1 OPERATIONS ON SETS

Q1. Find the cardinal number of the following sets and classify them as empty, singleton or finite. Tick (✓) or cross (✗) under appropriate headings:

Set	Cardinal Number	Empty Set	Singleton Set	Finite Set
A = {p : p is a vowel in the word *BETTER*}				
K = {x : x ∈ N and x < 5}				
D = {y : y ∈ N and y < $\frac{1}{2}$}				
F = {1, 2, 3, 5, 7, 9}				

Q2. Write the following sets in set builder (rule method) form.

a. A = {5, 10, 15, 20, 25}

A = _____

b. B = {B, U, T, E, R}

B = _____

c. C = {1, 4, 9, 16, 25, 36}

C = _____

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

X = {positive even number less than 10},

Y = {p : p = 2n, n ∈ W, 2n < 10}

then find the elements of X and Y and 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 finite sets. _____

d. X and Y are overlapping sets. _____

e. X – Y is an empty set. _____

Q4. If U = {multiples of 3 less than 30}, A = {multiples of 6 divisible by 9}, then find n (A), n (A′), n (U) and verify n (A) + n (A′) = n (U):

n (A) = _____; n (A′) = _____; n (U) = _____

Verification: _____ + _____ = _____

Q5. Let universal set U = {x : x is a multiple of 2 less than 14}, A = {natural number less than 4}, B = {x : 2 < x < 10} and C = {factors of 5}, find

a. $A \cup B$ = {_____}

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

c. $(A \cup B)'$ = {_____}

Q6. If n (A) = 20, n (B) = 13 and n (A ∩ B) = 10, find

a. n (A ∪ B) = _____

b. n (B – A) = _____

c. n (only B) = _____

Q7. If U = {Whole numbers less than 10}, A = {Odd numbers less than 10} and B = {Prime numbers less than 10}, then fill in the blanks and verify that

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

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

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

Q8. If A={x : x < 10, x ∈ N}, B = {whole numbers less than 5}, C = {2, 4, 6, 8, 10}, then fill in the elements of the following sets:

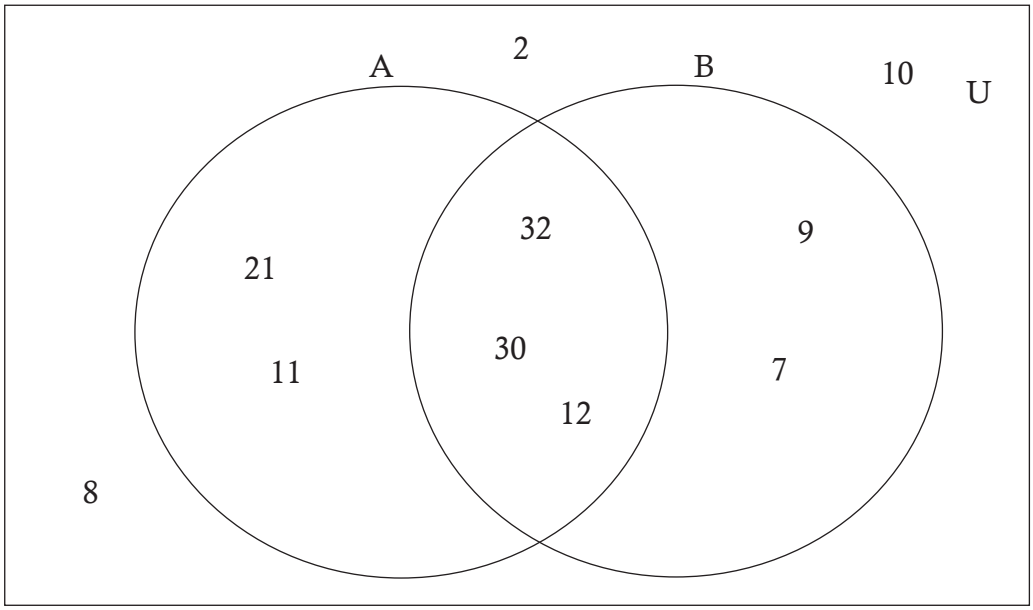
$(A \cup B)$ = {_____}; $(A \cup C)$ = {_____}; $(A \cup B) \cap (A \cup C)$ = {_____}

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

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

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

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



a. $(A \cup B)'$ = {_____}

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

c. $A - B$ = {_____}

Q10. In an organization there are 80 employees who can drive a scooter or a car or both. Out of these, 40 can drive a scooter and 45 can drive a car. Draw a Venn diagram to find:

a. How many people can drive both car as well as scooter?

Answer: _____

b. How many people can drive scooter only?

Answer: _____

c. How many people can drive car only?

Answer: _____

Answers

1.

Set	Cardinal Number	Empty Set	Singleton Set	Finite Set
A = {p : p is a vowel in the word *BETTER*}	1	✗	✓	✓
K = {x : x ∈ N and x < 5}	4	✗	✗	✓
D = {y : y ∈ N and $y < \frac{1}{2}$}	0	✓	✗	✓
F = {1, 2, 3, 5, 7, 9}	6	✗	✗	✓

2. a. A = {x : x = 5n, 0 < n, n ∈ W };

b. B = { x : x is a letter in the word BUTTER};

c. C = { x : x = n^2, $n \leq 6$, n ∈ N }

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

4. n (A) = 1 ; n (A′) = 8; n (U) = 9; Verification:1 + 8 = 9

5. a. {2, 4, 6, 8}; b. {4, 6, 8}; c. {10, 12}

6. a. 23; b. 3; c. 3

7. (A ∪ B) = {1, 2, 3, 5, 7, 9}; (A ∪ B)′ = {0, 4, 6, 8}; A′ = {0, 2, 4, 6, 8}; B′ = {0, 1, 4, 6, 8, 9}; A′ ∩ B′ = {0, 4, 6, 8}

8. (A ∪ B) = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9};

(A ∪ C) = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};

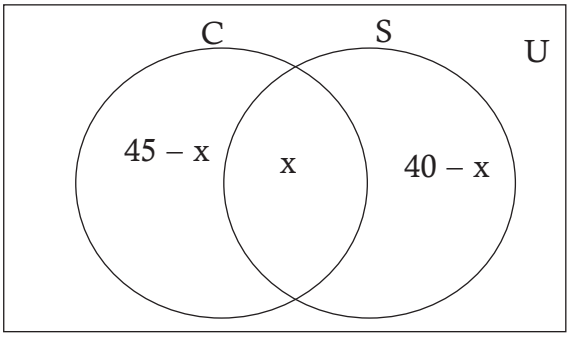
(A ∪ B) ∩ (A ∪ C) = {1, 2, 3, 4, 5, 6, 7, 8, 9}

(B ∩ C) = {2, 4}; A ∪ (B ∩ C) = {1, 2, 3, 4, 5, 6, 7, 8, 9}

Yes

9. a. {2, 10, 8}; b. {2, 8, 10, 21, 11, 9, 7}; c. {21, 11}

10.



a. 5 people; b. 35 people; c. 40 people