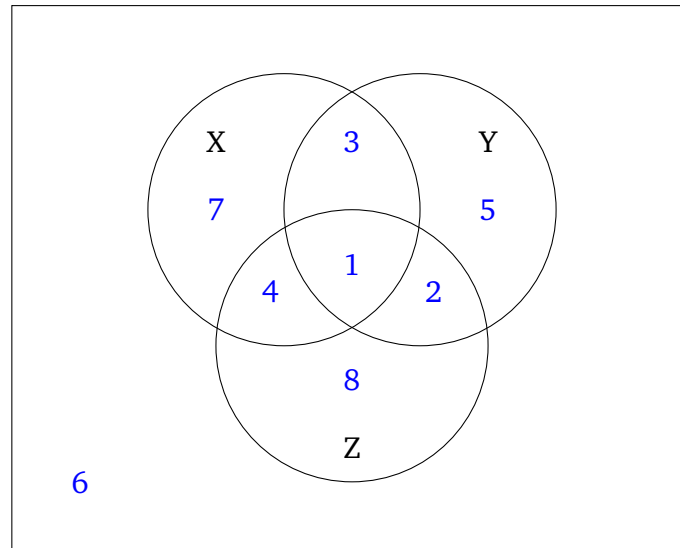


SET APPS HOMEWORK

TEXT: 1.4, 1.5

LAST NAME	FIRST NAME	DATE
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This diagram shows the cardinality of each of the eight mutually disjoint subsets of the universe.



Find the following cardinalities.

- $|X \cap Z|$
- $|Y \cup Z|$
- X'
- $|(X \cup Y)'|$
- $|(X \cap Y) - Z|$
- $|(X - Y) \cap Z|$

Let $A = \{1, 2, 3, 4, 5\}$, $B = \{1, 3, 5\}$, $C = \{4, 6\}$. Find the following cardinalities.

- $|A|$
- $|B|$
- $|A \cup C|$
- $|A \cap C|$
- $|A - B|$
- $|C - C|$

13. If $|G| = 20$, $|H| = 30$, $|G \cap H| = 5$, find $|G \cup H|$.

14. If $|A| = 5$, $|B| = 8$, $|A \cap B| = 4$, find $|A \cup B|$.

Recall that $\mathcal{P}(X)$ is the set of all subsets of X . Find cardinalities of the following sets:

15. $\mathcal{P}(\{10, 20, 30, 40, 50, 60, 70, 80\})$

16. $\mathcal{P}(\emptyset)$

In a class of 70 students, 45 students like to play soccer, 52 students like to play baseball. All the students like to play at least one of the two games.

17. Using the addition formula for unions, find how many students like to play both soccer and baseball.

18. How many students only play soccer?

A trading card game is played with a deck of 32 magical creature cards, where every creature can either breath fire or turn invisible or both. 20 of these creatures can breath fire, and 6 of the creatures have both powers.

19. Using the addition formula for unions, find how many creatures can turn invisible.

20. How many creatures have only one of the two powers?

A survey asked 60 people what alternative transportation modes they use.

30 use the bus

25 walk

10 ride a bicycle and walk

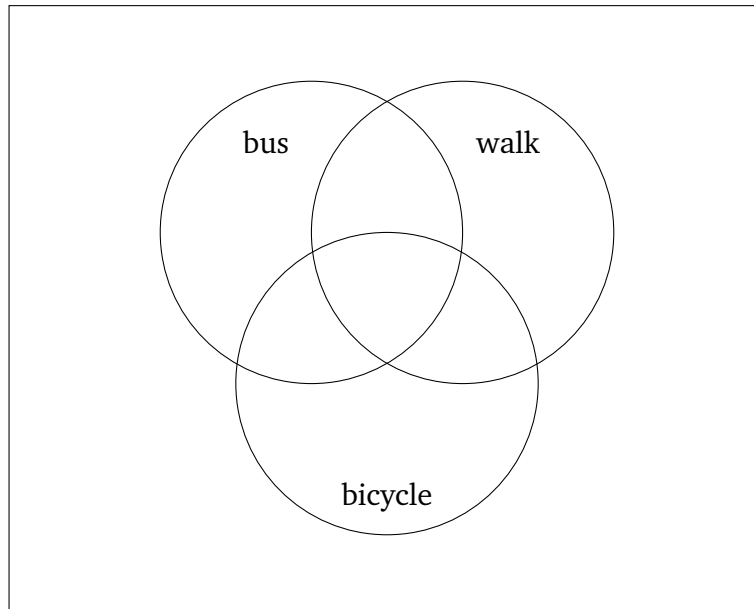
2 use all three

20 ride a bicycle

5 use the bus and ride a bicycle

12 use the bus and walk

21. Complete the Venn diagram by stating the cardinality of each of the eight mutually disjoint subsets of the universe.



22. How many people only use bicycle?

23. How many people walk or use bus or both?

24. How many people walk and use a bicycle, but not the bus?

25. How many people use neither of the alternative transportation modes?

26. How many people do not use the bus?

27. How many people use exactly two of the the transportation modes?

A survey asked buyers whether color, size, or brand influenced their choice of cell phone. The results are:

5 only said color

16 only said brand

42 said only color and brand

10 said all three

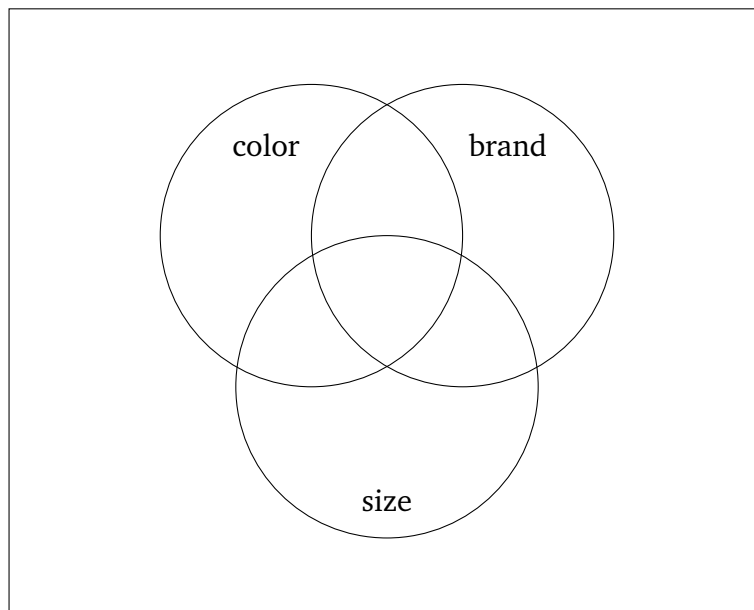
8 only said size

20 said only color and size

53 said only size and brand

20 said none of these

28. Complete the Venn diagram by stating the cardinality of each of the eight mutually disjoint subsets of the universe.



29. How many buyers were influenced by brand?

30. How many buyers were **not** influenced by color?

31. How many people were surveyed?

Definition. A *partition* of a set X is a set P of subsets of X such that

- (a) $\emptyset \notin P$,
- (b) for any two distinct elements A and B of P , if $A \neq B$ then $A \cap B = \emptyset$,
- (c) the union of all elements of P is X .

32. Create all possible partitions of integers $\mathbb{Z}$ using combinations of given sets as partition elements:

- $S = \{x \mid x \in \mathbb{Z} \text{ and } x \geq 7\}$
- E : even numbers
- A : integers whose rightmost digit is not a zero
- $\mathbb{Z}^+$: positive integers
- L : integers which are 6 or smaller
- P : prime numbers
- D : odd numbers
- $\{7\}$
- T : integer multiples of 10
- $\mathbb{Z}^-$: negative integers
- $\mathbb{Z}$
- G : integers which are higher than 7
- $\{0\}$
- N : non-negative integers

33. Find the cardinality of the set of all partitions of $\{1, 2, 3\}$.

34. Find the cardinality of the set of all partitions of $\{a, b, c, d\}$.

ANSWERS

1. 5

3. 21

5. 3

7. 5

9. 6

11. 2

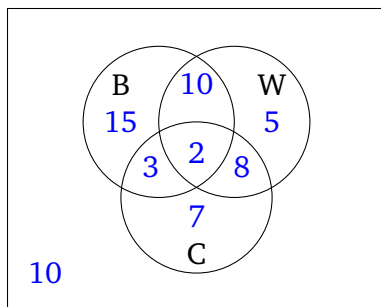
13. 45

15. 256

17. 27

19. 18

21. Let B , W , and C be the sets of people who use bus, walk, and cycle respectively.



23. 43

25. 10

27. 21

29. 121

31. 174

33. 5