

SUBJECT: MATHEMATICS

LESSON PLAN 1/10

TOPIC: RELATIONS AND FUNCTIONS

Pre-Content/content Post-Content	Learning outcomes/Objectives	
<u>Pre-Content</u>	General	Specific
*Recall the concepts of Cartesian product, domain and range of a function and types of relations Identify Reflexive, symmetric, transitive and equivalence relation *One-one and onto functions *composition of functions inverse of a function	Students will be able to recall the concepts of function and types of relations explore Reflexive, symmetric, transitive and equivalence relation familiarize students about one-one and onto functions understand composition as a function of a function comprehend the meaning of inverse of a function	Students will be able to recall the concepts of function and types of relations, domain and range justify whether the given relation is an equivalence relation or not justify whether the given function is one-one , onto or not find the composition of functions conditions for the inverse of a function to exist checking the commutativity and associativity and finding the identity element if any

Home Work /Assignments

1)NCERT Exercise questions

2)Exemplar problem

CLASS: XII 2/10

MONTH: April 2020

Teacher's Activity	Student's Activity	Teacher's observation and Remedial
Teacher will revise domain and range taking examples explain the concept of equivalence relation through examples Instruct them about the Activity related to equivalence relation ANNEXURE-1 explain through arrow diagram will work on various examples to check and will also solve and show the working to the students. Instruct them to perform the Activity related to one-one onto function. ANNEXURE-2 Explain method to find the inverse of a function explain concept of inverse and identity elements related to inverse and identity matrices and taught.	Student will recall the concept and relate it with the current topic observe and classify, various types of relation carefully and and solve questions from Ex1.1 perform the activity as per the given instructions and write their observations ANNEXURE-1 ask questions and will also solve questions from Ex1.2 perform the activity as per the given instructions and write their observations ANNEXURE-2 solve Questions from Ex1.3 do questions based on the topic	Teacher will write observation and remarks after the class

Teaching Aids- ncert.nic.in publication Exemplar problem, ncert.nic.in publication laboratory manual

Methodology/Innovative Methods Use of Smart board reinforcement method.

. Interdisciplinary Links computer sciences

Coordinator

Vice-Principal

Principal

ANNEXURE-1_**3/10**

Subject	MATHEMATICS
Class	XII
Chapter/Unit	RELATION AND FUNCTIONS
Topic	EQUIVALENCE RELATION
Time	40 minutes
Nature of Activity	Individual

What will I learn? (Learning outcome)

To check that the relation R in the set L of all lines in a plane, defined by $R = \{(l, m): l \perp m\}$ is an equivalence relation(symmetric ,reflexive or transitive).

Skills: Logical ability, Analytical thinking, Deductive reasoning, Creativity, Accuracy.

What do I require?

Hardboard, some pieces of threads, pins, white thick sheets of paper, pencils, colours, a pair of scissors coloured paper, sketch pens, geometry box, glue stick,

What do we need to know?

Parallel lines, perpendicular lines,

➤ **Teacher 's Activity**

Teacher will discuss Reflexive, symmetric and Transitive relations with students

How will I proceed?➤ **Student's Activity**

Student will

1. Take a piece of hardboard and paste a white paper on it. Fix the threads randomly on the hardboard with the help of pins such that some of them are parallel, some are perpendicular to each other as shown in Fig.1.
2. Let the threads represent the lines l_1, l_2, l_3, l_4
3. l_1 is perpendicular to each of the lines l_2 , and l_4 . [see Fig. 1]
4. l_3 is perpendicular to each of the lines l_2 , and l_4 . [see Fig. 1]
5. l_1 is parallel to l_3 and l_2 is parallel to l_4
6. $(l_3, l_4), (l_1, l_4), ((l_3, l_2) (l_1, l_2), \in R$

What have I learnt?

This activity can be used to check whether a given relation is an equivalence relation or not.
In this case, the relation is not an equivalence relation.

The activity can be repeated by taking some more wire in different positions

$(R = \{(l, m): l \parallel m\})$ is an equivalence relation or not

Let me evaluate myself

Q1 Let T be the set of all triangles in a plane with R a relation in T given by $R = \{(T_1, T_2): T_1 \text{ is congruent to } T_2\}$. Show that R is an equivalence relation.

Q2. Let L be the set of all lines in XY plane and R be the relation in L defined as

$R = \{(L_1, L_2): L_1 \text{ is parallel to } L_2\}$. Show that R is an equivalence relation. Find the set of all lines related to the line $y = 2x + 4$

Q 3 Consider the non-empty set consisting of children in a family and a relation R defined as $a R b$ if a is brother of b . Then R is

- | | |
|--------------------------------------|-----------------------------------|
| (a) symmetric but not transitive | (b) transitive but not symmetric |
| (c) neither symmetric nor transitive | (d) both symmetric and transitive |

Q4. Let $A = \{0, 1, 2, 3\}$ and define a relation R on A as follows: $R = \{(0, 0), (0, 1), (0, 3),$

$(1, 0), (1, 1), (2, 2), (3, 0), (3, 3)\}$. Is R reflexive? symmetric? transitive?

Q 5. For the set $A = \{1, 2, 3\}$, define a relation R in the set A as follows:

$$R = \{(1, 1), (2, 2), (3, 3), (1, 3)\}.$$

Write the ordered pairs to be added to R to make it the smallest equivalence relation.

ANNEXURE-2**7/10**

Subject	MATHEMATICS
Class	XII
Chapter/Unit	Relation and function
Topic	One-one onto function
Time	40 min
Nature of Activity	Individual

What will I learn (Learning Outcome)?

To demonstrate a function which is not one-one but is onto.

Skills: Visualizing, Creating, Accuracy, Precision

What do I require?

Hardboard, some pieces of threads, pins, white thick sheets of paper, pencils, colours, a pair of scissors coloured paper, sketch pens, geometry box, glue stick,

What I have to do?

Take the set $A = \{a, b, c, d, e\}$ Take the set $B = \{1, 2, 3\}$ Join (correspondence) elements of A to the elements of B as shown in Fig. 2.3

What do I need to know?

Knowledge of sets, relation and function

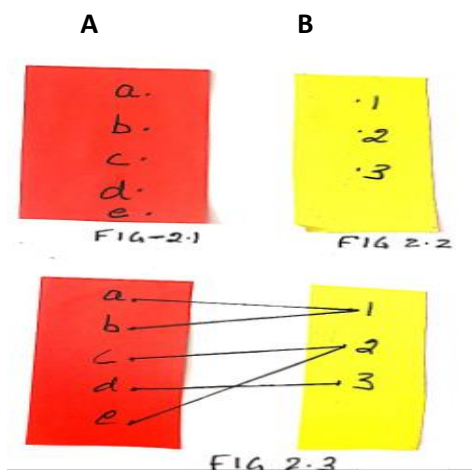
➤ **Teacher's Activity**

Teacher will discuss one -one, many-one, onto and not onto function with students

How will I proceed?➤ **Student's Activity**

Student will

1. Take a coloured strip and Paste it on the left-hand side of the board and fix five pins on it as shown in the Fig.2.1. Name the pins on the strip **as a b, c d, and e**
2. Take. another coloured strip and Paste it on the right-hand side of the cardboard and fix three pins on it. The coloured strip as shown in Fig.2.2. Name the pins on the strip as **1,2 and 3.**
3. Join pins on the left strip to the pins on the right strip as shown in Fig. 2.3



What have I observed?

S.NO	From Fig 2.1, 2.2, 2.3	
1	The image of the element a of A in B is	-----
2	The image of the element b of A in B is	-----
3	The image of the element c of A in B is _____.	-----
4	The image of the element d of A in B is _____.	-----
5	The image of the element e of A in B is _____.	-----
6	So, Fig 2.3 represents a _____	(one-one/not one-one).
7	Every element in A has a _____ image in B So, the function is _____	(one-one/not one-one).
8	The pre-image of each element of B in A _____	(exists/does not exist)
9	So, the function is _____	(onto/not onto)

What have I learnt?

A function which is not one-one but is onto can be demonstrated in the above manner.

What am I curious to learn?

The same activity can be done by changing the number of the elements of the sets A and B , also a function which is one-one but not onto.

Let me evaluate myself

Q1. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = \frac{1}{x} \quad \forall x \in \mathbb{R}$. Then f is

- (a) one-one (b) onto (c) bijective (d) f is not defined

Q2 Which of the following functions from $\mathbb{Z}$ into $\mathbb{Z}$ are bijections?

- (a) $f(x) = x^3$ (b) $f(x) = x + 2$ (c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + 1$

Q3 Give an example of a map (i) which is one-one but not onto (ii) which is not one-one but onto

(iii) which is neither one-one nor onto.

Q4. If $A = \{a, b, c, d\}$ and $f = \{a, b\}, (b, d), (c, a), (d, c)\}$, show that f is one-one from A onto A . Find f^{-1} .

Q 5. Let $\mathbb{N}$ be the set of natural numbers and the function $f: \mathbb{N} \rightarrow \mathbb{N}$ be defined by

$f(n) = 2n + 3 \forall n \in \mathbb{N}$. Then f is

(a) surjective

(b) injective

(c) bijective

(d) none of these
