Independent Event.

- when probability of event A does not affect probability of event B then both are independ-ent.

$$\boxed{\therefore P(A \cap B) = P(A) \times P(B)}$$

Q. (Ex: 7.4) (Q 13) (Page 108)

→ Req^d. probability $= \frac{^{12}C_1}{^{52}C_1} \times \frac{^{12}C_1}{^{52}C_1}$

$= \frac{12}{52} \times \frac{12}{52}$

$= \frac{3}{13} \times \frac{3}{13}$

$= \frac{9}{169}$

Q. (Ex: 7.4) (Q 6) (Page 107)

→

Let $P(A) = P$(Man will be alive) $= 0.83$

$P(B) = P$(woman will be alive) $= 0.97$

$\therefore P(A \cap B) = P(A) \times P(B)$

$= 0.83 \times 0.97$

$$= \frac{83}{100} \times \frac{97}{100}$$

$$= \frac{8051}{10{,}000}$$

$$= \underline{\underline{0.8051}}$$

Q. Ex : 7.4 (Q8) (Page 108)

→

$P(A) = 0.5$, $P(A') = 1 - 0.5 = 0.5$

$P(B) = 0.6$, $P(B') = 1 - 0.6 = 0.4$

$P(C) = 0.8$, $P(C') = 1 - 0.8 = 0.2$

$\therefore P(\text{at least 1 Hit}) = P(A \cup B \cup C)$

$$\therefore P(\text{0 Hit}) = P(A' \cap B' \cap C')$$

$$= P(A') \times P(B') \times P(C')$$

$$= 0.5 \times 0.4 \times 0.2$$

$$= \frac{5}{10} \times \frac{4}{10} \times \frac{2}{10}$$

$$= \frac{40}{1000}$$

$$= \underline{0.04}$$

$$\therefore P(\text{at least 1 Hit}) = 1 - 0.04$$

$$= \underline{\underline{0.96}}$$

Q. Ex: 7.4 (Q 5) (page 107)

→ $\therefore P(A) = \frac{1}{3}$, $P(A') = 1 - \frac{1}{2} = \frac{2}{3}$

$\therefore P(B) = \frac{1}{4}$, $P(B') = 1 - \frac{1}{4} = \frac{3}{4}$

$\therefore P(C) = \frac{1}{5}$, $P(C') = 1 - \frac{1}{5} = \frac{4}{5}$

a) problem is solved

P (Problem is not solved) $= P(A' \cap B' \cap C')$

$= P(A') \times P(B') \times P(C')$

$= \frac{2}{\cancel{3}} \times \frac{\cancel{3}}{\cancel{4}} \times \frac{\cancel{4}}{5}$

$= \frac{2}{5}$

$\therefore$ P (Problem is solved) $= 1 - \frac{2}{5}$

$= \frac{3}{5}$

b) (problem is not solved) $= \frac{2}{5}$

c) P (Exactly 2 student solved the problem)

$= P(A \cap B \cap C') + P(A \cap B' \cap C) + P(A' \cap B \cap C)$

$= P(A)\,P(B)\,P(C') + P(A) \times P(B') \times P(C) +$
$P(A') \times P(B) \times P(C)$

$$= \frac{1}{3} \times \frac{1}{4} \times \frac{4}{5} + \frac{1}{3} \times \frac{3}{4} \times \frac{1}{5} + \frac{2}{3} \times \frac{1}{4} +$$

$$= \frac{4}{60} + \frac{3}{60} + \frac{2}{60}$$

$$= \frac{9}{60}$$

$$= \frac{3}{20}$$

Q. (Ex: 7.4) (Q 12) (Page 108)

$\therefore P(Blue_1) = \frac{4}{9}$

$\therefore P(Blue_2) = \frac{3}{10}$

$\therefore P(Green_1) = \frac{5}{9}$

$\therefore P(Green_2) = \frac{7}{10}$

$\therefore P(\text{both blue balls}) = P(B_1 \cap B_2) = P(B_1) \times P(B_2$

$$= \frac{4}{9} \times \frac{3}{10}$$

$$= \frac{12}{90}$$

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$\therefore P(\text{both green balls}) = P(G_1 \cap G_2)$

$= P(G_1) \times P(G_2)$

$= \frac{5}{9} \times \frac{7}{10}$

$= \frac{35}{90}.$

$\therefore P$ (both the balls are same colour)

$= P$ (both blue balls) $+ P$ (both green balls)

$= \frac{12}{90} + \frac{35}{90}$

$= \frac{47}{90}$

Q Ex: 7.4 (Q.3) (Page 107)

$\therefore$ Let A = (The event that the sum of number is even)

and

B = (The event that the numbers are odd)

$\therefore$ Two tickets can be drawn from 11 ticket with replacement in $11 \times 11 = 121$ ways.

$\therefore n(S) = 121$

$\therefore n(A) = \{(2, 4, 6, 8, 10)\}$ from 1 to 11 are even number

$n(A) = 6$

$\therefore n(B) = \{(1, 3, 5, 7, 9, 11)\}$ from 1 to 11 are odd number

$n(B) = 5$

$\therefore n(A) = 6 \times 6 + 5 \times 5$
$= 36 + 25$
$\therefore \boxed{n(A) = 61}$

$\therefore n(B) = 6 \times 6$
$\therefore \boxed{n(B) = 36}$

$\therefore$ P (both the no. are odd, given that sum is even)

$= P(B/A) = \frac{36}{61}$

Q. (Ex: 7.4) (Q 4) (Page 107)
→
$\therefore {}^{52}C_1 = 52$ ways.

$\therefore n(S) = 52.$

$\therefore n(A) =$ (The event that a club card is drawn).

$\therefore$ 1 club card can be drawn out of 13 club cards in ${}^{13}C_1 = 13$ ways.

$\therefore n(A) = 13.$

$\therefore P(A) = \frac{n(A)}{n(S)} = \frac{13}{52} = \frac{1}{4}$

$\therefore n(B) =$ (The event that an ace card is drawn).

$\therefore$ 1 ace card can be drawn out of 4 aces in ${}^4C_1 = 4$ ways.

$n(B) = 4$.

$\therefore P(B) = \frac{n(B)}{n(S)} = \frac{4}{52} = \frac{1}{13}$

$\therefore$ 1 card is common betn A & B.

$n(A \cap B) = 1$.

$\therefore P(A \cap B) = \frac{n(A \cap B)}{n(S)} = \frac{1}{52}$

$\therefore P(A) \times P(B) = \frac{1}{4} \times \frac{1}{13}$

$\boxed{P(A \cap B) = \frac{1}{52}}$

$\therefore$ A and B are independent event