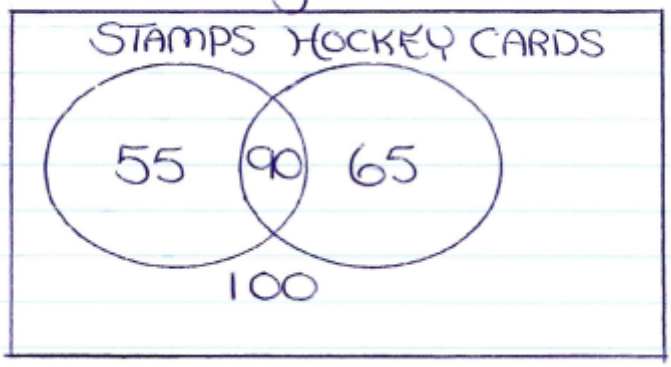
SOLUTIONS ⇒ Venn Diagram Questions

1. 310 people surveyed.
   - 55 collected stamps only.
   - 65 collected hockey cards only.
   - 90 collected both stamps and hockey cards.

   Conclusion: 310 − 55 − 65 − 90
   = 100 people did not collect hockey cards or stamps.

a) Venn Diagram:



b) P(stamps and hockey cards) $= \frac{90}{310}$

$= \frac{9}{31}$

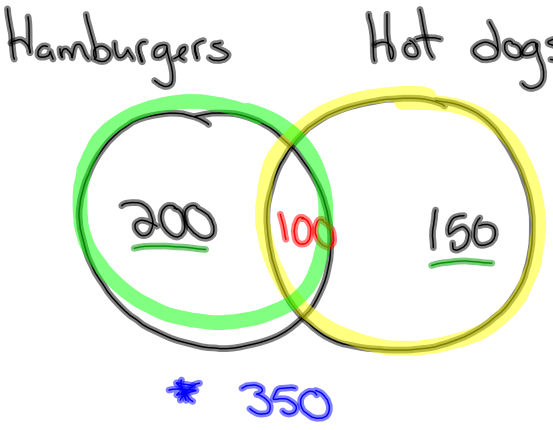
c) P(stamps or hockey cards) $= \frac{145}{310} + \frac{155}{310} - \frac{90}{310}$

$= \frac{300}{310} - \frac{90}{310}$

$= \frac{210}{310}$

$= \frac{21}{31}$

- 800 attended
- 300 ate hamburgers (300 - 100)
- 250 ate hot dogs (250 - 100)
- 100 ate both (Mutually Inclusive)



* 350

* 800 - 200 - 100 - 150

= 350

b) $P(\text{no ham or hd}) = \frac{350}{800} = \frac{7}{16}$

c) $P(\text{hot dog}) = \frac{250}{800} = \frac{5}{16}$

d) $P(\text{hamburger or hot dog}) = P(\text{ham}) + P(\text{hd}) - P(\text{ham and hd})$

$= \frac{300}{800} + \frac{250}{800} - \frac{100}{800}$

$= \frac{450}{800}$

$= \frac{9}{16}$

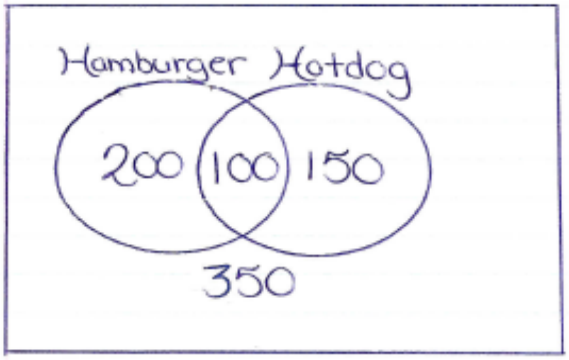
2. 800 total people in attendance.
- 300 people ate a hamburger.
- 250 people ate a hotdog.
- 100 people had both a hamburger and a hotdog.

Conclusions: 300 − 100 = 200 people ate only a hamburger.

250 − 100 = 150 people ate only a hotdog.

800 − 200 − 150 − 100 = 350 did not each either a hamburger or a hotdog.

a) Venn Diagram:



b) $P(\text{no hamburger or hotdog}) = \frac{350}{800}$

$= \frac{7}{16}$

c) $P(\text{hotdog}) = \frac{100}{800} + \frac{150}{800}$

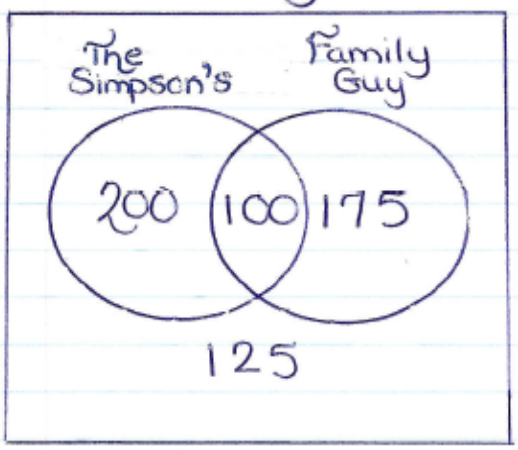
$= \frac{250}{800}$

$= \frac{5}{16}$

3. 600 people surveyed
   - 200 people only watched "The Simpson's"
   - 175 people only watched "Family Guy"
   - 125 people watched neither show.

Conclusion: 600 - 200 - 175 - 125
= 100 people watched both shows.

a) Venn Diagram:



b) $P(\text{Simpson's and Family Guy}) = \frac{100}{600}$

$= \frac{1}{6}$

c) $P(\text{Simpson's or Family Guy}) = \frac{300}{600} + \frac{275}{600} - \frac{100}{600}$

$= \frac{575}{600} - \frac{100}{600}$

$= \frac{475}{600}$

$= \frac{19}{24}$

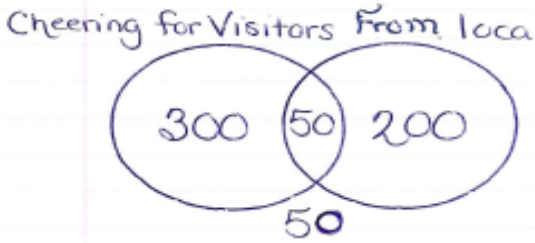
4. 600 fans at a hockey game.
- 250 from the local area.
- 350 people cheering for the visitors.
- 50 fans from the local area are cheering for the visitors.

Conclusions: 350-50=300 people cheering for visitors only

250-50=200 people cheering for local area only.

600-300-200-50=50 fans are not cheering for either side.

a) Venn Diagram:



b)

i) $P(\text{someone from local area}) = \frac{200}{600} + \frac{50}{600}$

$= \frac{250}{600}$

$= \frac{5}{12}$

ii) P(not someone from local area) $= \frac{300}{600} + \frac{50}{600}$

$= \frac{350}{600}$

$= \frac{7}{12}$

iii) P(local area cheering for visitors) $= \frac{50}{600}$

$= \frac{1}{12}$

iv) P(local area or cheering for visitors)

$= \frac{250}{600} + \frac{350}{600} - \frac{50}{600}$

$= \frac{550}{600}$

$= \frac{11}{12}$