (ii) $(A \cup B) \times (A \cap B)$ as a set of ordered pairs is (a) $\{(1, 0), (1, 1), (1, 2), (2, 0), (2, 1), (2, 2), (3, 0), (3, 1), (3, 2), (4, 0), (4, 1), (4, 2)\}$ (b) $\{(0, 1), (0, 2), (1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 2), (4, 1), (4, 2)\}$ (c) $\{(1, 0), (1, 1), (1, 2), (2, 0), (2, 1), (2, 2), (3, 0), (3, 1), (3, 2), (4, 0), (4, 1), (4, 2), (5, 0), (5, 1), (5, 2)\}$ (d) $\{(1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 2), (4, 1), (4, 2), (5, 1), (5, 2)\}$ (iii) A relation R from A to B defined by $R = \{(x, y): x + y = 4, x \in A, y \in B\}$ as a set of ordered pairs is (a) $R = \{(1, 3), (3, 1), (0, 4), (4, 0)\}$ (b) $R = \{(2, 2), (3, 1), (1, 3)\}$

	(c) $R = \{(2,2), (3,1), (4,0)\}$ (d) $R = \{(2,2), (1,3), (0,4)\}$ (iv) Domain of R is (a) $\{0,1,3,4\}$ (b) $\{1, 2, 3\}$ (c) $\{2,3,4\}$ (d) $\{0,1,2\}$ (v) Range of R is (a) $\{0,1,2\}$ (b) $\{2, 3, 4\}$ (c) $\{1, 2,3\}$ (d) $\{0,1,3, 4\}$
Q 22	Let A, B be any two (non-empty) sets and R be a relation from A to B, then inverse of relation R denoted by R^{-1} is a relation from B to A i.e. $R^{-1} \subseteq B \times A$. Also, $R^{-1} = \{(b, a): (a, b) \in R\}$. Clearly, $(a, b) \in R \Leftrightarrow (b, a) \in R^{-1}$, If $A = \{2,3,4,5\}$, $B = \{3,6,7,10\}$ and a relation R from A to B is defined as $R = \{(x, y): x \text{ divides } y, x \in A, y \in B\}$. Based on the above information, answer the following questions: (i) R as a set of ordered pairs is: (a) $\{(2,2), (2, 6), (2,10), (3,3), (3,6), (4,4), (5,5), (5,10)\}$ (b) $\{(2,6), (2,10), (3,3), (3,6), (5,10)\}$ (c) $\{(2,2), (2,6), (2,10), (3,3), (3, 6), (5,5), (5,10)\}$ (d) $\{(2,2), (2,6), (2,10), (3,3), (3,6), (5,10)\}$ (ii) R^{-1} as a set of ordered pairs is: (a) $\{(6,2), (10,2), (3,3), (6,3), (10,5)\}$ (b) $\{(2,2), (6,2), (10,2), (3,3), (6,3), (4,4), (5,5), (10,5)\}$ (c) $\{(2,2), (6,2), (10,2), (3,3), (6,3), (10,5)\}$ (d) $\{(2,2), (6,2), (10,2), (3,3), (6,3), (5,5), (10,5)\}$ (iii) Domain of R^{-1} is: (a) $\{2,3,4,5,6,10\}$ (b) $\{3,6,10\}$ (c) $\{2,3,6,10\}$ (d) $\{2,3,5,6,10\}$ (iv) Co-Domain of R^{-1} is: (a) $\{3,6,7,10\}$ (b) $\{2,3,6,7,10\}$ (c) $\{2,3,4,5\}$ (d) $\{2,3,4,5,6,7,10\}$ (iv) Range of R^{-1} is: (a) $\{2,3,6,10\}$ (b) $\{3,6,7,10\}$ (c) $\{2,3,4,5\}$ (d) $\{2,3,5\}$

Q 23	Let f and g are two functions defined as $f(x) = \sqrt{x-1}$ and $g(x) = 2 - 3x$. Based on the above information answer the following questions: (i) Domain of f is: (a) $(1, \infty)$ (b) $[1, \infty)$ (c) $(-\infty, 1)$ (d) $(-\infty, 1]$ (ii) Domain of $\frac{1}{g}$ is: (a) $\mathbb{R} - \{\frac{3}{2}\}$ (b) $\mathbb{R}$ (c) $\mathbb{R} - \{\frac{2}{3}\}$ (d) $\mathbb{R} - \{-\frac{3}{2}\}$ (iii) Domain of $f + g$ is: (a) $(1, \infty)$ (b) $\mathbb{R} - (1, \infty)$ (c) $[1, \infty)$ (d) $\mathbb{R} - \{\frac{2}{3}\}$ (iv) Domain of $\frac{g}{f}$ is: (a) $(1, \infty)$ (b) $[1, \infty)$ (c) $\mathbb{R} - \{\frac{3}{2}\}$ (d) $\mathbb{R}$ (v) Domain of $\frac{f}{g}$ is: (a) $\mathbb{R} - \{\frac{3}{2}\}$ (b) $\mathbb{R}$ (c) $\mathbb{R} - \{\frac{2}{3}\}$ (d) $[1, \infty) - \{\frac{3}{2}\}$
Q 24	Read the following text and answer the following questions based on the same. Consider the following real valued functions $f(x)$, $g(x)$ and $h(x)$ defined as: $\begin{aligned} f(x) &= x \\ g(x) &= e^x \\ h(x) &= x^2 \end{aligned}$ (i) The domain of $f(x)$ is: (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $(0, 1)$ (d) $\{-1, 1\}$ (ii) the range of $f(x)$ is: (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $(0, \infty)$ (d) $(-\infty, \infty)$ (iii) the range of $g(x)$ is: (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $[0, \infty)$ (d) $(-\infty, \infty)$ (iv) The range of $h(x)$ is: (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $(0, \infty)$ (d) $(-\infty, \infty)$ (v) The value of $h(-5)$ is: (a) 16 (b) e^{-5} (c) 25 (d) -5
Q 25	Read the following text and answer the following questions based on the same. The function $f: \mathbb{R} \rightarrow [0, \infty)$ is defined by $f(x) = x$ and $g(x) = f(x+1) + f(x-1)$ for all $x \in \mathbb{R}$. (i) The domain of $f(x)$ is:

- (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $[0, \infty)$ (d) $\{-1, 1\}$

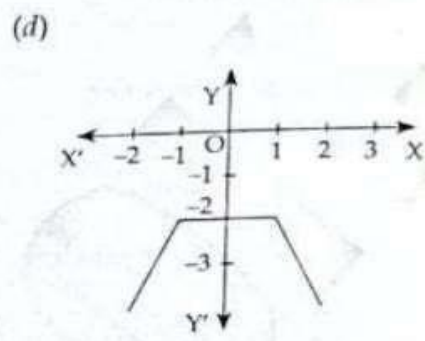
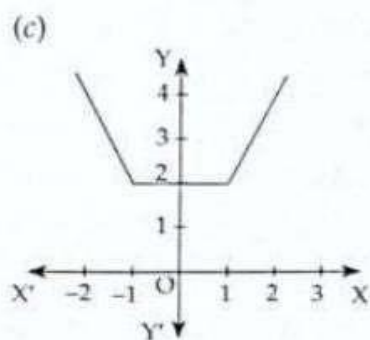
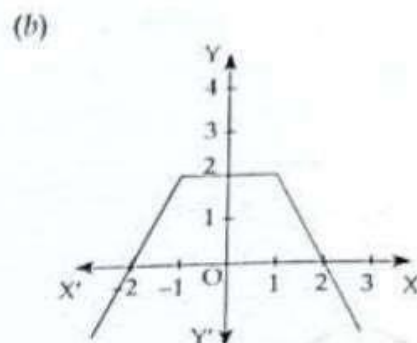
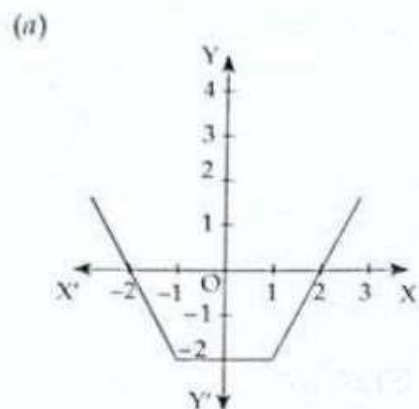
(ii) The graph of $f(x)$ is:



(iii) the range of $f(x)$ is:

- (a) $\mathbb{R}$ (b) $\mathbb{Z}$ (c) $[0, \infty)$ (d) $(-\infty, \infty)$

(iv) The graph of $g(x)$ is:



(iii) the range of $g(x)$ is:

- (a) $[-2, \infty)$ (b) $(-\infty, 2]$ (c) $(-\infty, -2]$ (d) $[2, \infty)$

ASSERTION REASONING QUESTIONS:

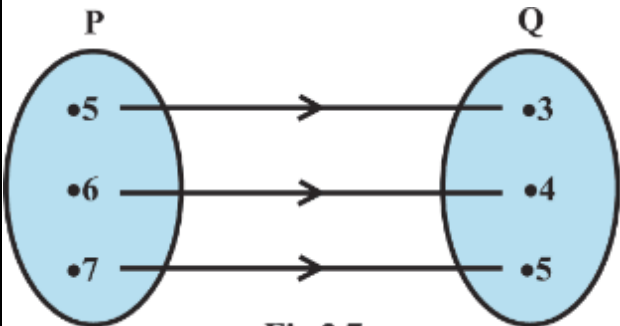
In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct answer out of the following choices:

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is not the correct explanation of A.
- (C) A is true but R is false.
- (D) A is false but R is true.

Q 26	Assertion (A): if $A = \{1, 2\}$ then $A \times A = \{(1, 1), (2, 2)\}$ Reason (R): A and B to be two non-empty sets and the Cartesian Product is given by $A \times B$ is the set of all ordered pairs (a, b) where $a \in A$ and $b \in B$.
Q 27	Assertion (A): The relation $\{(1, 3), (1, 5), (2, 5)\}$ defined from $\{1, 2\} \rightarrow \{3, 5\}$ is a function. Reason (R): A relation is said to be a function if each element of domain has one and only one image.
Q 28	Assertion (A): if $n(A) = p$ and $n(B) = q$, then total number of relations that can be defined from A to B are 2^{pq} Reason (R): since $n(A \times B) = n(A) \times n(B)$ and total number of subsets of a set having n elements is given by 2^n
Q 29	Assertion (A): The range of the greatest integer function defined by $f(x) = [x]$ is the set of integers. Reason (R): The inputs of the greatest integer function can take any real number but the output will always be an integer
Q 30	Assertion (A): The range of the modulus function defined by $f(x) = x $ is the set of integers. Reason (R): The inputs of the modulus function can take any real number but the output will always be a non-negative real number.

VERY SHORT ANSWER TYPE QUESTIONS

Q 31	Let $A = \{x, y, z\}$ and $B = \{1, 2\}$, find the number of relations from A to B.
Q 32	Find x and y, if $(x + 3, 5) = (6, 2x + y)$.
Q 33	Is the following relation a function? Give reason. If it is a function,

	determine its domain and range. $\{(1, 3), (1, 5), (2, 5)\}$
Q 34	Find the domain and range of the real functions $f(x) = - x $.
Q 35	Determine the domain and range of the relation R defined by, $R = \{(x, x + 5) : x \in \{0, 1, 2, 3, 4, 5\}\}$.
Q 36	The Cartesian product $A \times A$ has 9 elements among which are found $(-1, 0)$ and $(0, 1)$. Find the set A and the remaining element $A \times A$
Q 37	If $A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$. Find A and B.
Q 38	What is the domain of the real valued function $f(x) = \frac{1}{3x-2}$
Q 39	Is the given relation a function? Give reasons for your answer. $h = \{(4, 6), (3, 9), (-11, 6), (3, 11)\}$
Q 40	Is the given relation a function? Give reasons for your answer. $s = \{(n, n^2) \mid n \text{ is a positive integer}\}$
Q 41	What will be total number of relations from A to B where $n(a) = p$ and $n(b) = q$.
Q 42	Write the range of the function $f(x) = -x^2$.
Q 43	Let $A = \{1, 2\}$ and $B = \{2, 3\}$ then find $A \times (A \cap B)$
Q 44	A function f is defined as $f(x) = 3 - 2x$. find the value of $f(7)$.
Q 45	The following figure shows a relationship between the sets P and Q. Write this relation in set-builder form:  Fig 2.7
Q 46	Let $A = \{1, 2, 3, 4\}$, $B = \{1, 4, 9, 16, 25\}$ and R be a relation defined from A to B as, $R = \{(x, y) : x \in A, y \in B \text{ and } y = x^2\}$

	i) Depict this relation in roster form. ii) Find domain of R. iii) Find range of R. iv) Write co-domain of R.
Q 47	If $R = \{(x + y) \mid x \text{ and } y \text{ are integers and } x^2 + y^2 = 64\}$ is a relation, then find R.
Q 48	Let $A = \{1, 2, 3, 4\}$ and $B = \{10, 12, 13, 14, 20\}$. Whether $f: A \rightarrow B$ defined by $f(1) = 10, f(2) = 12, f(3) = 13$ and $f(4) = 20$ is a function?
Q 49	If $n(A) = 3$ and $B = \{1, 2, 3\}$ then find $n(A \times B)$
Q 50	Draw the graph of the modulus function.
	SHORT ANSWER TYPE QUESTIONS
Q 51	If f and g are two real valued functions defined as $f(x) = 2x + 1, g(x) = x^2 + 1$ then find $f + g, f - g, f \cdot g$ and f/g
Q 52	Given $R = \{(x, y): x, y \in W, x^2 + y^2 = 25\}$, find the domain and range of R.
Q 53	If $A = \{-1, 1\}$, find $A \times A \times A$.
Q 54	Define a relation R on the set N of natural numbers by $R = \{(x, y): y = x + 5, x \text{ is a natural number less than } 4; x, y \in N\}$. Depict this relationship using roster form. Write down the domain and range.
Q 55	Determine the domain and range of the relation R defined by, $R = \{(x, x + 5): x \in (0, 1, 2, 3, 4, 5)\}$.
Q 56	Let $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from set A to A by $R = \{(x, y): 3x - y = 0, \text{ where } x, y \in A\}$. Write down its domain, co-domain, and range.
Q 57	$A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$. Define a relation R from A to B by $R = \{(x, y): \text{the difference between } x \text{ and } y \text{ is odd, } x \in A \text{ and } y \in B\}$. Write R in roster form.
Q 58	Let $A = \{9, 10, 11, 12, 13\}$ and let $f: A \rightarrow N$ be defined by $f(n) = \text{the highest prime factor of } n$. Find the range of f.
Q 59	Let $A = \{1, 2, 6, 8\}$ and let R be a relation on A defined by $\{(a, b): a, b \in$

	A, b is exactly divisible by a} (i) Write R in roster form. (ii) Find the domain of R. (iii) Find the range of R.
Q 60	If $R = \{(x, y) \mid y = 2x + 7, \text{ where } x \in \mathbb{R} \text{ and } -5 < x < 5\}$ is a relation. Then find the domain and Range of R.
Q 61	Draw the graph of $f(x)$ defined by $f(x) = \begin{cases} 1 - x, & \text{if } x < 0 \\ 1, & \text{if } x = 0 \\ x + 1, & \text{if } x > 0 \end{cases}$
Q 62	Let $f(x) = x^2$ and $g(x) = 2x + 1$ be two real functions. Find $(f + g)(x)$, $(f - g)(x)$, $(fg)(x)$, $(f/g)(x)$
Q 63	Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be given by $f(x) = x^2 + 3$ Find (i) x if $f(x) = 28$ (ii) The pre-images of 39 and 2 under 'f'.
Q 64	Find the range of the following function given by: $f(x) = \frac{ x-4 }{x-4}$
Q 65	Find the range of the following functions given by: $f(x) = 1 - x - 2$
Q 66	Find the range of the following functions given by: $f(x) = x - 3$
Q 67	Find the domain and the range of the real function f defined by $f(x) = \sqrt{x - 1}$
Q 68	Express the function $f: A \rightarrow \mathbb{R}$, $f(x) = x^2 - 1$. where $A = \{-4, 0, 1, 4\}$ in roster form.
Q 69	Let $f = \{(1, 1), (2, 3), (0, -1), (-1, -3)\}$ be a function from $\mathbb{Z}$ to $\mathbb{Z}$ defined by $f(x) = ax + b$, for some integers a and b. Determine a, b.
Q 70	Find the range of the following functions $f(x) = \sqrt{9 - x^2}$