*** Choose the right answer from the given options. [1 Marks Each]** **[20]**

1. In an examination 70% students passed both in Mathematics and Physics 85% passed in Mathematics and 80% passed in Physics If 30 students have failed in both the subjects then the total number of students who appeared in the examination is equal to:

(A) 900 (B) 600 (C) 150 (D) 100

**Ans. :**

b. 600

**Solution:**

Student passed in atleast one subject

= n (P ∪ M) = n(P) + n(M) -n (P ∪ M)

= 80 + 85 - 70 = 95

∴ 5% student failed in both the subjects

⇒ 5% of total students = 30

⇒ Total students $= \frac{30\times100}{5} = 600$

2. Choose the correct answers from the given four option:

Let R be set of points inside a rectangle of sides a and b (a, b > 1) with two sides along the positive direction of x-axis and y-axis. Then

(A) R = {(x, y) : 0 ≤ x ≤ a, 0 ≤ y ≤ b}.

(B) R = {(x, y) : 0 ≤ x < a, 0 ≤ y ≤ b}.

(C) R = {(x, y) : 0 ≤ x ≤ a, 0 < y < b}.

(D) R = {(x, y) : 0 < x < a, 0 < y < b}.

**Ans. :**

d. R = {(x, y) : 0 < x < a, 0 < y < b}.

**Solution:**

Since, R be the set of points inside the rectangle.

∴ R = {(x, y) : 0 < x < a, 0 < y < b}.

3. Let S = {2, 4, 6, 8,.....20}. What is the maximum number of subsets does S have?

(A) 10 (B) 20 (C) 512 (D) 1024

**Ans. :**

d. 1024

**Solution:**

Given, S = 2, 4, 6, 8....., 20.

There are a total of 10 elements.

Therefore we have 210 = 1024 subsets.

4. Which of the following has only one subset?

(A) {0,1} (B) {1} (C) {0} (D) {}

**Ans. :**

d. {}

**Solution:**

Empty set is the subset of itself.

5. If Y ∪ {1, 2} = {1, 2, 3, 5, 9}, then:

(A) The smallest set of Y is {3, 5, 9}

(B) The smallest set of Y is {2, 3, 5, 9}

(C) The largest set of Y is {1, 2, 3, 5, 9}

(D) The largest set of Y is {2, 3, 4, 9}

**Ans. :**

a. The smallest set of Y is {3, 5, 9}

c. The largest set of Y is {1, 2, 3, 5, 9}

**Solution:**

Since the set of the right hand side has 5 elements,

∴ smallest set of Y has three elements and largest set of Y has five elements,

∴ smallest set of Y is {3, 5, 9}

and largest set of Y is {1, 2, 3, 4, 9}

6. All the students of a batch opted Psychology, Business, or both. 73% of the students opted Psychology and 62% opted Business. If there are 220 students, how many of them opted for both Psychology and business?

(A) 60 (B) 100 (C) 77 (D) 35

**Ans. :**

c. 77

**Solution:**

By set theory

n(P ∩ B) = n(P) + n(B) − n(P ∪ B)

= 0.73 + 0.62 − 1.00 = 0.35

35% of 220 = 77

7. Find the equivalent set for A − B.

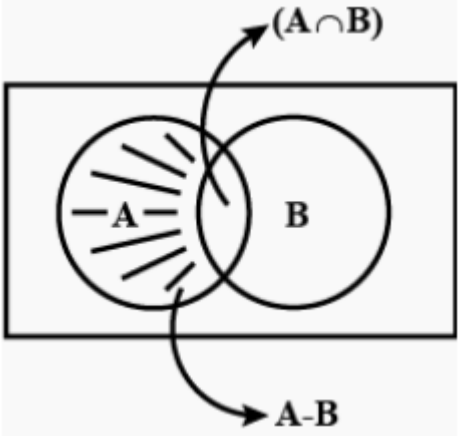
(A) $A \cup (A \cap B)$ (B) $A - B$ (C) $A - (A \cap B)$ (D) $A \cap B$

**Ans. :**

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

**Solution:**

Hence By this graph we see that $A - B = A - (A \cap B)$




8. Choose the correct answers from the given four option:

Let S = set of points inside the square, T = the set of points inside the triangle and C = the set of points inside the circle. If the triangle and circle intersect each other and are contained in

a square. Then

(A) $S \cap T \cap C = \phi$ (B) $S \cup T \cup C = C$ (C) $S \cup T \cup C = S$ (D) $S \cup T = S \cap C$

**Ans. :**

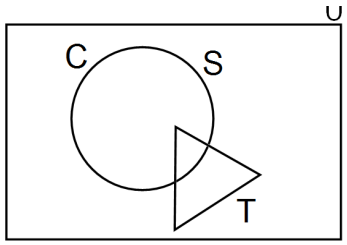
c. $S \cup T \cup C = S$

**Solution:**

The given conditions of the question may be represented by the following Venn diagram.

From the given Venn diagram, we conclude thta

$S \cup T \cup C = S$




Hence, the correct option is (c).

9. For any two sets A and B, $A \cap (A \cup B)'$ is equal to:

(A) $A$ (B) $B$ (C) $\phi$ (D) $A \cap B$.

**Ans. :**

c. $\phi$.

**Solution:**

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

$= A \cap (A' \cup B')$ (De Morgen Law)

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

$= \phi \cap B'$

$= \phi$

Hence, the correct answer is option (c).

10. If A ⊂ B, then A ∩ B is:

(A) $B$ (B) $\frac{A}{B}$ (C) $A$ (D) $\frac{B}{A}$

**Ans. :**

c. $A$

**Solution:**

We are given that A is the subset of B

⇒ Every element of A is an element of B.

Therefore, the intersection elements of sets A and B are A ∩ B = A.

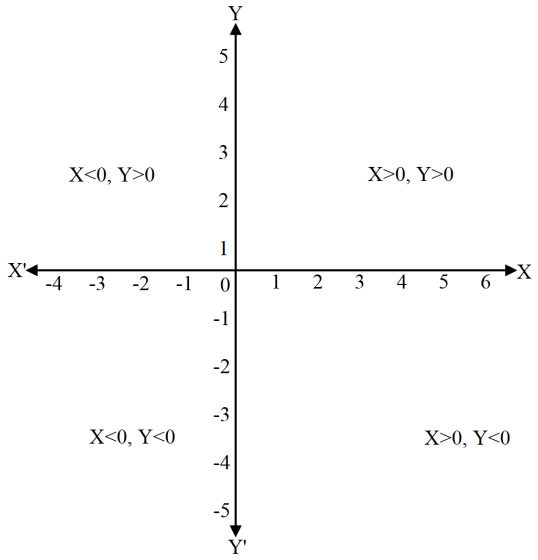
11. In last quadrant?

(A) X < 0, Y > 0 (B) X < 0, Y < 0 (C) X > 0, Y < 0 (D) X > 0, Y > 0

**Ans. :**

d. X > 0, Y > 0

**Solution:**




12. In a community of 175 persons, 40 read the Times, 50 read the Samachar and 100 do not read any. How many persons read both the papers?

(A) 10 (B) 15 (C) 20 (D) 25

**Ans. :**

b. 15

**Solution:**

Since 100 do not read any

n(T ∪ S) = 175 − 100 = 75

y set theory

n(T ∩ S) = n(T) + n(S) − n(T ∪ S)

= 40 + 50 − 75 = 15

13. For any two sets A and $\mathrm{B}$, $\mathrm{A}$ - $\mathrm{B} \cup \mathrm{B} = \mathrm{A} =$

(A) $(\mathrm{A}$ - $\mathrm{B}) \cup \mathrm{A}$ (B) $(\mathrm{B}$ - $\mathrm{A}) \cup \mathrm{B}$

(C) $(\mathrm{A} \cup \mathrm{B}) - (\mathrm{A} \cap \mathrm{B})$ (D) $(\mathrm{A} \cup \mathrm{B}) \cap (\mathrm{A} \cap \mathrm{B})$.

**Ans. :**

c. $(\mathrm{A} \cup \mathrm{B}) - (\mathrm{A} \cap \mathrm{B})$.

**Solution:**

$(\mathrm{A} - \mathrm{B}) \cup (\mathrm{B} - \mathrm{A}) = (\mathrm{A} \cap \mathrm{B}') \cup (\mathrm{B} \cap \mathrm{A}')$

$= [\mathrm{A} \cup (\mathrm{B} \cup \mathrm{A}')] \cap [\mathrm{B}' \cup (\mathrm{B} \cap \mathrm{A}')]$ [Using distribution law]

$= [(\mathrm{A} \cup \mathrm{B}) \cap (\mathrm{A} \cup \mathrm{A}')] \cap [(\mathrm{B}' \cup \mathrm{B}) \cap (\mathrm{B}' \cup \mathrm{A}')]$ [Using distribution law]

$= [(\mathrm{A} \cup \mathrm{B}) \cup (\mathrm{U})] \cap [(\mathrm{U}) \cap (\mathrm{B}' \cup \mathrm{A}')]$ [$\mathrm{A} \cup \mathrm{A}' = \mathrm{U} = \mathrm{B}' \cup \mathrm{B}$]

$= [\mathrm{A} \cup \mathrm{B}] \cap [\mathrm{B}' \cup \mathrm{A}']$ $\left[\begin{array}{c}(\mathrm{A} \cup \mathrm{B}) \cap (\mathrm{U}) = (\mathrm{A} \cup \mathrm{B}) \\ \text{and } (\mathrm{U}) \cap (\mathrm{B}' \cup \mathrm{A})' = (\mathrm{B}' \cup \mathrm{A}')\end{array}\right]$

$= [\mathrm{A} \cup \mathrm{B}] \cap [(\mathrm{A} \cap \mathrm{B})']$ $[(\mathrm{A} \cap \mathrm{B})' = \mathrm{B}' \cup \mathrm{A}']$

$= [\mathrm{A} \cup \mathrm{B}] \cap [(\mathrm{A} \cup \mathrm{B}) - (\mathrm{A} \cap \mathrm{B})]$

$= [(\mathrm{A} \cup \mathrm{B}) - (\mathrm{A} \cap \mathrm{B})]$.

14. If A = {1, 2, 3, 4, 5, 6}, B = {2, 4, 6, 8}, then A - B will be:

(A) {1, 3, 5, 8} (B) {1, 3, 5}

(C) {1, 2, 3, 4, 5, 6, 8} (D) = {}

**Ans. :**

b. {1, 3, 5}

**Solution:**

Given, A = {1, 2, 3, 4, 5, 6} and B = {2, 4, 6, 8}

A - B means A contains the element which is not present in B.

Thus, A − B = {1, 3, 5}

15. The symmetric difference of A and B is not equal to:

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

(C) $(A \cup B) - (B \cap A)$ (D) $\{(A \cup B) - A\} \cup \{(A \cup B) - B\}$.

**Ans. :**

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

**Solution:**

The symmetric difference of A and B is given by:-

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

16. If A = {x, y} then the power set of A is:

(A) {xx, yy} (B) {f, x, y}

(C) {f, {x},{2y}} (D) {f, {x},{y},{x, y}}

**Ans. :**

d. {f, {x},{y},{x, y}}

17. The sets Sx are defined to be (x, x + 1, x + 2, x + 3, x + 4) where x = 1, 2, 3,.....80. How many of these sets contain 6 or its multiple?

(A) 65 (B) 66 (C) 59 (D) 60

**Ans. :**

b. 66

**Solution:**

Since 5 consecutive no.s are chosen only one set in 6 consecutive sets will not have a multiple of 6. So till 78 sets there are

$78 - \frac{78}{6} = 78 - 13 = 65$ sets containing 6 or multiples of 6.

$S_{79}$ does not contain any multiple of 6

Hence $S_{80}$ must contain a multiple of 6.

Answer = 66 sets

18. In an examination, 34% of the candidates fail in Arithmetic and 42% in English.If 20% fail in Arithmetic and English, the percentage of those passing in both subjects is:

(A) 44 (B) 45 (C) 46 (D) 47

**Ans. :**

a. 44

**Solution:**

n(A) = 34

n(B) = 42

n(A∩B) = 20

n(A∪B) = n(A) + n(B) − n(A∩B) = 34 + 42 − 20 = 56

$n(A \cup B)' = 100 - n(A \cup B) = 100 - 56 = 44$

19. n a class of 55 students, the number of students studying different subjects are 23 in Mathematics and 24 in Physics, 19 in Chemistry, 12 in Mathematics and Physics, 9 in

Mathematics and Chemistry, 7 in Physics and Chemistry and 4 in all the three subjects, The number of students who have taken exactly one subject is:

(A) 20 (B) 24 (C) 23 (D) 22

**Ans. :**

d. 22

20. In set-builder method the null set is represented by:

(A) $\{\}$ (B) $\phi$ (C) $\{x : x \neq x\}$ (D) $\{x : x = x\}$.

**Ans. :**

c. $\{x : x \neq x\}$.

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