

**QUICK DRILL · CBSE CLASS 12**

# Relations and Functions

Mathematics · Chapter 1 · 15 MCQs · 20 minutes · PYQ-tagged with time budgets

DATE	TOTAL MARKS	DURATION	MARKING	TARGET
_____	15	20 min	+1/0	≥ 12/15

**OBJECTIVES**

Reinforce the four core topics of Relations and Functions via 15 PYQ-derived MCQs. Identify weak sub-topics via concept-node IDs (see answer key). Build per-question time budget habit.

**INSTRUCTIONS**

Attempt all 15. Time budget shown per Q (use it as pacing guide). Mark answers (A/B/C/D) in the margin. Answer key + explanations on the last page. **Don't peek — score yourself honestly.**

**SECTION · QUICK DRILL**

Q 1-15 · 20 MIN

- Q1.** A relation  $R$  on  $A = \{1,2,3\}$  is reflexive if it must contain:  
**(A)**  $(1,2),(2,3),(1,3)$  **(B)**  $(1,1),(2,2),(3,3)$   
**(C)** All ordered pairs **(D)** Only  $(1,1)$   
*PYQ 2018 · Delhi · 1m · 30s*
- Q2.** A relation  $R$  is symmetric if:  
**(A)**  $(a,b) \in R \Rightarrow (b,a) \in R$  **(B)**  $(a,a) \in R$  for all  $a$   
**(C)**  $(a,b),(b,c) \Rightarrow (a,c)$  **(D)**  $R$  is empty  
*PYQ 2019 · All India · 1m · 25s*
- Q3.**  $R = \{(a,b) : a \leq b\}$  on  $\mathbb{R}$  is:  
**(A)** Equivalence **(B)** Reflexive + Transitive only  
**(C)** Symmetric only **(D)** None  
*PYQ 2022 · Delhi · 1m · 45s*
- Q4.**  $f(x) = x^2$  on  $\mathbb{R} \rightarrow \mathbb{R}$  is:  
**(A)** One-one only **(B)** Onto only  
**(C)** Bijective **(D)** Neither one-one nor onto  
*PYQ 2020 · Delhi · 1m · 40s*
- Q5.**  $f(x) = 2x + 3$  on  $\mathbb{R} \rightarrow \mathbb{R}$  is:  
**(A)** One-one only **(B)** Onto only  
**(C)** Bijective **(D)** Neither  
*PYQ 2019 · Delhi · 1m · 35s*
- Q6.** If  $f(x) = x + 2$  and  $g(x) = x^2$ , then  $(g \circ f)(3)$ :  
**(A)** 11 **(B)** 25  
**(C)** 13 **(D)** 9  
*PYQ 2018 · All India · 1m · 30s*
- Q7.** For  $f(x) = x + 2$ ,  $g(x) = x^2$ , compute  $(f \circ g)(3)$ :  
**(A)** 11 **(B)** 25  
**(C)** 13 **(D)** 9  
*PYQ 2018 · All India · 1m · 30s*
- Q8.** A function has an inverse iff it is:  
**(A)** One-one only **(B)** Onto only  
**(C)** Bijective **(D)** Continuous  
*PYQ 2022 · All India · 1m · 25s*
- Q9.**  $(f \circ g)^{-1}$  equals:  
**(A)**  $f^{-1} \circ g^{-1}$  **(B)**  $g^{-1} \circ f^{-1}$   
**(C)**  $f \circ g$  **(D)**  $g \circ f$   
*PYQ 2023 · Delhi · 1m · 25s*
- Q10.** Equivalence classes of 'is congruent mod 3' on  $\mathbb{Z}$  are:  
**(A)** 1 class **(B)** 2 classes  
**(C)** 3 classes **(D)** Infinite classes  
*PYQ 2019 · Outside Delhi · 1m · 35s*

**Q11.**  $f: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = \sin x$  is:

- (A) One-one  
(C) Bijective

- (B) Onto  
(D) Many-one and not onto

PYQ 2020 · All India · 1m · 35s

**Q12.**  $R = \{(1,1), (2,2), (1,2), (2,1)\}$  on  $\{1,2,3\}$  is:

- (A) Reflexive only  
(C) Reflexive + Symmetric not transitive

- (B) Symmetric only  
(D) Not reflexive

PYQ 2018 · Outside Delhi · 1m · 40s

**Q13.** For  $f(x) = 3x - 5$ ,  $f^{-1}(x)$ :

- (A)  $(x+5)/3$   
(C)  $3x+5$

- (B)  $(x-5)/3$   
(D)  $(5-x)/3$

PYQ 2022 · Delhi · 1m · 40s

**Q14.** Identity function  $I$  on  $A$  satisfies:

- (A)  $foI = f$   
(C)  $foI = lof = f$

- (B)  $Iof = f$   
(D)  $I = f$

PYQ 2023 · All India · 1m · 25s

**Q15.**  $R$  on  $\mathbb{Z}$  defined by  $aRb$  iff  $(a-b)$  is even is:

- (A) Equivalence  
(C) Symmetric only

- (B) Reflexive only  
(D) Transitive only

PYQ 2024 · Delhi · 1m · 50s

## ANSWER KEY & EXPLANATIONS

Q 1-15 · MARK YOUR SCORE

**Q1. Answer: B**

Reflexive needs  $(a,a)$  for EVERY  $a \in A$ .

**Q2. Answer: A**

Standard definition.

**Q3. Answer: B**

Reflexive ( $a \leq a$ ) + Transitive ( $a \leq b, b \leq c \Rightarrow a \leq c$ ). NOT symmetric ( $1 \leq 2$  but  $2 \not\leq 1$ ).

**Q4. Answer: D**

$f(1) = f(-1) = 1$  (not one-one). Range =  $[0, \infty) \neq \mathbb{R}$  (not onto).

**Q5. Answer: C**

Linear with non-zero slope  $\Rightarrow$  bijection on  $\mathbb{R}$ .

**Q6. Answer: B**

$f(3) = 5$ ;  $g(5) = 25$ .

**Q7. Answer: A**

$g(3) = 9$ ;  $f(9) = 11$ .

**Q8. Answer: C**

Need both one-one AND onto.

**Q9. Answer: B**

Order reverses on inversion of composition.

**Q10. Answer: C**

Remainders 0, 1, 2 give 3 classes.

**Q11. Answer: D**

$\sin$  is periodic (many-one); range  $[-1, 1] \neq \mathbb{R}$  (not onto).

**Q12. Answer: D**

$(3,3)$  is missing — not reflexive on  $\{1,2,3\}$ .

**Q13. Answer: A**

$y = 3x - 5 \Rightarrow x = (y+5)/3$ .

**Q14. Answer: C**

Identity preserves any function in composition from either side.

**Q15. Answer: A**

Reflexive ( $a-a=0$  even). Symmetric ( $a-b$  even  $\Rightarrow b-a$  even). Transitive ( $a-b, b-c$  even  $\Rightarrow a-c$  even).