CHAPTER- Probability

Q1.

Peter throws two different dice together and finds the product of the two numbers obtained. Rina throws a dice and squares the number obtained.

Who has the better chance to get the number 25?

Q2.

A number x is selected at random from the numbers 1, 2, 3 and 4. Another number y is selected at random from the numbers 1, 4, 9 and 16. Find the probability that product of x and y is less than 16.

Q3.

Two different dice are thrown together. Find the probability that the numbers obtained

(i) have a sum less than 7

(ii) have a product less than 16

(iii) is a doublet of odd numbers.

Q4.

Two different dice are thrown together. Find the probability of:

(i) getting a number greater than 3 on each die

(ii) getting a total of 6 or 7 of the numbers on two dice

Q5.

A number x is selected at random from the numbers 1, 4, 9, 16 and another number y is selected at random from the numbers 1, 2, 3, 4. Find the probability that the value of xy is more than 16.

Q6.

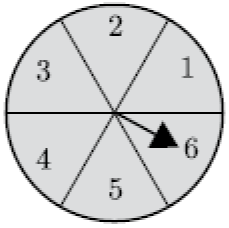
Q: Two dice are rolled. Find the probability of getting digit on the upper face of the first die less than the digit on the second die.

THEREFORE,
p(A)= n(A)/ n(S) = 15/36 =5/12

Q7.

.In Figure a disc on which a player spins an arrow twice. The fraction $\frac{a}{b}$ is formed, where a is the number of sector on which arrow stops on the first spin and 'b' is the number of the sector in which the arrow stops on second spin, On each spin, each sector has equal chance of selection by the arrow.

Find the probability that the fraction $\frac{a}{b} > 1$



Q8.

A dice is rolled twice. Find the probability that :

(i) 5 will not come up either time.

(ii) 5 will come up exactly one time.

Q9.

From a deck of 52 playing cards, Jacks and kings of red colour and Queen and Aces of black colour are removed. The remaining cards are mixed and a card is drown at random. Find the probability that the drawn card is

(i) a black queen

(ii) a card of red colour

(iii) a Jack of black colour

(iv) a face card

Q10.

Two different dice are thrown together. Find the probability that the numbers obtained have

(i) even sum, and

(ii) even product.

SOLUTIONS

Q1.

Total possible events in case of Peter is 36
favourable outcome is (5, 5)

$\because \quad n(E) = 1$

So, $P(\text{getting 25 as product}) = \frac{1}{36}$

While total possible events in case of Rina is 6
Favourable outcome is 5

$\because \quad n(E) = 1$

So, $P(\text{square is 25}) = \frac{1}{6}$

As $\frac{1}{6} > \frac{1}{36}$, so Rina has better chance.

Q2.

Let x be 1, 2, 3 or 4
and y be 1, 4, 9 or 16.
Now, $xy = \{1, 4, 9, 16, 2, 8, 18, 32, 3, 12, 27, 48, 4, 16, 36, 64\}$

Total number of possible outcomes = 16
Number of outcomes whose product is less than 16 = 8
i.e, {1, 4, 9, 2, 8, 3, 12, 4}

$\therefore$ Required probability $= \frac{8}{16} = \frac{1}{2}$

Q3.

Total possible outcomes in each case= $6 \times 6 = 36$

(i) Have a sum less than 7,

Possible outcomes are,

(1, 1) (1, 2) (1, 3) (1, 4) (1, 5) (2, 1) (2, 2) (2, 3) (2, 4) (3, 1) (3, 2) (3, 3) (4, 1) (4, 2) (5, 1)

$\therefore \quad n(E) = 15$

So, $\quad \text{probability} = \frac{15}{36} = \frac{5}{12}$

(ii) Have a product less than 16,

Possible outcomes are,

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

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

(3, 1) (3, 2) (3, 3) (3, 4) (3, 5)

(4, 1) (4, 2) (4, 3)

(5, 1) (5, 2) (5, 3)

(6, 1) (6, 2)

$\therefore \quad n(E) = 25$

So, $\quad \text{probability} = \frac{25}{36}$

(iii) Is a doublet of odd no.,

Possible outcomes are

(1, 1), (3, 3), (5, 5)

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

$P(\text{doublet of odd no.}) = \frac{3}{36} = \frac{1}{12}$

Q4.

Total outcomes =
{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)
(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)
(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)
(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)
(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)
(6, 1), (6, 2), (6, 3) (6, 4), (6, 5), (6, 6)}

$\Rightarrow$ Total no. of outcomes = 36

(i) Let E_1 be the event of getting a number greater than 3 on each die.

Favourable outcomes = {(4, 4), (4, 5), (4, 6), (5, 4), (5, 5), (5, 6), (6, 4), (6, 5), (6, 6)}

$\Rightarrow$ No. of favourable outcomes = 9

$$\therefore \quad P(E_1) = \frac{9}{36} = \frac{1}{4}$$

(ii) Let E_2 be the event of getting a total of 6 or 7 of the numbers on two dice.

Favourable outcomes = {(1, 5), (2, 4), (3, 3), (4, 2), (5, 1), (1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)}

$\Rightarrow$ No. of favourable outcomes = 11

$$\therefore \quad P(E_2) = \frac{11}{36}$$

Q5.

Let x be 1, 4, 9, 16 and y be 1, 2, 3, 4.

Now, xy = {1, 2, 3, 4, 4, 8, 12, 16, 9, 18, 27, 36, 16, 32, 48, 64}

Total number of possible outcomes = 16

Number of outcomes where product is more than 16 = 6

i.e., {18, 27, 36, 32, 48, 64}

$$\therefore \text{Required probability} = \frac{6}{16} = \frac{3}{8}$$

Q6.

Sample space,

S = {(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6),
(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6),
(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6),
(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6),
(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6),
(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}

∴ **n(S) = 36**

A: The number on upper face of first die is less than the digit on second die.

H = {(1, 2) (1, 3) (1, 4) (1, 5) (1, 6) (2, 3) (2, 4) (2, 5) (2, 6) (3, 4) (3, 5) (3, 6) (4, 5) (4, 6) (5, 6)}

∴ **n(A) = 15**

THEREFORE,
p(A)= n(A)/ n(S) = 15/36 =5/12

Q7.

For $\frac{a}{b} > 1$, when $a = 1$, b can not take any value.
For $a = 2$, b can take 1 value i.e. 1.
For $a = 3$, b can take 2 values, i.e. 1 and 2.
For $a = 4, b$ can take 3 values i.e. 1, 2, and 3.
For $a = 5, b$ can take 4 values i.e. 1, 2, 3 and 4.
For $a = 6, b$ can take 5 values i.e. 1, 2, 3, 4 and 5
Total possible outcomes,

$$n(S) = 36$$

Favourable outcomes,

$$n(E) = 0 + 1 + 2 + 3 + 4 + 5 = 15$$

$$p\left(\frac{a}{b} > 1\right), \qquad P(E) = \frac{n(E)}{n(S)} = \frac{15}{36} = \frac{5}{12}$$

Q8.

When a dice is rolled twice, total number of outcomes,

$$n(S) = 6^2 = 36$$

There are 25 outcomes when 5 not come up either time.

Thus $n(E_1) = 25$

P(5 will not come up either time),

$$P(E_1) = \frac{n(E_1)}{n(S)} = \frac{25}{36}$$

(ii) 5 will come up exactly one time.

Possible outcomes are (1, 5), (2, 5), (3, 5), (4, 5), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6) and (6, 5).

$$n(E_2) = 10$$

P(5 will come up exactly one time)

$$P(E_2) = \frac{n(E_2)}{n(S)} = \frac{10}{36} = \frac{5}{18}$$

Q9.

There are $52-(2+2+2+2)=44$ cards in deck.
Thus we have 44 possible outcomes.

$$n(S)=44$$

(i) a black queen
Number of black Queens in the deck,

$$n(E_1)=0$$

P(getting a black queen),

$$P(E_1)=\frac{n(E_1)}{n(S)}=\frac{0}{44}=0$$

Hence it is an impossible event
(ii) a card of red colour
Number of red cards,

$$n(E_2)=26-4=22$$

P(getting a red card),

$$P(E_2)=\frac{n(E_2)}{n(S)}=\frac{22}{44}=\frac{1}{2}$$

(iii) a Jack of black colour
Number of Jacks (black),

$$n(E_3)=2$$

P(getting a black coloured Jack),

$$P(E_3)=\frac{n(E_3)}{n(S)}=\frac{2}{44}=\frac{1}{22}$$

(iv) a face card
Number of face cards in the deck,

$$n(E_4)=12-6=6$$

P(getting a face card),

$$P(E_4)=\frac{n(E_4)}{n(S)}=\frac{6}{44}=\frac{3}{22}$$

Q10.

There are 36 possible outcomes of rolling two dices.

$$n(S) = 36$$

(i) even sum

Favourable outcome are (1, 3), (1, 5), (1, 1), (2, 2), (2, 4), (2, 6), (3, 1) (3, 3), (3, 5), (4, 2), (4, 4), (4, 6), (5, 1), (5, 3) (5, 5) (6, 2), (6, 4) and (6, 6).

Number of favourable outcomes,

$$n(E_1) = 18$$

P(even sum),

$$P(E_1) = \frac{n(E_1)}{n(S)} = \frac{18}{36} = \frac{1}{2} \text{ or } 0.5$$

(ii) even product

Favourable outcome are (1, 2), (1, 4), (1, 6), (2, 1), (2,2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (3, 4), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 2) (5, 4), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5) and (6, 6).

Number of favourable outcomes

$$n(E_2) = 27$$

P(have a product less than 16),

$$P(E_2) = \frac{n(E_2)}{n(S)} = \frac{27}{36} = \frac{3}{4} = 0.75$$

Probability of getting even product is $\frac{3}{4}$ or 0.75.