(i) Total number of discs having two digit numbers = 81
(Since 1 to 9 are single digit numbers and so, total 2 digit numbers are 90 - 9 = 81)
P (bearing a two-digit number) = 81/90 = 9/10 = 0.9

(ii) Total number of perfect square numbers = 9 (1, 4, 9, 16, 25, 36, 49, 64 and 81)
P (getting a perfect square number) = 9/90 = 1/10 = 0.1

(iii) Total numbers which are divisible by 5 = 18 (5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85 and 90)
P (getting a number divisible by 5) = 18/90 = ⅕ = 0.2

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19. A child has a die whose six faces show the letters as given below:

A	B	C	D	E	A

The die is thrown once. What is the probability of getting
(i) A?
(ii) D?

Solution:
The total number of possible outcomes (or events) = 6
P(E) = (Number of favourable outcomes/ Total number of outcomes)

(i) The total number of faces having A on it = 2
P (getting A) = 2/6 = ⅓ = 0.33

(ii) The total number of faces having D on it = 1
P (getting D) = ⅙ = 0.166

20. Suppose you drop a die at random on the rectangular region shown in Fig. 15.6. What is the probability that it will land inside the circle with diameter 1m?

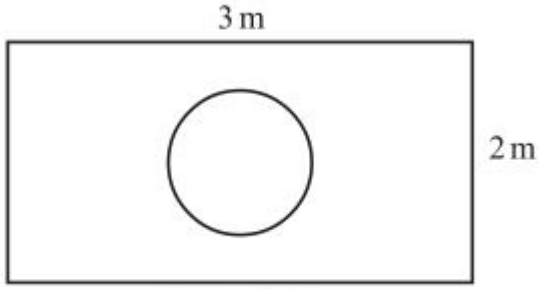

Fig. 15.6

Solution:

First, calculate the area of the rectangle and the area of the circle. Here, the area of the rectangle is the possible outcome and the area of the circle will be the favourable outcome.
So, the area of the rectangle = $(3 \times 2)\ m^2 = 6\ m^2$
and,
The area of the circle = $\pi r^2 = \pi(½)^2\ m^2 = \pi/4\ m^2 = 0.78$
∴ The probability that die will land inside the circle = $[(\pi/4)/6] = \pi/24$ or, 0.78/6 = 0.13

21. 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?

Solution:
The total numbers of outcomes i.e. pens = 144
Given, numbers of defective pens = 20
∴ The numbers of non defective pens = 144 - 20 = 124
P(E) = (Number of favourable outcomes/ Total number of outcomes)

(i) Total numbers events in which she will buy them = 124
So, P (buying) = 124/144 = 31/36 = 0.86

(ii) Total numbers events in which she will not buy them = 20
So, P (not buying) = 20/144 = 5/36 = 0.138

22. Refer to Example 13. (i) Complete the following table:

Event: 'Sum on 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 1/11. Do you agree with this argument? Justify your Solution:.

Solution:

If 2 dices are thrown, the possible events 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)

So, the total numbers of events: 6 × 6 = 36

(i) It is given that to get the sum as 2, the probability is 1/36 as the only possible outcomes = (1,1)

For getting the sum as 3, the possible events (or outcomes) = E (sum 3) = (1,2) and (2,1)

So, P(sum 3) = 2/36

Similarly,

E (sum 4) = (1,3), (3,1), and (2,2)

So, P (sum 4) = 3/36

E (sum 5) = (1,4), (4,1), (2,3), and (3,2)

So, P (sum 5) = 4/36

E (sum 6) = (1,5), (5,1), (2,4), (4,2), and (3,3)

So, P (sum 6) = 5/36

E (sum 7) = (1,6), (6,1), (5,2), (2,5), (4,3), and (3,4)

So, P (sum 7) = 6/36

E (sum 8) = (2,6), (6,2), (3,5), (5,3), and (4,4)

So, P (sum 8) = 5/36

E (sum 9) = (3,6), (6,3), (4,5), and (5,4)

So, P (sum 9) = 4/36

E (sum 10) = (4,6), (6,4), and (5,5)

So, P (sum 10) = 3/36
E (sum 11) = (5,6), and (6,5)
So, P (sum 11) = 2/36
E (sum 12) = (6,6)
So, P (sum 12) = 1/36

So, the table will be as:

Event: Sum on 2 dice	2	3	4	5	6	7	8	9	10	11	12
Probability	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36

(ii) The argument is not correct as it is already justified in (i) that the number of all possible outcomes is 36 and not 11.

23. 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.

Solution:
The total number of outcomes = 8 (HHH, HHT, HTH, THH, TTH, HTT, THT, TTT)

Total outcomes in which Hanif will lose the game = 6 (HHT, HTH, THH, TTH, HTT, THT)
P (losing the game) = 6/8 = ¾ = 0.75

24. 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?
[Hint : Throwing a die twice and throwing two dice simultaneously are treated as the same experiment]

Solution:
Outcomes 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)

So, the total number of outcome = 6 × 6 = 36

(i) **Method 1:**
Consider the following events.
A = 5 comes in first throw,
B = 5 comes in second throw
P(A) = 6/36,
P(B) = 6/36 and
P(not B) = 5/6
So, P(notA) = 1 - 6/36 = 5/6
∴ The required probability = 5/6 × 5/6 = 25/36

Method 2:
Let E be the event in which 5 does not come up either time.
So, the favourable outcomes are [36 – (5 + 6)] = 25
∴ P(E) = 25/36

(ii) Number of events when 5 comes at least once = 11 (5 + 6)
∴ The required probability = 11/36

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25. Which of the following arguments are correct and which are not correct? Give reasons for your Solution:.
(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 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 1/2

Solution:

(i) All the possible events are (H,H); (H,T); (T,H) and (T,T)
So, P (getting two heads) = ¼

and, P (getting one of the each) = 2/4 = ½
∴ This statement is incorrect.

(ii) Since the two outcomes are equally likely, this statement is correct.

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Exercise: 15.2

1. Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on
(i) the same day?
(ii) consecutive days?
(iii) different days?

Solution:
Since there are 5 days and both can go to the shop in 5 ways each so,
The total number of possible outcomes = 5 × 5 = 25

(i) The number of favourable events = 5 (Tue., Tue.), (Wed., Wed.), (Thu., Thu.), (Fri., Fri.), (Sat., Sat.)
So, P (both visiting on the same day) = 5/25 = ⅕

(ii) The number of favourable events = 8 (Tue., Wed.), (Wed., Thu.), (Thu., Fri.), (Fri., Sat.), (Sat., Fri.), (Fri., Thu.), (Thu., Wed.), and (Wed., Tue.)
So, P(both visiting on the consecutive days) = 8/25

(iii) P (both visiting on the different days) = 1 - P (both visiting on the same day)
So, P (both visiting on the different days) = 1 - ⅕ = ⅘

2. A die is numbered in such a way that its faces show the numbers 1, 2, 2, 3, 3, 6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws:

Number in first throw

Number in second throw						
+	1	2	2	3	3	6
1	2	3	3	4	4	7
2	3	4	4	5	5	8
2					5	
3						
3			5			9
6	7	8	8	9	9	12

What is the probability that the total score is

(i) even?

(ii) 6?

(iii) at least 6?

Solution:

The table will be as follows:

+	1	2	2	3	3	6
1	2	3	3	4	4	7
2	3	4	4	5	5	8
2	3	4	4	5	5	8
3	4	5	5	6	6	9
3	4	5	5	6	6	9
6	7	8	8	9	9	12

So, the total number of outcome = 6 × 6 = 36

(i) E (Even) = 18

P (Even) = 18/36 = ½

(ii) E (sum is 6) = 4

P (sum is 6) = 4/36 = 1/9

(iii) E (sum is atleast 6) = 15

P (sum is atleast 6) = 15/36 = 5/12

3. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.

Solution:

It is given that the total number of red balls = 5

Let the total number of blue balls = x

So, the total no. of balls = x + 5

P(E) = (Number of favourable outcomes/ Total number of outcomes)

∴ P (drawing a blue ball) = [x/(x + 5)] --------(i)

Similarly,

P (drawing a red ball) = [5/(x + 5)] --------(i)

From equation (i) and (ii)

x = 10

So, the total number of blue balls = 10

4. A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball?

If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x

Solution:

Total number of black balls = x

Total number of balls = 12

P(E) = (Number of favourable outcomes/ Total number of outcomes)

P (getting black balls) = x / 12 ----------(i)

Now, when 6 more black balls are added,

Total balls become = 18

∴ Total number of black balls = x + 6

Now, P (getting black balls) = (x + 6)/18 ----------(i)

Solving equation (i) and (ii)

x = 3

5. A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is ⅔. Find the number of blue balls in the jar.

Solution:

Total marbles = 24

Let the total green marbles = x

So, the total blue marbles = 24 - x

P(getting green marble) = x/24

From the question, x/24 = ⅔

So, the total green marbles = 16

And, the total blue marbles = 24 - x = 8