

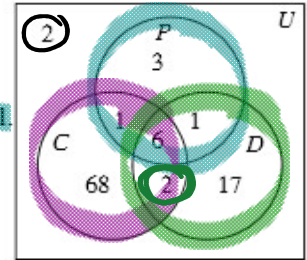
Lesson 4: Venn Diagrams - Part Two

Logical Reasoning and Set Theory Lesson #4: Venn Diagrams - Part Two



The Venn diagram displays the results of a survey of 100 students in a high school regarding movies they watched in the last two weeks.

P represents the number of students who watched Perfect Rebel.
 C represents the number of students who watched Chill.
 D represents the number of students who watched Dazed.

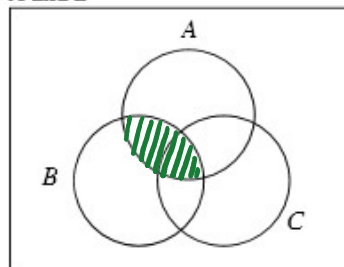


- How many students watched only "Perfect Rebel"? 3
- How many students watched "Perfect Rebel"? $3+1+6+1=11$
- How many students watched "Chill" and "Dazed"? $2+6=8$
- How many students watched "Chill" or "Dazed"? $68+1+6+2+1+17=95$
- How many students watched all three films? 6
- What does the number 2 outside the three circles represent?
 2 students did not watch any of the movies
- What does the number 2 inside the circles represent?
 2 students watched "Chill" and "Dazed" but not "Perfect Rebel"

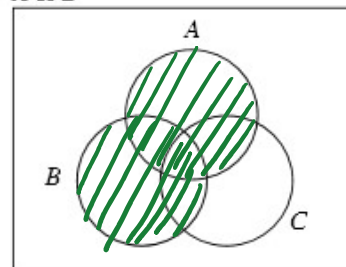


In each of the following Venn diagrams, shade the region indicated.

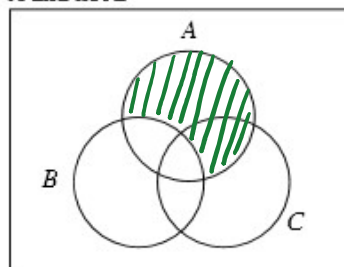
- a) A and B



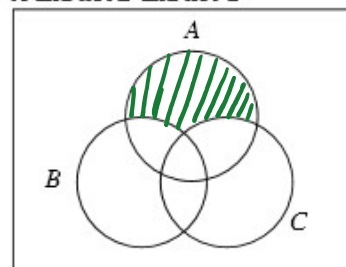
- b) A or B



- c) A and not B



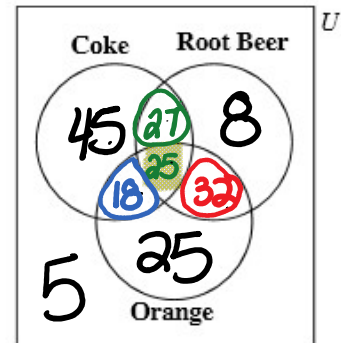
- d) A and not B and not C





In Big Hill High School, 185 Grade 12 students were surveyed to determine which soft drinks they liked to drink.

25 drank all three
 52 drank root beer and coke
 43 drank coke and orange
 57 drank root beer and orange
 92 drank root beer
 115 drank coke
 100 drank orange



Sabine started to organize the results in a Venn diagram, starting from the inside and working outwards. She began by placing the number 25 in the centre of the three circles.

- a) Explain why she placed the number 27 in the region immediately above the 25.

52 students drank root beer and coke
 25 of those drank all 3 pops
 $52 - 25 = 27$ drank RB & C but not O

- b) Use similar reasoning to place numbers in the regions to the left and right of the 25.

C & O but not RB $43 - 25 = 18$
 RB & O but not C $57 - 25 = 32$

- c) Continue the process until numbers have been placed in all the regions inside the circles.

Just RB $92 - 27 - 25 - 32 = 8$
 Just C $115 - 27 - 25 - 18 = 45$
 Just O $100 - 18 - 25 - 32 = 25$

- d) Determine the sum of all the numbers inside the circles. If this sum is not equal to 185, determine the number that must be placed in the region outside the circles.

Sum = 180 $185 - 180 = 5$

- e) Determine how many students

i) drank only coke

ii) did not like to drink any of the three drinks

iii) drank coke or root beer

$45 + 27 + 25 + 18 + 32 + 0 = 155$

Complete Assignment Questions #1 - #9

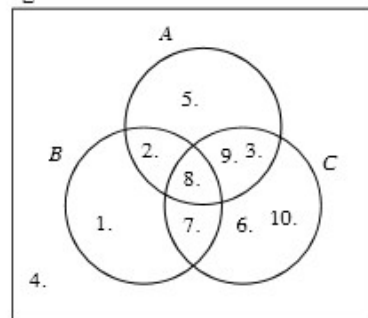
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#1 - 5

Assignment

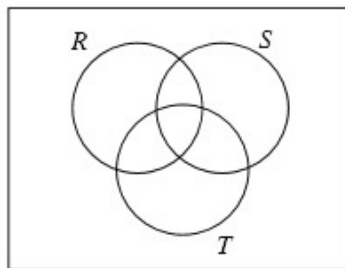
1. Use the Venn diagram to list the elements of the following sets.

- a) A
- b) A and B
- c) A and B and C
- d) B or C
- e) A or B or C
- f) not C
- g) A and not B
- h) C and not A and not B

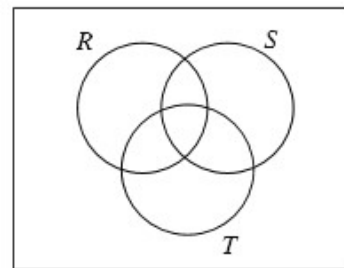


2. In each of the following Venn diagrams, shade the region indicated.

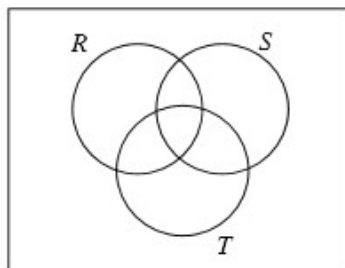
- a) R or T



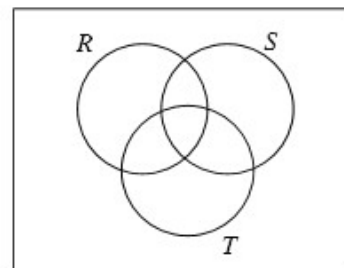
- b) R and not S



- c) R and S and not T



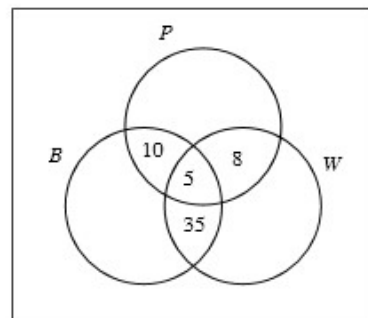
- d) not R and not S and not T



30 Logical Reasoning and Set Theory Lesson #4: Venn Diagrams - Part Two

3. The partially completed Venn diagram displays the results of a fast food survey of 145 teenagers.

- $n(P) = 75$ represents the number of teenagers who liked pizza.
- $n(B) = 60$ represents the number of teenagers who liked burgers.
- $n(W) = 68$ represents the number of teenagers who liked wraps.



- a) Complete the Venn diagram.
 - b) How many teenagers liked
 - i) pizza and burgers and wraps?
 - ii) burgers and not wraps?
 - iii) burgers and pizza?
 - iv) only burgers and pizza?
 - v) burgers or pizza?
 - vi) none of the three types of fast food?
4. To cater for a school party, all of the 115 students involved brought at least one of the following items: sandwiches (S), chips (C), or lemonade (L).
- 5 brought sandwiches, chips, and lemonade
 - 24 brought chips and lemonade
 - 27 brought sandwiches and lemonade
 - 17 brought sandwiches and chips
 - 54 brought sandwiches
 - 70 brought lemonade
- How many students brought only chips?

5. The students from Mr. Hennesey's Grade 12 class were surveyed. 19 students take Math, 10 students take Math and Physics, 14 students take only Chemistry, 12 students take Chemistry and Math, and 3 students take all three subjects. 2 students do not take any of these subjects and all Physics students take Math.

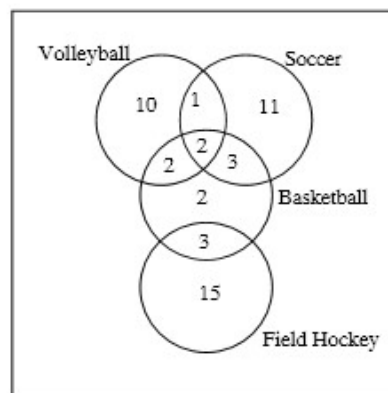
a) Show this information in a Venn diagram.

b) How many students

- i) are there in Mr. Hennesey's homeroom? ii) take only Math?
iii) take Chemistry and not Math? iv) take Chemistry or Physics?

Use the following information to answer questions #6 and #7.

The Venn diagram illustrates the number of girls who played on various school sports teams.



Multiple Choice

6. The number of girls who played soccer and volleyball was
A. 1 B. 3 C. 8 D. 29
7. The number of girls who played on exactly two teams was
A. 6 B. 8 C. 9 D. 11

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Use the following information to answer questions #8 and #9.

Of the 21 teachers in a high school who teach Biology, Chemistry, or Physics, or some combination of these, no one teaches both Biology and Physics. 8 teach Biology, of whom 5 do not also teach Chemistry. 7 teach Physics, and 3 teach both Chemistry and Physics.

**Numerical
Response**

8. The number of teachers who teach Chemistry or Physics is _____.

(Record your answer in the numerical response box from left to right.)

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9. The number of teachers who teach only one of the subjects is _____.

(Record your answer in the numerical response box from left to right.)

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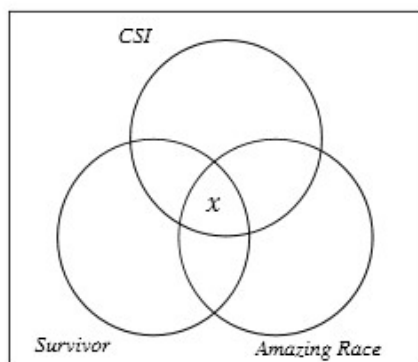
**Group
Work**

150 Grade 12 students were asked which of the following 3 television programs they watch regularly - "CSI", "Survivor", and "Amazing Race".

102 students watched "CSI"
 70 watched "Survivor"
 40 watched "Amazing Race"
 25 students watched both "CSI" and "Survivor"
 27 watched "CSI" and "Amazing Race"
 30 watched "Survivor" and "Amazing Race"
 Every student watched at least 1 program

Let x = the number of students who watch all three programs.

Complete each section of the Venn diagram in terms of x , starting from the inside out.
 Form an equation in x that can be solved to give the number of students who watched all three programs and determine the number of students who watched all three programs.

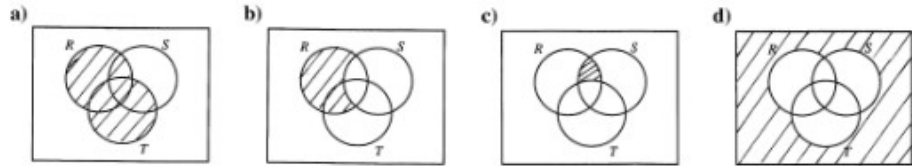


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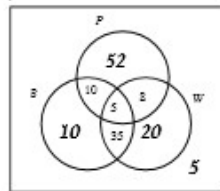
Answer Key

1. a) {2, 3, 5, 8, 9} b) {2, 8} c) {8} d) {1, 2, 3, 6, 7, 8, 9, 10}
 e) {1, 2, 3, 5, 6, 7, 8, 9, 10} f) {1, 2, 4, 5} g) {3, 5, 9} h) {6, 10}

2.



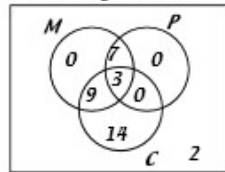
3. a)



- b) i) 5 ii) 20 iii) 15
 iv) 10 v) 120 vi) 5

4. 18

5. a) See diagram below.



- b) i) 35 ii) 0 iii) 14 iv) 33

6. B

7. C

8.

1	6		
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9.

1	5		
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Enrichment Group Work 20 students