PROBABLITY

KEY POINTS

1. **Probability:** - The theoretical probability of an event E, written as P (E) is defined as.

$$P(E) = \frac{\text{Number of outcomes Favorable to E}}{\text{Number of all possible outcomes of the experiment}}$$

Where we assume that the outcomes of the experiment are equally likely.

2. The probability of a sure event (or certain event) is 1.
3. The probability of an impossible event is 0.
4. The probability of an Event E is number P (E) such that $0 \le P(E) \le 1$.
5. Elementary events: - An event having only one outcome is called an elementary event. The sum of the probabilities of all the elementary events of an experiment is 1.
6. For any event E, P (E) +P ($\bar{E}$) =1, where $\bar{E}$ stands for not E, E and $\bar{E}$ are called complementary event.
7. Performing experiments:-
   a. Tossing a coin.
   b. Throwing a die.
   c. Drawing a card from deck of 52 cards.
8. **Sample space:-**The set of all possible outcomes in an experiment is called sample space.
9. An event is a subset of a sample space.
10. Equally likely events - If one event cannot be expected in preference to other event then they are said to be equally likely.

LEVEL-I

1. The probability of getting bad egg in a lot of 400 is 0.035.Then find the no. of bad eggs in the lot.

2. Write the probability of a sure event.

3. What is the probability of an impossible event?

4. When a dice is thrown, then find the probability of getting an odd number less than 3.

5. A girl calculates that the probability of her winning the third prize in a lottery is 0.08.If 6000 tickets are sold, how many ticket has she bought.

6. What is probability that a non-leap year selected at random will contain 53 Sundays.

7. A bag contains 40 balls out of which some are red, some are blue and remaining are black. If the probability of drawing a red ball is $\frac{11}{20}$ and that of blue ball is $\frac{1}{5}$, then what is the no. of black ball?

8. Two coins are tossed simultaneously. Find the probability of getting exactly one head.

9. A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting an ace.

10. In a lottery, there are 10 prizes and 25 blanks. Find the probability of getting a prize.

LEVEL-II

1. Find the probability that a no. selected at random from the number 3, 4, 5, 6...25 is prime.

2. A bag contains 5 red, 4 blue and 3 green balls. A ball is taken out of the bag at random. Find the probability that the selected ball is (a) of red colour (b) not of green colour.

3. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability of drawing

(a) A face card (b) card which is neither a king nor a red card

4. A dice is thrown once. What is the probability of getting a number greater than 4?

5. Two dice are thrown at the same time. Find the probability that the sum of two numbers appearing on the top of the dice is more than 9.

6. Two dice are thrown at the same time. Find the probability of getting different numbers on both dice.

7. A coin is tossed two times. Find the probability of getting almost one head.

8. Cards with numbers 2 to 101 are placed in a box. A card selected at random from the box. Find the probability that the card which is selected has a number which is a perfect square.

9. Find the probability of getting the letter M in the word "MATHEMATICS".

LEVEL-III

1. Cards bearing numbers 3, 5… 35 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card bearing (a) a prime number less than 15 (b) a number divisible by 3 and 5.

2. Two dice are thrown at the same time. Find the probability of getting (a) same no. on the both side (b) different no. on both dices.

3. A child game has 8 triangles of which three are blue and rest are red and ten squares of which six are blue and rest are red. One piece is lost at random. Find the probability of that is (a) A square (b) A triangle of red colour.

4. Two dice are thrown simultaneously. What is the probability that:

(a) 5 will not come up either of them? (b) 5 will come up on at least one? (c) 5 will come at both dice?

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5. The king, queen and jack of clubs are removed from a deck of 52 playing cards and remaining cards are shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of (a) heart (b) queen (c) clubs

6. A game consist 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., 3 heads or three tails and loses otherwise. Calculate the probability that Hanif will lose the game.

7. Cards bearing numbers 1, 3, 5… 37 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card bearing

(a) A prime number less than 15

(b)a number divisible by 3 and 5.

8. A dice has its six faces marked 0, 1, 1, 1, 6, 6.Two such dice are thrown together and total score is recorded.(a)how many different scores are possible? (b) What is the probability of getting a total of seven?

Self-Evaluation/HOTS

1. Two dice are thrown simultaneously .Find the probability of getting an even number as the sum.
2. Cards marked with the number 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from the box. Find the probability that the number on the card is:
   (i) An even number
   (ii) A number less than 14
   (iii) A number is perfect square
   (iv) A prime number less than 20
3. Out of the families having three children, a family is chosen random. Find the probability that the family has
   (i) Exactly one girl
   (ii) At least one girl
   (iii) At most one girl

Value based Question

Q1. In a survey, it was found that 40 % people use petrol, 35 % uses diesel and remaining uses CNG for their vehicles. Find the probability that a person uses CNG at random.

(a) Which fuel out of above 3 is appropriate for the welfare of the society?

Board questions of previous years

Level -I

1. A die is thrown once. What is probability of getting a number greater than 4?
2. A bag contains 4 red and 6 black balls. A ball is taken out of the bag at random. Find the probability of getting a black ball?
3. A die is thrown once. Find the probability of getting.
   a) prime number
   b) A number divisible by 2.

Level -II

1. A bag contains card which are numbered from 2 to 90. A card is drawn at random from the bag. Find the probability that it bears.

a.) A Two digit number

b.) A number which is perfect square.

2. Two dice are rolled once. Find the probability of getting such numbers on the two dice whose product is 12.

Level – III

1. Red queens and black jacks are removed from a pack of 52 playing card. A card is drawn at random from the remaining card, after reshuffling them. find the probability that the drawn card is:

   i) King ii) of red colour iii) a face card iv) queen

2. All the red face cards are removed from a pack of 52 playing cards. A card is drawn at random from the remaining cards after reshuffling them. Find the probability that the card drawn is

   i) Of red colour ii) a queen iii) an ace iv) a face card.

3. In a family of 3 children, find the probability of having a least 1 boy.

4. Three unbiased coins are thrown simultaneously. Find the probability of getting.

   i. Exactly two heads.

   ii. At least two heads.

   iii. At most two heads.

ANSWER

LEVEL-I

1. 14
2. 1
3. 0
4. 1/6
5. 480
6. 1/7
7. 10
8. ½
9. 1/13
10. 2/7

LEVEL - II

1. 8/23
2. A. 5/12 B. ¾
3. A. 3/13 B. 6/13
4. 1/3
5. 1/6
6. 5/6
7. ¾
8. 9/100
9. 2/11

LEVEL – III

1. A. 5/17 B. 1/17
2. A. 1/6 B. 5/6
3. A. 5/9 B. 5/18
4. A. 25/36 B. 11/36 C. 1/36
5. A. 13/49 B. 3/49, C 10/49
6. ¾
7. A. 5/19 B. 1/19
8. A. 6 scores B. 1/3

SELF EVALUATION

1. ½
2. A. ½ B 3/25 C 9/100, D. 2/25
3. A. 1/5, B. (i) ¼ (ii) 0

VALUE BASED QUESTION

1. Probability = 0.25

   CNG

BOARD QUESTION

LEVEL-I

1. 1/3
2. 3/5
3. ½, ½

LEVEL- II

1. 81/89, 8/89
2. 1/9

LEVEL- III

1. 1/12, 11/48, 1/6, 1/24
2. 10/23,1/23,2/23,3/23
3. 7/8
4. 3/8, ½,7/8

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