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1. A coin is tossed three times.

Solution:-

Since either coin can turn up Head (H) or Tail (T), the possible outcomes may be

So, when 1 coin is tossed once the sample space = 2

Then,

Coin is tossed 3 times the sample space = $2^3 = 8$

Thus, the sample space is $S = \{HHH, THH, HTH, HHT, TTT, HTT, THT, TTH\}$

2. A die is thrown two times.

Solution:-

Let us assume that 1, 2, 3, 4, 5 and 6 are the possible outcomes when the die is thrown.

Then, the total number of sample space = (6×6)

= 36

Thus, the sample space is

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

3. A coin is tossed four times.

Solution:-

Since either coin can turn up Head (H) or Tail (T), are the possible outcomes.

So, when 1 coin is tossed once the sample space = 2

Then,

Coin is tossed 3 times the sample space = $2^4 = 16$

Thus, the sample space is $S = \{HHHH, THHH, HTHH, HHTH, HHHT, TTTT, HTTT, THTT, TTHT, TTTH, TTHH, HHTT, THTH, HTHT, THHT, HTTH\}$

4. A coin is tossed and a die is thrown.

Solution:-

Since either coin can turn up Head (H) or Tail (T), are the possible outcomes.

Let us assume that 1, 2, 3, 4, 5 and 6 are the possible numbers comes when the die is thrown.

Then, total number of space = $(2 \times 6) = 12$

Thus, the sample space is,

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

5. A coin is tossed and then a die is rolled only in case a head is shown on the coin.

Solution:-

Since either coin can turn up Head (H) or Tail (T), are the possible outcomes.

Let us assume that 1, 2, 3, 4, 5 and 6 are the possible numbers comes when the die is thrown.

When head is encountered,

Then, number of space = $(1 \times 6) = 6$

Sample Space $S_H = \{H1, H2, H3, H4, H5, H6\}$

Now, tail is encountered, Sample space $S_T = \{T\}$

Therefore the total sample space $S = \{H1, H2, H3, H4, H5, H6, T\}$

6. 2 boys and 2 girls are in Room X, and 1 boy and 3 girls in Room Y. Specify the sample space for the experiment in which a room is selected and then a person.

Solution:-

From the question it is given that,

2 boys and 2 girls are in Room X

1 boy and 3 girls in Room Y

Let us assume b_1, b_2 and g_1, g_2 be 2 boys and 2 girls are in Room X.

And also assume b_3 and g_3, g_4, g_5 be 1 boy and 3 girls in Room Y.

The problem is solved by dividing into two cases

Case 1: Room X is selected

Sample Space $S_x = \{(X,b1),(X,b2),(X,g1),(X,g2)\}$

Case 2: Room Y is selected

Sample Space $S_y = \{(Y,b3),(Y,g3),(Y,g4),(Y,g5)\}$

The overall sample space

$S = \{(X,b1),(X,b2),(X,g1),(X,g2),(Y,b3),(Y,g3),(Y,g4),(Y,g5)\}$

7. One die of red colour, one of white colour and one of blue colour are placed in a bag. One die is selected at random and rolled, its colour and the number on its uppermost face is noted. Describe the sample space.