# BYJU'S Study Planner for Board Term I
# (CBSE Grade 12)

Date: 09/11/2021

Subject: Mathematics

Topic : Relations and Functions

Class: Standard XII

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1. Let $A$ be a non-empty set such that $A \times A$ has $9$ elements and $(-1, 0), (0, 1)$ are elements of $A \times A$, then $A =$

   **A.** $\{-1, 0, 2\}$

   **B.** $\{-1, 0, 1\}$

   **C.** $\{-2, 0, 1\}$

   **D.** Cannot be determined

2. Let $\mathbb{N}$ denote the set of all natural numbers. Define two binary relations on $\mathbb{N}$ as
   $R_1 = \{(x, y) \in \mathbb{N} \times \mathbb{N} : 2x + y = 10\}$ and
   $R_2 = \{(x, y) \in \mathbb{N} \times \mathbb{N} : x + 2y = 10\}$. Then

   **A.** Both $R_1$ and $R_2$ are transitive relations.

   **B.** Range of $R_2$ is $\{1, 2, 3, 4\}$.

   **C.** Range of $R_1$ is $\{2, 4, 8\}$.

   **D.** Both $R_1$ and $R_2$ are symmetric relations.

3. If the function $f : B \to [-5, \infty)$ defined by $f(x) = x^2 - 4x + 5$ is one-one function, then $B$ is

   **A.** $[2, \infty)$

   **B.** $[0, \infty)$

   **C.** $[-5, \infty)$

   **D.** $[-1, \infty)$

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4. Consider the set $A = \{1, 2, 3\}$ and the relation on $A$ as $R = \{(1, 2), (1, 3)\}$, then $R$ is

   **A.** a reflexive relation

   **B.** a symmetric relation

   **C.** a transitive relation

   **D.** None of the above

5. The number of solution(s) of the equation $|x - 3| = x^3$ is

   **A.** $1$

   **B.** $0$

   **C.** $2$

   **D.** $3$

6. Let $f(x) = \dfrac{x^2 - 1}{x}, g(x) = \dfrac{x + 2}{x - 3}$ then domain of $\dfrac{f(x)}{g(x)}$ is

   **A.** $\mathbb{R} - \{0, -2\}$

   **B.** $\mathbb{R} - \{-2, 0, 3\}$

   **C.** $\mathbb{R}$

   **D.** $\mathbb{R} - \{0, -3\}$

7. The function $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = |(x - 1)(x - 2)|$ is

   **A.** One-one function

   **B.** Many-one function

   **C.** Constant function

   **D.** None of these

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8. Let $A = \{1, 2, 3\}$ and $R, S$ be two relations on $A$ given by $R = \{(1,1), (2,2), (3,3), (1,2), (2,1)\}, S = \{(1,1), (2,2), (3,3), (2,3), (3,2)\}$ then $R \cup S$ is

**A.** Reflexive, symmetric and transitive relation

**B.** reflexive and transitive relation only

**C.** not a transitive relation

**D.** Reflexive relation but not Symmetric relation

9. Let $f(x) = (1 + b^2)x^2 + 2bx + 1$ and let $m(b)$ be the minimum value of $f(x)$. As $b$ varies, the range of $m(b)$ is

**A.** $[0, 1]$

**B.** $\left[0, \frac{1}{2}\right]$

**C.** $\left[\frac{1}{2}, 1\right]$

**D.** $(0, 1]$

10. The domain of $f(x) = \sqrt{\frac{4 - x^2}{[x] + 2}}$ is

(where [.] represents the greatest integer function)

**A.** $(-\infty, 1)$

**B.** $(-\infty, -2) \cup [-1, 2]$

**C.** $(-\infty, -1) \cup [2, \infty)$

**D.** $(-\infty, 1) \cup [2, \infty)$

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11. Let the function $f : \mathbb{R} - \{-b\} \rightarrow \mathbb{R} - \{1\}$ be defined by $f(x) = \dfrac{x+a}{x+b}, a \neq b,$ then

    **A.** $f$ is one–one but not onto function

    **B.** $f$ is onto but not one–one function

    **C.** $f$ is bijective function

    **D.** $f$ is neither one–one nor onto function

12. If relation $R$ is defined as $aRb$ if "$a$ is the father of $b$". Then $R$ is

    **A.** reflexive

    **B.** symmetric

    **C.** transitive

    **D.** none of these

13. Let $\mathbb{N}$ denote the set of natural numbers and $R$ be a relation on $\mathbb{N} \times \mathbb{N}$ defined by
    $(a,b)R(c,d) \iff ad(b+c) = bc(a+d)$. Then on $\mathbb{N} \times \mathbb{N}, R$ is

    **A.** An equivalence relation

    **B.** Reflexive and symmetric relation only

    **C.** Transitive relation only

    **D.** Symmetric and transitive relation only

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14. Let a relation $f$ defined on $(0, \infty)$ as $f(x) = \left|1 - \frac{1}{x}\right|$. Then which among the following is true

**A.** $f(-1) = 2$

**B.** $f$ is many-one function

**C.** $f$ is one-one function

**D.** Relation $f$ is not a function

15. Let $f : \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = \frac{(e^x - e^{-x})}{2}$.
The inverse of the given function is:

**A.** $f^{-1}(x) = \log_e(x + \sqrt{x^2 + 1})$

**B.** $f^{-1}(x) = \log_e(x - \sqrt{x^2 + 1})$

**C.** $f^{-1}(x) = \log_e(x + \sqrt{x^2 - 1})$

**D.** $f^{-1}(x) = \log_e(x - \sqrt{x^2 - 1})$

16. Which among the following relations on $\mathbb{Z}$ is an equivalence relation

**A.** $xRy \Leftrightarrow |x| = |y|$

**B.** $xRy \Leftrightarrow x \geq y$

**C.** $xRy \Leftrightarrow x > y$

**D.** $xRy \Leftrightarrow x < y$

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17. Let $S$ be the set of all triangles and $R^+$ be the set of all positive real numbers. If the relation $f$ defined from $S$ to $R^+$ such that $f(\triangle) =$ area of triangle, $\triangle \in S$, then which of the following is true about relation $f$

   **A.** $f$ is not a function

   **B.** relation $f$ is a many-one function

   **C.** If $\triangle_1 \cong \triangle_2$, then $f(\triangle_1) \neq f(\triangle_2)$

   **D.** None of the above

18. If a relation $R$ is defined on set of real numbers as $xRy \Longleftrightarrow x - y + \sqrt{2}$ is an irrational number, then the relation $R$ is

   **A.** a reflexive relation

   **B.** a symmetric relation

   **C.** a transitive relation

   **D.** both reflexive and transitive relation

19. Consider the functions $f(x) = \begin{cases} x+1, & x \leq 1 \\ 2x+1, & 1 < x \leq 2 \end{cases}$

   $g(x) = \begin{cases} x^2, & -1 \leq x < 2 \\ x+2, & 2 \leq x \leq 3 \end{cases}$

   Domain of $f(g(x))$ is

   **A.** $[0, \sqrt{2}]$

   **B.** $[-1, 2]$

   **C.** $[-1, \sqrt{2}]$

   **D.** $[\sqrt{2}, \sqrt{2}]$

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20. Consider the functions $f(x)=\begin{cases} x+1, & x\le 1 \\ 2x+1, & 1<x\le 2 \end{cases}$

$g(x)=\begin{cases} x^2, & -1\le x<2 \\ x+2, & 2\le x\le 3 \end{cases}$

Range of the function $f(g(x))$ is

**A.** $[1,5]$

**B.** $[2,3]$

**C.** $[1,2]\cup(3,5]$

**D.** $[1,5]-\{3\}$