

# Venn Diagrams and Subsets

## Contemporary Math (MAT-130)

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Decide whether  $\subset$ ,  $\subseteq$ , both or  $\not\subseteq$  can be placed in each blank to make the statement true.

1.  $\{a, b, c\} \quad \square \quad \{a, c\}$
2.  $\{a, c\} \quad \square \quad \{a, b, c\}$
3.  $\{0, 1, 3, 5\} \quad \square \quad \{1, 2, 3, 4, 5\}$
4.  $\{1, 2, 3\} \quad \square \quad \{1, 2, 3\}$
5.  $\emptyset \quad \square \quad \{a, 2\}$

Find the number of (a) subsets and (b) proper subsets for each set.

6.  $\{1, 2\}$
7.  $\{a, b, c\}$
8.  $\{x|x \text{ is a vowel}\}$
9. The set of odd whole numbers less than 9.
10.  $\emptyset$

Find the complement of each set if  $U = \{1, 2, 3, 4, 5, 6\}$ .

11.  $\{1, 2, 3\}$
12.  $\{2, 4, 6\}$
13.  $\{2, 5\}$
14.  $U$
15.  $\emptyset$

Tell whether each statement is true or false.

Let  $U = \{a, b, c, d, e, f\}$   $A = \{a, b, c\}$   $B = \{a, b, c, d, f\}$   $C = \{e, f, g\}$   $D = \{f\}$

16.  $A \subset B$
17.  $A \subseteq C$
18.  $B \not\subseteq U$
19.  $D \not\subseteq A$
20.  $\emptyset \subset D$
21. The complement of D contains all the letters of the alphabet except f.
22. B has exactly 32 subsets.
23. A has exactly 8 proper subsets.

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### **Solutions:**

1.  $\not\subseteq$
2. Both
3.  $\not\subseteq$
4.  $\subseteq$
5. Both
6. (a) 4 (b) 3
7. (a) 8 (b) 7
8. (a) 32 (b) 31
9. (a) 16 (b) 15
10. (a) 1 (b) 0
11. {4, 5, 6}
12. {1, 3, 5}
13. {1, 3, 4, 6}
14.  $\emptyset$
15.  $U$
16. True
17. False
18. False
19. True
20. True
21. False
22. True
23. False