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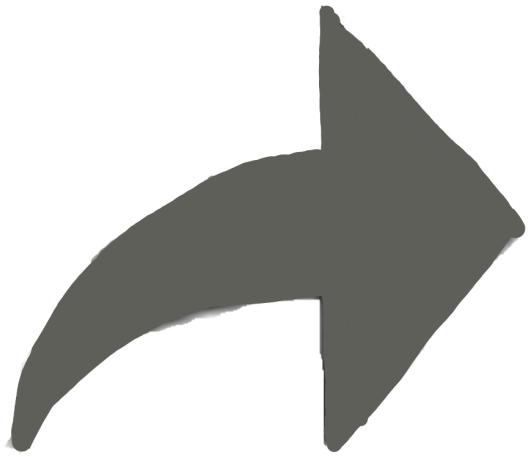

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TURN ON

NOTIFICATIONS

PROBABILITY

SCORING points

1. Probability always lies between

$$0 \leq P(E) < 1$$

2. $$P(E) = \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}}$$

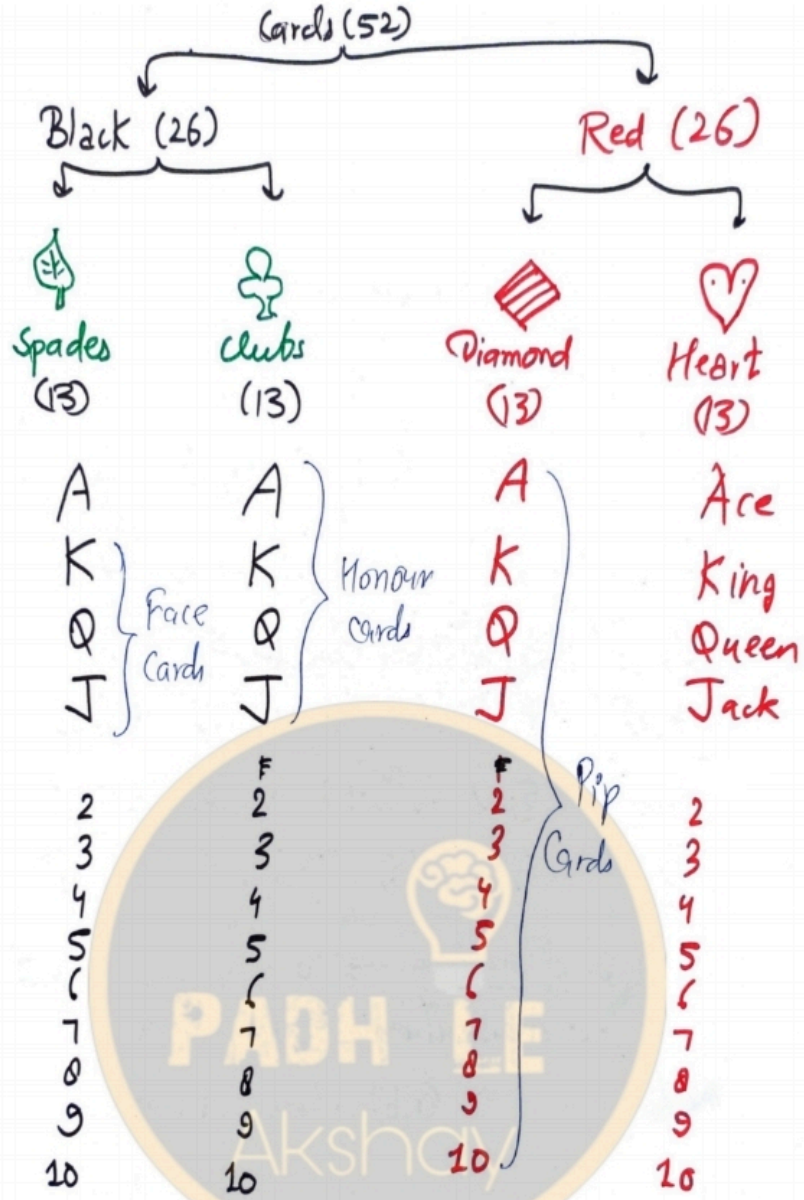
3. Complementary Event ; $P(c) = 1 - P(E)$

4. Sure Event ?
   Event having probability of 1

5. Tossing coins $P(E) = \left(\frac{1}{2}\right)^n$ → 'n' is number of coins

6. Throwing Dice outcomes = $(6)^n$ → 'n' is no. of dice

7. Leap Year ? (366 days)
   ↳ If year number is divisible by 4 → e.g. $2020 \div 4 = 55$
   ∴ YES !



ALERT... NOTES!

→ Probability of a leap year having 53 sunday = $\frac{2}{7}$

→ 1 is neither Prime nor Composite

→ 2 dice throw : 6 elementary events

Chapter-15 Probability

Very Short Question

Q. 3.Two dice are thrown simultaneously. Find the probability of getting a prime number on both dice. [CBSE 2011]

Sol. When a pair of dice is thrown, then the number of possible outcomes are $6 \times 6 = 36$

Favourable outcomes are (2, 2), (2, 3), (2, 5), (3, 2), (3, 3), (3, 5), (5, 2), (5, 3), (5, 5)

$\therefore$ Required probability $= \frac{9}{36} = \frac{1}{4}$

Q. 6. Two dice are thrown together. Find the probability of getting the same number on both dice. [CBSE 2012]

Or **In a thrown of a pair of dice, what is the probability of getting a doublet.** [CBSE 2011]

Sol. In a thrown of two dice, the number of possible outcomes = 36

Favourable outcomes = 6 *i.e.*, (1, 1), (2, 2), (3, 3), (4, 4), (5, 5) and (6, 6)

$\therefore$ Required probability $= \frac{6}{36} = \frac{1}{6}$

Q. 7. If a die is thrown once, find the probability of getting a number less than 3 and greater than 2. [CBSE 2011]

Sol. There is no such number lie on a die which is less than 3 and greater than 2.

$\therefore$ Probability will be zero.

Q.20. A coin is tossed two times. Find the probability of getting atmost one head. [NCERT Exemplar]

Sol. On tossing a coin two times, the possible outcomes are $\{(HH), (TT), (HT), (TH)\}$

$\therefore \quad n(S) = 4$

Let E = Event of getting atmost one head

$= \{(HH), (HT), (TH)\}$

$\therefore \quad n(E) = 3$

Hence, Required probability $= \frac{n(E)}{n(S)} = \frac{3}{4}$

Q.22. If the probability of an event is p, then what will be the probability of its complementary event? [NCERT Exemplar]

Sol. We know that,

Probability of an event + Probability of its complementary event = 1

$\therefore$ Probability of its complementary event

= 1 – Probability of an event = $1 - p$

Q.23. 20 tickets, on which numbers 1 to 20 are written, are mixed throughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple of 3 or 7. [CBSE (F) 2016]

Sol. Total number of tickets = 20

$\therefore$ Total number of possible outcomes = 20

Multiple of 3 or 7 = {3, 6, 9, 12, 15, 18, 7, 14}

$\therefore$ Number of favourable outcomes = 8

$\therefore$ Required probability $= \frac{8}{20} = \frac{2}{5}$

Q.10. From a pack of 52 playing cards, a card is drawn at random. Find the probability, that the drawn card is not a face card. [CBSE 2011]

Sol. Number of face cards = 12

Non-face cards = $52 - 12 = 40$

$\therefore$ The required probability $= \frac{40}{52} = \frac{10}{13}$

Short Question

Q.15. A box contains cards numbered 6 to 50. A card is drawn at random from the box. Find the probability that the drawn card has a number which is a perfect square.

[CBSE 2013]

Sol. Here, sample space contains 45 outcomes from 6 to 50 and number which is a perfect square are 9, 16, 25, 36, 49 *i.e.*, 5 numbers.

Hence, required probability $= \frac{5}{45} = \frac{1}{9}$

Q.16. The probability of guessing the correct answer to certain question is $p/12$. If the probability of not guessing the correct answer to same question is 3/4, then find the value of p. **[CBSE 2011]**

Sol. Let E = Guessing the correct answer to certain question

Probability (guessing the correct answer)

$$P(E) = \frac{p}{12} \quad \text{[given]}$$

Probability (not guessing the correct answer)

$$P(\bar{E}) = \frac{3}{4} \quad \text{[given]}$$

We know that,

$$1 - P(E) = P(\bar{E})$$

$$\Rightarrow \quad 1 - \frac{p}{12} = \frac{3}{4} \quad \Rightarrow \quad 1 - \frac{3}{4} = \frac{p}{12}$$

$$\Rightarrow \quad p = 3$$

Hence, the value of p is 3.

Q.12. In a simultaneous toss of two coins, find the probability of exactly one head.

[CBSE 2013]

Sol. Possible outcomes of tossed two coins are [HH, HT, TH, TT].

$\therefore \quad n(S) = 4$

Let E = Event of getting exactly one head

$= \{HT, TH\}$

$\therefore \quad n(E) = 2$

So, required probability $= \frac{n(E)}{n(S)} = \frac{2}{4} = \frac{1}{2}$

Hence, the probability of exactly one head is $\frac{1}{2}$.

Q. 12 If an event cannot occur, then its probability is

(a) 1 (b) $\frac{3}{4}$ (c) $\frac{1}{2}$ (d) 0

Sol. *(d)* The event which cannot occur is said to be impossible event and probability of impossible event is zero.

Q. 13 Which of the following cannot be the probability of an event?

(a) $\frac{1}{3}$ (b) 0.1 (c) 3 (d) $\frac{17}{16}$

Sol. *(d)* Since, probability of an event always lies between 0 and 1.

Q. 14 An event is very unlikely to happen. Its probability is closest to

(a) 0.0001 (b) 0.001

(c) 0.01 (d) 0.1

Sol. *(a)* The probability of an event which is very unlikely to happen is closest to zero and from the given options 0.0001 is closest to zero.

Q. 15 If the probability of an event is P, then the probability of its completmentry event will be

(a) $P-1$ (b) P (c) $1-P$ (d) $1-\frac{1}{P}$

Sol. *(c)* Since, probability of an event + probability of its complementry event = 1

So, probability of its complementry event = 1 – Probability of an event $= 1-P$

Q. 16 The probability expressed as a percentage of a particular occurrence can never be

(a) less than 100 (b) less than 0

(c) greater than 1 (d) anything but a whole number

Sol. *(b)* We know that, the probability expressed as a percentage always lie between 0 and 100. So, it cannot be less than 0.

Q. 17 If $P(A)$ denotes the probability of an event A, then

(a) $P(A) < 0$ (b) $P(A) > 1$ (c) $0 \le P(A) \le 1$ (d) $-1 \le P(A) \le 1$

Sol. *(c)* Since, probability of an event always lies between 0 and 1.

Q. 18 If a card is selected from a deck of 52 cards, then the probability of its being a red face card is

(a) $\frac{3}{26}$ (b) $\frac{3}{13}$ (c) $\frac{2}{13}$ (d) $\frac{1}{2}$

Sol. *(a)* In a deck of 52 cards, there are 12 face cards *i.e.*, 6 red and 6 black cards.

So, probability of getting a red face card $= \frac{6}{52} = \frac{3}{26}$

Q. 19 The probability that a non-leap your selected at random will contains 53 Sunday is

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{5}{7}$

Sol. *(a)* A non-leap year has 365 days and therefore 52 weeks and 1 day. This 1 day may be Sunday or Monday or Tuesday or Wednesday or Thursday or Friday or Saturday.

Thus, out of 7 possibilities, 1 favourable event is the event that the one day is Sunday.

$\therefore$ Required probability $= \frac{1}{7}$

Q. 20 When a die is thrown, the probability of getting an odd number less than 3 is

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 0

Sol. *(a)* When a die is thrown, then total number of outcomes = 6

Odd number less than 3 is 1 only.

Number of possible outcomes = 1

$\therefore$ Required probability $= \frac{1}{6}$.

Q. 21 A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is

(a) 4 (b) 13 (c) 48 (d) 51

Sol. *(d)* In a deck of 52 cards, there are 13 cards of heart and 1 is ace of heart.

Hence, the number of outcomes favourable to $E = 51$

Q. 22 The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is

(a) 7 (b) 14 (c) 21 (d) 28

Sol. *(b)* Here, total number of eggs = 400

Probability of getting a bad egg = 0.035

$\Rightarrow \frac{\text{Number of bad eggs}}{\text{Total number of eggs}} = 0.035$

$\Rightarrow \frac{\text{Number of bad eggs}}{400} = 0.035$

$\therefore$ Number of bad eggs $= 0.035 \times 400 = 14$

Q. 23 A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, then how many tickets has she bought?

(a) 40 (b) 240 (c) 480 (d) 750

Sol. *(c)* Given, total number of sold tickets = 6000

Let she bought x tickets.

Then, probability of her winning the first prize $= \frac{x}{6000} = 0.08$ [given]

$\Rightarrow$ $x = 0.08 \times 6000$

$\therefore$ $x = 480$

Hence, she bought 480 tickets.

Q. 24 One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is

(a) $\frac{1}{5}$ (b) $\frac{3}{5}$ (c) $\frac{4}{5}$ (d) $\frac{1}{3}$

Sol. *(a)* Number of total outcomes = 40

Multiples of 5 between 1 to 40 = 5, 10, 15, 20, 25, 30, 35, 40

$\therefore$ Total number of possible outcomes = 8

$\therefore$ Required probability $= \frac{8}{40} = \frac{1}{5}$

Q. 25 Someone is asked to take a number from 1 to 100. The probability that it is a prime, is

(a) $\frac{1}{5}$ (b) $\frac{6}{25}$ (c) $\frac{1}{4}$ (d) $\frac{13}{50}$

Sol. *(c)* Total numbers of outcomes = 100

So, the prime numbers between 1 to 100 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 56, 61, 67, 71, 73, 79, 83, 89 and 97.

$\therefore$ Total number of possible outcomes = 25

$\therefore$ Required probability $= \frac{25}{100} = \frac{1}{4}$

Q. 26 A school has five houses *A*, *B*, *C*, *D* and *E*. A class has 23 students, 4 from house *A*, 8 from house *B*, 5 from house *C*, 2 from house *D* and rest from house *E*. A single student is selected at random to be the class monitor. The probability that the selected student is not from *A*, *B* and *C* is

(a) $\frac{4}{23}$ (b) $\frac{6}{23}$ (c) $\frac{8}{23}$ (d) $\frac{17}{23}$

Sol. *(b)* Total number of students = 23

Number of students in house *A*, *B* and *C* = 4 + 8 + 5 = 17

$\therefore$ Remains students = 23 − 17 = 6

So, probability that the selected student is not from *A*, *B* and *C* $= \frac{6}{23}$