Exercise 15.1

Q21. A lot consists of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that:

(i) she will buy it?

(ii) she will not buy it?

Ans. Total number of favourable outcomes = 144

(i) Number of non-defective pens = 144 – 20 = 124

$\therefore$ Number of favourable outcomes = 124

Hence P (she will buy) = P (a non-defective pen) = $\frac{124}{144} = \frac{31}{36}$

(ii) Number of favourable outcomes = 20

Hence P (she will not buy) = P (a defective pen) = $\frac{20}{144} = \frac{5}{36}$

Q22. Refer to example 13.

(i) Complete the following table:

Event: Sum of 2 dice	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$						$\frac{5}{36}$				$\frac{1}{36}$

(ii) A student argues that 'there are 11 possible outcomes 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. Therefore each of them has a probability $\frac{1}{11}$. Do you agree with this argument? Justify your answer.

Ans. Total favourable outcomes of throwing two dice are:

(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)

$\therefore$ Total number of favourable outcomes = 36

(i) Favourable outcomes of getting the sum as 3 = 2

Hence P (getting the sum as 3) = $\frac{2}{36} = \frac{1}{18}$

Favourable outcomes of getting the sum as 4 = 3

Hence P (getting the sum as 4) = $\frac{3}{36} = \frac{1}{12}$

Favourable outcomes of getting the sum as 5 = 4

Hence P (getting the sum as 5) = $\frac{4}{36} = \frac{1}{9}$

Favourable outcomes of getting the sum as 6 = 5

Hence P (getting the sum as 6) = $\frac{5}{36}$

Favourable outcomes of getting the sum as 7 = 6

Hence P (getting the sum as 7) = $\frac{6}{36} = \frac{1}{6}$

Favourable outcomes of getting the sum as 9 = 4

Hence P (getting the sum as 9) = $\frac{4}{36} = \frac{1}{9}$

Favourable outcomes of getting the sum as 10 = 3

Hence P (getting the sum as 10) = $\frac{3}{36} = \frac{1}{12}$

Favourable outcomes of getting the sum as 11 = 2

Hence P (getting the sum as 11) = $\frac{2}{36} = \frac{1}{18}$

Event: Sum of 2 dice	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

(ii) I do not agree with the argument given here. Justification has already been given in part (i).

Q23. A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result, i.e., three heads or three tails and loses otherwise. Calculate the probability that Hanif will lose the game.

Ans. The outcomes associated with the experiment in which a coin is tossed thrice:

HHH, HHT, HTH, THH, TTH, HTT, THT, TTT

Therefore, Total number of favourable outcomes = 8

Number of favourable outcomes = 6

Hence required probability = $\frac{6}{8} = \frac{3}{4}$

Q24. A die is thrown twice. What is the probability that:

(i) 5 will not come up either time?

(ii) 5 will come up at least once?

Ans. (i) The outcomes associated with the experiment in which a dice is thrown is twice:

(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)

Therefore, Total number of favourable outcomes = 36

Now consider the following events:

A = first throe shows 5 and B = second throw shows 5

Therefore, the number of favourable outcomes = 6 in each case.

$\therefore$ P(A) = $\frac{6}{36}$ and P(B) = $\frac{6}{36}$

$\Rightarrow P\left(\overline{A}\right)=1-\frac{6}{36}=\frac{30}{36}=\frac{5}{6}$ and $P\left(\overline{B}\right)=\frac{5}{6}$

$\therefore$ Required probability = $\frac{5}{6}\times\frac{5}{6}=\frac{25}{36}$

(ii) Let S be the sample space associated with the random experiment of throwing a die twice. Then, n(S) = 36

$\therefore$ $A\cap B$ = first and second throw shoe 5, i.e. getting 5 in each throw.

We have, A = (5, 1) (5, 2) (5, 3) (5, 4) (5, 5) (5, 6)

And B = (1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5)

$\therefore$ P(A) = $\frac{6}{36}$, P(B) = $\frac{6}{36}$ and P($A\cap B$) = $\frac{1}{36}$

$\therefore$ Required probability = Probability that at least one of the two throws shows 5

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

$=\frac{6}{36}+\frac{6}{36}-\frac{1}{36}=\frac{11}{36}$

Q25. Which of the following arguments are correct and which are not correct? Give reasons for your answer:

(i) If two coins are tossed simultaneously there are three possible outcomes – two heads, two tails or one of each. Therefore, for each of these outcomes, the probability is $\frac{1}{3}$.

(ii) If a die is thrown, there are two possible outcomes – an odd number or an even number. Therefore, the probability of getting an odd number is $\frac{1}{2}$.

Ans. (i) Incorrect: We can classify the outcomes like this but they are not then, 'equally likely'. Reason is that 'one of each' can result in two ways – from a head on first coin and tail on the second coin or from a tail on the first coin and head on the second coin. This makes it twice as likely as two heads (or two tails).

(ii) Correct: The two outcomes considered in the question are equally likely.

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