14. PROBABILITY

1. A die is thrown once. Find the probability of getting a number which has at least 2 factors.

   [Ans : $\frac{5}{6}$**]**

2. A die is thrown once. Find the probability of getting "at most 2".

   [Ans: $\frac{1}{3}$**]**

3. A die is thrown once. Find the probability of getting a number which is not a factor of 36.

   [Ans : $\frac{1}{6}$**]**

4. Dimpi and Vani draws one ball each from a bag containing 2 red and 3 green balls. Dimpi draws a red ball first which is not put back. What is the probability that Vani who draws next also gets a red ball.

[Ans : $\frac{1}{4}$ **]**

5. A pair of dice is thrown once. What is the probability of getting the number 4 on one die at least?

[Sol. : Total outcomes = $6 \times 6 = 36$.

Favourable outcomes for number 4 at least on one die are (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (1, 4), (2, 4), (3, 4), (5, 4) and (6, 4) (Total 11)

So, required probability $= \frac{11}{36}$ **]**

6. A box is containing 55 flash cards showing different numbers on it. If a card is picked up at random from the box, the probability of getting an even number is $\frac{1}{11}$. How many cards have odd numbers written on it ?

[Ans : Let x cards have odd numbers written on them.

So, number of even number of cards = $(55 - x)$.

Hence, $\frac{55-x}{55} = \frac{1}{11}$

$\Rightarrow \quad 55 - x = 5 \quad \Rightarrow \quad x = 55 - 5 = 50.$

Thus, odd number cards are 50.**]**

7. A letter is chosen at random from the letters of the message 'HEY DUDE WASSUP!'. What is the probability that the chosen letter is a consonant ?

[Sol. : Total possible outcomes = 13.

Outcomes favourable to a consonant are H, Y, D, D, W, S, S, P

So, required probability $= \frac{8}{13}$.**]**

8. Chances of winning a game are 60%. If Anil has played the game 20 times, how many times he can expect to loose ?

[Sol. : Chance of winning = 60%

Chance of losing = $(100 - 60)\% = 40\%$

Therefore, Anil will loose 40% of 20 games.

$= \frac{40 \times 20}{100} = 8 \text{games}$.**]**

9. Black aces and black queens are removed from a pack of 52 cards. Remaining cards are reshuffled and then a card is drawn. Find the probability of getting : (*i*) a black card (*ii*) an ace.

[Sol. : Number of remaining cards = 52 – 2 – 2 = 48.

i) $\therefore$ P(black card) $= \frac{26-2-2}{48} = \frac{22}{48} = \frac{11}{24}$

ii) P(an ace) $= \frac{(4-2)}{48} = \frac{2}{48} = \frac{1}{24}$]

10. Seeta and Geeta are two sisters with an age difference of 3 years. Find the probability that :
a) they both are born in a leap year. b) at least one of them is born in a leap year.

[Sol. : a) As the age difference is 3 years, so both cannot be born in a leap year.

So, required probability = 0.

b) Let one of the sisters be not born in a leap year, say x. Since the age difference is 3 years, so the other sister will be born in the year x + 3

Now, for the years (x + 1), (x + 2) and (x + 3), either x + 1 may be a leap year or (x + 2) may be a leap year or (x + 3) may be leap year.

So, P(at least onr of them is born in a leap year) $= \frac{1}{3}$.

So, P(other sister born in a leap year) $= \frac{1}{3}$

Let one of the sisters be born in a leap year say y. Then, since the age difference is 3 years, the other sister will not be born in a leap year.

So, in this case, P(other sister born in a leap year) = 0.

So, the required probability of at least one of them born in a leap year $= \frac{1}{3} + 0 = \frac{1}{3}$]

11. A number is selected from the numbers 2, 3, 3, 5, 5, 5, 7, 7, 7, 7, 9, 9, 9, 9, 9 at random. Find the probability that the number selected is :
i) their median ii) their mode

[Sol. : i) Median of the numbers is 7.

So, P(median) $= \frac{4}{15}$ (Because there are four 7s and total number = 15

ii) Mode = 9.

So, P(mode) = $\frac{5}{15} = \frac{1}{3}$. (There are five 9's)]

12. Two friends Charlie and Gloria plan to visit a dentist for a regular check up in the same week from Monday to Friday. Their chances of visiting the dentist on any one day of the week are equally likely. What is the probability of visiting the dentist.

i) on the same day?

ii) on two consecutive days?

iii) on two different days?

[Sol. : Total outcomes = $5 \times 5 = 25$.

i) P(visiting the same day) $= \frac{5}{25} = \frac{1}{5}$.

ii) For two consecutive days they can meet as shown below :

(Mon, Tue), (Tue, Wed), (Wed, Thurs), (Thurs, Friday)

There are two possibilities ___Charlie may visit on Mon, Tue, ..., Friday and Gloria may visit on Tue, Wed, ..., Friday or Gloria may visit on Mon, Tue, ..., Friday and Charlie may visit on Tue, Wed, ..., Friday.

So, total favourable ways = $2 \times 4 = 8$ ways.

Hence, required probability $= \frac{8}{25}$

iii) P(on two different days) = 1 – (same day)

$= 1 - \frac{1}{5} = \frac{4}{5}$.

13. Sum of digits of a 2 digit number is 11.

A) Write the numbers.

B) Find the probability that such a number is even.

C) Find the probability that such a number is greater than 50.

D) Find the probability that such a number is divisible by 11.

[Ans : A) 29, 92, 38, 83, 47, 74, 56, 65 B) $\frac{1}{2}$

C) $\frac{5}{8}$ D) 0]

14. In a leap year, the month of February begins with Monday. Find the probability that :

a) its last day is also Monday.

b) it has 5 Mondays.

c) it has 5 Sundays.

[Ans : a) 1 b) 1 c) 0]

15. Three students A, B and C want to be in the school cricket team. The chances of B selection is twice that of A's, the chances of C's selection is twice that of B's. What are the probabilities that

i) C will be in school cricket team? ii) B will not be able to make it (team)?

iii) A or B will find a place in the school cricket team?

[Ans. : i) $\frac{4}{7}$ ii) $\frac{5}{7}$ iii) $\frac{3}{7}$**]**

16. On a particular day, Vidhi and Unnati couldn't decide on who would get to drive the car. They had one coin each and flipped their coins exactly three times. The following was agreed upon:

- If Vidhi gets two heads in a row, she would drive the car.
- If Unnati gets a head immediately followed by a tail, she would drive the car.

Who has more probability to drive the car that day? List all outcomes and show your steps.

[Ans. : All the outcomes as {(HHH), (HHT), (HTH), (THH), (TTH), (THT), (HTT), (TTT)} and identifies the total number of outcomes as 8.
The favourable outcomes for Vidhi as {(HHH), (HHT), (THH)} and identifies the favourable outcomes for Vidhi to win as 3.)]

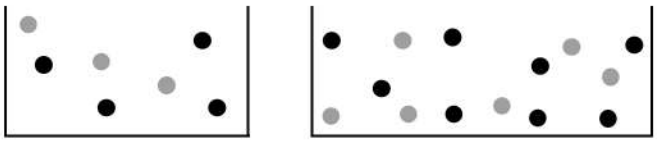
The probability of Vidhi flipping two heads in a row as $\frac{3}{8}$.

The favourable outcomes for Unnati as {(HHT), (HTH), (THT), (HTT)} and identifies the favourable outcomes for Unnati to win as 4.

The probability of Unnati flipping a head immediately followed by a tail as $\frac{4}{8}$.

Uses steps 3 and 5 to conclude that if they flipped their coins exactly three times. Unnati is more likely to drive the car that day.**]**

17. Shown below are two baskets with grey and black balls.



Basket 1 Basket 2

Abhishek is playing a game with his friend where he has to close his eyes and pick a black ball from one of the baskets in one trial.

He said "I will try basket 2 as it hs a higher number of black balls than basket 1 and hence the probability of picking a black ball from basket 2 is higher."

Is Abhishek's statement correct? Justify your answer.

[Sol. : Writes that Abhishek's statement is not correct.

Justifies the answer. For example, writes that the probability of randomly picking a black ball from basket 1 is $\frac{4}{7}$ and the probability of randomly picking a black ball from basket 2 is $\frac{8}{14}$.

Hence, the probability of picking ball from basket 1 is same as basket 2**]**

18. Rohan has a bag of multiple balls either pink, green or yellow in colour. He randomly picks up one ball.

His friend, Farid predicted, "The probability of Rohan picking a pink ball is definitely $\frac{1}{3}$ as there are 3 colours".

If Farid's statement true or false. Give a valid reason or a counter example.

[Sol. : Farid's statement is false.

Gives a counterexample. For example, if a bag has 1 pink ball, 2 green balls and 2 yellow balls, the probability of randomly picking a pink ball is $\frac{1}{5}$.]

19. Shivesh was tossing a fair coin, Shown below are the outcomes of his first 5 tosses.
Tail Tail Tail Tail Tail
Is the probability of Shivesh getting a head in his sixth toss higher than the probability of getting a tail? Give a valid reason.

[Sol. : No, For example, when tossing a fair coin, the probability of getting a head is equal to the probability of getting a tail.]

20. Jenin has four 50 - rupee notes, seven 100 - rupee notes and two 2000 - rupee notes in her purse. She doesn't have any otehr denomination of currency with her. She goes for shopping and buys a skirt for Rs. 799. She takes out a note from her purse at random.

i) Find the probability that the note will be sufficient to pay for the dress.

ii) Find the probability that she will be able to give exactly Rs. 799 to the shopkeeper. Show your work.

[Sol. : i) Identifies total number of outcomes as 4 + 7 + 2 = 13 and favourable number of outcomes as 2.

Finds the probability that the note will be sufficient to pay for the dress as $\frac{2}{13}$.

ii) Writes that the probability that Jenin will be able to give exactly Rs.799 to the shopkeeper is 0.]