CLASS XI – MATHEMATICS (041)
CHAPTER 2 : RELATIONS AND FUNCTIONS
PRACTICE PAPER (SESSION 2026–27)

Maximum Marks: 40 **Time Allowed: 1½ Hours**

General Instructions:

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 23 questions. All questions are compulsory.
2. This question paper is divided into five Sections – A, B, C, D and E.
3. In Section A, Questions 1 to 12 are Multiple Choice Questions (MCQs) and Questions 13 and 14 are Assertion–Reason based questions of 1 mark each.
4. In Section B, Questions 15 to 18 are Very Short Answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Questions 19 to 21 are Short Answer (SA) type questions, carrying 3 marks each.
6. In Section D, Question 22 is a Long Answer (LA) type question, carrying 5 marks.
7. In Section E, Question 23 is a case study based question, carrying 4 marks.
8. There is no overall choice. However, an internal choice has been provided in 2 questions of Section B (Q17, Q18), 2 questions of Section C (Q20, Q21), in Q22 of Section D and in one sub-part of Q23 of Section E.
9. Draw neat and clean figures wherever required. Use of calculators is not allowed.

SECTION – A **(14 × 1 = 14)**

This section comprises of 12 multiple choice questions (Q1–Q12) and 2 assertion–reason based questions (Q13–Q14) of 1 mark each.

No.	Questions	Marks

Q1. The arrow diagram (Fig. 1) shows a relation R from a set P to a set Q. In set-builder form, R can be written as **1**

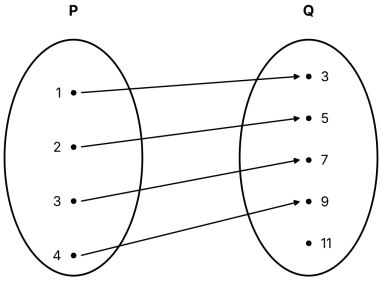


Fig. 1

(A) {(x, y) : y = x + 2, x ∈ P} (B) {(x, y) : y = 2x + 1, x ∈ P}

(C) {(x, y) : y = 2x + 3, x ∈ P} (D) {(x, y) : y = x^2 + 2, x ∈ P}

Q2. The graph of a real function f is shown in Fig. 2. The function f(x) is **1**

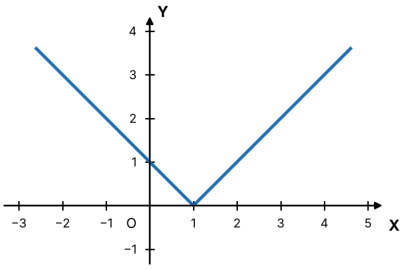


Fig. 2

(A) |x| − 1 (B) |x| + 1

(C) |x + 1| (D) |x − 1|

Q3. If n(A) = 3 and n(B) = 2, then the number of relations from A to B is **1**

(A) 6 (B) 32

(C) 64 (D) 8

Q4. If $(2x - 1, y + 3) = (5, 2y - 1)$, then the value of $x + y$ is **1**

(A) 7 (B) 6

(C) 8 (D) 5

Q5. If $A \times B$ has 12 elements and n(A) = 3, then the number of elements in $B \times A \times A$ is **1**

(A) 12 (B) 24

(C) 36 (D) 48

Q6. Let A = {1, 2, 3} and B = {a, b, c}. Which of the following relations from A to B is a function? **1**

(A) {(1, a), (2, b), (1, c)} (B) {(1, a), (2, a), (3, a)}

(C) {(1, a), (2, b)} (D) {(a, 1), (b, 2), (c, 3)}

Q7. The domain of the real function $f(x) = 1/(x^2 - 4x - 5)$ is **1**

(A) $R - \{5\}$ (B) $R - \{1, -5\}$

(C) R (D) $R - \{-1, 5\}$

Q8. The relation from P = {1, 2, 3, 4} to Q = {a, b, c} shown in Fig. 3 is **not** a function because **1**

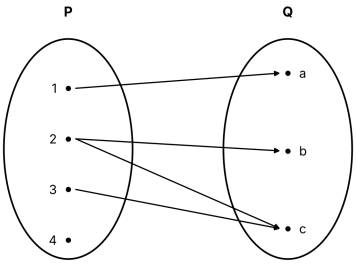


Fig. 3

(A) 2 has two images and 4 has no image (B) only 2 has two images

(C) only 4 has no image (D) it is a function

Q9. The range of the real function $f : R \to R$ defined by $f(x) = 2 - |x|$ is **1**

(A) $[2, \infty)$ (B) $(-\infty, 2)$

(C) $(-\infty, 2]$ (D) R

Q10. If $[x]$ denotes the greatest integer function, then the value of $[-2.3] + [3.9] - [-0.5]$ is **1**

(A) 1 (B) −1

(C) 0 (D) 2

Q11. Let f be the signum function defined by $f(x) = 1$ if $x > 0$, $f(x) = 0$ if $x = 0$ and $f(x) = -1$ if $x < 0$. The value of $f(-4) + f(0) - f(2.5)$ is **1**

(A) −1 (B) −2

(C) 0 (D) 2

Q12. If $f(x) = x^2$ and $g(x) = 2x + 3$ are real functions, then the value of $(f - g)(-1) + (fg)(1)$ is **1**

(A) 3 (B) 4

(C) 6 (D) 5

Assertion–Reason Based Questions

Directions: Question numbers 13 and 14 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below:
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true but Reason (R) is false.
(D) Assertion (A) is false but Reason (R) is true.

Q13. **Assertion (A):** If A = {1, 2} and B = {3}, then A × B ≠ B × A. **1**
Reason (R): The ordered pairs (a, b) and (b, a) are equal only when a = b.

Q14. **Assertion (A):** Every function is a relation. **1**
Reason (R): Every relation is a function.

SECTION – B (4 × 2 = 8)

This section comprises of 4 very short answer (VSA) type questions of 2 marks each.

Q15. Fig. 4 shows the graph of the greatest integer function f(x) = [x]. **2**

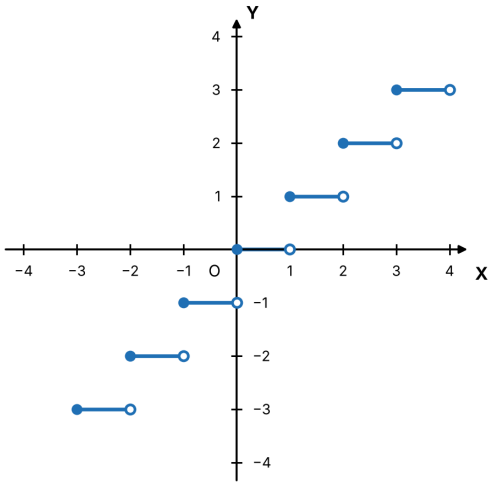


Fig. 4

(i) Use the graph to find f(−1.5) and f(2.9). **[1]**
(ii) Write the range of f. **[1]**

Q16. If A = {2, 3} and B = {3, 4}, find (A × B) ∩ (B × A). **2**

Q17. **(A)** Let A = {1, 2, 3, 4, 5, 6} and R = {(x, y) : y = 2x, x, y ∈ A} be a relation on A. Write R in roster form and find its domain and range. **2**

OR

(B) Write the relation R = {(x, x^3) : x is a prime number less than 10} in roster form. Also write its domain and range.

Q18. **(A)** Find the domain and range of the real function f(x) = √(25 − x^2). **2**

OR

(B) Find the domain of the real function f(x) = (x + 2)/(x^2 − x − 6).

SECTION – C (3 × 3 = 9)

This section comprises of 3 short answer (SA) type questions of 3 marks each.

Q19. The graph of a real function f : R → R is shown in Fig. 5. (An open dot means that the point is not on the graph.) **3**

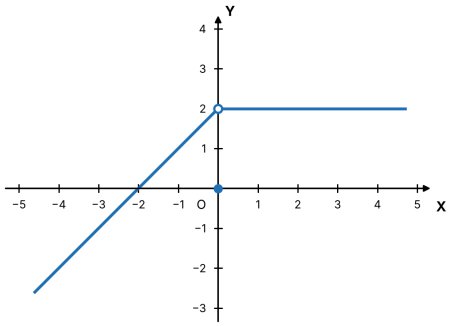


Fig. 5

(i) Write the rule of f in piecewise form. **[1]**

(ii) Find f(−3) + f(0) + f(5). **[1]**

(iii) Write the range of f. **[1]**

Q20. **(A)** Let A = {1, 2}, B = {2, 3} and C = {3, 4}. Find A × (B ∪ C) and (A × B) ∪ (A × C). What do you observe? **3**

OR

(B) If A × B = {(p, x), (p, y), (q, x), (q, y)}, find the sets A and B. Also write A × A.

Q21. **(A)** Let f(x) = x^2 − 4 and g(x) = 2x + 1 be real functions. Find (f + g)(x), (f − g)(x), (fg)(x) and (f/g)(x), stating the domain of (f/g)(x). **3**

OR

(B) Find the domain and range of the real function f(x) = 3 − |x + 2|. Also find f(−5) and f(1).

SECTION – D (1 × 5 = 5)

This section comprises of 1 long answer (LA) type question of 5 marks.

Q22. **(A)** Let A = {1, 2, 3, 4} and B = {1, 4, 9, 16, 25}. A relation R from A to B is defined by R = {(x, y) : y = x^2, x ∈ A, y ∈ B}. **5**

(i) Write R in roster form. **[1]**

(ii) Write the domain, codomain and range of R. **[1]**

(iii) Is R a function from A to B? Justify your answer. **[1]**

(iv) Find n(A × B) and the total number of relations that can be defined from A to B. **[2]**

OR

(B) Consider the real function f(x) = |x − 1| + 2.

(i) Write f(x) in piecewise form. **[1]**

(ii) Complete a table of values of f for x = −2, −1, 0, 1, 2, 3, 4. **[1]**

(iii) Draw the graph of f. **[2]**

(iv) Write the domain and range of f. **[1]**

SECTION – E (1 × 4 = 4)

This section comprises of 1 case study based question of 4 marks with sub-parts (i), (ii), (iii) of marks 1, 1, 2 respectively.

Q23. **Case Study:** A boutique sells T-shirts in three sizes, A = {S, M, L}, and three colours, B = {Red, Blue, Green}. Fig. 6 shows every possible size–colour combination as a point. The **filled** points are the combinations that are currently in stock; the hollow points are out of stock. Let R be the relation from A to B consisting of the in-stock combinations. **4**

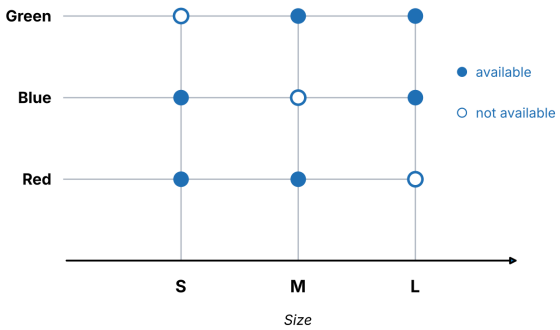


Fig. 6

Based on the given information, answer the following questions:

(i) Find n(A × B). **[1]**

(ii) Write the relation R in roster form. **[1]**

(iii) **(a)** Is R a function from A to B? Give a reason. Also write the domain and range of R. **[2]**

OR

(b) Find the total number of relations that can be defined from A to B, and the number of elements in A × A × B. **[2]**

— End of Question Paper —