

QB365

Important Questions - Probability

11th Standard CBSE

Mathematics

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

Section-A

- 1) A coin tossed. If it shows tail, we draw a ball from a box which contains 2 red and 3 black balls. If it shows for this experiment. 2
- 2) In any school examination, probability that Mohan passed in Chemistry is $\frac{1}{3}$ and the probability that he passed in Physics is $\frac{2}{5}$. If the probability of passing in both subjects is $\frac{1}{6}$, then what is the probability that Mohan will pass in atleast one of these subjects? 2
- 3) A bag contains 5 green and 7 red balls, Two balls are drawn. What is the probability that one is green and other is red? 2
- 4) Two cards are drawn without replacement from a well-shuffled pack of 52 cards. What is the probability that one is red queen and the other is a king of black colour? 2
- 5) If A and B are mutually exclusive events, such that $P(A)=0.28$ and $P(B)=0.38$, then $P(A' \cap B')$ 2
- 6) Suppose that each child born is equally likely to be a boy or a girl. Consider a family with exactly three children. Write each of the following events as a set and find its probability. 2
 - (a) The event that exactly one child is a girl.
 - (b) The event that atleast two children are girls.
 - (c) The event that no child is a girl.

Section-B

- 7) A and B are two events that $P(A) = 0.54$, $P(B) = 0.69$ and $P(A \cap B) = 0.35$. Find $P(A' \cap B')$ 3
- 8) Two dice are thrown once. The events A, B, E are as follows 3

A: Getting an even number on the first die.
B: Getting on the odd number on the first die.
E: Getting the sum of numbers on the dice ≥ 10 .

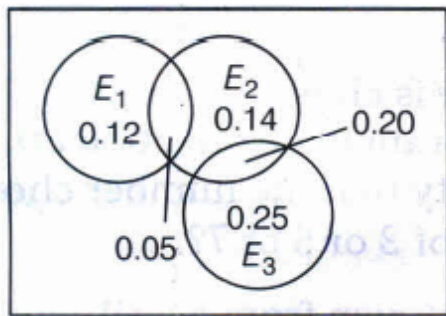
Describe the events

iii) E'
- 9) If the odds against the occurrence of an event are 4:7; find the probability of occurrence of the event. 3
- 10) Three coins are tossed once. Find the probability of getting at least 2 heads 3
- 11) A card is drawn from an ordinary pack and a gambler bets that it is spade or an ace. What are the odds against the winning his bet? 3

- 12) Probability that Ram passed in Mathematics is $\frac{2}{3}$ and the probability that he passed in English is $\frac{4}{9}$. If the probability of passing in both subjects is $\frac{1}{4}$, then what is the probability that Ram will pass in atleast one of these subjects? 3

Section-C

- 13) In a large metropolitan area, the probabilities are 0.87,0.36,0.30 that a family (randomly chosen for a sample survey) owns a colour television set, a black and white television set, or both kinds of sets. What is the probability that a family owns either anyone or both kinds of sets? 4
- 14) Let A, B and C be three events. If the probability of occurring exactly one event out of A and B is $1-x$, out of B and C is $1-2x$, out of C and A is $1-x$, and that of occurring three events simultaneously is x^2 , then prove that the probability that at least one out of A, B, C will occur is greater than $1/2$. 4
- 15) Three coins are tossed once.Find the probability of getting 2 heads 4
- 16) The probabilities of three events shown in the Venn diagram is shown below 4



Determine

$P(E_2)$

- 17) The probabilities of three events shown in the Venn diagram is shown below 4
- Determine
- $P(E_1 \cap \bar{E}_2)$

Section-A

- 1) Let the balls in the box be represented by R_1, R_2 , and B_1, B_2, B_3 2
 $\{(H,1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, R_1), (T, R_2), (T, B_1), (T, B_2), (T, B_2), (T, B_3)\}$
- 2) $\frac{17}{30}$ 2
- 3) $\frac{35}{36}$ 2
- 4) Number of ways of possible outcomes = 26×51 2
 We know that, there are 2 red queen and 2 kings of black colour in a pack of 52 cards
 Number of favourable outcomes
 $= {}^2C_1 \times {}^2C_1 = 2 \times 2 = 4$
 Hence, required probability = $\frac{4}{26 \times 51} = \frac{2}{663}$
- 5) $P(A' \cap B') = P(A \cup B)' = 1 - P(A \cup B)$ 2
Ans. 0.34

6) (a) Let E_1 denotes the event that exactly one child is a girl.

2

Then, $E_1 = \{BBG, BGB, GBB\}$

$$\Rightarrow P(E_1) = \frac{3}{8}$$

(b) Let E_2 denotes the event that atleast two children are girls.

Then, $E_2 = \{BGG, GBG, GGB, GGG\}$

$$\Rightarrow P(E_2) = \frac{4}{8} = \frac{1}{2}$$

(c) Let E_3 denotes the event that no child is a girl.

then, $E_3 = \{BBB\}$

$$\Rightarrow P(E_3) = \frac{1}{8}$$

Section-B

7) $P(A' \cap B') = P((A \cup B)') = 1 - P(A \cup B)$
 $= 1 - 0.88 = 0.12$

3

8) On throwing of two dice, we have sample space

3

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

E: Getting the sum of numbers on the dice ≥ 10

E' Getting the sum of numbers on the dice < 10

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

9) We know that, if odds against of an event are n:m, then

3

probability of occurrence of this event is $\frac{m}{m+n}$

$$\therefore \text{Required probability} = \frac{7}{7+4} = \frac{7}{11}$$

10) In random experiment of tossing three coins, the sample space is

3

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

$$\Rightarrow n(S) = 8$$

Let E_2 be the event of getting atleast 2 heads.

Then, outcome favourable to E_2 are $\{HHT, HTH, THH, \text{ and } HHH\}$

$$\text{Thus, } n(E_2) = 4$$

$$\therefore P(E_2) = \frac{n(E_2)}{n(S)} = \frac{4}{8} = \frac{1}{2}$$

11)

3

Let S be the sample space associated with the given random experiment. Then, $n(S) = 52$

Now, let A be the event of getting a spade and B be the event of getting an ace. $A \cap B$ denote the event of getting an ace of spade.

Then,

$$n(A) = 13 \text{ and } n(B) = 4$$

$$n(A \cap B) = 1$$

$$P(A) = \frac{13}{52}; P(B) = \frac{4}{52} \text{ and } P(A \cap B) = \frac{1}{52}$$

Now, $P(\text{winning the bet}) = P(\text{getting a spade or an ace})$

$$= P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$$

$$P(\text{not winning the bet}) = 1 - \frac{4}{13} = \frac{9}{13}$$

Hence, odds against the winning his bet

$$= \frac{P(\text{not winning the bet})}{P(\text{winning the bet})} = \frac{\frac{9}{13}}{\frac{4}{13}} = \frac{9}{4} = 9 : 4$$

12)

3

Let M be the event that Ram passed in Mathematics, E be the event that Ram passed in English and

$M \cap E$ be the event that Ram passed in both subjects

Now, $P(\text{Ram pass in atleast one subject}) = P(M \cup E)$

$$= P(M) + P(E) - P(M \cap E) = \frac{2}{3} + \frac{4}{9} - \frac{1}{4} = \frac{24+16-9}{36} = \frac{31}{36}$$

Section-C

13)

4

Let A be the event that the family owns a colour television set and B be the event that the family owns a black and white television. Then, we have $P(A) = 0.87$, $P(B) = 0.36$, $P(A \cap B) = 0.30$

Ans. 0.93

$$14) P(A \cup B \cup C) = \frac{3-4x}{2} + x^2 = x^2 - 2x + \frac{3}{2}$$

$$= (x-1)^2 + \frac{1}{2} > \frac{1}{2}$$

4

$$15) \frac{3}{8}$$

4

$$16) 0.39$$

4

$$17) 0.12$$

4