



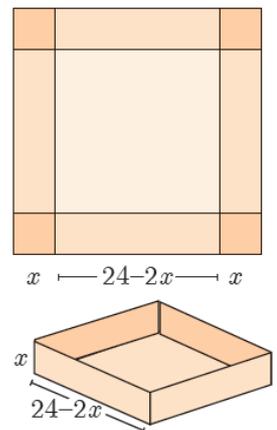
**I. Answer any 5 of the following questions:**

**[5 x 2 = 10]**

- Find  $A \times B$ ,  $A \times A$  and  $B \times A$  for  $A = \{m, n\}$ ;  $B = \emptyset$
- If  $A = \{5,6\}$ ,  $B = \{4,5,6\}$ ,  $C = \{5,6,7\}$ , Show that  $A \times A = (B \times B) \cup (C \times C)$
- Let  $A = \{3,4,7,8\}$  and  $B = \{1,7,10\}$ . Which of the following sets are relations from  $A$  to  $B$ ?
  - $R_1 = \{(3,7), (4,7), (7,10), (8,1)\}$
  - $R_2 = \{(3,1), (4,12)\}$
  - $R_3 = \{(3,7), (4,10), (7,7), (7,8), (8,11), (8,7), (8,10)\}$
- Let  $A = \{1, 2, 3, 4, \dots, 45\}$  and  $R$  be the relation defined as "is square of a number" on  $A$ .

Write  $R$  as a subset of  $A \times A$ . Also, find the domain and range of  $R$ .

- Let  $X = \{3, 4, 6, 8\}$ . Determine whether the relation  $R = \{(x, f(x)) \mid x \in X, f(x) = x^2 + 1\}$  is a function from  $X$  to  $N$ ?
- An open box is to be made from a square piece of material, 24 cm on a side, by cutting equal squares from the corners and turning up the sides as shown (Fig.). Express the volume  $V$  of the box as a function of  $x$ .



**II. Answer any 3 of the following questions:**

**[3 x 5 = 15]**

- Let  $A =$  The set of all natural numbers less than 8,  
 $B =$  The set of all prime numbers less than 8,  
 $C =$  The set of even prime number.

Verify that (i)  $(A \cap B) \times C = (A \times C) \cap (B \times C)$

(ii)  $A \times (B - C) = (A \times B) - (A \times C)$

8. A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide ₹10,000, ₹25,000, ₹50,000 and ₹1,00,000 as salaries to the people who work in the categories A, C, M and E respectively. If  $A_1, A_2, A_3, A_4$  and  $A_5$  were Assistants;  $C_1, C_2, C_3, C_4$  were Clerks;  $M_1, M_2, M_3$  were managers and  $E_1, E_2$  were Executive officers and if the relation  $R$  is defined by  $xRy$ , where  $x$  is the salary given to person  $y$ , express the relation  $R$  through an ordered pair and an arrow diagram.

9. A graph representing the function  $f(x)$  is given in Fig. it is clear that  $f(9) = 2$ .

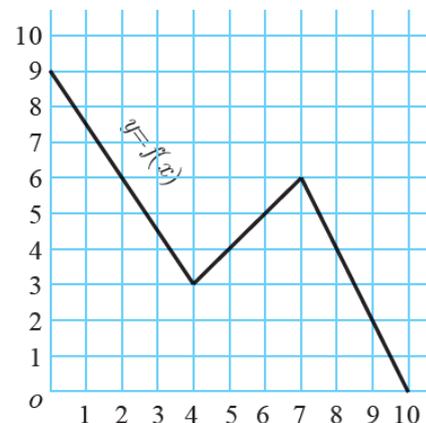
(i) Find the following values of the function

- (a)  $f(0)$       (b)  $f(7)$       (c)  $f(2)$       (d)  $f(10)$

(ii) For what value of  $x$  is  $f(x) = 1$ ?

(iii) Describe the following      (i) Domain      (ii) Range.

(iv) What is the image of 6 under  $f$ ?



10. The data in the adjacent table depicts the length of a person forehead and their corresponding height. Based on this data, a student finds a relationship between the height ( $y$ ) and the forehead length( $x$ ) as  $y = ax + b$ , where  $a, b$  are constants.

(i) Check if this relation is a function.

(ii) Find  $a$  and  $b$ .

(iii) Find the height of a person whose forehead length is 40 cm.

(iv) Find the length of forehead of a person if the height is 53.3 inches.

Length ' $x$ ' of forehead (in cm)	Height ' $y$ ' (in inches)
35	56
45	65
50	69.5
55	74

-----ALL THE BEST-----

Test should be written under the supervision of your parents and get the answer paper signed from them.

No corrections should be made after the test timings. We expect your honesty.

Test Papers have to be submitted after the completion of all the 4 tests.

Submission Date of Test Papers: 27<sup>th</sup> May, 28<sup>th</sup> May 29<sup>th</sup> May

Timings: 9.30 AM – 1.00 PM / 5 PM- 8 PM