

# MATHS

## BOOKS - OMEGA PUBLICATION

### SETS

#### Question

1. Write the given set  $A = \{x : x \text{ is an integer and } -3 \leq x < 7\}$  in roaster form.



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2. Express the set  $\{5, 25, 125, 625\}$  in set builder form.



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3. Are the following pair of sets equal ? Give reasons.

$A = \{x : x \text{ is a letter in the word FOLLOW}\}$

$B = \{y : y \text{ is a letter in the word WOLF}\}$ .



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4. Write down all the subsets of the following set :-  $\{1,2,3\}$



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5. Write  $\{x : x \in R, -12 < x < -10\}$  as interval.



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6. Write interval  $(6, 12)$  in the set builder form.



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7. Find the union of each of the following pairs of set :  $A = \{x : x \text{ is a natural number and multiple of } 3\}$   $B = \{x : x \text{ is a natural number less than } 6\}$



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8. Let  $A = \{ a, b \}$ ,  $B = \{a, b, c\}$ . Is  $A \subset B$  ? What is  $A \cup B$ ?



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9. If  $A = \{1, 2, 3, 4\}$ ,  $B = \{3, 4, 5, 6\}$  and  $D = \{7, 8, 9, 10\}$ . Find  $A \cup B \cup D$ .



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10. If  $A = \{ 3, 5, 7, 9, 11 \}$ ,  $B = \{7, 9, 11, 13\}$ ,  $C = \{11, 13, 15\}$  and  $D = \{15, 17\}$ , find:-  $(A \cup D) \cap (B \cup C)$



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11. If  $X = \{a,b,c,d\}$  and  $Y = \{f,b,d,g\}$ , find  $X-Y$  and  $Y-X$ .



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12. Let  $U = \{ 1, 2, 3, 4, 5, 6, 7, 8, 9 \}$ ,  $A = \{ 1, 2, 3, 4 \}$ ,  
 $B = \{ 2, 4, 6, 8 \}$  and  $C = \{ 3, 4, 5, 6 \}$ . Find:-  $(B - C)'$



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13. Taking the set of natural numbers as the universal set, write down the complements of the following set:  $\{ x : x \text{ is a prime number} \}$



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**14.** Draw appropriate Venn diagram for each of the following :

i)  $(A \cap B)^c$

ii)  $A^c \cap B^c$ .



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**15.** If  $X$  and  $Y$  are two sets such that  $n(X) = 17$ ,  
 $n(Y) = 23$  and  $n(X \cup Y) = 38$ , find  
 $n(X \cap Y)$ .



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**16.** In a group of 400 people, 250 can speak Hindi and 200 can speak English. How many people can speak both Hindi and English?



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**17.** If  $X$  and  $Y$  are two sets such that  $X$  has 40 elements,  $X \cup Y$  has 60 elements and  $X \cap Y$  has 10 elements, how many elements does  $Y$  have?



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**18.** Prove that  $A^c - B^c = B - A$ .



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**19.** In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only and not cricket? How many like tennis?



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**20.** In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?



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**21.** A college awarded 38 medals in Football, 15 in Basketball and 20 in Cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many

received medals in exactly two of the three sports?



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## Important Questions From Miscellaneous Exercise

1. Let  $A$ ,  $B$  and  $C$  be three sets such that  $A \cup B = A \cup C$  and  $A \cap B = A \cap C$ . Show that  $B = C$ .



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2. Assume that  $P(A) = P(B)$ . Show that  $A = B$



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3. Show that for any sets  $A$  and  $B$ ,

$$A = (A \cap B) \cup (A - B) \quad \text{and}$$

$$A \cup (B - A) = (A \cup B)$$



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4. Let  $A$  and  $B$  be sets. If  $A \cap X = B \cap X = \phi$  and  $A \cup X = B \cup X$  for some set  $X$ , show that  $A = B$ . (Hints  $A = A \cap (A \cup X)$ ,  $B = B \cap (B \cup X)$  and use Distributive law )



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5. In a survey of 600 students in a school, 150 students were found to be taking tea and 225 taking coffee, 100 were taking both tea and

coffee. Find how many students were taking neither tea nor coffee?



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6. In a group of students, 100 students know Hindi, 50 know English and 25 know both. Each of the students knows either Hindi or English. How many students are there in the group?



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7. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find: the number of people who read at least one of the newspapers.



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8. If  $X$  and  $Y$  are two sets such that  $X \cup Y$  has 18 elements,  $X$  has 8 elements and  $Y$  has 15 elements, how many elements does  $X \cap Y$  have?



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## Multiple Choice Questions Mcqs

1. Which of the following is a null set

A.  $\{0\}$

B.  $\{x : x > 0 \text{ or } x < 0\}$

C.  $\{x : x^2 = 4 \text{ or } x = 3\}$

D.  $\{x : x^2 + 1 = 0, x \in R\}$

**Answer: D**



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2. The set of

$A = \{u : u \in R, u^2 = 49, 2u = 14\}$  is

A.  $\phi$

B.  $\{7\}$

C.  $\{-7\}$

D.  $\{-7,7\}$

**Answer: B::C**



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**3.** The set of intelligent students in a class is

A. a null set

B. a singleton set

C. a finite set

D. not a well defined collection.

**Answer: D**



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4. The set of  $A = \{x : x \in R, x^2 = 25\}$  is

A.  $\{5\}$

B.  $\{-5\}$

C.  $\{-5,5\}$

D.  $\phi$

**Answer: C**



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5. Which is the subset of all given sets?

A.  $\{1, 2, 3, 4, \dots\}$

B.  $\{1\}$

C.  $\{0\}$

D.  $\{\}$

**Answer: D**



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**6. The set of Girls in a Boys school is**

A. a null set

B. a singleton

C. a finite set

D. not a well defined collection

**Answer: A**



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7. Let  $S = \{0, 1, 5, 4, 7\}$ , then the total number of subsets of  $S$  is

A. 64

B. 32

C. 40

D. 20

**Answer: B**



8. Two sets  $A, B$  are disjoint iff

A.  $A \cup B = \phi$

B.  $A \cap B \neq \phi$

C.  $A \cap B = \phi$

D.  $A - B = A$

**Answer: C**





9. Let  $A$  and  $B$  be two sets in the universal set.

Then  $A-B$  is equal to

A.  $A \cap B^c$

B.  $A^c \cap B$

C.  $A \cap B$

D. none of these

**Answer: A**



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10. If  $A$  and  $B$  are any two sets, then

$A \cup (A \cap B)$  is equal to

A.  $A$

B.  $B$

C.  $A^c$

D.  $B^c$

**Answer: A**



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11. Let A and B be two sets such that  $n(A) = 70$ ,  $n(B) = 60$  and  $n(A \cup B) = 110$ . Then  $n(A \cap B)$  is equal to

A. 240

B. 20

C. 100

D. 120

**Answer: B**



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12. If  $n(A)=3$  and  $n(B)=6$  and  $A \subseteq B$ . Then the number of elements in  $A \cup B$  is equal to

A. 3

B. 9

C. 6

D. none of these

**Answer: C**



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13. If  $n(A) = 3$  and  $n(B) = 6$  and  $A \subseteq B$ . Then the number of elements in  $A \cap B$  is equal to

A. 3

B. 9

C. 6

D. none of these

**Answer: A**



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14. The number of non-empty subsets of the set  $\{1, 2, 3, 4\}$  is

A. 15

B. 14

C. 16

D. 17

**Answer: A**



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15. If  $A = \{1, 2, 3, 4, 5\}$ , then the number of proper subsets of  $A$  is

A. 120

B. 30

C. 31

D. 32

**Answer: C**



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16. Let  $n(U) = 700$ ,  $n(A) = 200$ ,  $n(B) = 300$  and  $n(A \cap B) = 100$ , then  $n(A^c \cap B^c) =$

A. 400

B. 600

C. 300

D. 200

**Answer: C**



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17. The number of subsets of a set having  $n$  elements is

A.  $2^n$

B.  $n^2$

C.  $2n$

D.  $2^n - 1$

**Answer: C**



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**18.** If  $A$  and  $B$  be two sets containing 6 and 3 elements respectively, what can be the minimum number of elements in  $A \cup B$ ? Also, find the maximum number of elements in  $A \cup B$ .

A. 9

B. 10

C. 7

D. 5

**Answer: A**



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19. Find the Derivative of  $\sin 3x$  at  $x = \frac{\pi}{6}$

A. 9

B. 3

C. 6

D. none of these

**Answer: D**



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20. If  $X$  and  $Y$  are two sets, then  $X \cap (X \cup Y)$  equals:

A.  $X$

B.  $Y$

C.  $\phi$

D.  $X \cup Y$

**Answer: C**



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21. If  $A$  and  $B$  are non-empty sets and  $A \times B = B \times A$ , then

$\times A$ , then

A.  $A$  is a proper subset of  $B$

B.  $B$  is a proper subset of  $A$

C.  $A=B$

D. none of these

**Answer: B**



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22.  $A-B=B-A$  iff

A.  $A \subset B$

B.  $B \subset A$

C.  $A=B$

D.  $A \cap B = \phi$

**Answer: C**



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23. If  $A$  is an set, then

A.  $A \cup A' = \phi$

B.  $A \cap A' = X$

C.  $A \cap A' = \phi$

D. none of these

**Answer: C**



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**24.** Number of subsets of set A having 3 elements

A. 7

B. 6

C. 8

D. 10

**Answer: C**



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**25.** Let  $A$  and  $B$  have 3 and 6 elements respectively. What can be the minimum number of elements in  $A \cup B$ ?



A. 3

B. 6

C. 9

D. 18

**Answer: B**



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**26.  $A - B = A$  iff**

A.  $A \subset B$

B.  $B \subset A$

C.  $A = B$

D.  $A \cap B = \phi$

**Answer: D**



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27.  $A - B = \phi$  iff

A.  $A \subset B$

B.  $B \subset A$

C.  $A = B$

D.  $A \cap B = \phi$

**Answer: A**



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