4- A deck of card contains 52 different cards

*(a) Based on an assumption that a deck of card is not set in any order.

→ Possibility of ace of heart:

$= 1/52$

	H	C	D	S
	13	13	13	13
$\boxed{\text{Aces}}$	1	1	1	1
Q	1	1	1	1

[13 each of hearts, diamonds, clubs & spades with one ace in each].

4 *(b) first card is Ace of hearts $= \frac{1}{52}$

second is queen of spades $= \frac{1}{51}$ [no replacement]

$\therefore P(\text{Ace of heart and Q of spades}) = \boxed{\frac{1}{52} \times \frac{1}{51}}$

4 (c) Because the order matters here, there would be two possibilities. [+ dependent events]

$P[\text{A of heart \& queen of spades}] = \frac{1}{52} \times \frac{1}{51}$.

$P(\text{Q of spades \& A of hearts}) = \frac{1}{52} \times \frac{1}{51}$.

Adding we get $= \frac{1}{52} \times \frac{1}{51} + \frac{1}{52} \times \frac{1}{51}$

$= 2\left[\frac{1}{52} \times \frac{1}{51}\right]$

$\Rightarrow \frac{1}{1326}$

4(b). Because the card is replaced, & reshuffled, the two events are independent.

$P(\text{ace of heart \& queen of spades}) = \frac{1}{52} \times \frac{1}{52} = \frac{1}{2704}$

4(c) There would be two scenarios here.

(i) I draw the ace of heart in the very first draw, which results in the second draw not being an ace of heart, so the probability here is zero (0).

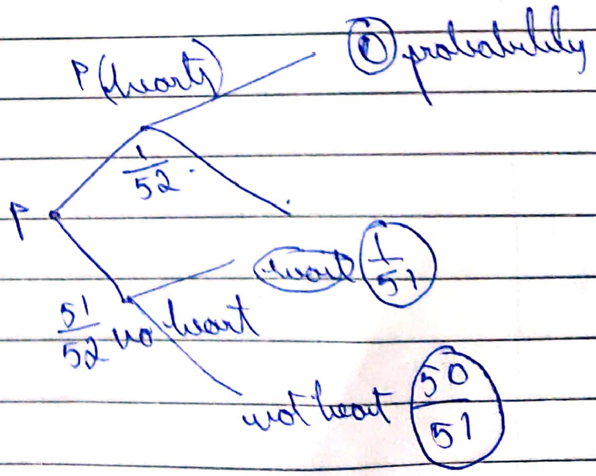
$P(\text{Ace of heart \& ace of heart}) = 0.$

(2) Probability of not drawing an ace of heart in the first draw, & then drawing an ace of heart from the re-shuffled deck without replacing it would be:

$= \left(\frac{1}{51}\right)$

or

0.0196



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PROBLEM - 5

5 (a) Probability of all four dice shows an even number?

even numbers = 2, 4, 6 ⇒ $P(E) = \frac{3}{6}$

$\frac{3}{6} \times \frac{3}{6} \times \frac{3}{6} \times \frac{3}{6}$

$= \frac{1}{16}$

5 (b) Atleast one of the dice shows six?

(1) Complementary, i.e. Probability of one or any dice not showing a six.

$= 1 - [P(\text{not showing any six})]$

$= 1 - \left[\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6}\right]$

$= 1 - \left(\frac{5}{6}\right)^4 \Rightarrow 1 - \frac{625}{1296}$

$= \frac{671}{1296} = 0.5177$

5 (c) Sum of the dice is atleast 6.

⇒ 1 − P[less than six]

Total Possibilities = 6 × 6 × 6 × 6 = 1296

less than 6 = 4 + 1 ⇒ 5

$P(<6) = \frac{5}{1296}$

$P(\text{atleast six}) = 1 - \frac{5}{1296} = \frac{1291}{1296}$ or 99.61%

Combinations < 6	Count
1 1 1 2	$\frac{4!}{3!}$ (4)
1 1 1 1	$\frac{4!}{4!}$ (1)

TROSSET

6

(a) Five gimels and five hehs.

⇒ In 10 spins of the dreidel lets assume we have a combination as below.

G G G G G H H H H H

→ now this can be arranged in the following ways:

$$\frac{10!}{5! \times 5!}$$ [10 spin]. [Repeating G, H 5 times]

Hence, the desired ways in which we would have 5 gimels and 5 hehs would be $\underline{\underline{252}}$.

Now, the probability of having either gimel or hehs for every spin ~~event~~. would be $(2/4)$, & upon this would be $\left(\frac{2}{4}\right)^{10}$ in every ~~10 spins~~. 10 spin.

Hence the total probability $= 252 \times \left(\frac{2}{4}\right)^{10}$

$$= \frac{252}{1024} = \underline{\underline{0.246}}.$$

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6Q. No queens or no kings.

⇒ For every spin, to have no queens or no kings, we have either jacks or aces.

so P(jacks or aces) for every spin $= \frac{2}{4} = \frac{1}{2}$.

for 10 spins, the probability would be.

$$\left[\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}\right] = \left(\frac{1}{2}\right)^{10}$$

$$= \frac{1}{1024}$$