



MATHS

BOOKS - PEARSON IIT JEE FOUNDATION

SETS

Example

1. Are the sets given below equal ?

$$A = \{x : x \text{ is an even prime, } x > 2\}$$

$$B = \{\}$$

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2. Are the sets given below equal ?

$$C = \{x : x \in R, 2 < x < 5\}$$

$$B = \{x : x \in N, 2 < x < 5\}$$



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3. Given $A = \{1, 2, 3, 4, 5, 8\}$ and $B = \{2, 4, 6, 8, 9, 11\}$. Find $A \cup B$.



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4. Given $A = \{2, 3, 5, 9\}$ and $B = \{3, 4, 9, 12\}$. Find $A \cap B$.



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5. Given $A = \{1, 2, 4, 5, 6, 8, 20\}$ and $B = \{2, 3, 4, 5, 9, 20\}$. Find $A - B$ and $B - A$.



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6. If $n(A) = 10$, $n(B) = 21$ and $n(A \cap B) = 5$, then find $n(A \cup B)$.

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7. If $n(A) = 4$, $n(B) = 6$ and $n(A \cup B) = 8$, then find $n(A \cap B)$.

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8. If $n(A) = 8$, $n(B) = 6$ and the sets A and B are disjoint, then find $n(A \cup B)$.

A. 12

B. 14

C. 16

D.

Answer: B

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1. If $A = \{\phi\}$, then $n(A) = \underline{\hspace{2cm}}$.



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2. The set builder form of $A = \{1, 4, 9, 16, 25\}$ is $\underline{\hspace{2cm}}$.



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3. If A and B are two equivalent sets and $n(A) = 2016$, then $n(B) = \underline{\hspace{2cm}}$.



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4. If ϕ is an empty set, then $n(\phi) = \underline{\hspace{2cm}}$.



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5. The set of prime number which are having more then two factor is a/an _____ set (empty/singleton).



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6. Which of the following is a singleton set ?

- A. The set of all the months in a year having exactly 30 days.
- B. The set of all the days in a week.
- C. The set of all the natural satellites of the earth in the solar system.
- D. The set of all the intersecting points of two parallel lines in a plane.

Answer: C



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7. Let A be the set of all triangles in a plane having the sum of three interior angles is greater than 180° , then A is a/an _____ set.

- A. Empty
- B. Singleton
- C. Infinite
- D. None of these

Answer: A



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8. Which of the following is an infinite set ?

- A. $\{x : x \text{ is a prime, } x < 10\}$
- B. $\{x : x \text{ is a vowel in the word MATHEMATICS}\}$
- C. $\{x : x \text{ is a natural number, } 2015 < x < 2016\}$
- D. $\{x : x \in \mathbb{Z}, x \text{ is a non-negative integer}\}$

Answer: D



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9. Which of the following is an empty set ?

- A. $\{x : x \in N, x \text{ is divisible by } 2\}$
- B. $\{x : x \in N, x \text{ is the additive inverse of } 2016\}$
- C. $\{x : x \text{ is a binary digit}\}$
- D. $\{x : x \text{ is either prime or composite}\}$

Answer: B



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10. Which of the following collection is not a set ?

- A. The colours in RAINBOW.

B. All good books in a school library.

C. The members of your family.

D. The principals of your school.

Answer: B



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11. Match the following Column A to Column B

Column A	Column B
(a) $\{x: x \text{ is a two digit number, whose units digit is equal to tens digit.}\}$	(p) Empty set
(b) The collection of natural numbers each of which is reciprocal of itself.	(q) Finite set
(c) The collection of odd numbers which are multiples of 6.	(r) Infinite set
(d) The set of straight lines passing through a point in a plane.	(s) Singleton set



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12. If a and B are disjoint sets, then $n(A \cup B) = \underline{\hspace{2cm}}$



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13. If $A = \{x : x \text{ is prime}\}$ and $B = \{x : x \text{ is even}\}$, then $A \cap B =$ _____



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14. If $A \cap B = \phi$, then A and B are called _____ sets.



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15. If A and B are two non-empty sets, then the minimum number of elements in $A \cap B$ is _____



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16. If all the elements of set A are present in set B, then $A \cup B =$ _____.



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17. If $n(A) = 2016$ and $n(B) = 2017$, then the minimum number of elements in $A \cup B$ is _____.

A. 0

B. 1

C. 2016

D. 2017

Answer: D



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18. If A is collection of natural numbers which are less than 2 and $B = \{x : x \in N, x \text{ is neither prime nor composite}\}$ then $A \cap B =$ _____.

A. ϕ

B. $\{1\}$

C. N

D. None of these

Answer: B



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19. If $A = \{x : x \in N, x \text{ is an additive inverse of } 2017\}$ and $B = \{x : x \in N, x \text{ is a multiplicative inverse of } 2017\}$. Then $A \cup B = \underline{\hspace{2cm}}$.

A. ϕ

B. $\left\{ -2017, \frac{1}{2017} \right\}$

C. 1

D. $\left\{ 2017, \frac{-1}{2017} \right\}$

Answer: A



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20.

If

$$A = \{x : x \in N, 2015 < x < 2017\} B = \{x : x \in N, x + 1 = 2017\},$$

then $A - B =$ _____.

A. ϕ

B. $\{2016\}$

C. $\{2015, 2016, 2017\}$

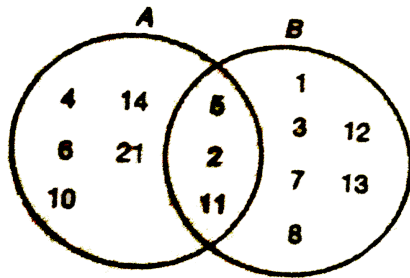
D. $\{1, 2, 3, \dots, 2017\}$

Answer: A



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21. Match the following Column A to Column B



Column A

Column B

- | | | |
|-------------------|-----|--------|
| (a) $n(A - B)$ | () | (p) 14 |
| (b) $n(A \cup B)$ | () | (q) 3 |
| (c) $n(A \cap B)$ | () | (r) 5 |
| (d) $n(B - A)$ | () | (s) 6 |



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Short Answer Type

1. Let $A = \{x : x \text{ is the nearest star to the earth}\}$. Find the set A.



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2. (a) Describe the following sets in the description form.

(i) {A river}

(ii) { Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday}

(b) Describe the following in set builder form.

(i) {2, 4, 6, 8}

(ii) {3, 6, 9, 12, 15, 21 ...}



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3. Check whether the following sets are equivalent ?

(i) $A = \{x : x \text{ is a letter in the word SOLUTION}\}$ $B = \{P, R, O, B, L, E, M\}$

(ii) $C = \{x : x \text{ is either prime or composite, } x < 10\}$

$D = \{1\}$



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4. Check whether the following sets are equal ?

(i) $A = \{\text{The set of the first five elements of the periodic table}\}$

$$B = \{H, He, Li, Be, B\}$$

(ii) $C = \{x : x \text{ is a prime number}\}$

$$D = \{x : x \text{ is an odd number}\}$$



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5. Classify the following into empty sets or singleton sets.

(i) $A = \{x : x \text{ is a composite number which is having less than three factors}\}$

(ii) $B = \{x : x \in R, x \text{ is a multiplicative inverse of } 2016\}$

(iii)

$$C = \{x : x \in N, x \text{ is neither prime number nor composite number}\}$$



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6. All equal sets are equivalent. Is the converse true ? Support your answer with suitable examples.

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7. Let $A = \{x : x \text{ is a letter in the word INDIA}\}$ and $B = \{x : x \text{ is a vowel in the word EDUCATION}\}$ Verify : $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

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8. Let $A = \{x : x \in Z, 2 \leq x \leq 5\}$ and $B = \{x : x \in Z, -2 \leq x < 4\}$.

Find the following :

(i) $n(A \cup B)$ (ii) $n(A \cap B)$

(iii) $n(A - B)$ (iv) $n(B - A)$

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9. Let $A = \{x : x \text{ is an even natural number, } x < 10\}$ and $B = \{x : x \text{ is a factor of } 24\}$

(i) Draw venn diagram to represent these sets.

(ii) Find : (a) $A \cup B$ (b) $A \cap B$

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10. If $n(A) = 20$ and $n(A \cap B) = 5$, then find the value of $n(A - B)$.

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11. If $n(A) = x$, $n(B) = 2[n(A)]$, $n(A \cup B) = 2017$ and $n(A \cap B) = 1007$. Find the value of x .

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12. If $F(n)$ is the set of all factors of 'n' excluding 1 and $F(16) \cap F(24) = F(x)$, then find the value of x .

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Concept Application

1. A and B are any two sets, $n(A) = 17$ and $n(B) = 13$. What is the maximum possible value of $n(A \cup B) - n(A \cap B)$?

A. 4

B. 13

C. 17

D. 30

Answer: D



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2. A and B are two equivalent sets, what is the maximum possible value of $n(A \cap B)$?

A. $n(A)$

B. $n(A \cup B)$

C. $n(A) + n(B)$

D. $n(A) - n(B)$

Answer: A



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3. In a class of 25 students, 18 of them passed in maths, 14 of them passed in Science and 3 of them failed in both the exams. How many students passed in both the exams ?

A. 3

B. 4

C. 10

D. 11

Answer: C



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4. A is set of the factors of 28, b is a set of the factors of 17 and C is a set of the odd multiples of 7 less than 50. Which of the following are singleton sets ?

(A) $A \cap B$ (ii) $C \cap B$

(C) $A \cap C$

A. Only (A) and (B)

B. Only (B) and (C)

C. Only (A) and (C)

D. (A), (B) and (C)

Answer: C



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5. A is a set of all the prime numbers less than 20, B is a set of all the even natural numbers less than 20 and C is a set of all the odd natural numbers. Which of the following is/are true statements ?

(A) $A \cap B$ is a singleton set.

(B) B and C are disjoint sets.

(C) $A \cap C$ is an infinite set.

A. Only (B)

B. Both (A) and (B)

C. Both (B) and (C)

D. (A), (B) and (C)

Answer: B



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Assessment Test

1. Write the set builder form of {January, June, July}.



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2. Write the Roster form of $\{x : x \in \mathbb{Z}, -3 \leq x \leq 3\}$.



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3. Let $A = \{x : x \text{ is a factor of } 24 \text{ excluding } 1 \text{ and itself, } x \in \mathbb{N}\}$.

Write A is in Roster form. Find $n(A)$.



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4. Let $A = \{x : x \text{ is a prime factor of } 2016\}$ and $B = \{x : x \text{ is a prime factor of } 2025\}$.

find : (i) $A \cup B$ (ii) $A \cap B$

(iii) $A - B$ (iv) $B - A$



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5. If $n(G - H) = 15$ and $n(G \cap H) = 10$, then find the value of $n(G)$.

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6. Let $A = \{x^2 : x^2 < 50, x \in N\}$ and $B = \{x : x \text{ is a 2-digit number in which the sum of the digits is 7, } x \in N\}$.

(i) Draw Venn diagram to represent these sets. (ii) Find : (a) $A \cup B$ (b)

$$A \cap B$$

(c) $A - B$ (d) $B - A$

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7. Let $A = \{x : x \text{ is a multiple of } 3, 5, < x < 19\}$ and $B = \{x : x \text{ is a factor of } 18\}$.

Find : (i) $A - B$

(ii) $B - A$

(iii) What do you notice ?

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8. Represent the following set in Descriptive and Set-builder forms.

$\{11, 22, 33, 44, 55, 66, 77, 88, 99\}$



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9. Make a set of all the consonants in the following words : MATHEMATICS, SCIENCE, ENGLISH



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10. Which of the following are sets ?

- (i) A collection of odd numbers
- (ii) A collection of small flowers in a garden
- (iii) All four-legged animals at Delhi Zoo.



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11. If $A = \{4, 8, 12, 16, 20\}$

$B = \{8, 16, 24, 32, 40\}$, then write the correct symbols (\in , \notin) in the following blanks.

(i) $40 \underline{\hspace{1cm}} A$

(ii) $8 \underline{\hspace{1cm}} B$

(iii) $44 \underline{\hspace{1cm}} A$



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12. Can the following be called sets ?

(i) Consonants in the word SETS

(ii) Names of days of the week that have at least 4 hours of sunshine.



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13. If $M = \{\text{January, March, May, July}\}$ and $M = \{\text{April, June, September, November}\}$, then write the correct symbols (\in , \notin) in the following blanks.

February ____ M

February ____ N



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14. What is the cardinal number of the Set N of the natural numbers between 10 and 20 ?



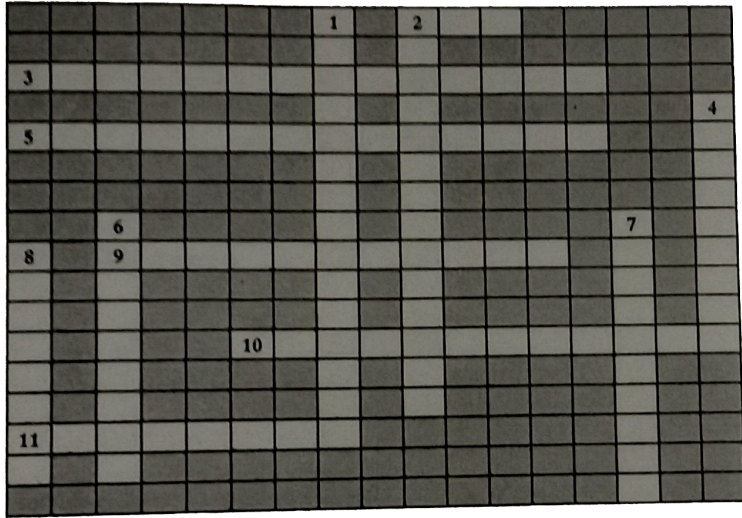
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15. What is the cardinal number of a set with the smallest odd number ?



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Crossword



15/05/2022

1.



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