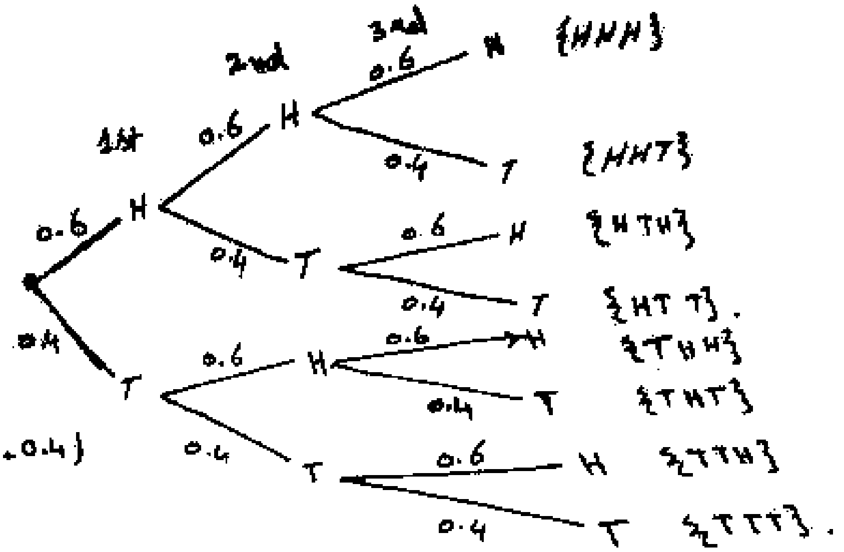
Question 1:-



① $P(HHH) = 0.6 \times 0.6 \times 0.6$
$= 0.216$

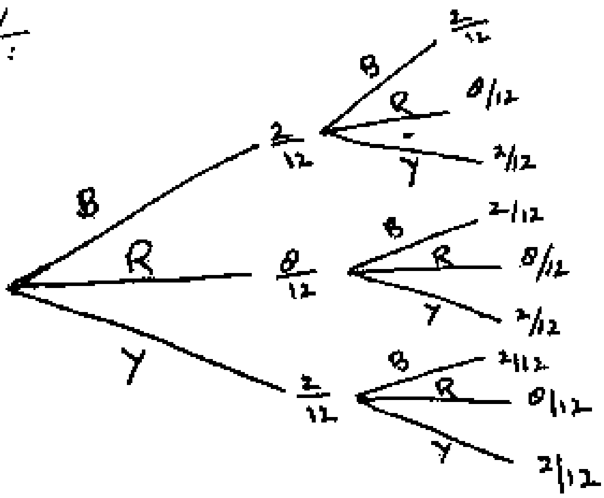
② $P(HHT)$ or $P(HTH)$ or $P(THH)$

$= (0.6^2 \times 0.4) + (0.6^2 \times 0.4) + (0.6^2 \times 0.4)$

$= 0.432$

③ $P(\text{at least } 1\,H) = 1 - P(TTT) = 1 - (0.4)^3 = 0.936$

Question 2:- with Replacement:



① P(getting 2 Red)

$= \frac{8}{12} \times \frac{8}{12} = \frac{64}{144}$

② P(getting 2 blues)

$= \frac{2}{12} \times \frac{2}{12} = \frac{4}{144}$

③ P(getting 2 yellow)

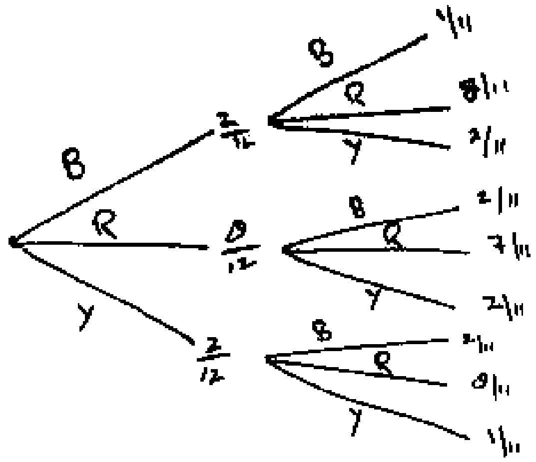
$= \frac{2}{12} \times \frac{2}{12} = \frac{4}{144}$

④ P(getting 2 different colours) $= 1 - \left(\frac{64}{144} + \frac{4}{144} + \frac{4}{144}\right) = \frac{72}{144}$

Questions without Replacement:-

1. P(Getting 2 Reds)

$= \frac{8}{12} \times \frac{7}{11} = \frac{56}{132}$



2. P(Getting 2 blues)

$= \frac{2}{12} \times \frac{1}{11} = \frac{2}{122}$

3. P(Getting 2 yellows) $= \frac{2}{12} \times \frac{1}{11} = \frac{2}{132}$

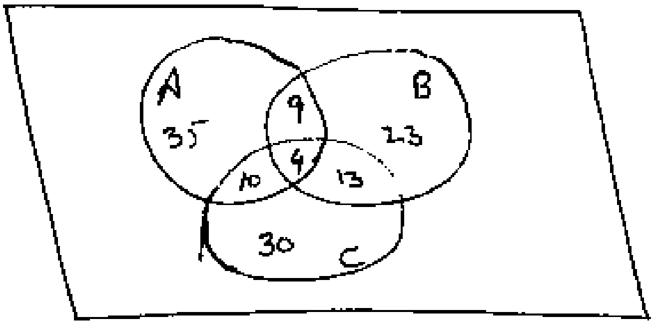
4. P(Getting 2 different colours) $= 1 - P(\text{Same}) = 1 - \left(\frac{2}{132} + \frac{56}{132} + \frac{2}{132}\right) = \frac{6}{11}$.

Question 5:-

N = 150, A, B, C be the three different juices

$A = 58$
$B = 49$
$C = 57$
$A \& C = 14$
$A \& B = 13$
$B \& C = 17$
$A, B \& C = 4$

First way To solve it.



No. of students who drinks none is

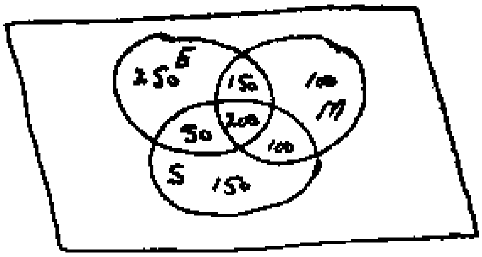
$= 150 - 35 - 10 - 4 - 9 - 30 - 13 - 23 = 26$

Second way to Solve it:-

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|$$
$$= 58 + 49 + 57 - 14 - 13 - 17 + 4 = 124$$

How students drinks non $= |(A \cup B \cup C)^c| = 150 - 124$
$= 26$. Required.

Question 6:-



$|E \cup M \cup S| = 1000$

$|E \cup M \cup S| = |E| + |M| + |S|$
$\quad - |E \cap M| + |E \cap S| - |M \cap S| + |E \cap S \cap M|$

$\Rightarrow \quad 1000 = 650 + 550 + 500 - 350 - 300 - 250 + |E \cap S \cap M|$

$1000 = 800 + |E \cap S \cap M|$

$\Rightarrow |E \cap S \cap M| = 1000 - 800 = 200$

Question 7:-

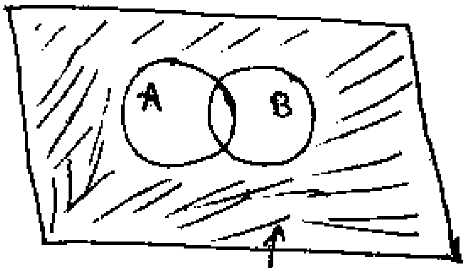
$P(A) = 0.40, \quad P(B) = 0.50, \quad P((A \cup B)^c) = 0.25.$

$P(A \cup B) = 1 - P((A \cup B)^c) = 1 - 0.25 = 0.75$

Since we know that

B = satisfactory
A = on time.

$P(A \cup B) = P(A) + P(B) - P(A \cap B).$



$P((A \cup B)^c)$

$\Rightarrow \quad P(A \cap B) = P(A) + P(B) - P(A \cup B).$

$= 0.40 + 0.50 - 0.75 =$

$P(A \cap B) = 0.90 - 0.75 = 0.15$

Question 8. no of selections. A, A, A, D, V, N, T, G, E.

0 A's , 1 A's, 2 A's , and 3 A's.

$$0 A's = \frac{6\times5\times4\times3\times2}{5\times4\times3\times2\times1} = \binom{6}{5} = 6.$$

$$1 A's = \frac{6\times5\times4\times3}{4\times3\times2\times1} = \binom{6}{4} = 15$$

$$2 A's = \frac{6\times5\times4}{3\times2\times1} = \binom{6}{3} = 20$$

$$3 A's = \frac{6\times5}{2\times1} = \binom{6}{2} = 15$$

So The total no of selections = $6+15+20+15 = 56$.

Question 9.- The number of ways to choose four cards $= \binom{52}{4} = \frac{52!}{48!\times4!} =$

$$= \frac{52\times51\times50\times49}{4\times3\times2\times1} = 270,725.$$

The number of ways choosing two kings from The four King's in the pack as well as the number of ways of chosing two Queen's from the four Queen's in the Pack

$$\binom{4}{2} = \frac{4!}{2!\times2!} = \frac{4\times3}{2\times1} = 6.$$

So the number consisting 2 Kings and 2 Queen's =

$$\binom{4}{2} * \binom{4}{2} = 6 * 6 = 36.$$

Thus the required probability $= \frac{36}{270,725} = 1.33 * 10^{-4}$

Which is a chance of about 13 out of 100,000.
