

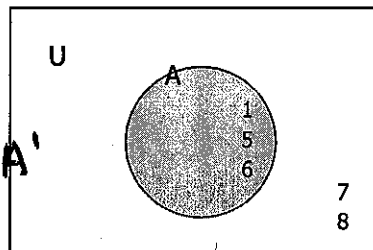
2.3 Notes: Venn Diagrams and Set Operations

Key

3 x 5

A **Venn diagram** shows the relationship among sets. The **universal set**, symbolized by **U**, consists of **all** of the elements under discussion and is represented a region inside a rectangle. Subsets within the universal set are represented by circles.

Use the Venn diagram to determine each set.



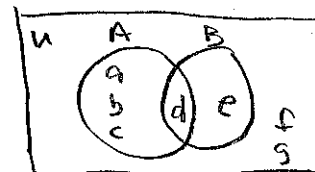
- 1) U 2) A 3) not in A but are in U $\{7, 8\} = A'$

$U = \{1, 5, 6, 7, 8\}$ $A = \{1, 5, 6\}$

The **complement** of a set A, symbolized by **A'**, is the set of all elements that are in the universal set that are **NOT** in A.

Use the Venn diagram FIGURE 2.11 to answer the following.

pg 67

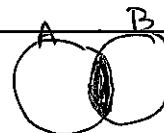


- 4) the set of elements in B but not A $\{e\}$

- 5) the set of elements in U that are not in A $\{e, f, g\}$

6) B' (not in B) = $\{a, b, c, f, g\}$

The **intersection** of sets A and B, written **A ∩ B**, is the set of elements that both sets have in common.

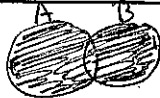


Find the following:

7) $\{1, 3, 5, 7, 10\} \cap \{6, 7, 10, 11\} = \{7, 10\}$ 8) $\{1, 2, 3\} \cap \{4, 5, 6, 7\} = \emptyset$

9) $\{1, 2, 3\} \cap \emptyset = \emptyset$

The **union** of sets A and B, written $A \cup B$, is the set of elements that are in A or B or both.



Find the following:

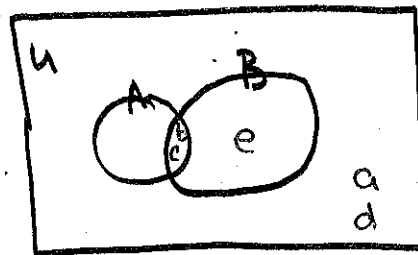
$$10) \{1, 3, 5, 7, 10\} \cup \{6, 7, 10, 11\} = \{1, 3, 5, 6, 7, 10, 11\}$$

$$11) \{1, 2, 3\} \cup \{4, 5, 6, 7\} = \{1, 2, 3, 4, 5, 6, 7\}$$

$$12) \{1, 2, 3\} \cup \emptyset = \{1, 2, 3\}$$

Pairs (draw Venn after 5 min)

$$13-16 \text{ Given } U = \{a, b, c, d, e\} \quad A = \{b, c\} \quad B = \{b, c, e\}$$



$$13) A \cup B' = \{a, b, c, d\}$$

$$\{b, c\} \cup \{a, d\}$$

$$14) A' \cap B' = \{a, d\}$$

$$\{a, d, e\} \cap \{a, d\} = \{a, d\}$$

$$15) (A \cap B)'$$

$$= \{b, c\}' = \{a, d, e\}$$

$$16) (A \cup B)'$$

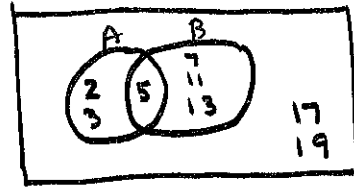
$$= \{b, c, e\}' = \{a, d\}$$

Pairs

17-22 Refer to the Venn diagram FIGURE 2.17:

pg 72 Discuss Regions

$$17) A \cap B = \{5\}$$



$$18) (A \cap B)' = \{5\}' = \{2, 3, 7, 11, 13, 17, 19\}$$

$$19) A \cup B = \{2, 3, 5, 7, 11, 13\}$$

$$20) (A \cup B)' = \{17, 19\}$$

$$21) A' \cup B = \{7, 11, 13, 17, 19\} \cup \{5, 7, 11, 13\} \\ = \{5, 7, 11, 13, 17, 19\}$$

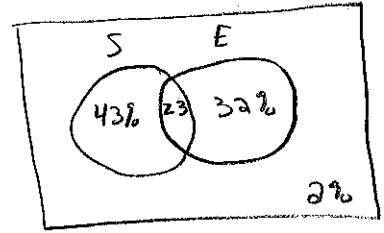
$$22) A \cap B' \\ = \{2, 3, 5\} \cap \{2, 3, 17, 19\} = \{2, 3\}$$

$$23) U \cap B = B = \{5, 7, 11, 13\}$$

When describing collections in English, the word **or** refers to the **union** of the sets.
 The word **and** refers to the **intersection** of the sets.

Refer to the Venn diagram FIGURE 2.18

pg 72



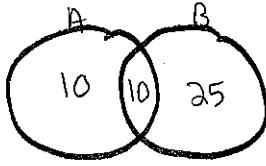
- What Percent of
- 24) How many people speak Spanish **and** English? 23%
- What Percent of
- 25) How many people speak Spanish **or** English? 98%

$$43 + 23 + 32$$

Big White Boards

Ex 8 pg 73

- 26) Set A contains 20 elements, set B contains 35 elements, and 10 elements are common to both sets A and B. How many elements are in $A \cup B$? 45



$$20 + 35 - 10 = 45$$

pg 73

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$= 20 + 35 - 10$$

$$= \boxed{45} \text{ elements}$$

- ① Reader / Explainer / Thinker
- ② Drawer
- ③ Writer
- ④ Presenter

Key

Notes 2.4 Set Operations with 3 Sets

Inside () first

Given: $U = \{a, b, c, d, e, f\}$, $A = \{a, b, c, d\}$, $B = \{a, b, d, f\}$, $C = \{b, c, f\}$

$$1) A \cup (B \cap C) = \{a, b, c, d\} \cup \{b, f\} = \{a, b, c, d, f\}$$

$$2) (A \cup B) \cap (A \cup C) = \{a, b, c, d, f\} \cap \{a, b, c, d, f\} \\ = \{a, b, c, d, f\}$$

$$3) A \cap (B \cup C) = \{a, b, c, d\} \cap \{a, b, d, e, f\} = \{a, b, d\}$$

$$a \ b \ c \ d \ \cap \ (a \ b \ d \ f \ \cup \ a \ d \ e)$$

$$\underline{a} \ \underline{b} \ \underline{c} \ \underline{d} \ \cap \ \underline{a} \ \underline{b} \ \underline{d} \ \underline{e} \ \underline{f} \\ \{a, b, d\}$$

$$4) (A' \cap B) \cup (C' \cap B')$$

$$(e \ f \ \cap \ a \ b \ d \ f) \cup (a \ d \ e \ \cap \ c \ e)$$

$$\{f\} \cup \{e\}$$

$$\{e, f\}$$

$$5) A' \cap (C \cup B')$$

$$(e \ f) \cap (b \ c \ f \ \cup \ c \ e)$$

$$(e \ f) \cap (b \ c \ e \ f)$$

$$\{e, f\}$$

