Q1. Find the elements of the following sets and classify them as equal or equivalent. Tick under the appropriate heading:

Sets	A = B	A ↔ B
A = {x : x is not prime and x = 2n, 0 < n < 6} B = {4, 8, 6, 10}		
A = {vowels in English alphabet} B = {p : p ∈ N, 0 < p ≤ 5}		
A = {5, 7} B = {factors of 35}		

Q2. Write the following sets in roster (tabular) form.

(a) X = {p : p = 6n, n < 4, n ∈ N}

X = _____

(b) Y = {q : q = n^2 – 1, n ≤ 5 and n ∈ W}

Y = _____

(c) P = {r : r = a + $\dfrac{1}{2}$, a ≤ 5 and a ∈ N}

P = _____

Q3. If X and Y are two finite sets such that:

X = {a : a = 6n, a < 24, n ∈ N},

Y = {b : b is a multiple of both 3 and 2, b ≤ 18, b ∈ N},

then state whether the following statements are True or False.

(a) X is equal to Y. _____

(b) X is equivalent to Y. _____

(c) X and Y are disjoint sets. _____

(d) X – Y is a finite set. _____

Q4. If U= {Whole numbers less than 10}, B = {Multiples of 3}, C ={Prime numbers divisible by 2}, fill in the elements of the sets in the table given below:

Set	Elements of the set
U	{_____}
U'	{_____}
B	{3, 6, 9}
B'	{_____}
C	{_____}
C'	{_____}

Based on the above table, state True or False for the following statements:

(a) The set and its complement are always disjoint sets. _____

(b) The complement of a universal set is an empty set. _____

(c) The complement of a set is always an empty set. _____

Q5. Let universal set U = {Letters in the English alphabet}, A = {Vowels in the English alphabet}, B = {x : x is a letter in 'MUMBAI'} and C = {Vowels in the word 'DELHI'}. Find (A ∩ B) and (B ∩ C) and fill in the blanks to prove:

(A ∩ B) ∩ C = A ∩ (B ∩ C)

(A ∩ B) = {_____}; (A ∩ B) ∩ C = {_____}

(B ∩ C) = {_____}; A ∩ (B ∩ C) = {_____}

Q6. If $n(A) = 16$, $n(B) = 10$ and $n(A \cap B) = 7$, find

$n(A - B)$, $n(B - A)$, $n(A \cup B)$

and fill in the blanks to prove each of the following inequalities :

(a) $n(A - B) \neq n(B - A)$

$n(A - B)$= _____

$n(B - A)$= _____

_____ $\neq$ _____

(b) $n(A \cup B) \neq n(A) + n(B)$

$n(A \cup B)$ = _____

$n(A) + n(B)$ = _____

_____ $\neq$ _____

Q7. If U = {Letters in the word *PORTAL*}, A = { Letters in the word *PORT*} and B = { Letters in the word *TALL* }, then fill in the blanks and verify that

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

$(A \cap B) = \{_____\}$; $(A \cap B)' = \{_____\}$

$A' = \{_____\}$; $B' = \{_____\}$; $A' \cup B' = \{_____\}$

Q8. If A={x : x = 2n, n ≤ 5, n ∈ N}, B = {Prime numbers less than 10}, C = {x : x is an even natural number, 3 < x < 10}, then fill in the elements of the following sets:

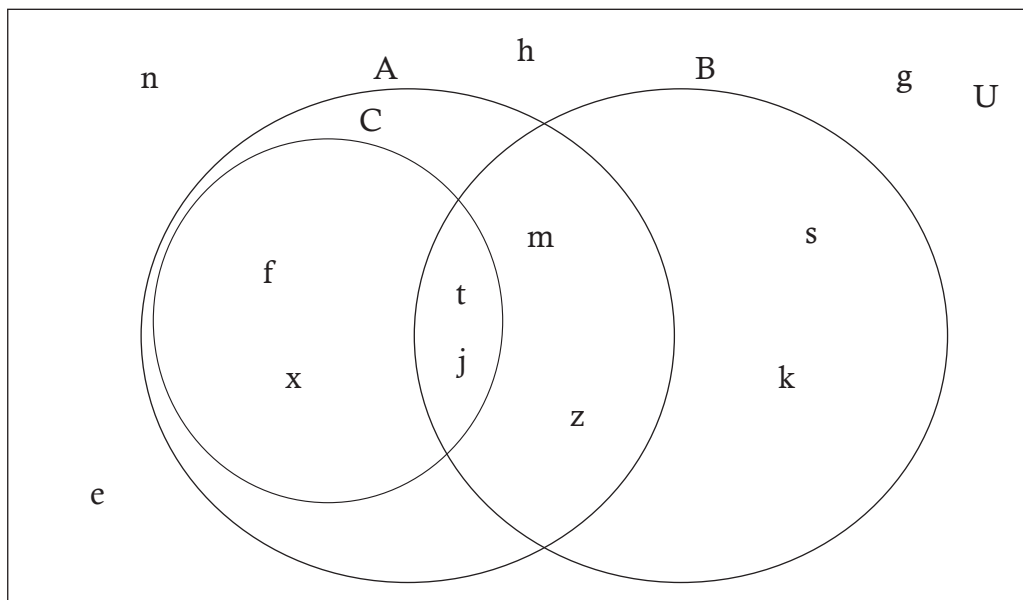$(A \cap B) = \{_____\}$; $(A \cap C) = \{_____\}$; $(A \cap B) \cup (A \cap C) = \{_____\}$

$(B \cup C) = \{_____\}$; $A \cap (B \cup C) = \{_____\}$

Also, determine whether $(A \cup B) \cap (A \cup C) = A \cup (B \cap C)$ or not, and tick Yes or No.

$(A \cap B) \cup (A \cap C) = A \cap (B \cup C)$: (Yes/No)

Q9. From the given Venn diagram, list the following sets:

(a) A − B = {_____}

(b) (A ∪ C)' = {_____}

(c) (B ∩ C) = {_____}

Q10. **50 students of a class learnt music and dance or both in their hobby classes during the summer vacations. 32 students took music classes and 15 students took both music and dance classes. Draw Venn diagram to find:**

(a) How many students took only dance classes?

Answer: _____

(b) How many students took music classes but not dance classes?

Answer: _____

(c) How many took either music or dance classes but not both?

Answer: _____

Answers

1.

Sets	A = B	A ↔ B
A = {x : x is not prime and x = 2n, 0 < n < 6} B = {4, 8, 6, 10}	☒	☒
A = {vowels in English alphabet} B = {p : p∈ N, 0 < p ≤ 5}	☒	☒
A = {5, 7} B = {factors of 35}	☒	☒

2. a. X = {6, 12, 18}; b. Y = {−1, 0, 3, 8, 15, 24}; c. P = { }

3. a. True; b. True; c. False; d. True

4.

Set	Elements of the set
U	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
U'	{ }
B	{3, 6, 9}
B'	{0, 1, 2, 4, 5, 7, 8}
C	{2}
C'	{0, 1, 3, 4, 5, 6, 7, 8, 9}

(a) True, b. True, c. False

5. $(A \cap B)$ = { U, A, I}; $(A \cap B) \cap C$ = {I}

$(B \cap C)$ = {I}; $A \cap (B \cap C)$ = {I}

6. a. $n (A - B)$ = 9; $n (B - A)$ = 3; 9 ≠ 3

b. $n (A \cup B)$ = 19; $n (A) + n (B)$ = 26; 19 ≠ 26

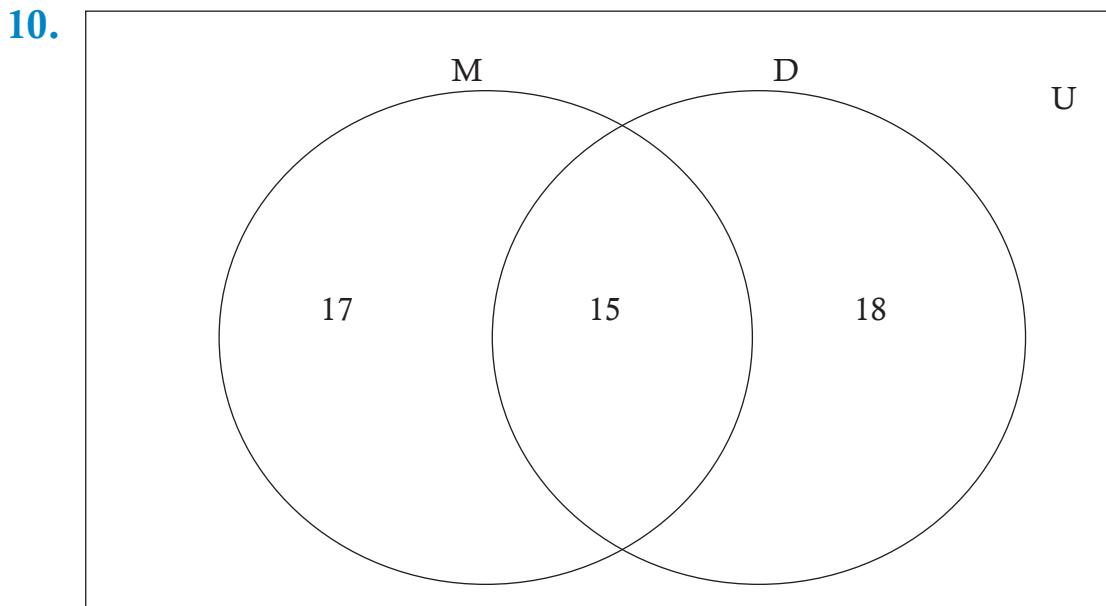**7.** $(A \cap B)$ = {T}; $(A \cap B)'$ = {P, O, R, A, L}; A' = {A, L}; B' = {P, O, R};

$A' \cup B'$ = {P, O, R, A, L}

8. $(A \cap B)$ = {2}; $(A \cap C)$= {4, 6, 8}; $(A \cap B) \cup (A \cap C)$ = {2, 4, 6, 8}

$(B \cup C)$ = {2, 3, 4, 5, 6, 7, 8}; $A \cap (B \cup C)$ = {2, 4, 6, 8}

$(A \cap B) \cup (A \cap C) = A \cap (B \cup C)$: Yes

9. a. {f, x};

b. {s, k, g, h, n, e};

c. {t, j}

10.

a. 18 students; b. 17 students; c. 35 students