

# SNS COLLEGE OF TECHNOLOGY



## An Autonomous Institution Coimbatore-35

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# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19GET276 - VQAR II

II YEAR/ IV SEMESTER

**UNIT 2 – QUANTITATIVE ABILITY IV** 

TOPIC - PROBABILITY





#### Experiment:

An operation which can produce some well-defined outcomes is called an experiment.

#### 2. Random Experiment:

An experiment in which all possible outcomes are know and the exact output cannot be predicted in advance, is called a random experiment.

#### Examples:

- Rolling an unbiased dice.
- ii. Tossing a fair coin.
- Drawing a card from a pack of well-shuffled cards.
- iv. Picking up a ball of certain colour from a bag containing balls of different colours.





## 3. Sample Space:

When we perform an experiment, then the set S of all possible outcomes is called the sample space.

## Examples:

- 1. In tossing a coin, S = {H, T}
- If two coins are tossed, the S = {HH, HT, TH, TT}.
- 3. 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.





#### 5. Probability of Occurrence of an Event:

Let S be the sample and let E be an event.

Then, E ⊆ S.

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

#### 6. Results on Probability:

i. 
$$P(S) = 1$$

ii. 
$$0 \le P(E) \le 1$$

iii. 
$$P(\phi) = 0$$

- iv. For any events A and B we have :  $P(A \cup B) = P(A) + P(B) P(A \cap B)$
- v. If  $\overline{A}$  denotes (not-A), then  $P(\overline{A}) = 1 P(A)$ .





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?

- A.  $\frac{1}{2}$
- B. 2
- C. 8
- **D.**  $\frac{9}{20}$

Answer: Option D

#### Explanation:

Here, S = {1, 2, 3, 4, ...., 19, 20}.

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

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





A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

- A. 10
- B. 11/21
- c.  $\frac{2}{7}$
- D. 5/7

#### Answer: Option A

#### **Explanation:**

Total number of balls = (2 + 3 + 2) = 7.

Let S be the sample space.

Then, n(S) = Number of ways of drawing 2 balls out of 7

$$= {^{7}C_{2}}^{\cdot}$$

$$= \frac{(7 \times 6)}{(2 \times 1)}$$

$$= 21.$$

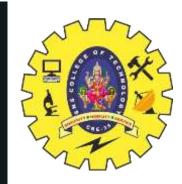
Let E = Event of drawing 2 balls, none of which is blue.

n(E) = Number of ways of drawing 2 balls out of (2 + 3) balls.

$$= {}^{5}C_{2}$$

$$= \frac{(5 \times 4)}{(2 \times 1)}$$

∴ P(E) = 
$$\frac{n(E)}{n(S)} = \frac{10}{21}$$
.





In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

- A.  $\frac{1}{3}$
- B.  $\frac{3}{4}$
- c.  $\frac{7}{19}$
- D. 8
- E. 9

Answer: Option A

#### Explanation:

Total number of balls = (8 + 7 + 6) = 21.

Let E = event that the ball drawn is neither red nor green

= event that the ball drawn is blue.

$$P(E) = \frac{n(E)}{n(S)} = \frac{7}{21} = \frac{1}{3}$$





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

- A.  $\frac{1}{6}$
- B.  $\frac{1}{8}$
- C. <sup>1</sup>/<sub>9</sub>
- D.  $\frac{1}{12}$

Answer: Option C

#### Explanation:

In two throws of a dice,  $n(S) = (6 \times 6) = 36$ .

Let  $E = \text{event of getting a sum} = \{(3, 6), (4, 5), (5, 4), (6, 3)\}.$ 

$$P(E) = \frac{n(E)}{n(S)} = \frac{4}{36} = \frac{1}{9}$$





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

- **A**.  $\frac{3}{4}$
- B.  $\frac{1}{4}$
- c.  $\frac{3}{8}$
- D.  $\frac{7}{8}$

Answer: Option D

#### Explanation:

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

Let E = event of getting at most two heads.

Then  $E = \{TTT, TTH, THT, HTT, THH, HTH, HHT\}.$ 

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{7}{8}.$$





Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?

- A. 1/2
- **B.**  $\frac{3}{4}$
- **c**.  $\frac{3}{8}$
- D. 5

Answer: Option B

#### Explanation:

In a simultaneous throw of two dice, we have  $n(S) = (6 \times 6) = 36$ .

$$n(E) = 27$$

$$P(E) = \frac{n(E)}{n(S)} = \frac{27}{36} = \frac{3}{4}$$





In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected, is:

- A. 21/46
- B. 25
- c.  $\frac{1}{50}$
- D.  $\frac{3}{25}$

#### Answer: Option A

#### Explanation:

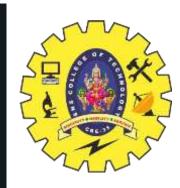
Let S be the sample space and E be the event of selecting 1 girl and 2 boys.

Then, n(S) = Number ways of selecting 3 students out of 25

$$= \frac{25C_3}{(3 \times 24 \times 23)}$$
$$= \frac{(25 \times 24 \times 23)}{(3 \times 2 \times 1)}$$
$$= 2300.$$

$$n(E) = (^{10}C_1 \times ^{15}C_2)$$
$$= \left[ 10 \times \frac{(15 \times 14)}{(2 \times 1)} \right]$$
$$= 1050.$$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{1050}{2300} = \frac{21}{46}$$





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

- A. 1/10
- B. 2/5
- c.  $\frac{2}{7}$
- D. 5

Answer: Option C

#### Explanation:

P (getting a prize) = 
$$\frac{10}{(10 + 25)} = \frac{10}{35} = \frac{2}{7}$$





From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

- A. 1
- B. 25
- c.  $\frac{35}{256}$
- D.  $\frac{1}{221}$

Answer: Option D

#### Explanation:

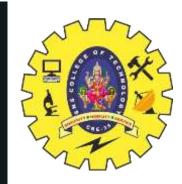
Let S be the sample space.

Then, 
$$n(S) = {}^{52}C_2 = \frac{(52 \times 51)}{(2 \times 1)} = 1326.$$

Let E = event of getting 2 kings out of 4.

$$n(E) = {}^{4}C_{2} = \frac{(4 \times 3)}{(2 \times 1)} = 6.$$

$$P(E) = \frac{n(E)}{n(S)} = \frac{6}{1326} = \frac{1}{221}$$





Two dice are tossed. The probability that the total score is a prime number is:

- A.  $\frac{1}{6}$
- B.  $\frac{5}{12}$
- **c**.  $\frac{1}{2}$
- D.  $\frac{7}{9}$

Answer: Option B

#### Explanation:

Clearly,  $n(S) = (6 \times 6) = 36$ .

Let E = Event that the sum is a prime number.

Then  $E = \{ (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5) \}$ 

$$n(E) = 15.$$

∴ P(E) = 
$$\frac{n(E)}{n(S)} = \frac{15}{36} = \frac{5}{12}$$
.





A card is drawn from a pack of 52 cards. The probability of getting a queen of club or a king of heart is:

- A.  $\frac{1}{13}$
- B.  $\frac{2}{13}$
- c.  $\frac{1}{26}$
- D.  $\frac{1}{52}$

Answer: Option C

#### Explanation:

Here, n(S) = 52.

Let E = event of getting a queen of club or a king of heart.

Then, n(E) = 2.

$$P(E) = \frac{n(E)}{n(S)} = \frac{2}{52} = \frac{1}{26}$$





A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red, is:

- A. 1/22
- B.  $\frac{3}{22}$
- c.  $\frac{2}{91}$
- D.  $\frac{2}{77}$

Answer: Option C

#### Explanation:

Let S be the sample space.

Then, n(S) = number of ways of drawing 3 balls out of 15

$$= ^{15}C_3$$

$$= \frac{(15 \times 14 \times 13)}{(3 \times 2 \times 1)}$$

$$= 455.$$

Let E = event of getting all the 3 red balls.

$$n(E) = {}^{5}C_{3} = {}^{5}C_{2} = \frac{(5 \times 4)}{(2 \times 1)} = 10.$$

$$P(E) = \frac{n(E)}{n(S)} = \frac{10}{455} = \frac{2}{91}$$





Two cards are drawn together from a pack of 52 cards. The probability that one is a spade and one is a heart, is:

- A.  $\frac{3}{20}$
- B.  $\frac{29}{34}$
- c.  $\frac{47}{100}$
- D. 13 102

Answer: Option D

#### Explanation:

Let S be the sample space.

Then, 
$$n(S) = {}^{52}C_2 = \frac{(52 \times 51)}{(2 \times 1)} = 1326.$$

Let E = event of getting 1 spade and 1 heart.

$$\cdot \cdot \cdot n(E)$$
 = number of ways of choosing 1 spade out of 13 and 1 heart out of 13

$$= (^{13}C_1 \times ^{13}C_1)$$

$$= (13 \times 13)$$

$$= 169.$$

$$\therefore P(E) = \frac{n(E)}{n(S)} = \frac{169}{1326} = \frac{13}{102}.$$





One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

- A.  $\frac{1}{13}$
- B.  $\frac{3}{13}$
- c.  $\frac{1}{4}$
- D.  $\frac{9}{52}$

Answer: Option B

#### Explanation:

Clearly, there are 52 cards, out of which there are 12 face cards.

$$\therefore$$
 P (getting a face card) =  $\frac{12}{52} = \frac{3}{13}$ .





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?

- A.  $\frac{3}{4}$
- B.  $\frac{4}{7}$
- c.  $\frac{1}{8}$
- D.  $\frac{3}{7}$

Answer: Option B

#### Explanation:

Let number of balls = (6 + 8) = 14.

Number of white balls = 8.

P (drawing a white ball) =  $\frac{8}{14} = \frac{4}{7}$ .





# THANK YOU