RD Sharma Solutions Class 12 Maths Chapter 31 Ex 31.1

Probability Ex 31.1 Q1

The sample space $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Let,

A = Number on the card drawn is even number

$A = \{2, 4, 6, 8, 10\}$

B = Number on the card greater than 4

$B = \{4, 5, 6, 7, 8, 9, 10\}$

$A \cap B = \{4, 6, 8, 10\}$

$$P\left(\frac{A}{B}\right) = \frac{n(A \cap B)}{n(B)}$$

$$= \frac{4}{7}$$

Required probability $= \frac{4}{7}$

Probability Ex 31.1 Q2

Let b and g represent the boy and the girl child respectively. If a family has two children, the sample space will be

S = {(b, b), (b, g), (g, b), (g, g)}

Let A be the event that both children are girls.

$$\therefore A = \{(g, g)\}$$

(i) Let B be the event that the youngest child is a girl.

$$\therefore B = [(b,g),(g,g)]$$
$$\Rightarrow A \cap B = \{(g, g)\}$$
$$\therefore P(B) = \frac{2}{4} = \frac{1}{2}$$
$$P(A \cap B) = \frac{1}{4}$$

The conditional probability that both are girls, given that the youngest child is a girl, is given by P (A|B).

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{4}}{\frac{1}{2}} = \frac{1}{2}$$

Therefore, the required probability is $\frac{1}{2}$.

Probability Ex 31.1 Q3

A = Two numbers on two dice are different

$$= \{(1,2),(1,3),(1,4),(1,5),(1,6)$$
$$(2,1),(2,3),(2,4),(2,5),(2,6)$$
$$(3,1),(3,2),(3,4),(3,5),(3,6)$$
$$(4,1),(4,2),(4,3),(4,5),(4,6)$$
$$(5,1),(5,2),(5,3),(5,4),(5,6)$$
$$(6,1),(6,2),(6,3),(6,4),(6,5)\}$$

B = Sum of numbers on the dice is 4

$$B = \{(1,3),(2,2),(3,1)\}$$

$$A \cap B = \{(1,3),(3,1)\}$$

Required probability $= P\left(\frac{B}{A}\right)$

$$= \frac{n(A \cap B)}{n(A)}$$
$$= \frac{2}{30}$$

Required probability $= \frac{1}{15}$

(ii) Let C be the event that at least one child is a girl.

$$\therefore C = \{(b, g), (g, b), (g, g)\}$$
$$\Rightarrow A \cap C = \{g, g\}$$

$$\Rightarrow P(C) = \frac{3}{4}$$
$$P(A \cap C) = \frac{1}{4}$$

The conditional probability that both are girls, given that at least one child is a girl, is given by P(A|C).

$$\text{Therefore, } P(A|C) = \frac{P(A \cap C)}{P(C)} = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$$

Probability Ex 31.1 Q4

A = Head on the first two toss on three tosses of coin

$A = \{HHT, HHH\}$

B = Getting ahead on third toss

$B = \{HHH, HTH, THH, TTH\}$

$A \cap B = \{HHH\}$

Required probability $= P\left(\frac{B}{A}\right)$

$$= \frac{n(A \cap B)}{n(A)}$$

Required probability $= \frac{1}{2}$

Probability Ex 31.1 Q5

A = 4 appears on third toss, if a die is thrown three times

$= \{(1,1,4),(1,2,4),(1,3,4),(1,4,4),(1,5,4),(1,6,4)$
$(2,1,4),(2,2,4),(2,3,4),(2,4,4),(2,5,4),(2,6,4)$
$(3,1,4),(3,2,4),(3,3,4),(3,4,4),(3,5,4),(3,6,4)$
$(4,1,4),(4,2,4),(4,3,4),(4,4,4),(4,5,4),(4,6,4)$
$(5,1,4),(5,2,4),(5,3,4),(5,4,4),(5,5,4),(5,6,4)$
$(6,1,4),(6,2,4),(6,3,4),(6,4,4),(6,5,4),(6,6,4)\}$

B = 6 and 5 appears respectively on first two tosses, if die is tosses three times

$B = \{(6,5,1),(6,5,2),(6,5,3),(6,5,4),(6,5,5),(6,5,6)\}$

$A \cap B = \{(6,5,4)\}$

Required probability $= P\left(\frac{A}{B}\right)$

$= \frac{n(A \cap B)}{n(B)}$

$= \frac{1}{6}$

Required probability $= \frac{1}{6}$

Probability Ex 31.1 Q6

Given, $P(B) = 0.5$, $P(A \cap B) = 0.32$

We know that,

$P\left(\frac{A}{B}\right) = \frac{n(A \cap B)}{n(B)}$

$= \frac{0.32}{0.5}$

$= \frac{32}{50}$

$= \frac{16}{25}$

$P\left(\frac{A}{B}\right) = \frac{16}{25}$

Probability Ex 31.1 Q7

Given, $P(A) = 0.4$, $P(B) = 0.3$ and $P\left(\frac{B}{A}\right) = 0.5$

We know that,

$$P\left(\frac{B}{A}\right) = \frac{P(A \cap B)}{P(A)}$$

$$0.5 = \frac{P(A \cap B)}{0.4}$$

$$P(A \cap B) = 0.5 \times 0.4$$

$$P(A \cap B) = 0.2$$

$$P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)}$$

$$= \frac{0.2}{0.3}$$

$$P\left(\frac{A}{B}\right) = \frac{2}{3}$$

Probability Ex 31.1 Q8

Given, $P(A)=\frac{1}{3}$, $P(B)=\frac{1}{5}$, $P(A\cup B)=\frac{11}{30}$

We know that,

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

$$\frac{11}{30}=\frac{1}{3}+\frac{1}{5}-P(A\cap B)$$

$$P(A\cap B)=\frac{1}{3}+\frac{1}{5}-\frac{11}{30}$$

$$=\frac{10+6-11}{30}$$

$$=\frac{5}{30}$$

$$P(A\cap B)=\frac{1}{6}$$

We know that,

$$P\left(\frac{A}{B}\right)=\frac{P(A\cap B)}{P(B)}$$

$$=\frac{\frac{1}{6}}{\frac{1}{5}}$$

$$P\left(\frac{A}{B}\right)=\frac{5}{6}$$

$$P\left(\frac{B}{A}\right)=\frac{P(B\cap A)}{P(A)}$$

$$P\left(\frac{B}{A}\right)=\frac{\frac{1}{6}}{\frac{1}{3}}$$

$$=\frac{1}{6}\times\frac{3}{1}$$

$$=\frac{1}{2}$$

$$P\left(\frac{A}{B}\right)=\frac{5}{6},\ P\left(\frac{B}{A}\right)=\frac{1}{2}$$

Probability Ex 31.1 Q9

Given, Couple has two children.

(i)

A = Both are male

$A = \{M_1M_2\}$

B = Atleast one is male

$B = \{M_1M_2, M_1F_2, F_1M_2\}$

$A \cap B = \{M_1M_2\}$

$$P\left(\frac{A}{B}\right) = \frac{n(A \cap B)}{n(B)}$$

$$P\left(\frac{A}{B}\right) = \frac{1}{3}$$

$$P\left(\frac{A}{B}\right) = \frac{1}{3}$$

(ii)

A = Both are Females

$A = \{F_1F_2\}$

B = Elder child is female

$B = \{F_1M_2, F_1F_2\}$

$A \cap B = \{F_1F_2\}$

$$P\left(\frac{A}{B}\right) = \frac{n(A \cap B)}{n(B)}$$

$$= \frac{1}{2}$$

$$P\left(\frac{A}{B}\right) = \frac{1}{2}$$