QB365

Important Questions - Relations and Functions

11th Standard CBSE

Mathematics

Reg.No. : | | | | | | |

Time : 01:00:00 Hrs

Total Marks : 50

Section-A

1) Let f and g be real functions defines by $f(x) = \sqrt{x+2}$ and g , then $g(x) = \sqrt{4-x^2}$ find each of the following functions **2**

f.g

2) Let A={2,4,6,9} and B={4,6,18,27,54}, find the set of ordered pair (a,b) such that aϵ A,bϵ B,a is a factor of b, and a<b. **2**

3) Find the values of a and b, if **2**

(i) (2a-5,4)=(5,b+6)

4) Find the values of a and b, if **2**

(a-3,b+7)=(3,7)

5) Which of the following relations are functions? **2**

$\{(2, 0), (4, 8), (2, 1), (3, 6)\}$

6) Find the cartesian product of three sets **2**

A={1,2}, B={3,4} and C={x:x $\in$ N and 4 $\leq$ x $\leq$ 6}.

Section-B

7) Let A = {a,b,c} and B={x=x $\in$ N, x is a prime number less than 5}. Find A X B ans B X A. **3**

Show that A X B $\neq$ B X A.

8) If A={1,2}, then find A $\times$ A $\times$ A **3**

9) If x,$y\epsilon\{1, 2, 3, 4\}$ then check whether f_1, f_2 and f_3 are functions or not where **3**

$f_1 = \{(x, y) : y = x + 1\}, f_2 = \{(x, y) : x + y = 5\}, f_3 = \{(x, y) : x + y > 4\}.$

Also, find the range in the case of a function.

10) If two functions are defined as **3**

$f(x) = \frac{1}{(x-2)}, x \neq 2$ and $g(x) = (x-2)^2$ then find

f-g

11) If A X B = {a,1), (b,3), (a,3), (b,1), (a,2), (b,2)}. Then, find A and B. **3**

12) If the function t which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by **3**

$t(c) = \frac{9C}{5} + 32,$ then find t(-10)

Section-C

13) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$ **4**

Then, describe each of the following functions.

f+g

14) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$ **4**

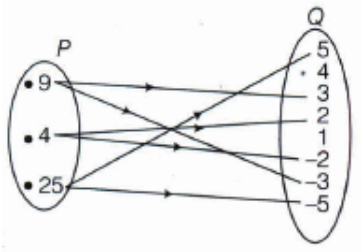
Then, describe each of the following functions.

f.g

15) If A={2,4,6} and B={1,4} then show that $A \times B \neq B \times A$. Also,show it graphically **4**

16) Write the relation between set P and Q given by an arrow diagram in **4**

(i) roster form (ii) set-builder form



17) The function f is defined by **4**

$$f(x) = \begin{cases} 1-x, x < 0 \\ 1, x = 0 \\ x+1, x > 0 \end{cases}$$

Draw the graph of f(x).

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Section-A

1) $f(x) = \sqrt{x+2}, g(x) = \sqrt{4-x^2}$ **2**

f(x) is defined for $x + 2 \geq 0 \Rightarrow \geq -2$

Domain(f)=$[-2, \infty)$

$g(x)$is defined for $4 - x^2 \geq= 0 \Rightarrow x^2 - 4 \leq 0$

$\Rightarrow (x-2)(x+2) \leq 0 \Rightarrow x\epsilon[-2, 2]; Domain(g) = [-2, 2]$

Domain(f) $\cap$ domain(g)=[-2,2]

Ans $(x+2)\sqrt{2-x}$

2) Here, A={2,4,6,9}: B={4,6,18,27,54} **2**

Let R={(a,b):aϵ A,bϵ B,a is a factor of b, and a<b}

Then, R={(2,4),(2,6),(2,18),(2,54),(6,18),(6,54),(9,18),(9,27),(9,54)}

3) We know that, two ordered pairs are equal, if their corresponding elements are equal. **2**

(2a-5,4)=(5,b+6) $\Rightarrow$ 2a-5=5 and 4=b+6

[equating corresponding elements]

$\Rightarrow$ 2a=5+5 and and 4-6=b

$\Rightarrow$ 2a=10 and -2=b

$\Rightarrow$ a=5 and b=-2

4) We know that, two ordered pairs are equal, if their corresponding elements are equal. **2**

(a-3,b+7)=(3,7) $\Rightarrow$ a-3=3 and b+7=7

[equating corresponding elements]

$\Rightarrow$ a=3+3 and b=7-7

$\Rightarrow$ a=6 and b=0

5) $\{(2, 0), (4, 8), (2, 1), (3, 6)\}$ **2**

It is not a function because first elements of (2,0) and (2,1) are same.

6) We have, A={1,2},B={3,4} **2**

and C={x:x ∈ N and 4 ≤ x ≤ 6}= {4,5,6}

Cartesian product of A and B = A × B = {1,2} × {3 ,4}

= {(1,3),(1,4),(2,3),(2,4)}

Let D = A × B = {(1,3),(1,4),(2,3),(2,4)}

Now D × C = A × B × C = {(1,3),(1,4),(2,3),(2,4)} × {4,5,6}

= {(1,3,4),(1,3,5),(1,3,6),(1,4,4),(1,4,5),(1,4,6),(2,3,4),(2,3,5),(2,3,6),(2,4,4),(2,4,5),(2,4,6)}

It is the required cartesian product of three sets.

Section-B

7) Given sets are A={a,b,c} **3**

and B={x:x ∈ N, x is a prime number leaa than 5}={2,3}

For element a of set A, All ordered pairs are (a,2), (a,3).

For element b of set A, All ordered pairs are (b,2), (b,3).

For element c of set A, All ordered pairs are (c,2), (c,3).

∴ A X B = {(a,2)(a,3),(b,2)(b,3)(c,2)(c,3)}

For element 2 of set B, all ordered pairs are

(2,a), (2,b),(2,c).

For element 3 of set B, all ordered pairs are

(3,a), (3,b), (3,C).

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

Since, (a,2) ≠ (2,a)

∴ A X B ≠ B X A

8) We have, A × A ={1,2} × {1,2} **3**

= {(1,1),(1,2),(2,1),(2,2)}

Now, (A × A) × A = A × A × A={(1,1),(1,2),(2,1),(2,2)} × {1,2}

={(1,1,1),(1,1,2),(1,2,1),(1,2,2),(2,1,1),(2,1,2),(2,2,1),(2,2,2)}

9) **3**

Let A = $\{1, 2, 3, 4\}$, then f_1, f_2 and f_3 are defined from A to A.

write

$f_1 = \{(1, 2), (2, 3), (3, 4)\} f_2 = \{(1, 4), (2, 3), (3, 2), (4, 1)\} f_3 = \{(1, 4), (2, 3), (2, 4), (3, 3), (3, 2), (3, 4), (4, 1), (4, 2), (4, 3), (4, 4)\}$

Now in f_1 , we observed that an element does not appear at first place of any ordered pair of f_1 . So, f_1 is not a function from A to A.

10) $(f-g)(x) = f(x) - g(x)$ $= \frac{1}{(x-2)} - (x-2)^2, x \neq 2$ $= \frac{1-(x-2)^3}{x-2}, x \neq 2$ **3**

11) **3**

Here, first element of each ordered pair of A X B gives the elements of set A and corresponding second element gives the elements of set B.

∴ A={a,b} and b={1,3, 2}

Note

We write each element only one time in set, if it occurs more than one time.

12) Given, $t(c) = \frac{9C}{5} + 32 \quad \ldots(i)$ **3**

On putting C = -10 in Eq.(i), we get

$t(-10) = \frac{9\times(-10)}{5} + 32 = \frac{-9\times10}{5} + 32 = -9\times2 + 32 = -18 + 32 = 14$

Section-C

13) Domain $(f) \cap$ Domain $(g) = [-1, 3]$ **4**

$(f+g)(x) = \sqrt{x+1} + \sqrt{9-x^2}$

14) Domain $(f) \cap$ Domain $(g) = [-1, 3]$ **4**

$(fg)(x) = \sqrt{9 + 9x - x^2 - x^3}$

15) **4**

We have A={2,4,6} and B={1,4}

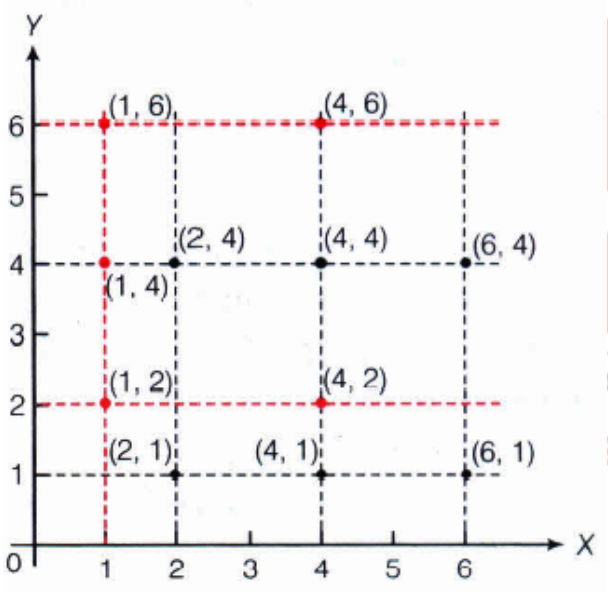
Then $A \times B = \{(2, 1), (2, 14), (4, 1), (4, 4), (6, 1), (6, 4))\}$ ----(i)

$B \times A = \{(1, 2), (1, 4), (1, 6), (4, 2), (4, 4), (4, 6))\}$ ----(ii)

From equ(i) and (ii) we have $A \times B \neq B \times A$

Graphically representation Firstly draw two perpendicular lines ,say OX and OY intersectiong O. $A \times B$ To show $A \times B$ graphically, we draw three dotted vertical lines through 2,4 and 6 OX.Also,draw two dotted horizontal lines through 1 and 4 of OY.

The point of intersection of these lines represents the ordered pair of $A \times B$



$B \times A$ Now ,to show $B \times A$graphically ,we draw two dotted vertical lines through 1 and 4 OX.Also,draw three dotted horizontal lines through 2,4 and 6 of OY.The points of intersection of these lines represent the ordered pairs of $B \times A$

Thus,from the graph ,we can see that ordered pairs of $A \times B$ **(denoted by black dots)** have different position from the ordered pairs of $B \times A$**(denoted by coloured dots)**.So, ordered pairs of both catersian product represent different points of graph

Hence, $A \times B \neq B \times A$

16) From arrow diagram,we have **4**

$P = \{9, 4, 25\}$

and $Q = \{5, 4, 3, 2, 1, -2, -3, -5\}$

Here, the relation R 'x' is the square of y'

where $x \in P$ and $y \in Q$

In roster form, it can be written as

$R = \{(9, 3)(9, -3), (4, 2), (4, -2)(25, 5)(25, -5)\}$

In set-builder from R cam be written as

$R = \{x, y) : x \in P, y \in Q$ and x is the square of y}

17) Here, f(x) =1-x, x<0, this gives

f(-4) =1-(-4) =5

f(-3) =1-(-3) =4

f(-2) =1-(-2) =3

f(-1) =1-(-1) =2

and f(x) = x+1,x>0

f(1) =2, f(2) =3, f(3) =4

f(4) =5 and so on.

Now, the graph of f is as shown in following figure.