Problems for Venn diagram
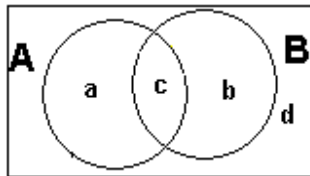
Important Formulas:

n(A U B) = n(A) + n(B) - n(A∩B)

1) In a group of 400 people, 250 can speak Hindi and 200 can speak English. If 50 people cannot speak neither English nor Hindi then,
a) How many people can speak both Hindi and English?
b) How many people can speak only English?
c) How many cannot speak Hindi?

Solution:

Total number of people = 400
=> a + b + c + d = 400 -->(1)

Let A Corresponds to hindi and B corresponds to English

From the above figure people who can speak Hindi = a + c = 250 -->(2)
Similarly, people who can speak English = c + d = 200 -->(3)
People who cannot speak either English or Hindi = d = 50 -->(4)

Sub (4) in (3)
=> c + 50 = 200
=> c = 150 -->(5)

sub (5) in (2)
a + 150 = 250
=> a = 100 -->(6)
Sub all values for a, c and d in (1)
=> 100 + b + 150 + 50 = 400
=> b = 100

Now
(a) How many people can speak both Hindi and English?
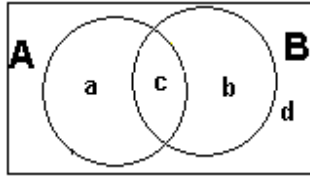Which is nothing but c = 150

b) How many people can speak only English?
Which is nothing but b = 100

(c) How many cannot speak Hindi?
Which is nothing but b + d = 100 + 50 = 150

2) In a group of 70 people, 37 like coffee, 52 like tea and each person likes at least one of the two drinks. How many people only like coffee?

Solution:

Total people are $70 = a + b + c + d$ -->(1)
Let A corresponds to Coffee and B with Tea
37 like coffee => $a + c = 37$ -->(2)
52 like tea => $b + c = 52$ -->(3)
Given that, each person drink at least one of the two drinks
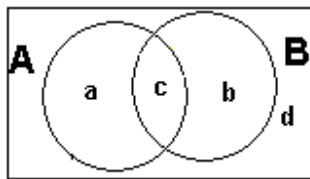=> $d = 0$
=> from (1) $a + b + c = 70$
Now people who like only coffee = a
(1) – (3)
=> $a = 70 – 52 = 18$

3) In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only and not cricket? How many like tennis?

Solution:

Let A corresponds to cricket and B corresponds to Tennis
Total people = 65
Since nothing is mentioned we can assume all the people like atleast one game
$a + b + c = 65$ -->(1)

40 like cricket
=> $a + c = 40$ -->(2)

10 like both cricket and tennis
=> $c = 10$ -->(3)
=> $a = 40 – c = 40 – 10 = 30$ -->(4)

$a + b + c = 65$
=> $30 + b + 10 = 65$
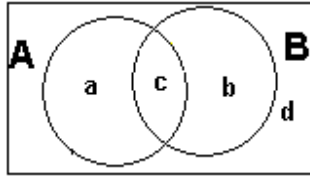=> $b = 25$
a) How many like tennis only and not cricket
Which is nothing but $b = 25$
b) How many like tennis?
Which is $b + c = 25 + 10 = 35$

4) In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?
Solution:

Let A corresponds to French and B corresponds to Spanish

50 speak french.

$\Rightarrow a + c = 50$

20 speak spanish

$\Rightarrow b + c = 20$

10 speak both
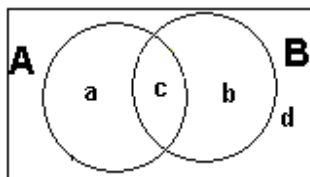$\Rightarrow c = 10$

$\Rightarrow b = 20 - c = 20 - 10 = 10$

$a = 50 - c = 50 - 10 = 40$

How many speak at least one of these two languages?
Which means $a + b + c = 40 + 10 + 10 = 60$

5) Out of 500 car owners investigated, 400 owned car A and 200 owned car B, 50 owned both A and B cars. Is this data correct?

Solution:

Let A be the car A and B be the car B

500 car owners means everyone will have a car
So, d = people who doesnt have a car = 0

400 owned car A = $a + c = 400$
200 owned car B = $b + c = 200$

50 owned both A and B = $c = 50$
$\Rightarrow a = 400 - 50 = 350$

and b = 200 − c = 200 − 50 = 150

Total number of people will be = a + b + c = 350 + 150 + 50 = 550
But it was given that total number of people who own a car are 500

Hence the given data is incorrect

6) In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked product C only.

Solution:
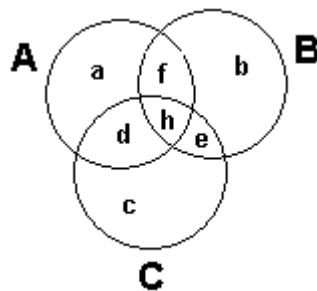
21 people liked product A
=> a + d + f + h = 21 -->(1)

26 liked product B
=> b + f + h + e = 26 -->(2)

29 liked product C
=> c + d + e + h = 29 -->(3)

14 people liked products A and B
=> f + h = 14

12 people liked products C and A
=> d + h = 12

14 people liked products B and C
=> h + e = 14

8 liked all the three products
=> h = 8

=> e = 14 − h = 14 − 8 = 6
and
d = 12 − h = 12 − 8 = 4
and
f = 14 − 8 = 6

How many liked product C only. Which means the value of c
we know,
c + d + e + h = 29

=> c + 4 + 6 + 8 = 29
=> c + 18 = 29
=> c = 11

7) In a legislative body of 200 people, the number of Democrats is 50 less than 4 times the number of Republicans. If one fifth of the legislators are neither Republican nor Democrat, how many of the legislators are Republicans?
(A) 42 (B) 50 (C) 71 (D) 95 (E) 124
Solution:

Let D be the total number of Democrats
and R be the total number of Republicans
and N be the number of people who are neither Republican nor Democrat

So, Total R + D + N = 200

Given that one fifth of the legislators are neither Republican nor Democrat.

=> N = (1/5)*200 = 40
=> R + D + 40 = 200
=> R + D = 160

Also given that the number of Democrats is 50 less than 4 times the number of Republicans
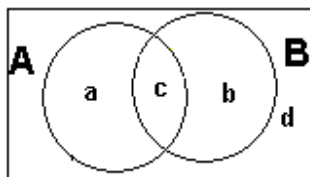=> D = 4R – 50

=> R + 4R – 50 = 160
=> 5R = 210
=> R = 42

Hence 42 members are Republicans

8) In a small town, 16 people own Fords and 11 people own Toyotas. If exactly 15 people own only one of the two types of cars, how many people own both types of cars.
(A) 2 (B) 6 (C) 7 (D) 12 (E) 14
Solution:

Let A corresponds to ford and B corresponds to toyoto

Given that 16 people own Fords and 11 people own Toyotas
a + c = 16 -->(1)
b + c = 11 -->(2)

Now from the above figure total number of people who own exactly one car will be = a + b
=> a + b = 15 -->(3)
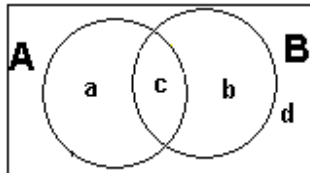add (1) (2) (3)
=> 2(a+b+c) = 16+11+15 = 42
=> (a+b+c) = 21 -->(4)

(4) – (3)
=> c = 21 – 15 = 6
Hence 6 people own both cars

9) A school has a total enrollment of 90 students. There are 30 students taking physics, 25 taking English, and 13 taking both. What percentage of the students are taking either physics or English?
(A) 30% (B) 36% (C) 47% (D) 51% (E) 58%
Solution:

Let A corresponds to Physics and B corresponds to English
30 students taking physics
=> a + c = 30

25 taking English
=> b + c = 25

13 taking both
=> c = 13

=> a = 30 – 13 = 17
and b = 25 – c = 25 – 13 = 12

Total students taking either physics or english = a + b + c = 13 + 17 + 12 = 42

Percentage of the students are taking either physics or English = 42/90*100 = 37%

10) 30% of the members of G are in H,
20% of the members of H are in G.
Col A: Members in G
Col B: Members in H

Solution:
Let G and H be the members in G and H respectively.
30% of the members of G are in H which corresponds to the G and H common part

=> 0.3G

20% of the members of H are in G which corresponds to the same G and H common part

=> 0.2H

=> 0.3G = 0.2H
=> G = 2H/3
Hence G < H
Therefore, Column B will be greater than Column A