Venn diagrams can be used to represent the number of items in each region (rather than the specific items). This is often done to represent the results of a survey.

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Find the number of elements in each set.

1) $A$
2) $B$
3) $A \text{ not } B$
4) $B \text{ not } A$
5) $A \text{ or } B$
6) $A \text{ and } B$
7) neither $A \text{ nor } B$
8) $U$

Example: A group of middle school students was asked to volunteer at an event for 5th grade students. Set $A$ represents the students who agreed to lead tours. Set $B$ represents the students willing to work game booths. The results of the survey are summarized in the Venn diagram below.

a) How many students are willing to lead tours?

b) How many students are willing to work game booths?

c) How many students are willing to lead tours and work game booths?

d) How many students are willing to lead tours or work game booths?

e) How many students are willing to lead tours but not work game booths?

f) How many students do not want to do either task?

g) How many students were surveyed?
A survey of 75 college students was taken to determine where they got their news. 29 students got the news from newspapers, 43 from television, and 7 from both newspapers and television.

Construct a Venn diagram:

How many got the news from only newspapers?

How many got the news from only television?

How many got the news from newspapers or television?

How many did not get the news from either source?
A survey of 90 people was taken to determine whether they have dogs or cats or fish. Of those surveyed, 35 had dogs, 30 had cats, and 15 had fish. Additionally, 18 had both dogs and cats, 7 had both cats and fish, and 4 had both fish and dogs. Finally, 3 owned all three types of pets. Construct a Venn diagram and determine the cardinality of each region. Use the Venn diagram to answer the following questions.

a) How many have only dogs?

b) How many have dogs or cats?

c) How many have dogs or fish but not cats?

d) How many have dogs and cats but not fish?

e) How many have exactly one type of the three pets?

f) How many have exactly two types of the three pets?

g) How many do not have any of the three pets?