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Probability
Level 1

Q.1.A coin is tossed once .What is the probability of getting a head?
Ans.
The outcomes of the experiment are Head (H) and Tail(T).
Total no.ofevents = 2
No. of favourable events = 1

P(H) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{\textit{Totalnumberofevents}}}$

= $\frac{1}{2}$

Q.2. Two coins are tossed once(or one coin is tossed twice).What is the probability of
(i) getting two heads
(II) at least one tail.
Solution.
Possible outcomes of the experiment are HH,HT,TH,TT
(i) **Total no.**of events = 4
No.offavourable events = 1(HH)

P(E) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{\textit{Totalnumberofevents}}}$

P(HH) = $\frac{1}{4}$.
(ii) Total no.of events = 4

No. of favourable events = 3 (HT,TH,TT)

P(E) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{\textit{Totalnumberofevents}}}$

P(at least one Tail) = $\frac{3}{4}$

Q.3.An unbiased die is thrown. What is the probability of getting:
(i) an even number (ii) a multiple of 3 (iii) a number 3 or 4 (iv) a number less than 5 (v) an odd number
(vi) a number greater than 3.
Solution:
In a single throw of a die we can get any one of the six numbers 1,2,3,4,5,and 6 marked on its six faces.Therefore , the total no of events associated with the random experiment are 6.
We know that P(E) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{\textit{Totalnumberofevents}}}$

(i) There are three even numbers 2,4,6 written on the six faces of die.

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Total no. of favourable events = 3

P(an even number) = $\frac{3}{6}$

= $\frac{1}{2}$

ii) Multiple of 3 are 3,6
No. of favourable events are = 2

P(E) = $\frac{2}{6}$

= $\frac{1}{3}$

(ii) A number 3 or 4

No. of Favourable events = 2

P(a no. 3 or 4) = $\frac{2}{6}$

= $\frac{1}{3}$

(iii) A number less than 5

No. of favourableevents = 4 (1,2,3,4)

P(a number less than 5) = $\frac{4}{6}$

= $\frac{2}{3}$

(iv) An odd number

No. of favourableevents = 3 (1,3,5)

P(an odd number) = $\frac{3}{6}$

= $\frac{1}{2}$

(v) A number greater than 3

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No.ofFavourable events = 3 (4,5,6)

P(a no. greater than 3) = $\frac{3}{6}$

= $\frac{1}{2}$

Q.4 One card is drawn from a well shuffled deck of 52cards.Find the probability of getting the queen of diamonds.

Solution:

Total no. of events = 52

No.of queen of diamonds = 1

P(E) = = $\frac{\textbf{Favourablenumberofevents}}{\textbf{\textit{Totalnumberofevents}}}$

P(queen of diamonds) = $\frac{1}{52}$

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Level 2

1. A child has a block in the shape of a cube with one letter written on each face as shown below:

A	**B**	**C**	**D**	**E**	**A**

The cube is thrown once .What is the probability of getting (i) A (ii) D .

Solution:

In throwing the cube any one of the six faces of cube may come upward.

Therefore total number of events = 6

(i) There are two faces bearing the letter A

P(E) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{\textit{Totalnumberofevents}}}$

P(A) = $\frac{2}{6}$

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$= \frac{1}{3}$

(ii) There is only one face bearing the letter D

P(D) = $\frac{1}{6}$

Q.2. A bag contains 3 red and 2 blue balls.A ball is drawn at random . What is the probability of drawing a blue ball?
Solution:
Total no. of balls = 3 + 2
= 5

P(E) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{Totalnumberofevents}}$

P(blue ball) = $\frac{2}{5}$

Q.3.It is given that in a group of 3 students , the probability of 2 students having not same birthday is 0.992. What is the probability that 2 students have the same birthday?
Solution:
We know that P(A) + P(not A) = 1
Here P(Same Birthday) + P(not Same Birthday) = 1

P(same birthday) + 0.992 = 1

P(same birthday) = 1- 0.992
= 0.008

Q.4A bag contains 8 red, 6 white and 4 black marbles. A marble is drawn at random from the bag .Find the probability that themarbles drawn is
(i) Red or white (ii) not black (iii) neither white nor black

Solution:
Total no. of marbles = 8 +6+ 4
= 18

P(E) = $\frac{\textbf{Favourablenumberofevents}}{\textbf{Totalnumberofevents}}$

(i) No of red or white marbles = 8+6
= 14

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P(red or white) = $\frac{14}{18}$

= $\frac{7}{9}$

(ii) No.of not black marbles (red or white) = 14

Total Marbles = 18

P(not black marble) = $\frac{14}{18}$

=$\frac{7}{9}$

(Iii) no.of neither white nor black (Red marbles) = 8

P(neither white nor black) = $\frac{8}{18}$

= $\frac{4}{9}$

Level 3

Q.1. Fivecards–
theten,jack,queen,kingandace,arewellshuffledwiththeirfacedownwards.Onecardisthenpickedupatrandom.

(i) Whatistheprobabilitythatthecardisaqueen?

(ii) Ifthequeenisdrawn andputaside,whatistheprobabilitythatthesecondcardpickedupisa
(a)anace (b)aqueen :

1/5 ,1/4, 0

Ans:Here,thetotalnumberofelementaryevents=5

(i) Since,thereisonlyonequeen
Favourablenumberofelementaryevents= 5
Probabilityofgettingthecardofqueen=**1/5**

(ii) Now,thetotalnumberofelementaryevents=4

(a) Since,thereisonlyoneace
Favourablenumberofelementaryevents=4
Probability of getting an ace =**1/4**

(b) Since, thereisonly no queen
Favourablenumberof elementary events=4
Probability of getting a queen = **0/4**
=0

Q.2 A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that the letter chosen is a (i) vowel (ii) consonant

Solution:

There are 13 letters in the word 'ASSASSINATION' .

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Therefore total number of events = 13

(i) There are 6 vowels in the given word (A,A,I,A,I,O)

Therefore P(a vowel) = $\frac{6}{13}$

(ii) There are 7 consonants.

Therefore P(a consonant) = $\frac{7}{13}$

Q.3. If65%ofthepopulationshaveblackeyes,25%havebrowneyesandtheremaininghaveblueeyes.Whatistheprobabilitythatapersonselectedatrandomhas(i)Blueeyes (ii)Brownorblackeyes(iii)Blueorblack eyes

Ans:

No.ofblackeyes=65

No.ofBrowneyes =25

No.ofblueeyes=10

Totalno.ofeyes=100

i) P (Blueeyes)= $^{10}/_{100} = {}^{1}/_{10}$

ii) P(Brownorblackeyes) = $^{90}/_{100} = {}^{9}/_{10}$

iii) P(Blueorblackeyes)= $^{75}/_{100} = {}^{3}/_{4}$

Q.4.. Find the probability of getting 53 Fridays in a leap year.

Solution:- No. of days in a leap year = 366.

366 days = 52 weeks and 2 days.

A leap year must has 52 Fridays

The remaining two days can be

a. Sunday and Monday
b. Monday and Tuesday
c. Tuesday and Wednesday
d. Wednesday and Thursday
e. Thursday and Friday
f. Friday and Saturday
g. Saturday and Sunday

Out of 7 case, 2 cases have Friday

∴ P (53 Friday) = 2/7

Level 4

Q.1Three unbiased coins are tossed simultaneously. What is the probability of getting exactly two heads?

Solution: - When three coins are tossed simultaneously, the sample space is

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

n(S) = 8

E = Set of cases favourable to the event

= {HHT, HTH, THH}

n(E) = 3

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P (exactly two heads) = $\frac{n(E)}{n(S)} = \frac{3}{8}$

2. A dice is thrown twice. Find the probability of getting (a) doublets (b) prime number on each die.

Solutions: - 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

(i) E = Events getting doublet = {(1, 1) (2, 2) (3, 3) (4, 4) (5, 5) (6, 6)}

n (E) = 6

P(doublet) = $\frac{n(E)}{n(6)} = \frac{6}{36} = \frac{1}{6}$

(ii) E = Events getting prime number on each die

= {(2, 2), (2, 3), (2, 5), (3, 2), (3, 3), (3, 5), (5, 2), (5, 3), (5, 5)}

n(E) = 9

P (getting prime number on each die) = n(E)/n(S) = 9/36 = ¼

Q.3**An**integer ischosenatrandomfromthefirsttwohundredsdigit.Whatistheprobabilitythattheintegerchosenisdivisibleby6or8. (Ans:$^{1}/_{4}$)

Ans: Multiplesof6first200integers

6,12,18,24,30,36,42,48,54,60,66,72,78,84,90,96,102,108,114,120,126,132,138,144,150,156,162,168,174,180,186,192,198

Multiplesof8first200integers

8,16,24,32,40,48,56,64,72,80,88,96,104,112,120,128,136,144,152,160,168,176,184,192,200

NumberofMultiplesof6or8=50

P(Multiplesof6or8)=$^{50}/_{200}$=$^{1}/_{4}$

Q4Ajar contains 24 marbles, some are green and others are blue. If a marble is drawn at randomfrom the jar, theprobability that it is green is 2/3. Find the number of blue marbles in the jar.

Solution. Total number of elementary events = 24.

Let there be x green marbles.

P (green marbles is drawn) = x/24but,

P(green marbles is drawn)= 2/3 (given)

So, x / 24 = 2/3 x=24x2/3 x = 16

Number of green marbles = 16

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Number of blue marbles = 24 – 16 = 8 Ans.

5. A box contains 12 balls out of which x are black. If one ball is drawn at random from thebox, what is the probability that it will be a black ball? If 6 more black balls are put in thebox the probability of drawing a black ball is now double of what it was before. Find x?

Solution: Number of all possible outcomes = 12

Number of outcomes favourable to the event of drawing black ball = x

Required probability = $\frac{x}{12}$

Now when 6 more black balls are put in the box,

Number of all possible outcomes = 12 + 6 = 18

Number of outcomes favourable to the event of drawing a black ball = x + 6

∴ Probability of drawing a black ball = $\frac{x+6}{18}$

According to the question,

$\frac{x+6}{18} = 2\left(\frac{x}{12}\right)$

∴ x = 3

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