

8th Probability Solved Questions - 01

1. Experiment : An operation which can produce some well-defined outcome is called as experiment.

2. Random Experiment: An experiment in which all possible outcomes are known and the exact output cannot be predicted in advance, is called a random experiment.

Examples : Rolling an unbiased dice, Tossing a fair coin, Drawing a card from a pack of well-shuffled cards.

3. Sample Space : When we perform an experiment, then **the set S of all possible outcomes** is called the sample space.

Examples : In tossing a coin, $S = \{H, T\}$

If two coins are tossed, the $S = \{HH, HT, TH, TT\}$.

In rolling a dice, we have, $S = \{1, 2, 3, 4, 5, 6\}$.

4. **Event**: Any subset of a sample space is called an event. **P(E)**

5. Results on Probability:

1. An event having only one outcome of the experiment is called an elementary event.

In example 1, both the events E and F are elementary events.

Similarly, in Example 2, all the three events, Y, B and R are elementary events.

$$2. P(E) + P(F) = 1$$

$$P(Y) + P(R) + P(B) = 1$$

The sum of the probabilities of all the elementary events of an experiment is 1.

6. Details:

1. When we throw a coin, then either a Head (H) or a Tail (T) appears.

2. A dice is a solid cube, having 6 faces, marked 1, 2, 3, 4, 5, 6 respectively.

When we throw a die, the outcome is the number that appears on its upper face are 1, 2, 3, 4, 5, 6

3. A pack of cards has 52 cards.

It has 13 cards of each suit, name Spades, Clubs, Hearts and Diamonds.

Cards of spades and clubs are black cards.

Cards of hearts and diamonds are red cards.

6. There are 4 honours of each unit.

7. There are Kings, Queens and Jacks. These are all called face cards.

Example 1: One card is drawn from a well-shuffled deck of 52 cards.

Calculate the probability that the card will (i) be an ace, (ii) not be an ace.

Solution : Well-shuffling ensures equally likely outcomes.

(i) There are 4 aces in a deck. Let E be the event 'the card is an ace'.

The number of outcomes favourable to E = 4

The number of possible outcomes = 52

$$\text{Therefore, } P(E) = \frac{4}{52} = \frac{1}{13}$$

(ii) Let E' be the event 'card drawn is not an ace'.

$$P(E') = 1 - P(E) = 1 - \frac{1}{13} = \frac{12}{13}$$

Example- 2 Savita and Hamida are friends. What is the probability that both will have (i) different birthdays? (ii) the same birthday? (Ignoring a leap year).

Out of the two friends, one girl, say, Savita's birthday can be any day of the year. Now, Hamida's birthday can also be any day of 365 days in the year.

We assume that these 365 outcomes are equally likely.

(i) If Hamida's birthday is different from Savita's, the number of favourable outcomes for her birthday is $365 - 1 = 364$

So, $P(\text{Hamida's birthday is different from Savita's birthday}) = \frac{364}{365}$

(ii) $P(\text{Savita and Hamida have the same birthday}) = 1 - \frac{364}{365} = \frac{1}{365}$

Example 3 : A box contains 3 blue, 2 white, and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be (i) white? (ii) blue? (iii) red?

Solution= Total marbles=Number of possible outcomes = $3 + 2 + 4 = 9$

(i) $p(\text{white}) = \frac{2}{9}$ (ii) $p(\text{blue}) = \frac{3}{9} = \frac{2}{3}$

(iii) $p(\text{red}) = \frac{4}{9}$

Test yourself

1. In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize

Ans: The probability of getting a prize =

$$\frac{10}{10+25} = \frac{10}{35} = \frac{2}{7}$$

2. A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

Ans: The probability that the ball drawn is

$$\text{white} = \frac{8}{6+8} = \frac{8}{14} = \frac{4}{7}$$

3. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

Ans: Here, $S = \{1, 2, 3, 4, \dots, 19, 20\}$. = 20

Let E = event of getting a multiple of 3 or 5 = $\{3, 6, 9, 12, 15, 18, 5, 10, 20\} = 9$

$$P(E) = \frac{n(E)}{n(S)} = \frac{9}{20}$$

4. What is the probability of getting a sum 9 from two throws of a dice?

Ans: $S = 6 \times 6 = 36$

Let E = event of getting a sum 9 = $[(3,6), (4,5), (6,3), (5,4)] = 4$

So probability(E) = $\frac{4}{36} = \frac{1}{9}$

5. Three unbiased coins are tossed. What is the probability of getting at most two heads?

Here $S = \{TTT, TTH, THT, HTT, THH, HTH, HHT, HHH\} = 8$

Let E = event of getting at most two heads.

{Hint: at most two heads means two or less or no head}

Then $E = \{TTT, TTH, THT, HTT, THH, HTH, HHT\}$. = 7 $P(E) = \frac{n(E)}{n(S)} = \frac{7}{8}$

8th Probability Solved Questions - 02

1. A coin is tossed twice. Find the probability of getting both tails?

$$S = \{(H,H), (H,T), (T,H), (T,T)\} = 4 ; \quad E = (T,T)$$

$$\text{So, } P(E) = \frac{n(E)}{n(S)} = \frac{1}{4}$$

2. Find the probability of getting even number between 10 to 25.

$$S = \{10,11, \dots \dots \dots 25\} = 16$$

$$E = 10, 12, 14, 16, 18, 20, 22, 24 = 8$$

$$P(E) = 8/16 = 1/2$$

3. A die is thrown once. Find the probability of getting a prime number.

$$S = 1, 2, 3, 4, 5, 6 = 6$$

$$E = 2, 3, 5 = 3 \quad P(E) = \frac{3}{6} = \frac{1}{2}$$

4. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting a face card.

$$\text{Ans: } S = 52 ; \quad E = 12 \quad P(E) = \frac{12}{52} = \frac{3}{13}$$

5. What is the maximum value of the probability for an event?

$$\text{Ans : } 1$$

6. A bag contains 9 red, 7 white and 4 black balls. A ball is drawn at random. Find the probability that the ball drawn is not red.

$$S = 9 + 7 + 4 = 20 ; \quad E = 7 + 4 =$$

$$11 ; \quad p(E) = \frac{11}{20}$$

7. In the word "EDUCATION" find the probability of getting a vowel.

$$S = 9 \text{ and } E = E, U, A, I, O = 5 \quad P(E) = \frac{5}{9}$$

8. Out of 400 bulbs in a box, 15 bulbs are defective. One bulb is taken at random from the box. Find the probability that the bulb is not defective.

$$S = 400 \quad E = 400 - 15 = 385 \quad P(E) = \frac{385}{400}$$

9. A die is thrown once. What is the probability of getting a multiple of 3.

$$S = 6 \quad E = 3, 6 = 2 \quad P(E) = \frac{2}{6} = \frac{1}{3}$$

10. A card is drawn from a pack of 52 cards. Find the probability of drawing a red face card.

$$S = 52 \quad E = 6 \quad P(E) = \frac{6}{52} = \frac{3}{26}$$

11. A box contains 19 cards having numbers 1, 2, 3, ..., 19. A card is drawn from the box. What is the probability that the number on the card is divisible by 5.

$$S = 19 ; \quad E = 5, 10, 15 = 3 ; \quad P(E) = \frac{3}{19}$$

12. Three coins are tossed together. What are the total number of possible outcomes.

$$\text{Here } S = \{TTT, TTH, THT, HTT, THH, HTH, HHT, HHH\} = 8$$

13. A letter of English alphabet is chosen at random. Find the probability that the letter chosen is a vowel.

$$S = 26 ; \quad E = a, e, i, o, u = 5 \quad P(E) = \frac{5}{26}$$

14. A class has 40 students, 25 boys and 15 girls. A student of the class is selected at random as the monitor. Find the probability of selecting a girl student as the monitor.

$$S = 40 \quad E = 15 \quad P(E) = \frac{15}{40} = \frac{3}{8}$$

15. Two dice are thrown simultaneously. Find the probability of getting an even number as the sum.

$$S = 36 ; \quad E = (1,1), (1,3), (1,5) = 6 \times 3 = 18 \quad \text{So,}$$

$$P(E) = \frac{18}{36} = \frac{1}{2}$$

16. In a family of two children. Find the probability of at least one girl child.

$$S = \{(B,B), (B,G), (G,B), (G,G)\} = 4 ; \quad E \text{ of at least one girl child} = (B,G), (G,B), (G,G) = 3 \quad \text{So,}$$

$$P(E) = \frac{n(E)}{n(S)} = \frac{3}{4}$$

17. From 1 to 50 find the probability of getting a multiple of 6.

$$\text{Ans: } S = 50 \quad E = \{6, 12, 18, 24, 30, 36, 42, 48\} = 8$$

$$P(E) = \frac{8}{50}$$

18. Three unbiased coins are tossed together.

Find the probability of getting: (i) all heads (ii) two heads (iii) one head (iv) At least two head

Here $S = \{TTT, TTH, THT, HTT, THH, HTH, HHT, HHH\} = 8$

(i) E for all heads = 1 $P(E) = 1/8$

(ii) E for two heads = 3 { THH, HTH, HHT } $P(E) = 3/8$

(iii) E for one head = { TTH, THT, HTT } = 3 $P(E) = 3/8$

(iv) E for At least two head (two or more head) = { THH, HTH, HHT, HHH } = 4 $P(E) = 4/8 = 1/2$

19. Find the probability that a leap year selected at random will contain 53 Sundays.

Solution: For 53 Sundays, $\frac{366}{7} = 52$ week and 2 days

So we can be sure that there are 52 Sundays, The remaining 2 days decide the probability of being a Sunday.

So we consider pairings of 2 consecutive days (Sunday-Monday ;(Monday-Tuesday) , (Tuesday-Wednesday),

(Wednesday-Thursday),(Thursday-Friday), (Friday-Saturday) and (Saturday-Sunday)

So out of the 7 pairs, we have 2 pairs that include a Sunday.

Therefore the probability of having 53 Sundays in a Leap Year is = $\frac{2}{7}$.

20. Two dice are thrown simultaneously. Find the probability of getting: (i) a doublet i.e. same number on both dice. (ii) The sum as a prime number.

Ans: $S = 36$ (i) E for a doublet i.e. same number on both dice = {11,22,33,44,55,66} = 6

$$P(E) = \frac{6}{36} = \frac{1}{6}$$

(ii) E for The sum as a prime number = [(1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5)] = 15

$$P(E) = \frac{15}{36} = \frac{5}{12}$$

21. A single card is drawn at random from a standard deck of 52 playing cards.

Solution: Total number of playing cards = 52

(i) The card is a diamond:

E of diamonds = 13

$P(\text{the card is a diamond}) = 13/52 = 1/4$

(ii) The card is a red king:

E of red king = 2

$P(\text{the card is a red king}) = 2/52 = 1/26$

(iii) The card is a king or queen:

E of kings = 4 and E of queens = 4

E of king or queen in a deck = 4 + 4 = 8

$P(\text{the card is a king or queen}) = \frac{8}{52} = \frac{2}{13}$

(iv) The card is either a red card or an ace:

E of red card or an ace = 28 $P(E) = \frac{28}{52} = \frac{7}{13}$

(v) The card is not a king:

E of kings = 4 $P(\text{the card is a king}) = \frac{4}{52} = \frac{1}{13}$

$P(\text{the card is not a king}) = 1 - P(E) = 1 - \frac{1}{13} = \frac{12}{13}$

(vi) The card is a five or lower:

E of cards is a five or lower = 16 $P(E) = \frac{16}{52} = \frac{4}{13}$

(vii) The card is a king:

E of kings in a deck of 52 cards = 4 $P(E) = \frac{4}{52} = \frac{1}{13}$

(viii) The card is black:

E of black cards = 26 $P(E) = 26/52 = 1/2$

Ans:

1. $\frac{1}{4}$	2. $\frac{1}{2}$	3. $\frac{1}{2}$	4. $\frac{3}{13}$	5. 1
6. $\frac{11}{20}$	7. $\frac{5}{9}$	8. $\frac{77}{80}$	9. $\frac{1}{3}$	10. $\frac{3}{26}$
11. $\frac{3}{19}$	12. 8	13. $\frac{5}{26}$	14. $\frac{3}{8}$	15. $\frac{1}{2}$
16. $\frac{3}{4}$	17. $\frac{4}{25}$	18. $\frac{1}{8}, \frac{3}{8}, \frac{1}{2}$	19. $\frac{2}{7}$	20. $\frac{1}{6}, \frac{5}{12}$