

Show work!

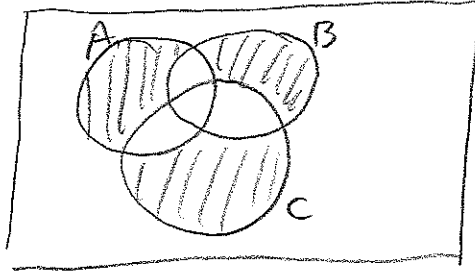
1.  $U = \{x \mid x \text{ is an integer between 1 and 12 inclusive}\}$   
 $A = \{1, 2, \dots, 8\}$ ,  $B$  is the set of even integers in  $U$ , and  $C = \{5, 6, \dots, 12\}$ .

a.  $A' \cup C = \{9, 10, 11, 12\} \cup \{5, 6, \dots, 12\} = \{5, 6, \dots, 12\}$

b.  $B \cap (A' \cup C)' = B \cap A \cap C' = \text{in } B \text{ and in } A \text{ and not in } C$   
 $B \cap \{5-12\}' = \text{Evens in } 1-4$   
 $B \cap \{1-4\} = \{2, 4\}$

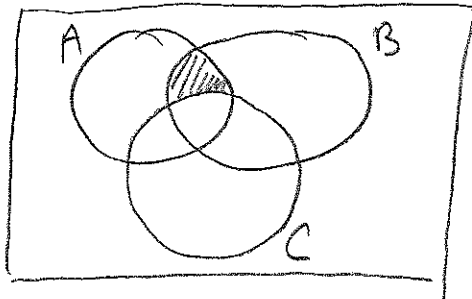
2. In a survey, students were asked if they liked apples, if they liked bananas, and if they liked cherries.

- a. Draw a Venn diagram that could be used to represent the results of the survey, and shade the area that would represent the students who liked only one of the three fruits.



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

- b. What people are represented by the shaded area below. Describe in English, and then in symbols.



$A \cap B \cap C'$   
 Those who like apples and bananas, but not cherries.

8

8

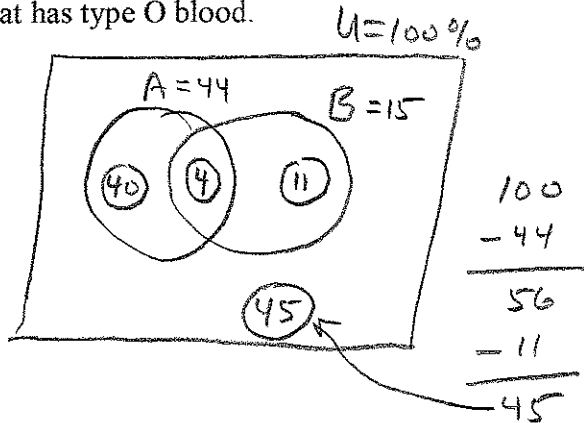
5

8

3. 44% of people have the A-antigen in their blood, 15% have the B-antigen in their blood, and 4% have both. Type O blood has neither. Use a Venn diagram to determine the percentage of the population that has type O blood.

10

45%



4. Show factors and compute:

4

a.  ${}_{10}P_5 = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 = 30,240$

4

b.  ${}_{19}C_4 = \frac{19 \cdot 18 \cdot 17 \cdot 16}{4 \cdot 3 \cdot 2 \cdot 1} = 3,876$

4

c.  ${}_{11}C_3 \times {}_7C_3 = \frac{11 \cdot 10 \cdot 9}{3 \cdot 2 \cdot 1} \times \frac{7 \cdot 6 \cdot 5}{3 \cdot 2 \cdot 1} = 11 \cdot 5 \cdot 3 \times 7 \cdot 3 = 3,465$

5. Two cards are dealt from a standard deck.

- a. How many outcomes are possible?

5

${}_{52}P_2 = \underline{52} \times \underline{51} = 2652$

- b. How many outcomes have the first and the second both spades.

5

${}_{13}P_2 = \underline{13} \times \underline{12} = 156$

- c. How many outcomes have at least one not a spade.

5

$$\begin{array}{r} 2652 \\ - 156 \\ \hline 2496 \end{array}$$

(part(a) - part(b))  
 ${}_{52}P_2 - {}_{13}P_2$

6. A certain model of automobile is available in six exterior colors, three interior colors, and three interior styles. In addition, the transmission can be either manual or automatic, and the engine can have either four or six cylinders. How many different versions of the automobile can be ordered?

(8)

$$\underline{6} \times \underline{3} \times \underline{3} \times \underline{2} \times \underline{2} = 216$$

7. A committee of four is to be selected from a group of 15 people. How many different committees are possible, given the following conditions?

- a. One person is the chair, one is the secretary, one is responsible for cleanup, and the last for refreshments.

(5)

$$\underline{15} \times \underline{14} \times \underline{13} \times \underline{12} = {}_{15}P_4 \quad 32,760$$

- b. One person is the chair, and the rest are general members.

(6)

$$\underline{15} \times \underline{{}_{14}C_3} = \underline{{}_{15}C_1} \times \underline{{}_{14}C_3} \quad \begin{matrix} 5460 \\ \del{6825} \end{matrix}$$

- c. there is no distinction between the responsibilities of the members.

(5)

$${}_{15}C_4 \quad 1,365$$

8. a) How many 5-card hands contain only hearts?

(5)

$${}_{13}C_5 \quad 1287 \quad \Rightarrow \quad {}_{13}P_5 = 15,440$$

- b) How many 5-card hands consist of all cards of the same suit?

(5)

$$\underline{4} \times \underline{{}_{13}C_5} \quad 5148$$

Choose suit      Choose 5 of the 13

$$61,776$$