



MATHS

BOOKS - CENGAGE

SETS

Worked Example

1. Each person in a group of 80 can speak either Hindi or English or both. If 55 persons can speak English and 40 can speak both, find the number of persons who can speak Hindi.

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2. A group of members know at least one of the two languages, Hindi or Kannada. In the group, 150 members know Hindi and 80 members know

Kannada and 70 of them know both. How many members are there in the group?



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3. There are 64 persons in a group. Each of them eats either an apple or an orange or both. The number of persons who eat apples is 28 and those who eat both apples and oranges are 13. How many eat oranges only?



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4. Of the 94 pupils who secured first class marks in mathematics or in English, 61 obtained first class marks in mathematics and 24 in English and mathematics. How many scored first class marks in English only?



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5. In a school, 900 students offer mathematics, 450 offer physics, and 262 students offer both physics and mathematics. How many students offer

(a) Mathematics only?

(b) Physics only?



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6. In a group of 72 students, 32 can speak Telugu only and 19 can speak English only. How many can speak both English and Telugu?



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7. In a survey of 25 students, it was found that 15 had taken mathematics, 12 had taken physics, and 11 had taken chemistry, 5 had taken mathematics and chemistry, 9 had taken mathematics and physics, 4 had taken physics and chemistry, and 3 had taken all the three subjects. Find the number of students who had taken

(a) Only mathematics.

(b) Mathematics and physics, but not chemistry.

(c) At least one of the three subjects.

(d) Only one of the three subjects.



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Test Yourself Level 1

1. Write the set in tabular form and rule method.

D = set of positive integral divisors of 19 .



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2. Write the set in tabular form and rule method.

D_2 = set of negative integers between -9 and -1.



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3. Write the set in tabular form and rule method.

G = set of positive rational numbers having numerator equal to 1.



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4. Write the set in tabular form.

$$H\{x \mid x^2 = 36\}$$



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5. Write the set in tabular form.

$$J = \{x \mid (x - 2)(x - 3) = 0\}$$



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6. Write the set in tabular form.

$$S = \{x \mid x > 0 \text{ is an interger between } -1 \text{ and } 2\}$$



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7. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$15 \square O$$

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8. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$25 \square G$$

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9. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{15, 3\} \square O$$

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10. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{0, 2\} \square E$$



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11. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$123, 125 \square O$$



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12. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$6, 10 \square E$$



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13. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$-35 \square G$$



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14. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{-16\} \square O$$



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15. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{25\} \square E$$



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16. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box proved in the statement.

$$2, 4, 6 \square E$$



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17. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box proved in the statement.

$$\{2, 6, 8, 10, 12\} \square E$$



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18. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box proved in the statement.

$$\{435\} \square O$$



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19. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{18\} \square E$$



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20. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{25, 37\} \square O$$



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21. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{35, 45\} \square G$$



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22. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box proved in the statement.

$$0 \square G$$



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23. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box proved in the statement.

$$\{4810\} \square G$$



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24. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box proved in the statement.

$$6415 \square G$$



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25. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{x \mid x, x^2 - 8x + 12 = 0\} \square G$$



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26. Write the correct symbol \in , \notin , \subseteq or $\not\subseteq$ in the box provided in the statement.

$$\{x \mid x, x^2 - 15x + 50 = 0\} \square G$$



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27. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{I} = the set of irrational number.

\mathbb{R} = the set of real number.

Name the four sets in which 12 is an element.



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28. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{I} = the set of irrational number.

\mathbb{R} = the set of real number.

Name two sets in which $\sqrt{15}$ appears as an element.



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29. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{I} = the set of irrational number.

\mathbb{R} = the set of real number.

Which three of the above sets have 0 as an element ?



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30. Net = the set of natural number.

Z = the set of integers.

Q = the set of rational number.

Q = the set of irrational number.

R = the set of real number.

Which two of the above sets have $3 + \sqrt{10}$ as an element ?



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31. Net = the set of natural number.

Z = the set of integers.

Q = the set of rational number.

Q = the set of irrational number.

R = the set of real number.

Which three of the above sets have -6 as an element ?



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32. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{I} = the set of irrational number.

\mathbb{R} = the set of real number.

Which two of the above sets do not have $\frac{3}{8}$ as an element ?



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33. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{I} = the set of irrational number.

\mathbb{R} = the set of real number.

Which two of the above sets have $0.\overline{1573}$ as an element ?



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34. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{Q}' = the set of irrational number.

\mathbb{R} = the set of real number.

Which two of the above sets have $2.1420157346\dots$ As an element ?



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35. \mathbb{N} = the set of natural number.

\mathbb{Z} = the set of integers.

\mathbb{Q} = the set of rational number.

\mathbb{Q}' = the set of irrational number.

\mathbb{R} = the set of real number.

Which two of the above sets have $-4/15$ as an element ?



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36. Fill in the box with appropriate sets N, Z, Q, Q', and R.

$$\frac{3}{5} \in \square$$

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37. Fill in the box with appropriate sets N, Z, Q, Q', and R.

$$-8 \in \square$$

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38. Fill in the box with appropriate sets N, Z, Q, Q', and R.

$$56 \in \square$$

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39. Fill in the box with appropriate sets N, Z, Q, Q', and R.

$$\frac{8}{4} \in \square$$





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40. Fill in the box with appropriate sets N, Z, Q, Q' and R.

$$\sqrt{25} \in \square$$



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41. Fill in the box with appropriate sets N, Z, Q, Q' and R.

$$\sqrt{7} \in \square$$



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42. Fill in the box with appropriate sets N, Z, Q, Q' and R.

$$\sqrt{8} \in \square$$



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43. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$-\frac{5}{6} \in \square$$

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44. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$\sqrt{\frac{6}{9}} \in \square$$

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45. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$\sqrt{\frac{75}{3}} \in \square$$

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46. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$3 + 3 + \sqrt{7} \in \square$$



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47. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$0.932932\overline{32} \in \square$$



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48. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$\sqrt{\frac{50}{25}} \in \square$$



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49. Fill in the box with appropriate sets N, Z, Q, Q' and R .

$$\frac{0}{28} \in \square$$



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50. Fill in the box with appropriate sets N, Z, Q, Q' and R .

2. $0.202000300004 \in \square$

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Test Yourself Level 2

1. $A = \{-2, 0, 8\}$, $B = \{-1, 0, 7, 9, -12\}$. List the elements of

$$A \cup B$$

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2. $A = \{-2, 0, 8\}$, $B = \{-1, 0, 7, 9, -12\}$. List the elements of

$$A \cup \emptyset$$

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3. $A = \{-2, 0, 8\}$, $B = \{-1, 0, 7, 9, -12\}$. List the element of $B \cup \emptyset$

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4. $P = \{1, 2, 3, 4, 5, 6\}$, $S = \{2, 4, 5\}$

List the elements of $P \cup S$.

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5. $P = \{1, 2, 3, 4, 5, 6\}$, $S = \{2, 4, 5\}$

Is the statement. $P \cup S = P$ true or false ?

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6.

Let

$A = \{1, 2, 3, 4, 5, \dots, 12\}$, $B = \{1, 3, 5, 7, 9, 11\}$, $C = \{2, 4, 6, 8, 10, 12\}$.

Compute the

$$A \cup B$$

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7.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$B \cup C$$

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8.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$A \cup C$$

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9.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$A \cap B$$



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10.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$B \cap C^c$$



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11.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$A \cap C$$

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12.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$A - B$$

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13.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$B - C$$

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14.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$C - A$$

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15.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$B - A$$

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16.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$C - B$$

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17.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$A - C$$



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18.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$A - A$$



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19.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$B - B$$

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20.

Let

$$A = \{1, 2, 3, 4, 5, \dots, 12\}, B = \{1, 3, 5, 7, 9, 11\}, C = \{2, 4, 6, 8, 10, 12\}.$$

Compute the

$$C - C$$

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21. If $n(A) = 18$, $nB = 12$, $(A \cap B) = \emptyset$ find $n(A \cup B)$.

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22. Given $n(U) = 70$, $n(A) = 50$, $n(B) = 42$, find the greatest and least value of

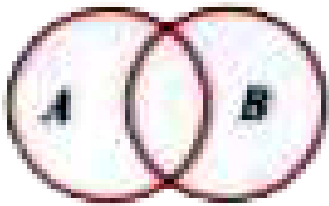
$$n(A \cap B)$$

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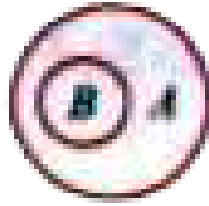
23. Given $n(U) = 70, n(A) = 50, n(B) = 42$, find the greatest and least value of $n(A \cup B)$

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24. In the following figures, shade $A \cup B$, $A \cap B$ and $A - B$, separately.



(a)



(b)



(c)

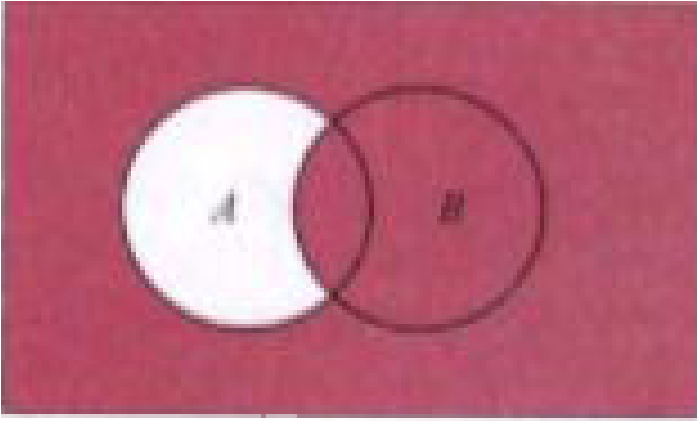


(d)

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Test Yourself Level 3

1. Which opartion in shaded in the following figure ?



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2. Which operation is shaded in the following figure ? Write in two ways.



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3. A survey of 500 television watchers produced the following information, 285 watch foot-ball, 195 watch hockey, 115 watch basketball, 45 watch football and basketball, 70 watch football and hockey, 50 watch hockey and basketball, 50 do not watch any of the three games. How many watch all the three games ? How many watch exactly one of the three games ?

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4. At break, 123 students go to the school canteen, which sells cokes, ice-creams, and pizzas. Of the total, 42 students buy ice-cream, 36 buy pizza, 10 buy only coke. 15 students buy ice-cream and pizza, 10 buy ice-cream and coke, 4 buy cokes and pizza, but not ice-cream and 11 buy ice-cream and pizza, but not coke. Draw a Venn diagram and find out How many students buy nothing at all?



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5. At break, 123 students go to the school canteen, which sells cokes, ice-creams, and pizzas. Of the total, 42 students buy ice-cream, 36 buy pizza, 10 buy only coke. 15 students buy ice-cream and pizza, 10 buy ice-cream and coke, 4 buy cokes and pizza, but not ice-cream and 11 buy ice-cream and pizza, but not coke. Draw a Venn diagram and find out How many students buy at least two items?



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6.

If

$A = \{0, 1, 2, 3, 4, 5, 6\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 2, 3\}$, and $U\{ - C$

then verify the

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



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7.

If

$A = \{0, 1, 2, 3, 4, 5, 6\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 2, 3\}$, and $U\{ - C$

then verify the

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



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8.

If

$A = \{0, 1, 2, 3, 4, 5, 6\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 2, 3\}$, and $U\{ - C$

then verify the

$$A \cap (B - C) = (A \cap B) - (A \cap C)$$



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9.

If

$A = \{0, 1, 2, 3, 4, 5, 6\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 2, 3\}$, and $U\{ - C$

then verify the

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



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10.

If

$A = \{0, 1, 2, 3, 4, 5, 6\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 2, 3\}$, and $U\{ - C$

then verify the

$$(A \cap B)' = A' \cap B'$$



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11.

If

$A = \{0, 1, 2, 3, 4, 5, 6\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 2, 3\}$, and $U\{ - C$

then verify the

$$(A \cap B)' = A' \cup B'$$

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Test Yourself Level 3 Multiple Choice Questions

1. Which of the following collections is set ?

- A. collection of talented students
- B. collection of most beautiful flowers
- C. collection of goals scored by Lionel Messi
- D. collection of melodious songs

Answer: C

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2. Consider a set $A = \{1, 2\{3, 4\}, 5, \{\phi\}\}$, then which of the following is correct ?

A. $\{3, 4\} \subseteq A$

B. $\{\phi\} \subseteq A$

C. $3 \in A$

D. None of these

Answer: D



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3. Let $S = \{x \mid x \text{ is an even prime number}\}$, then $n(S) =$

A. 1

B. 0

C. 2

D. > 1

Answer: A::B::C::D



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4. Let $S_1 = \{x \mid x \text{ is th ratio of circumference and diametr of circle}\}$,
 $S_2 = \{\pi\}$, then which of the following is incorrect ?

A. $S_1 - S_2 = \phi$

B. $S_1 \cup S_2 = S_1$

C. $S_1 = S_2$

D. None of these

Answer: A::B::C::D



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5. Let the sets A and B be defined as

$$A = \left\{ x \mid x + \frac{1}{x} = 2, x \in R \right\} \text{ and } B = \{x \mid x^2 - 4x + 3 = 0, x \in R\}$$

then which of the following is incorrect ?

A. $n(A) = 1$

B. $n(A) = 2$

C. $A \subseteq B$

D. $B \subseteq A$

Answer: C



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6. Let the sets A and B be defined as

$A = \{x \mid x + \frac{1}{x} = 1, x \in \mathbb{R}\}$ and $B = \{x \mid x \text{ is a real number}\}$ then which of the following is correct ?

A. $n(A) = 1$

B. $A \cap B = \phi$

C. $A \in B$

D. $A \cap B = B$

Answer: B



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7. Which of the following is null set ?

A. $\{x \mid x \in R \text{ and } x^2 - 3x + 2 = 0\}$

B. $\{c \mid x \in Q \text{ and } x \text{ has non-terminating non-repeating decimal representation}\}$

C. $\{c \mid c \leq 1 \text{ and } x \in N\}$

D. $\{x \mid x \text{ is an even prime number}\}$

Answer: B



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8. Which of the following is NOT an infinite set ?

- A. set of rational numbers between any two numbers on number line
- B. set of irrational numbers between any two numbers on number line
- C. set of rational numbers between $0.\bar{9}$ and 1.
- D. None of these

Answer: C



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9. If $A = \{1, 2, 3\}$, then the number of subsets of A is

- A. 3
- B. 6
- C. 8
- D. 9

Answer: C



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10. Let $A = \{a, e, I, o, u\}$ and $B = \{a, i\}$, then $A \cup B$ is

A. $A - B$

B. B

C. $A \cap B$

D. A

Answer: D



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11. Which of the following is an empty set ?

A. $\left\{ x \mid x \text{ is a real number and } \frac{1}{x} = 0 \right\}$

B. $\{x \mid x \text{ is a real number and } x^2 = \pi\}$

C. $\{x \mid x \text{ is an integer and } x^2 = 4x - 3\}$

D. None of these

Answer: A::B::C::D



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12. Two finite sets A and B have m and n elements, respectively. If total number of subsets of first set is 2^n more than the total number of subsets of second set, then $m - n$ is

A. 0

B. 1

C. 2

D. any natural number

Answer: B

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13. Let $A = \{x \mid x \text{ is a multiple of } 3\}$ and $B = \{x \mid x \text{ is multiple of } 7\}$, then $A \cap B$ is

A. $\{3, 6, 9, \dots\}$

B. $\{7, 14, 21, \dots\}$

C. $\{21, 42, 63, \dots\}$

D. None of these

Answer: C

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14.

Let

$$A = \{(x, y) \mid y = x, x \in R\} \text{ and } B = \{(x, y) \mid y = -x, x \in R\}$$

then

A. $A \cap B = A$

B. $A \cap B = B$

C. $A \cap B = \phi$

D. None of these

Answer: D



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15. The number of elements in the set

$\{(x, y) \mid x^2 + y^2 = 25 \text{ and } x, y \in z\}$ is

A. 2

B. 4

C. 6

D. 8

Answer: D

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16. Let A and B be two non-empty sets and A' denote the complement of A , then $A \cap (A \cup B)'$ =

- A. A
- B. ϕ
- C. $A \cap B$
- D. ϕ

Answer: D

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17. Let P and Q be two non-empty sets. Then $P \cap (P \cup Q)$ is

- A. P
- B. Q

C. $P \cup Q$

D. ϕ

Answer: A::B::C::D



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18. In a town of 700 persons, 400 speak Hindi, 200 speak French and 100 speak both Hindi and French. The number of persons who speak only Hindi is

A. 400

B. 300

C. 200

D. 100

Answer: B



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19. In a town of 700 persons, 400 speak Hindi, 200 speak French and 100 speak both Hindi and French. The number of persons who speak either Hindi or French is

A. 500

B. 300

C. 700

D. 600

Answer: A::B::C::D



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Test Yourself Level 3 Multiple Choice Questions Olympiad And Ntse Level Exercises

1. Let N be the set of non-negative integers, I and set of integers, N_P the set of non-positive integers, E the set of even integers and P the set of

prime numbers. Then

A. $I - N = N_P$

B. $N \cap N_P = \phi$

C. $E \cap P = \phi$

D. $N \Delta N_P^P = I - \{0\}$

Answer: D



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2. Let A and B two sets, then $(A \cup B)^c \cup (A^c \cap B)$ equals

A. A^C

B. B^C

C. A

D. None of these

Answer: A::B::C::D



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3. If $A = \{\phi, \{\phi\}\}$, then the power set of A is

A. A

B. $\{\phi, \{\phi\}, A\}$

C. $\{\phi, \{\phi\}, \{\{\phi\}\}, A\}$

D. None of these

Answer: C



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4. In $n(A) = 3, n(B) = 6$ 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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5. If $X = \{8^n - 7n - 1, n \in N\}$ and $Y = \{49n - 49, n \in N\}$, then

A. $X \subset Y$

B. $Y \subset X$

C. $X = Y$

D. $X \cap Y = \phi$

Answer: A::B::C::D



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6. If A, B and C are non-empty sets, then $(A - B) \cup (B - A)$ equals

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

B. $A - (A \cap B)$

C. $(A \cup B) - (A \cap B)$

D. $(A \cap B) \cup (A \cup B)$

Answer: C



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7. If A and B are two given sets, then $A \cap (B \cap B)^C$ is equal to

A. A

B. B

C. ϕ

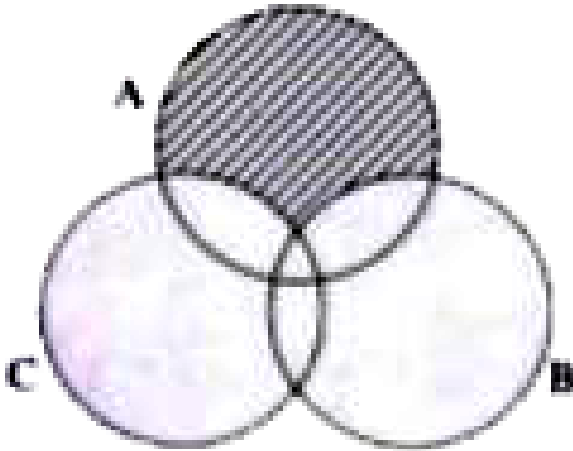
D. $A \cap B^C$

Answer: D



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8. The shaded region in the given figure is



A. $A \cap (B \cup C)$

B. $A \cup (B \cap C)$

C. $A \cap (B - C)$

D. $A - (B \cup C)$

Answer: D

9. Consider the following relations:

1. $A - B = A - (A \cap B)$

2. $A = (A \cap B) \cup (A - B)$

3. $A - (B \cup C) = (A - B) \cup (A - C)$

Which of these is/are correct ?

A. 1 and 3

B. 2 only

C. 2 and 3

D. 1 and 2

Answer: D

10. The number of proper subsets of the set $\{1, 2, 3\}$ is

A. 8

B. 7

C. 6

D. 5

Answer: C



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