Chapter 2 Exercises

Determine whether each statement is true or false. If the statement is false, explain why.

1. $\{3\} \in \{1, 2, 3, 4, 5, 6\}$

2. $1 \in \{x \mid x \text{ is an integer}\}$

3. $\{3\} \subseteq \{1, 2, 3, 4, 5, 6\}$

4. $\{1\} \not\subset \{x \mid x \text{ is an integer}\}$

5. Let $A = \{\text{red, yellow, blue}\}$. Then $|A| = 3$.

6. Let $B = \{-2\}$. Then $|B| = 2$.

7. $|\varnothing| = 1$

8. $|\{\varnothing\}| = 1$

Write each set as indicated.

9. Let the set A consist of the even counting numbers less than 14. Write A using roster notation.

10. Use roster notation to write the set B that consists of the seasons of the year.

11. Use set-builder notation to write the set C that consists of the set of real numbers between 100 and 1000.

12. Use set-builder notation to write the set D that consists of the months of the year that have 30 days.

Use the given sets to solve each problem.

A = {Felix, Amber}

B = {moral, social, civil}

13. Find $|A|$ and $|B|$.

14. List all the subsets of A and subsets of B.

15. List all the proper subsets of A.

16. Is $A = B$? Why or why not?

17. Is $A \sim B$? Why or why not?

Use the given sets to solve each problem.

G = {I, II, III}

F = {love, joy, peace}

18. Find $|G|$ and $|F|$.

19. List all the subsets of G and subsets of F.

20. List all the proper subsets of F.

21. Is $G = F$? Why or why not?

22. Is $G \sim F$? Why or why not?

Determine the number of proper subsets of each set.

23. $\{\alpha, \beta, \chi, \delta, \varepsilon, \phi, \mu, \pi\}$

24. $\varnothing$

Draw a Venn diagram to illustrate each group of sets. A universal set is not given, so choose one that fits and define it.

25. Parents and their children

26. Sculptors and Artists

27. Cats and Dogs

28. $A = \{x \mid x \in \mathbb{R}\}$ and $B = \{x \mid x \text{ is an integer}\}$

Use the given sets to write each set in roster notation.

U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

A = {1, 2, 3, 4, 5}

B = {1, 3, 5, 7}

29. $A \cap B$

30. $A \cup B$

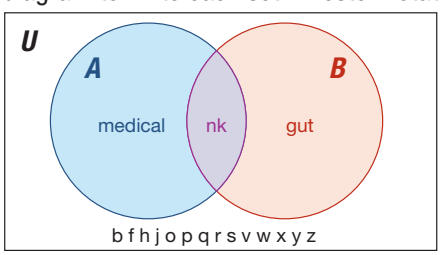
31. $A' \cap B$

32. $A' \cup B'$

33. $|A \cap B|$

34. $\left|(A \cup B)'\right|$

Use the given Venn diagram to write each set in roster notation.



35. A

36. B

37. $A \cap B$

38. $A \cup B$

39. $(A \cup B)'$

40. $(A \cap B)'$

41. U

42. $|A \cup B|$

43. $|A \cap B|$

44. $|(A \cup B)'|$

Solve each problem.

45. A school gym teacher is trying to determine what sports students enjoy the most. She collected information on 250 students and found that 150 like volleyball, 110 like soccer, and 65 students like both.

a. Draw a Venn diagram to represent the findings of the teacher.

b. How many students like only volleyball?

c. How many students like only soccer?

d. How many students like neither soccer nor volleyball?

46. A camp counselor is planning activities for the summer and wants to know what campers would enjoy. He asks 650 campers and finds that 457 enjoy swimming, 250 enjoy tennis, 223 enjoy jogging. He finds that 176 enjoy swimming and tennis, 75 enjoy swimming and jogging, 105 enjoy tennis and jogging, and 45 enjoy all three.

a. Draw a Venn diagram to represent the survey results.

b. How many campers enjoy only swimming?

c. How many campers enjoy only tennis?

d. How many campers enjoy only jogging?

e. How many campers enjoy only swimming and tennis?

f. How many campers enjoy only tennis and jogging?

g. How many campers enjoy only swimming and jogging?

h. How many campers enjoy none of the three?

47. A study found that 25% of a certain population has blue eyes, 20% of the population has blonde hair, and 12% of the population has blonde hair and blue eyes. Estimate the percentage of the population that has blue eyes or blonde hair?