



# MATHS

## BOOKS - S CHAND MATHS (ENGLISH)

### RELATION AND FUNCTIONS

#### Examples

1. If  $R = \{(x, y), x, y, \in W, x^2 + y^2 \leq 4\}$

then domain of R is

A.  $\{0,1,2,3\}$

B.  $\{0,1,2\}$

C.  $\{0,1\}$

D.  $\{0,2,3\}$

**Answer: B**



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2. Let  $A = \{9, 10, 11, 12, 13\}$  and let  $f: A \rightarrow N$  be defined by  $f(n) =$  the highest prime factor of  $n$ . Find the range of  $f$ .

A. {3,5, 11, 13}

B. {2,3,5,11,13}

C. {2,3,5,7,11,13}

D. {2,3,11,13}

**Answer: A**



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**3.** The domain of the function  $f$  defined by

$$f(x) = \frac{l}{\sqrt{9 - x^2}} \text{ is}$$

A. (0,3)

B. (-3,0)

C. [-3,3]

D. (-3,3)

**Answer: D**



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4. The domain of the function

$$f(x) = \frac{1}{\sqrt{(x) - [x]}}$$

where  $[*]$  denotes the

greatest integer function is

A.  $R$

B.  $R^+$

C.  $R^-$

D.  $R - Z$

**Answer: D**



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5. Which one of the following is the second degree polynomial function  $f(x)$ , where  $f(0) = 5$ ,  $f(-1) = 10$  and  $f(1) = 6$  ?

A.  $5x^2 - 2x + 5$

B.  $3x^2 - 2x - 5$

C.  $3x^2 - 2x + 5$

D.  $3x^2 - 10x + 5$

**Answer: C**



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# Multiple Choice Questions Choose The Correct Answer From The Given Four Options In Questions

1. If  $A = (-1, 2, 5, 8)$ ,  $B = \{0, 1, 3, 6, 7\}$  and  $R$  be the relation "is one less than" from  $A$  to  $B$ , then  $R$  as a set of ordered pairs is

- A.  $\{(-1, 0), (2, 3), (5, 6)\}$
- B.  $\{(-1, 0), (2, 1), (8, 7)\}$
- C.  $\{(0, 1), (2, 3), (6, 7)\}$
- D.  $\{(1, 2), (2, 3), (5, 6), (6, 7), (7, 8)\}$

**Answer: A**



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2. If  $R = \{(x, y) : x, y \in W, 2x + y = 8\}$ ,

then domain of R is

A.  $\{0, 1, 2, 3, 4, 5\}$

B.  $\{0, 1, 2, 3, 4, 5, 6\}$

C.  $\{0, 1, 2, 3, 4\}$

D.  $\{0, 1, 2, 3\}$

**Answer: C**



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**3.** If  $R = \{(x, y) : x, y \in N, x + 2y = 8\}$  then range of R is

A.  $\{1, 2, 3, \dots 7, 8\}$

B.  $\{1, 2, 3, \dots 9, 10\}$

C.  $\{1, 3, 5, 7 \dots 19\}$

D.  $\{1, 3, 5, 7, \dots 15\}$

**Answer: B**



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4. Let  $A = \{1,2,3,4,5,6\}$  and  $R$  be the relation defined on  $A$  by  $R = \{(x, y) : x, y \in A, x \text{ divides } y\}$ , then range of  $R$  is

A.  $\{2,3,4,5,6\}$

B.  $\{1,2,3,4,5\}$

C.  $\{2,4,6\}$

D.  $\{1,2,3,4,5,6\}$

**Answer: D**



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5. Let  $A = [3, 4]$  and  $B[7, 11]$  and  $R$  be the relation from  $A$  to  $B$  defined as  $R = \{(a, b) : a \in A, b \in B, a - b \text{ is odd then}$

A.  $R = R \times B$

B.  $R = \phi$

C.  $R \subset A \times B$

D.  $R \subset B \times A$

**Answer: B**



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6. Given  $R = \{(x, y) : x, y \in \mathbb{Z}, y = 3\}$ , then which ordered pair belongs to R?

A. (1,4)

B. (0,3)

C. (5,2)

D. (-4,1)

**Answer: C**



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**7.**

**Given**

$$R = \{(x, y) : x, y \in W, x^2 + y^2 = 169\},$$

then the domain of R is

A.  $\{0, 5, 12, 13\}$

B.  $\{-13, -12, -5, 0, 5, 12, 13\}$

C.  $\{0, 1, 2, 3, \dots, 13\}$

D.  $\{0, \pm 1, \pm 2, \dots, \pm 13\}$

**Answer: A**



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**8.** If  $A = \{a, b\}$  and  $B = \{x, y, z\}$ , then the number of relations from  $B$  to  $A$  is

A. 8

B. 16

C. 32

D. 64

**Answer: D**



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**9.** Let  $n(A) = m$  and  $n(B) = n$ , then the number of non-empty relations from A to B is

A.  $m^n$

B.  $n^m - 1$

C.  $2^{mn} - 1$

D.  $2^{mn}$

**Answer: C**



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**10.** Let  $A$  be a finite set containing  $n$  elements, then the number of relations on  $A$  is

A.  $2^n$

B.  $2^{n^2}$

C.  $n^2$

D.  $n^n$

**Answer: B**



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**11.** If  $A = \{2,3,4,5,6\}$  and  $R$  is a relation on set  $A$  defined by

$R = \{(x, y) : y = x + 2, X, y \in A\}$  then

A.  $\{(2,4), (3,5), (4, 6)\}$

B.  $\{(4,2), (5,3), (6,4)\}$

C.  $\{(2,4), (5,3), (4, 6)\}$

D.  $\{(4,2), (3,5),(4,6)\}$

**Answer: A**



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**12.** Which of the following relations is a function?

A.  $R = \{(4,6), (3,9), (-11, 6), (3, 11)\}$

B.  $R = \{(1,2), (2, 4), (2,6), (3,5)\}$

C.  $R = \{(2,1), (4,3), (6,5), (8,7), (10,9)\}$

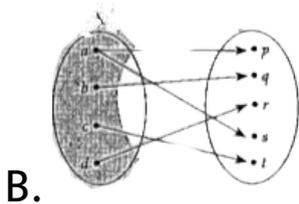
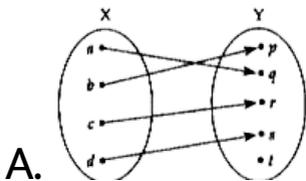
D.  $R = \{(0,1), (1,3), (2,4), (3, 1), (3,5)\}$

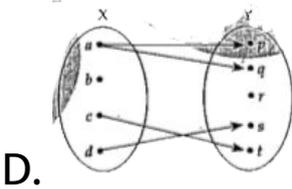
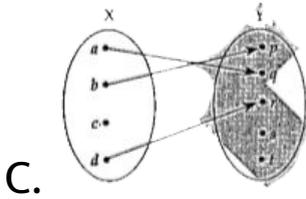
**Answer: C**



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**13.** Which of the following arrow diagrams represents a function from  $X$  to  $Y$ ?





**Answer: A**



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**14.** Let  $A$  and  $B$  be two finite sets, then the number of functions from  $A$  to  $B$  is

A.  $n(A) \cdot b(B)$

B.  $2^{n(A)} \cdot n(B)$

C.  $\{n(A)\}^{n(B)}$

D.  $\{n(B)\}^{n(A)}$

**Answer: D**



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**15.** Let  $A$  be a finite set containing 3 elements, then the number of functions from  $A$  to  $A$  is

A. 512

B. 511

C. 27

D. 26

**Answer: C**



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**16.** The domain of the function  $f$  defined by

$$f(x) = \sqrt{a^2 - x^2}, \quad (a > 0) \text{ is}$$

A.  $(-a, a)$

B.  $[-a,a]$

C.  $[0,a]$

D.  $(-a,0]$

**Answer: B**



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**17.** The domain of the function  $f$  defined by

$$f(x) = \sqrt{x^2 - 9} \text{ is}$$

A.  $[-3, 3]$

B.  $(-3, 3)$

C.  $(-\infty, -3] \cup [3, \infty)$

D.  $[0, 3]$

**Answer: C**



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**18.** The domain of the function  $f$  defined by

$$f(x) = \frac{1}{\sqrt{|x|} - x} \text{ is}$$

A.  $R - [3, -2]$

B.  $R - [-3, 2]$

C.  $[R - [3, -2]$

D.  $R - (-3 - 2)$

**Answer: C**



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**19.** The domain of the function  $f$  given by

$$f(x) = \frac{x^2 + 2x + 1}{x^2 - x - 6}$$

A.  $(-\infty, 1)$

B.  $(0, \infty)$

C.  $(-\infty, 0]$

D.  $\phi$

**Answer: A**



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**20.** The domain and range of the real function

$f$  defined by  $f(x) = \frac{1}{4x^2 - 1}$  are

$$\text{A. Domain} = \left\{ -\frac{1}{2}, \frac{1}{2} \right\}, \quad \text{Range}$$

$$= - \{ -\infty, -1) \cup (0, \infty)$$

$$\text{B. Domain} \quad R = \left\{ -\frac{1}{2}, \frac{1}{2} \right\}, \quad \text{Range}$$

$$= - \{ -\infty, -1) \cup (0, \infty)$$

$$\text{C. Domain} = \left[ -\frac{1}{2}, \frac{1}{2} \right], \quad \text{Range}$$

$$= - \{ -\infty, -1) \cup (0, \infty)$$

$$\text{D. Domain} = R - \left[ -\frac{1}{2}, \frac{1}{2} \right], \quad \text{Range}$$

$$= - \{ -\infty, -1) \cup (2, \infty)$$

**Answer: B**



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21. Find the domain and the range of the real function  $f$  defined by  $f(x) = \sqrt{(x - 1)}$ .

A. Domain =  $(1, \infty)$  Range =  $(0, \infty)$

B. Domain =  $[1, \infty)$  Range =  $(0, \infty)$

C. Domain =  $[1, \infty)$  Range =  $[0, \infty)$

D. Domain =  $(1, \infty)$  Range =  $[0, \infty)$

**Answer: C**



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22. The domain and range of the real function

$f$  defined by  $f(x) = \frac{x - 2}{2 - x}$  are

A. Domain =  $\mathbb{R} - \{2\}$ , Range =  $\{-1\}$

B. Domain =  $\mathbb{R} - \{-2\}$ , Range =  $\{-1\}$

C. Domain =  $\mathbb{R} \setminus \{2\}$ , Range =  $\{1\}$

D. Domain =  $\mathbb{R} - \{2\}$ , Range =  $\{1\}$

**Answer: A**



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23. The domain and range of the real function

f defined by  $\frac{x}{|x|}$  are

A. Domain = R, Range =  $\{-1, 1\}$

B. Domain =  $R - \{0\}$ , Range =  $(-1, 0, 1)$

C. Domain =  $R - \{0\}$ , Range =  $\{-1, 1\}$

D. Domain = R, Range =  $\{-1, 0, 1\}$

**Answer: C**



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24. The domain and range of the functions given by  $f(x) = 2 - |x - 5|$  are

A. Domain =  $R^+$ , Range =  $(-\infty, 1]$

B. Domain =  $R$  Range =  $(-\infty, 2]$

C. Domain =  $R^+$ , Range =  $(-\infty, 2]$

D. Domain =  $R$  Range =  $(-\infty, 2]$

**Answer: B**



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25. The domain of the function  $f$  defined by

$$f(x) = \sqrt{a-x} + \frac{1}{\sqrt{x^2-a^2}} \text{ is}$$

- A.  $(-\infty, a]$
- B.  $(-\infty, a]$
- C.  $(-\infty, -a)$
- D.  $(a, \infty)$

**Answer: C**



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26. The domain of the function  $f$  defined by

$$f(x) = \log_e(5 - 6x) \text{ is}$$

A.  $\left(-\infty, \frac{5}{6}\right)$

B.  $\left(\frac{5}{6}, \infty\right)$

C.  $\left(-\infty, \frac{5}{6}\right]$

D.  $\left[\frac{5}{6}, \infty\right)$

**Answer: A**



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27. The domain of the function

$$f(x) = \frac{1}{4 - x^2} + \log_{10}(x^2 - x) \text{ is}$$

A.  $(-\infty, 0) \cup (1, \infty)$

B.  $(-\infty, 0) \cup (1, \infty) - \{-2, 2\}$

C.  $\mathbb{R} - (-2, 2)$

D.  $(-\infty, 0] \cup [1, \infty) - \{-2, 2\}$

**Answer: B**



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28. If  $[x]^2 - 3[x] + 2 = 0$  where  $[*]$  denotes the greatest integer function, then

A.  $x \in [2, 3]$

B.  $x \in (1, 2]$

C.  $x \in [1, 2]$

D.  $x \in [1, 3)$

**Answer: D**



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29. If  $f(x) = px + q$ , where  $p$  and  $q$  are integers  $f(-1) = 1$  and  $f(2) = 13$ , then  $p$  and  $q$  are

A.  $p = 4, q = 5$

B.  $p = -4, q = 5$

C.  $p = -4, q = -5$

D.  $p = 4, q = -5$

**Answer: A**



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30. Let  $f(x) = \sqrt{1 + x^2}$ , then :

A.  $f(xy) = f(x) \cdot f(y)$

B.  $f(xy) \geq f(x) \cdot f(y)$

C.  $f(xy) \leq f(x) \cdot f(y)$

D. None of these

**Answer: C**



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31. The domain for which the functions defined by  $f(x) = 6x^2 + 1$  and  $g(x) = 11 - 7x$  are equal is

A.  $\left\{ -1, \frac{2}{3} \right\}$

B.  $\left\{ 3, \frac{5}{6} \right\}$

C.  $\left\{ -2, \frac{5}{6} \right\}$

D.  $\left\{ 2, \frac{2}{3} \right\}$

**Answer: C**



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32. If  $f(x) - 3f\left(\frac{1}{x}\right) = 2x + 3(x \neq 0)$  then

$f(3)$  is equal to

A.  $-\frac{3}{2}$

B.  $-\frac{5}{2}$

C.  $\frac{7}{2}$

D.  $-1$

**Answer: B**



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