1. **A die is thrown find the probability of following events:**

(i) A prime number will appear

(ii) A number greater than or equal to 3 will appear

(iii) A number less than or equal to one will appear

(iv) A number more than 6 will appear

(v) A number less than 6 will appear

Ans) The sample space of the given experiment is given by,

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

(i) Let A be the event of the occurrence of a prime number

$\Rightarrow A = \{2, 3, 5\}$

$$\therefore P(A) = \frac{Number\ of\ outcomes\ favourable\ to\ A}{Total\ number\ of\ possible\ outcomes} = \frac{n(A)}{n(S)} = \frac{3}{6} = \frac{1}{2}$$

(ii) Let B be the event of the occurrence of a number greater than or equal to 3

$\Rightarrow B = \{3, 4, 5, 6\}$

$$\therefore P(B) = \frac{Number\ of\ outcomes\ favourable\ to\ B}{Total\ number\ of\ possible\ outcomes} = \frac{n(B)}{n(S)} = \frac{4}{6} = \frac{2}{3}$$

(iii) Let C be the event of the occurrence of a number less than or equal to one $\Rightarrow C = \{1\}$

$$\therefore P(C) = \frac{Number\ of\ outcomes\ favourable\ to\ C}{Total\ number\ of\ possible\ outcomes} = \frac{n(C)}{n(S)} = \frac{1}{6}$$

(iv) Let D be the event of the occurrence of a number greater than $6 \Rightarrow D = \phi$

$$\therefore P(D) = \frac{Number\ of\ outcomes\ favourable\ to\ D}{Total\ number\ of\ possible\ outcomes} = \frac{n(D)}{n(S)} = \frac{0}{6} = 0$$

(v) Let E be the event of the occurrence of a number less than $6 \Rightarrow E = \{1, 2, 3, 4, 5\}$

$$\therefore P(E) = \frac{Number\ of\ outcomes\ favourable\ to\ E}{Total\ number\ of\ possible\ outcomes} = \frac{n(E)}{n(S)} = \frac{5}{6}$$

2. **Three coins are tossed once Find the probability of getting (i) 3 heads (ii) 2 heads (iii) at least 2 heads (iv) at most 2 heads (v) no head (vi) 3 tails (vii) exactly two tails (viii) no tail (ix) at most two tails**

Ans) When three coins are tossed once the sample space is given by

$S = HHH, HHT, HTH, THH, HTT, THT, TTH, TTT$

$\therefore$ Accordingly $n(S) = 8$

It is known that the probability of an event A is given by

$$P(A) = \frac{Number\ of\ outcomes\ favourable\ to\ A}{Total\ number\ of\ possible\ outcomes} = \frac{n(A)}{n(S)}$$

(i) Let B be the event of the occurrence of 3 heads

Accordingly $B = HHH$

$$\therefore P(B) = \frac{n(B)}{n(S)} = \frac{1}{8}$$

(ii) Let C be the event of the occurrence of 2 heads

Accordingly

$C = HHT, HTH, THH$

$$\therefore P(C) = \frac{n(C)}{n(S)} = \frac{3}{8}$$

(iii) Let D be the event of the occurrence of at least 2 heads

Accordingly

$D = HHH, HHT, HTH, THH$

$$\therefore P(D) = \frac{n(D)}{n(S)} = \frac{4}{8} = \frac{1}{2}$$

(iv) Let E be the event of the occurrence of at most 2 heads

Accordingly

$E = HHT, HTH, THH, HTT, THT, TTH, TTT$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{7}{8}$$

(v) Let F be the event of the occurrence of no head

Accordingly $F = TTT$

$$\therefore P(F) = \frac{n(F)}{n(S)} = \frac{1}{8}$$

(vi) Let G be the event of the occurrence of 3 tails

Accordingly $G = TTT$

$$\therefore P(G) = \frac{n(G)}{n(S)} = \frac{1}{8}$$

(vii) Let H be the event of the occurrence of exactly 2 tails

Accordingly

$$H = HTT, THT, TTH$$

$$\therefore P(H) = \frac{n(H)}{n(S)} = \frac{3}{8}$$

(viii) Let I be the event of the occurrence of no tail

Accordingly $I = HHH$

$$\therefore P(I) = \frac{n(I)}{n(S)} = \frac{1}{8}$$

(ix) Let J be the event of the occurrence of at most 2 tails

Accordingly

$$I = HHH, HHT, HTH, THH, HTT, THT, TTH$$

$$\therefore P(J) = \frac{n(J)}{n(S)} = \frac{7}{8}$$