Exemplar Problem with Solution :

An experiment consists of rolling a die until a 2 appears.

(i) How many elements of the sample space correspond to the event that the 2 appears on the Ath roll of the die?

Number of outcomes when die is thrown is '6'.

Soln : If 2 appears on the Ath roll of the die.
So, first (k -1) roll have 5 outcomes each and Kth roll results 2
Number of outcomes = 5^{k-1}

(ii) How many elements of the sample space correspond to the event that the 2 appears not later than the Ath roll of the die?

Soln : If we consider that 2 appears not later than K th roll of the die, then 2 comes before Ath roll.
If 2 appears in first roll, number of ways = 1 If 2 appears in second roll, number of ways
= 5 x 1 (as first roll does not result in 2)
If 2 appears in third roll, number of ways
= 5 x 5 x 1 (as first two rolls do not result in 2)
Similarly if 2 appears in (k – l)th roll, number of ways = [5x5x5… (k- 1) times] x 1 = 5^{k-1} Possible outcomes if 2 appears before kth roll = 1 +5 + 5^2 + 5^3+ … +5^{k-l}