Probability

MATHEMATICAL REASONING

1. Find the probability of getting 53 Fridays in a leap year.

(a) $\frac{3}{7}$

(b) $\frac{4}{7}$

(c) $\frac{2}{7}$

(d) $\frac{5}{7}$

2. There are 100 cards in a bag on which numbers from 1 to 100 are written. A card is taken out from the bag at random. Find the probability that the number on the selected card is divisible by 9 and is a perfect square.

(a) $\frac{9}{100}$

(b) $\frac{1}{25}$

(c) $\frac{7}{100}$

(d) $\frac{3}{100}$

3. When two dice are thrown, the probability of getting a number always greater than 4 on the second dice is ___.

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$

(c) $\frac{1}{36}$ (d) $\frac{5}{36}$

4. Three cards of spades are lost from a pack of 52 playing cards. The remaining cards were well shuffled and then a card was drawn at random from them. Find the probability that the drawn cards is of black colour.

(a) $\frac{26}{49}$ (b) $\frac{23}{49}$

(c) $\frac{13}{26}$ (d) $\frac{23}{52}$

5. The king, queen and jack of clubs are removed from a deck of 52 playing cards and then well-shuffled. One card is selected from the remaining cards. The probability of getting a club is ___.

(a) $\frac{13}{49}$ (b) $\frac{10}{49}$

(c) $\frac{3}{49}$ (d) $\frac{1}{49}$

6. Two dice are thrown at a time. The probability that the difference of the numbers shown on the dice is 1 is ___.

(a) $\frac{5}{18}$ (b) $\frac{1}{36}$

(c) $\frac{1}{6}$ (d) $\frac{1}{18}$

7. Cards marked with numbers 13, 14, 15,.....60 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that number on the drawn card is
(i) divisible by 5.
(ii) a number which is a perfect square.

	(i)	(ii)
(a)	$\frac{5}{24}$	$\frac{1}{24}$
(b)	$\frac{5}{24}$	$\frac{1}{12}$
(c)	$\frac{1}{12}$	$\frac{5}{12}$

(d) None of these

8. A black die, a red die and a green die are thrown at the same time. What is the probability that the sum of three numbers that turn up is 15?

(a) $\frac{11}{216}$ (b) $\frac{5}{108}$

(c) $\frac{9}{216}$ (d) $12\frac{1}{18}$

9. A bag contains three green, four blue and two orange marbles. If a marble is picked at random, then the probability that it is not an orange marble, is ___.

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$

(c) $\frac{4}{9}$ (d) $\frac{7}{9}$

10. A bag contains 6 blue and 4 green marbles. If a marble is drawn at random from the bag, the probability that the marble drawn is green, is __.

(a) $\frac{2}{5}$ (b) $\frac{1}{5}$

(c) $\frac{4}{5}$ (d) $\frac{1}{10}$

11. Five cards-the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. If the queen is drawn and put aside, one card is then picked up at random, what is the probability that the second card picked up is (i) a king and (ii) a queen?

	(i)	(ii)
(a)	1/4	0
(b)	1/2	0
(c)	1/13	0
(d)	1/3	1/2

12. A letter is chosen at random from the letters of the word 'ASSOCIATION'. Find the probability that the chosen letter is a vowel.

(a) $\frac{3}{11}$ (b) $\frac{5}{11}$

(c) $\frac{6}{11}$ (d) $\frac{7}{11}$

13. One card is drawn from a well-shuffled deck of 52 cards. The probability of drawing an ace is ___.

(a) $\frac{1}{12}$ (b) $\frac{1}{13}$

(c) $\frac{1}{50}$ (d) $\frac{3}{10}$

14. A jar contains 54 marbles each of which is blue, green or white. The probability of selecting a blue marble at random from the jar is $\frac{1}{3}$, and the probability of selecting a green marble at random is $\frac{4}{9}$. .How many white marbles does the jar contain?

(a) 12 (b) 6

(c) 9 (d) 11

15. Two dice are thrown simultaneously. The probability of getting a doublet or a total of 4 is ___.

(a) $\frac{2}{9}$ (b) $\frac{3}{7}$

(c) $\frac{4}{9}$ (d) $\frac{5}{9}$

EVERYDAY MATHEMATICS

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

(a) $\frac{1}{4}$

(b) $\frac{1}{2}$

(c) $\frac{3}{4}$

(d) $\frac{5}{8}$

17. 250 lottery tickets were sold and there are 5 prizes on these tickets. If Kunal has purchased one lottery ticket, what is the probability that he wins a prize?

(a) $\frac{1}{50}$ (b) $\frac{1}{125}$

(c) $\frac{3}{125}$ (d) $\frac{3}{50}$

18. 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 one day as on another. What is the probability that both will visit the shop on different days?

(a) $\frac{3}{5}$ (b) $\frac{4}{5}$

(c) $\frac{12}{25}$ (d) $\frac{1}{5}$

19. It is know that a box of 600 electric bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. What is the probability that it is a non-defective bulb?

(a) 0.45 (b) 0.98

(c) 0.57 (d) 0.85

20. Honey goes to school by a car driven by his driver or uses his bicycle. Probability that he will use the car is $\frac{3}{7}$. What is the probability that he will use his bicycle for going to the school?

(a) $\frac{1}{7}$ (b) $\frac{6}{7}$

(c) $\frac{4}{7}$ (d) $\frac{5}{7}$

ACHIEVERS SECTION (HOTS)

21. A box contains 19 balls bearing numbers 2, 3,...., 19. A ball is drawn at random from the box. What is the probability that the number on the ball is

(i) A prime number ?

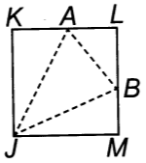
(ii) Divisible by 3 or 5?

(iii) Neither divisible by 5 nor by 10?

(iv) An even number?

	(i)	(ii)	(iii)	(iv)
(a)	3/19	7/19	1/19	9/19
(b)	1/19	1/19	8/19	9/19
(c)	8/19	8/19	16/19	9/19
(d)	8/19	8/19	17/19	9/19

22. In the given figure. JKLM is a square with sides of length 6 units. Points A and B are the mid-points of sides KL and LM respectively. If a point is selected at random from the interior of the square. What is the probability that the point will be chosen from the interior of ΔJAB?



(a) 5/8 (b) 7/8

(c) 3/4 (d) 3/8

23. Two dice are thrown simultaneously. Match the probability of events in column-I to the column-II.

Column-I	Column-II
(P) Sum as prime number	(i) $\frac{11}{36}$
(Q) Multiple of 2 on one dice and multiple of 3 on other dice	(ii) $\frac{1}{12}$
(R) Total of at least 10	(iii) $\frac{5}{12}$
(S) Doublet of even numbers	(iv) $\frac{1}{6}$

(a) P $\rightarrow$ (iv), Q $\rightarrow$ (i), R $\rightarrow$ (iii), S $\rightarrow$ (ii)

(b) P $\rightarrow$ (iv), Q $\rightarrow$ (iii), R $\rightarrow$ (i). S $\rightarrow$ (ii)

(c) P $\rightarrow$ (iii), Q $\rightarrow$ (ii), R $\rightarrow$ (iv), S $\rightarrow$ (i)

(d) P $\rightarrow$ (iii), Q $\rightarrow$ (i), R $\rightarrow$ (iv), S $\rightarrow$ (ii)

24. A bag contains 12 balls of two different colours, out of which x are white. One ball is drawn at random. If 6 more white balls are put in the bag, the probability of drawing a white ball now will be double to that of the previous probability of drawing a white ball. Then, the value of x is ___.

(a) 3

(b) 4

(c) 5

(d) 6

25. Fill in the blanks.
(i) In a single throw of a dice, the probability of getting a number greater than 2 is **P** .
(ii) A card is drawn from a deck of 52 cards. The probability of drawing a red card is **Q** and a face card is **R** .
(iii) A bag contains 2 blue and 3 green marbles, then the probability of drawing red marble **S**

P	Q	R	S	P
(a)	$\frac{1}{3}$	$\frac{11}{26}$	$\frac{2}{11}$	1
(b)	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{3}{11}$	0
(c)	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{13}$	0
(d)	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{13}$	$\frac{3}{5}$

ANSWER KEY									
1.	C	**2.**	D	**3.**	B	**4.**	B	**5.**	B
6.	A	**7.**	B	**8.**	B	**9.**	D	**10.**	A
11.	A	**12.**	C	**13.**	B	**14.**	A	**15.**	A
16.	C	**17.**	A	**18.**	B	**19.**	B	**20.**	C
21.	C	**22.**	D	**23.**	D	**24.**	A	**25.**	C

HINTS AND SOLUTION

1. (c): Leap year contains 366 days.
52 weeks + 2 days
52 weeks contain 52 Fridays.
We will get 53 Fridays if one of the remaining two days is a Friday. Total possibilities for two days are:
(Sunday, Monday), (Monday, Tuesday), (Tuesday, Wednesday),
(Wednesday, Thursday), (Thursday, Friday), (Friday, Saturday), (Saturday, Sunday)
There are 7 possibilities and out of these 2 are favourable cases.

$\therefore$ Required probability $= \frac{3}{100}$

2. (d): Total number of possible outcomes = 100
Numbers from 1 to 100 which are divisible by 9 and perfect square are 9, 36 and 81.
Number of favourable outcomes = 3

$\therefore$ Required probability $= \frac{3}{100}$

3. (b) Total number of outcomes when two dice are thrown = 36.
Let A be the event of getting a number always greater than 4 on second dice.

$\therefore A = \{(1,5),(1,6),(2,5),(2,6),(3,5),(3,6)$
$(4,5),(4,6),(5,5),(5,6),(6,5),(6,6)\}$

$\therefore$ Number of possible outcomes $=12$

$\therefore P(A) = \frac{12}{36} = \frac{1}{3}$

4. (b) No. of cards left $= 52-3 = 49$
No. of cards of spade left $= 13-3 = 10$
No. of black cards left $= 13+10 = 23$
[$\because$ Spade is of black colour]
Total no. of ways to draw a card = 49
No. of ways to draw a black card = 23
Required probability = 23/49

5. (b): total 13 cards are present in suit of club if 3 cards are removed, then 10 cards of clubs are remaining.

$\therefore$ Probability of getting a club $= \frac{10}{49}$

6. (a) Total number of outcomes = 36
Difference of numbers is 1, when pairs are (6, 5).(5, 4), (4, 3), (3, 2), (2, 1), (5, 6), (4, 5). (3, 4), (2, 3), (1, 2)

$\therefore$ Total favorable outcomes $=10$

$\therefore$ Required probability $= \frac{10}{36} = \frac{5}{18}$

7. (b) Outcomes are 13, 14, 15,....., 60.
Total number of possible outcomes $= 60-12 = 48$
The numbers divisible by 5 are 15, 20, 25, 30, 35, 40, 45, 50, 55, 60.
Thus, the number of numbers divisible by 5 $=10$

Required probability $= \frac{10}{48} = \frac{5}{24}$

(ii) Perfect square numbers are 16, 25, 36, 49; Thus, the number of perfect square number = 4

Required probability $= \frac{4}{48} = \frac{1}{12}$

8. (b) Total number of outcomes when three dice are thrown $= 6 \times 6 \times 6 = 216$

For sum of numbers to be 15, possible ways are, (6, 6, 3). (6, 3, 6), (3, 6, 6), (6, 5, 4), (6, 4, 5), (5, 4, 6), (5, 6, 4), (4, 5, 6), (4, 6, 5), (5, 5, 5)

$\therefore$ Number of favorable outcomes $= 10$

$\therefore$ Required probability $= \frac{10}{216} = \frac{5}{108}$

9. (d) Total number of marbles $= 3 + 4 + 2 = 9$

No. of green and blue marbles $= 3 + 4 = 7$.

$\therefore$ Probability of not getting an orange marble $= \frac{4}{10} = \frac{2}{5}$

10. (a) Total number of marbles = 10

$\therefore$ Probability of drawing a green marble

$= \frac{4}{10} = \frac{2}{5}$

11. (a): The queen is drawn and put aside,

$\therefore$ Only 5-1=4 cards are left,

$\Rightarrow$ Possible outcomes = 4

(i) $\because$ There is only one king

$\therefore$ No. of favourable outcomes = 1

$\Rightarrow \quad P(an\ ace) = \frac{1}{4}$

(ii) Since, the only queen has already been put aside.

$\therefore$ Number of possible outcomes $= 0$

$\Rightarrow$ P (a queen) $= \frac{0}{4} = 0$

12. (c) Total number of letters in 'ASSOCIATION'=11 Vowels are A, O, I, A, I O, i.e., 6 in numbers

$\therefore$ Probability of getting a vowel $= \frac{6}{11}$

13. (b): Total number of cards = 52

Total number of aces present in a deck of cards $= 4$

$\therefore$ Probability of drawing an ace $= \frac{4}{52} = \frac{1}{13}$

14. (a): Let there be b blue, g green and w white marbles in the jar. Then, $b + g + w = 54$ ....(i)

$\therefore$ P (Selecting a blue marble) $= \frac{b}{54}$

It is given that the probability of selecting a blue marble is $\frac{1}{3}$.

$\therefore \quad \frac{1}{3} = \frac{b}{54} \Rightarrow b = 18$

We have, P (Selecting a green rnarble) $= \frac{4}{9}$ (given)

$\Rightarrow \qquad \frac{9}{54} = \frac{4}{9} \Rightarrow g = 24$

Substituting the values of b and g in (i), we get:

$18 + 24 + w = 54 \Rightarrow w = 12$

Hence, the jar contains 12 white marbles.

15. (a): Total number of outcomes, when two dice are thrown $= 6 \times 6 = 36$

Total number of doublets present

=(1, 1), (2, 2), (3, 3), (4,4). (5, 5), (6, 6)

For a total of 4, pairs can be (1, 3), (3, 1), (2, 2). Thus, total number of favourable outcomes = 8 [since (2, 2) is present in both the cases],

$\therefore$ Required probability $= \frac{8}{36} = \frac{2}{9}$

16. (c)

17. (a) Total number of outcomes = 250

Number of favorable outcomes = 5

$\therefore$ Probability that Kunal wins the prize

$= \frac{5}{250} = \frac{1}{50}$

18. (b): Shyam and Ekta are visiting a shop from Tuesday to Saturday.

Total possible ways of visiting the shop by them $=5\times5=25$.
Possible ways of visiting the shop on same day = 5
Possible ways of visiting the shop on different days $=25-5=20$
$\therefore$ Probability of visiting the shop on different days $=\frac{20}{25}=\frac{4}{5}$

19. (b): Out of 600 electric bulbs one bulb can be chosen in 600 ways.
.'. Total number of elementary events = 600
There are 588 $(=600-12)$ non-defective bulbs out of which one bulb can be chosen in 588 ways.
$\therefore$ Favorable number of elementary events = 588
Hence, P (Getting a non-defective bulb)
$$=1-\frac{3}{7}=\frac{4}{7}$$

20. (c): Probability that he will use the bicycle + Probability the he will use the car = 1
$\therefore$ Probability that he will use the car = 3/7
$\therefore$ Probability that he will use the bicycle
$$=1-\frac{3}{7}=\frac{4}{7}$$

21. (c): Total number of possible outcomes $=19$
(i) Prime numbers are 2, 3, 5, 7, 11, 13, 17, 19.
$\therefore$ Probability of numbers being prime = 8/19
(ii) Numbers divisible by 3 or 5 are 3, 5, 6, 9, 10, 12, 15,18.
$\therefore$ Required probability = 8/19
(iii) Numbers neither divisible by 5 nor by 10 are 1,2, 3,4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19.
$\therefore$ Required probability $=16/19$
(iv) Even numbers are 2, 4, 6, 8, 10, 12, 14, 16, 18.
$\therefore$ Required probability $=9/19$

22. (d): Area of square JMLK $=6^2=36$ *sq.* units
A and B are the mid-points of sides KL and LM. i
$\therefore$ AL = KA = LB = BM = 3 units

Now, Area of $\Delta ALB=\frac{1}{2}\times AL\times LB$
$$=\frac{1}{2}\times3\times3=\frac{9}{2}sq.\text{ units}$$
Area of $\Delta JMB=\frac{1}{2}\times BM\times JM$
$$=\frac{1}{2}\times3\times3=\frac{9}{2}\text{sq. units.}$$
Area of $\Delta KAJ=\frac{1}{2}\times KJ\times KA$
$$=\frac{1}{2}\times6\times3=9\,sq.\text{ units}$$
Total area of all the three triangles
$$=\left(\frac{9}{2}+9+9\right)=\frac{45}{2}\ sq.\text{ units}$$
$\therefore$ Area of $\Delta JAB=\left(36-\frac{45}{2}\right)=\frac{27}{2}$ sq. units
$\therefore$ Required probability $=\frac{\frac{27}{2}}{36}=\frac{27}{2\times36}=\frac{3}{8}$

23. (d): Total number of outcomes when two dice are thrown $=6\times6=36$
(P) Possible ways for sum of numbers on dice is prime are
(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, 5), (6, 1)
Favourable outcomes $=15$
$\therefore$ Required probability $=\frac{15}{36}=\frac{5}{12}$
(Q) Possible ways of multiple of 2 on one dice and multiple of 3 on other dice are (2, 3), (2, 6), (3, 2), (6, 2), (4, 3), (4, 6), (3, 4), (6, 4), (6, 3), (6, 6), (3, 6)
Favourable outcomes $=11$
$\therefore$ Required probability $=\frac{11}{36}$
(R) Possible ways of total of atleast 10 are
(6, 6), (6, 5), (6, 4), (5, 6), (5, 5), (4, 6)
Favourable outcomes = 6
$\therefore$ Required probability $=\frac{3}{36}=\frac{1}{12}$
(S) Possible ways for doublet of even numbers are (2, 2), (4, 4), (6, 6)
Favourable outcomes = 3

$\therefore$ Required probability $= \frac{3}{36} = \frac{1}{12}$

24. (a): It is given that, Total number of balls = 12

Number of white balls = x

$\therefore$ Probability of getting a white ball $= \frac{x}{12}$

Now, 6 white balls are added.

$\therefore$ Total number of balls $= 12 + 6 = 18$

Number of white balls $= x + 6$

$\therefore$ Probability of getting a white ball $= \frac{x+6}{18}$

According to the question, $\frac{x+6}{18} = 2 \times \frac{x}{12}$

$\Rightarrow \quad x + 6 = 3x \Rightarrow x = 3$

$\therefore$ Number of white balls = 3

25. (c): (i) Total number of outcomes = 6

Numbers greater than 2 are 3, 4, 5, and 6.

Favorable outcomes = 4

$\therefore$ Required probability $= \frac{4}{6} = \frac{2}{3}$

(ii) Total number of outcomes = 52

Number of red cards = 26

$\therefore$ Probability of drawing a red card $= \frac{26}{52} = \frac{1}{2}$

Number of face cards = 12

$\therefore$ Probability of drawing a face card $= \frac{12}{52} = \frac{3}{13}$.

(iii) Since, there is no red marble in the bag, so probability of drawing a red marble is zero.