INDIAN SCHOOL AL WADI AL KABIR

Class XII, Mathematics ***Worksheet 1- Relations***

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Q.1.	For real numbers x and y define xRy if and only if x-y +$\sqrt{2}$ is an irrational number. Then the relation R is							
	A	reflexive	**B**	symmetric	**C**	transitive	**D**	none of these
Q.2.	The relation R in ***R*** defined by R = $\{(a, b): a \leq b^2\}.Then$ R is							
	A	Reflexive but not symmetric	**B**	Symmetric but not symmetric	**C**	reflexive but not transitive	**D**	None of these
Q.3.	Let R be the relation in the set {1, 2, 3, 4} given by R = {(1, 2), (2, 2), (1, 1), (4,4), (1, 3), (3, 3), (3, 2)} , then R is							
	A	Reflexive and symmetric but not transitive	**B**	Reflexive and transitive but not symmetric	C	Transitive and symmetric but not reflexive	**D**	an equivalence relation
Q.4.	The number of all reflexive relations from set A = $\{1, 2, 3\}$ to itself is							
	A	3	**B**	9	**C**	64	**D**	512
Q.5.	Let R =$\{(1, 3), (2,2), (3, 2)\}$ *is a relation defined on* $A = \{1, 2, 3\}$, *then minimum ordered pairs which should be added in relation R to make it reflexive and symmetric are*							
	A	$\{(1, 1), (2,3), (1, 2)\}$	**B**	$\{(3, 3), (3,1), (1, 2)\}$				
	C	$\{(1, 1), (3 ,3), (3, 1), (2, 3)\}$	**D**	$\{(1, 1), (3,3), (3, 1), (1,2\}$				
Q.6.	If R be the relation on set A = $\{1, 2, 3\}$ *given by* $R = \{(1, 2), (2, 1)\}$ *then* R is							
	A	only reflexive	**B**	*an equivalence relation*	**C**	only symmetric	**D**	only transitive
Q.7.	Let A =$\{1, 2, 3\}$ *and consider the relation* $R = \{(1, 2), (2, 2), (3, 3), (1,2), (2,3), (1, 3)\}$ *then R is*							
	A	reflexive but not transitive	**B**	symmetric and transitive	**C**	*reflexive but not symmetric*	**D**	None of these
Q.8.	If Relation R in the set Z of all integers defined as $R = \{(x, y): x - y \text{ is an integer }\}$ *then R is*							
	A	only a symmetric relation	**B**	Symmetric and transitive	**C**	Reflexive and transitive	**D**	an equivalence relation.

<table>
<tr><td>Q.9.</td><td colspan="8">If R = $\{(a, b): a = b\}, then\ R\ is$</td></tr>
<tr><td></td><td>A</td><td>only symmetric</td><td>B</td><td>Reflexive and symmetric</td><td>C</td><td>Symmetric and transitive</td><td>D</td><td>an equivalence relation</td></tr>
<tr><td>Q.10.</td><td colspan="8">If R == $\{(a, b): a \leq b, a, b\ are\ real\ numbers\}, then\ R\ is$</td></tr>
<tr><td></td><td>A</td><td>reflexive and symmetric</td><td>B</td><td>reflexive and transitive</td><td>C</td><td>Symmetric and transitive</td><td>D</td><td>none of these</td></tr>
<tr><td>Q.11</td><td colspan="8">Let T be the set of all triangles in a plane with R a relation in T given by
R = $\{(T1,\ T2): T1\ is\ isimilar\ to\ T2\}$. Show that R is an equivalence relation.</td></tr>
<tr><td>Q12.</td><td colspan="8">Let L be the set of all lines in a plane and R be the relation in L defined as R = $\{(L1, L2): L1\ \perp\ L2\}$. Show that R is symmetric but neither reflexive nor transitive.</td></tr>
<tr><td>Q13</td><td colspan="8">Determine whether the relation R defined on the set of R of all real numbers as
R = $\left\{(a, b): a, b\ \in \boldsymbol{R}\ and\ a - b + \sqrt{3}\ is\ the\ set\ of\ irrational\ numbers\right\}$ is reflexive or symmetric or transitive. Why?</td></tr>
<tr><td>Q14</td><td colspan="8">Prove that the relation R on the set NXN defined by (a, b)R(c, d), iff ad = bc, for all (a, b),(c, d)ϵNXN is an equivalence relation.</td></tr>
<tr><td>Q15.</td><td colspan="8">Prove that the relation R on the set AXA defined by (a, b) R (c, d), if and only if a+d = b+c, for all
(a, b),(c, d)ϵ AXA is an equivalence relation, where A={1, 2, 3, 4, 5...,10}. Write equivalence class of
(2 5).</td></tr>
<tr><td>Q16.</td><td colspan="8">Show that the relation R defined on set A = $\{0, 1, 2, 3, \dots.12\}$
R = $\{(a, b): |a - b| is\ diivisible\ by\ 4; a, b \in A\}$ is an equivalence relation.</td></tr>
<tr><td>Q17.</td><td colspan="7">CASE STUDY QUESTION:
Sherlin and Danju are playing Ludo. 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, D} and B={1, 2, 3, 4, 5,6}. Based on the above information answer the following:</td><td></td></tr>
<tr><td></td><td colspan="8">a) Write the number of possible functions from A to B.
b) Detrmine if R={(x, y): y is divisible by x, x, y∈ B} is refexive, symmetric or transitive.
c) How many one to one functions can be defined from A to B?
d) If R = {(1,2), (2,2), (1,3), (3,4), (3,1), (4,3), (5,5)}, where R is relation from B to B, check whether R is an equivalence relation</td></tr>
</table>

ANSWERS	**1.**	A	**2.**	D	**3.**	B	**4.**	D
	5.	C	**6.**	C	**7.**	B	**8.**	D
	9.	D	**10**	B	**13.**	only reflexive		
	15.	{(2, 5), (1, 4), (3, 6), (4, 7),(5, 8) , (6, 9), (7, 10)}	**17**	a) 36 b) not symmetric c) 30 d) neither reflexive nor symmetric nor transitive				

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