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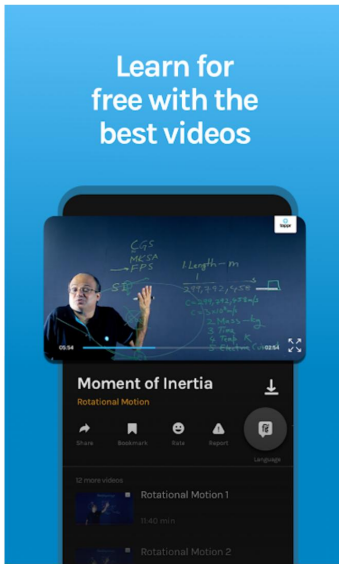
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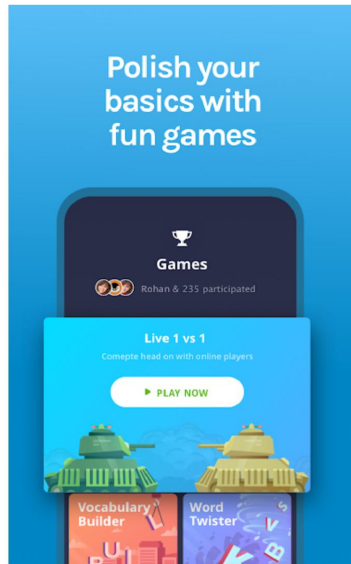


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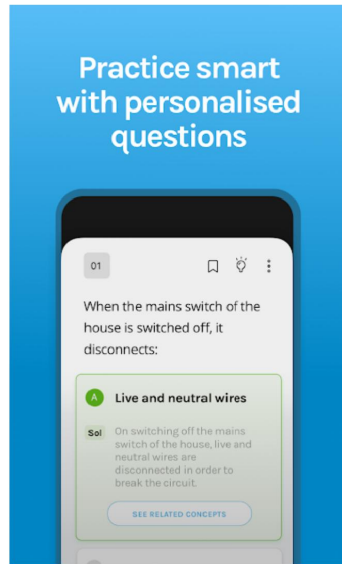
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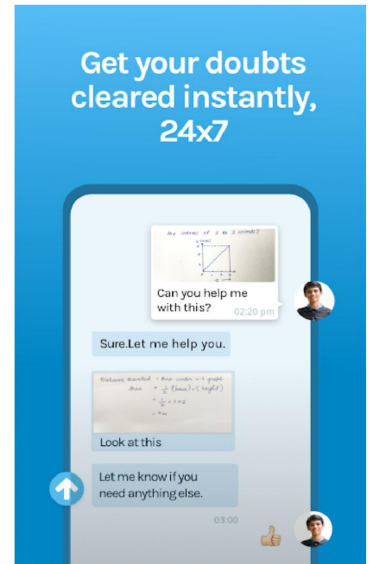
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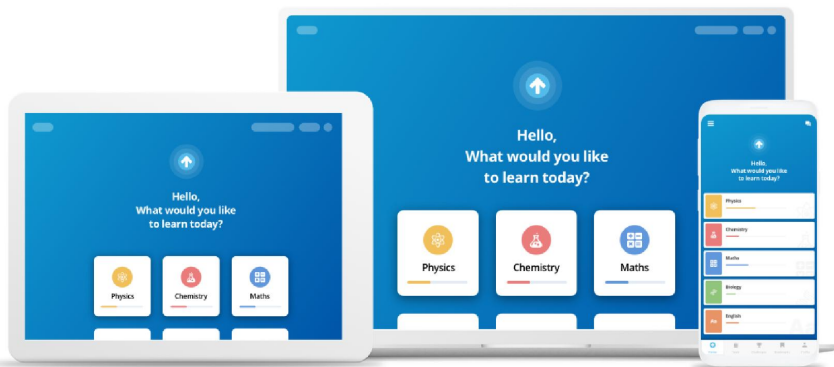
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#463422

Topic: Probability



List the outcomes you can see in these experiments.

- (a) Spinning a wheel (b) Tossing two coins together

Solution

(a) Possible outcomes would be: A, B, C, D

(b) Possible outcomes: HT, HH, TH, TT

#463423

Topic: Probability

When a die is thrown, list the outcomes of an event of getting

- (i) (a) a prime number (b) not a prime number.
(ii) (a) a number greater than 5 (b) a number not greater than 5

Solution

Possible outcomes: 1, 2, 3, 4, 5, 6

(i) (a) Prime numbers: 2, 3, 5

It represents the outcomes of Prime numbers

(b) Not a prime number: 1, 4, 6

It represent the outcomes of not a prime numbers.

(ii) (a) Number greater than 5:

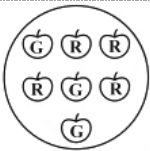
Only when 6 comes

(b) Number not greater than 5:

Only when outcomes: 1, 2, 3, 4 and 5

#463424

Topic: Probability



Find the

- (a) Probability of the pointer stopping on D in spinning a wheel if it has A, A, D, B, C written on it?
(b) Probability of getting an ace from a well shuffled deck of 52 playing cards?
(c) Probability of getting a red apple from the figure given above.

Solution

(a) The pointer can stop at one of following regions A, A, B, C, D .

Only in 1 case that pointer will stop at region D .

$$\text{Probability: } \frac{1}{5}$$

(b) There are 52 cards: 4 ace cards

Probability of getting an ace card

$$= \frac{4}{52} = \frac{1}{13}$$

(c) There are a total of 7 apple, out of which 4 are red, 3 are green.

$$\text{Probability of red apple} = \frac{4}{7}$$

#463426

Topic: Probability

Numbers 1 to 10 are written on ten separate slips (one number on one slip), kept in a box and mixed well. One slip is chosen from the box without looking into it. What is the probability of?

(i) getting a number 6?

(ii) getting a number less than 6?

(iii) getting a number greater than 6?

(iv) getting a 1-digit number?

Solution

(i) Total slips: 10

$$\text{Probability of getting a number 6} \Rightarrow \frac{1}{10}$$

(ii) Numbers less than 6: 1, 2, 3, 4, 5

$$\text{Probability} \Rightarrow \frac{5}{10} = \frac{1}{2}$$

(iii) Number greater than 6 are 7, 8, 9, 10

$$\text{Probability} \Rightarrow 6 \Rightarrow \frac{4}{10} = \frac{2}{5}$$

(iv) Single digit: 1, 2, 3, 4, 5, 6, 7, 8, 9

$$\text{Probability} = \frac{9}{10}$$

#463427

Topic: Probability

If you have a spinning wheel with 3 green sectors, 1 blue sector and 1 red sector, what is the probability of getting a green sector? What is the probability of getting a non blue sector?

Solution

Total sectors = 3 + 1 + 1 = 5

$$\text{Probability of getting green sector} = \frac{3}{5}$$

Non-Blue sector: Green sector or Red sector

$$\text{Probability of getting non-blue} = \frac{4}{5}$$

#463428

Topic: Probability

Find the probabilities of the events:

When a die is thrown, list the outcomes of an event of getting

(i) (a) a prime number (b) not a prime number.

(ii) (a) a number greater than 5 (b) a number not greater than 5

Solution

(i) (a)

Out of 6 possible outcomes, a prime number can be obtained in 3 cases.

$$\text{Probability of prime number} = \frac{3}{6} = \frac{1}{2}$$

(i) (b)

Out of 6 possible outcomes, a prime number not obtained in 3 cases

$$\text{Probability} = \frac{3}{6} = \frac{1}{2}$$

(ii) (a)

Out of 6 possible outcomes, greater than 5 can be obtained 1 case

$$\text{Probability} = \frac{1}{6}$$

(ii) (b)

Out of 6 possible outcomes, a number not greater than 5 can be obtained in: 5 cases

$$\text{Probability} = \frac{5}{6}$$

#464441

Topic: Probability

In a cricket match, a batswoman hits a boundary 6 times out of 30 balls she plays. Find the probability that she did not hit a boundary.

Solution

Number of times the batswoman hit a boundary = 6(given)

Total balls she played = 30

$$\text{Probability (hitting a boundary)} = \frac{6}{30} = \frac{1}{5}$$

$$\text{Probability of not hitting a boundary} = 1 - \frac{1}{5} = \frac{4}{5}$$

#464443

Topic: Probability

No. of girls in a family	2	1	0
No. of families	475	814	211

1500 families with 2 children were selected randomly, and the following data were recorded:

Compute the probability of a family, chosen at random, having

(i) 2 girls

(ii) 1 girl

(iii) No girl

Also check whether the sum of these probabilities is 1.

Solution

(i) Number of families having 2 girls = 475

Total families = $475 + 814 + 211 = 1500$

$$P(2 \text{ girls}) = \frac{475}{\text{Total families}}$$

$$= \frac{475}{1500} = \frac{19}{60}$$

$$(ii) P(1 \text{ girl}) = \frac{814}{1500} = \frac{407}{750}$$

$$(iii) P(\text{No girl}) = \frac{211}{1500}$$

Sum of all these probabilities

$$= \frac{19}{60} + \frac{407}{750} + \frac{211}{1500}$$

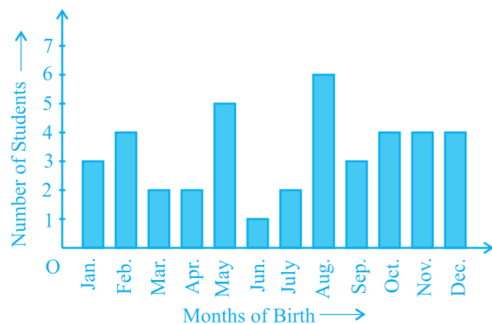
$$= \frac{475 + 814 + 211}{1500}$$

$$= \frac{1500}{1500} = 1$$

Sum of these probabilities = 1

#464445

Topic: Probability



In a particular section of class IX, 40 students were asked about the month of their birth and following graph was prepared for data so obtained:

Find the probability that a student of the class was born in August.

Solution

Number of students born in August = 6

Total number of students = 40

Probability of students born in August

$$= \frac{\text{Number of students born in August}}{\text{Total number of students}}$$

$$= \frac{6}{40} = \frac{3}{20}$$

#464449

Topic: Probability

Vehicles per family ⇒	0	1	2	Above 2
Monthly income (Rs.) ⇓				
Less than 7,000	10	160	25	0
7,000 - 10,000	0	305	27	2
10,000 - 13,000	1	535	29	1
13,000 - 16,000	2	469	59	25
16,000 or more	1	579	82	88

An organisation selected 2400 families at random and surveyed them to determine a relationship between income level and the number of vehicles in a family. The information gathered is listed in the table below:

Suppose a family is chosen. Find the probability that the family chosen is

- earning Rs. 10000 – 13000 per month and owning exactly 2 vehicles.
- earning Rs. 16000 or more per month and owning exactly 1 vehicle.
- earning less than Rs. 7000 per month and does not own any vehicle.
- earning Rs. 13000 – 16000 per month and owning more than 2 vehicles.
- owning not more than 1 vehicle.

Solution

Number of families surveyed

$$= 10 + 60 + 25 + 0 + 0 + 305 + 27 + 2 + 1 + 535 + 29 + 1 + 2 + 469 + 55 + 25 + 579 + 82 + 88$$

$$= 2400$$

(i) Number of families earning Rs. 10000 – 13000 per month and owning exactly 2 vehicles = 29

$$P = \frac{29}{2400}$$

(ii) Number of families earning Rs. 16000 or more per month and owning exactly 1 vehicle = 579

$$P = \frac{579}{2400}$$

(iii) Number of families earning less than Rs. 7000 per month and does not own any vehicle = 10

$$P = \frac{10}{2400} = \frac{1}{240}$$

(iv) Number of families earning Rs. 13000 – 16000 per month and owning more than 2 vehicles = 25

$$P = \frac{25}{2400} = \frac{1}{96}$$

(v) Number of families owning not more than 1 vehicle

$$= 10 + 160 + 0 + 305 + 1 + 535 + 2 + 469 + 1 + 579 = 2062$$

$$P = \frac{2062}{2400} = \frac{1031}{1200}$$

#464450

Topic: Probability

Marks	Number of Students
0 – 20	7
20 – 30	10
30 – 40	10
40 – 50	20
50 – 60	20
60 – 70	15
70 – Above	8
Total	90

A teacher wanted to analyze the performance of two sections of students in a mathematics test of 100 marks. Looking at their performance, she found that a few students got, under 20 marks and a few got 70 marks or above. So she decided to group them into intervals of varying sizes as follows: 0 – 20, 20 – 30... , 60 – 70, 70 – 100 Then she formed the following table.

- (i) Find the probability that a student obtained less than 20% in the mathematics test.
(ii) Find the probability that a student obtained marks 60 or above.

Solution

Total students = 90

- (i) Number of students getting less than 20% marks in the test = 7

$$P = \frac{7}{90}$$

- (ii) Number of students obtaining marks 60 or above = 15 + 8 = 23

$$P = \frac{23}{90}$$

#464460

Topic: Probability

Opinion	No. of students
like	135
dislike	65

To know the opinion of the students about the subject statistics, a survey of 200 students was conducted. The data is recorded in the following table.

Find the probability that a student chosen at random

- (i) likes statistics
(ii) does not like it.

Solution

Total students = 135 + 65 = 200

- (i) Number of students liking stats = 135

$$P = \frac{135}{200} = \frac{27}{40}$$

- (ii) Number of students who dont like stats = 65

$$P = \frac{65}{200} = \frac{13}{40}$$

#464461

Topic: Probability

The distance (in km) of 40 engineers from their residence to their place of work were found as follows:

5 3 10 20 25 11 13 7 12 31
 19 10 12 17 18 11 32 17 16 2
 7 9 7 8 3 5 12 15 18 3
 12 14 2 9 6 15 15 7 6 12

What is the empirical probability that an engineer lives:

(i) less than 7 km from her place of work?

(ii) more than or equal to 7 km from her place of work?

(iii) within $\frac{1}{2}$ km from her place of work?

Solution

Distance (in km.)	No. of engineers
Less than 7 km.	9
More than 7 km.	31
Total	40

Total number of engineers = 40

(i) Number of engineers living less than 7 km from their place of work = 9

$$P = \frac{9}{40}$$

(ii) Number of engineers living more than or equal to 7 km from their place of work = 40 - 9 = 31

$$P = \frac{31}{40}$$

(iii) Number of engineers living within $\frac{1}{2}$ km from her place of work = 0

$$P = \frac{0}{40} = 0$$

#464462

Topic: Probability

Activity: Note the frequency of two-wheelers, three-wheelers and four-wheelers going past during a time interval, in front of your school gate. Find the probability that any one vehicle out of the total vehicles you have observed is a two-wheeler.

Solution

Lets assume a case:

Number of 2 wheelers passed = 18

Number of 3 wheelers passed = 23

Number of 4 wheelers passed = 19

The time interval is 15 minutes for all the 3 conditions.

Total number of vehicles passed = Number of 2 wheelers + Number of 3 wheelers + Number of 4 wheelers

$$= 18 + 23 + 19 = 60$$

$$\text{Probability that one vehicle out of total vehicles is 2 wheelers} = \frac{18}{60} = \frac{3}{10}$$

#464463

Topic: Probability

In a class of 40 students, ask them to write a 3-digit number. Choose any student at random. What is the probability that the number written by her/him is divisible by 3?

Remember that a number is divisible by 3, if the sum of its digits is divisible by 3.

Solution

Total number of students in the class = 40

and out of 40 students, number divisible would be:

Case : Number divisible by 3 or Sum of its digits divisible by 3

Total 3 digit numbers = 100 to 999

= 900 numbers

First number divisible is greater than 100, i.e., = 102

Now add 3 to 102 till 999

$a = 102$ Common difference $d = 3$

$n = ?$ Last number = 999

$$\Rightarrow 999 = a + (n - 1)d$$

$$\Rightarrow 999 = 102 + (n - 1)3$$

$$\Rightarrow \frac{897}{3} = n - 1, n = 300$$

$$\text{Probability} = \frac{300}{900} = \frac{1}{3}$$

#464464

Topic: Probability

Eleven bags of wheat flour, each marked 5kg, actually contained the following weights of flour (in kg):

4.97 5.05 5.08 5.03 5.00 5.06 5.08 4.98 5.04 5.07 5.00

Find the probability that any of these bags chosen at random contains more than 5 kg of flour.

Solution

Total bags = 11

Number of bags containing more than 5kg of flour = 7

$$\text{Probability} = \frac{7}{11}$$

#464465

Topic: Probability

A study was conducted to find out the concentration of sulphur dioxide in the air in parts per million (ppm) of a certain city. The data obtained for 30 days is as follows:

0.03 0.08 0.08 0.09 0.04 0.17

0.16 0.05 0.02 0.06 0.18 0.20

0.11 0.08 0.12 0.13 0.22 0.07

0.08 0.01 0.10 0.06 0.09 0.18

0.11 0.07 0.05 0.07 0.01 0.04

Using this table, find the probability of the concentration of sulphur dioxide in the interval 0.12 – 0.16 on any of these days.

Solution

Concentration of sulphur dioxide (in ppm)	Frequency
0.00 – 0.04	4
0.04 – 0.08	9
0.08 – 0.12	9
0.12 – 0.16	2
0.16 – 0.20	4
0.20 – 0.24	2
Total	30

Number of days for which SO_2 concentration was in the interval of $0.12 - 0.16 = 2$

Total bags = 30

$$P = \frac{2}{30} = \frac{1}{15}$$

#464466

Topic: Probability

The blood groups of 30 students of Class VIII are recorded as follows:

A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O,
 A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O.

Use this table to determine the probability that a student of this class, selected at random, has blood group AB.

Solution

Blood group	No. of students
A	9
B	6
O	12
AB	3
Total	30

Number of students having blood group AB = 3

Total students = 30

$$P = \frac{3}{30} = \frac{1}{10}$$

#465253

Topic: Introduction

Which of the following experiments have equally likely outcomes? Explain.

- (i) A driver attempts to start a car. The car starts or does not start.
- (ii) A player attempts to shoot a basketball. She/he shoots or misses the shot.
- (iii) A trial is made to answer a true-false question. The answer is right or wrong.
- (iv) A baby is born. It is a boy or a girl

Solution

- i) Equally likely outcome because either the car starts or does not. There can be no other possibility.
- ii) Equally likely outcome because either the goes through the basket or it does not. There can be no other possibility.
- iii) Equally likely outcome because in a true or false type of question, either the answer is correct or wrong. There can be only 2 possibilities or no other possibility.
- iv) Equally likely outcome because either the child born is a girl or a boy. There can be no other possibility.

#465254

Topic: Introduction

Why is tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game?

Solution

When a coin is tossed, there is an equally likely outcome of getting either a head or a tail, so tossing a coin is a fair way of deciding.

#465255

Topic: Probability

Which of the following cannot be the probability of an event?

A $\frac{2}{3}$

B -1.5

C 15%

D 0.7

Solution

-1.5 cannot be a probability of an event as the probability of an event always lies between 0 and 1.

#465257

Topic: Probability

A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out

(i) an orange flavoured candy?

(ii) a lemon flavoured candy?

Solution

i) Since the bag contains only lemon candies, the probability of picking an orange flavored candy does not arise.

So, $P(\text{orange candy}) = 0$.

ii) Since the bag contains only lemon candies, the probability of picking a lemon flavored candy is certain

So, $P(\text{lemon candy}) = 1$.

#465258

Topic: Probability

It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday?

Solution

Let \bar{B} \equiv Event that 2 students do not have same birthday

$$\therefore P(\bar{B}) = 0.992$$

So, probability of 2 students having same birthday $P(B) = 1 - P(\bar{B})$

$$= 1 - 0.992$$

$$= 0.008$$

#465260

Topic: Probability

A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ? (ii) not red?

Solution

Total number of balls in the bag = $3 + 5 = 8$

$$\text{i) } P(\text{red ball}) = \frac{3}{8} \text{ [probability = no. of red balls/total number of balls]}$$

$$\text{ii) } P(\text{not red}) = \frac{5}{8} \text{ [probability = no. of non red balls/total number of balls]}$$

#465261

Topic: Probability

A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be (i) red ? (ii) white ? (iii) not green?

Solution

Total number of marbles in the box = $5 + 8 + 4 = 17$

i) $P(\text{red}) = \text{no. of red marbles/total number of marbles}$

$$P(\text{red}) = \frac{5}{17}$$

ii) $P(\text{white}) = \text{no. of white marbles/total number of marbles}$

$$P(\text{white}) = \frac{8}{17}$$

iii) $P(\text{green}) = \text{no. of green marbles/total number of marbles}$

$$P(\text{green}) = \frac{4}{17}$$

$$P(\text{not green}) = 1 - P(\text{green}) = \frac{13}{17}$$

#465262

Topic: Probability

A piggy bank contains hundred 50p coins, fifty c 1 coins, twenty c 2 coins and ten c 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin (i) will be a 50p coin ? (ii) will not be a c 5 coin?

Solution

Total number of coins in the piggy bank = $100 + 50 + 20 + 10 = 180$.

i)

$$P(50p \text{ coin}) = \frac{\text{number of 50p coins}}{\text{total number of coins}} = \frac{100}{180}$$

$$P(50p \text{ coin}) = \frac{5}{9}$$

ii)

Number of c 5 coins = 10

Number of coins which are not c 5 = 170

$$P(\text{coin not being c 5}) = \frac{170}{180} = \frac{17}{18}$$

#465265

Topic: Probability

Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish (see Fig.). What is the probability that the fish taken out is a male fish?

Solution

Total number of fish in the tank = 13

$$P(\text{Male fish}) = \frac{\text{Number of male fish}}{\text{Total number of fish}}$$

$$P(\text{Male fish}) = \frac{5}{13}$$

#465266

Topic: Probability



A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (see Fig.), and these are equally likely outcomes. What is the probability that it will point at

- (i) 8?
- (ii) an odd number?
- (iii) a number greater than 2?
- (iv) a number less than 9?

Solution

$$\text{i) } P(8) = \frac{1}{8}$$

ii)

$$P(\text{Odd number}) = \frac{\text{Number of odd numbers}}{\text{Total number of numbers in the chart}}$$

$$P(\text{Odd number}) = \frac{4}{8} = \frac{1}{2}$$

iii)

$$P(\text{Number} > 2) = \frac{\text{Number of numbers} > 2}{\text{Total number of numbers in the chart}}$$

$$P(\text{Number} > 2) = \frac{6}{8} = \frac{3}{4}$$

iv)

$$P(\text{Number} < 9) = \frac{\text{Number of numbers} < 9}{\text{Total number of numbers in the chart}}$$

$$P(\text{Number} < 9) = \frac{8}{8} = 1$$

#465268

Topic: Probability

A die is thrown once. Find the probability of getting

- (i) a prime number; (ii) a number lying between 2 and 6; (iii) an odd number

Solution

Sample space = { 1, 2, 3, 4, 5, 6 }

$$i) P(\text{Prime number}) = \frac{\text{Number of prime numbers}}{\text{Sample space}}$$

$$P(\text{Prime number}) = \frac{3}{6} = \frac{1}{2}$$

$$ii) P(\text{Number between 2 and 6}) = \frac{3}{6} = \frac{1}{2}$$

$$iii) P(\text{Odd number}) = \frac{3}{6} = \frac{1}{2}$$

#465269

Topic: Probability

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red colour (ii) a face card (iii) a red face card (iv) the jack of hearts (v) a spade (vi) the queen of diamonds

Solution

i) King of red colour can be hearts King or a diamond king.

So, the possibility is 2.

$$P(\text{Red king}) = \frac{2}{52} = \frac{1}{26}$$

ii) A face card can be jack, queen, king of any suite.

In this way we will get $3 \times 4 = 12$ face cards.

$$P(\text{Face card}) = \frac{12}{52} = \frac{3}{13}$$

iii) A red face card can be either hearts or diamond king, jack or queen, which means there are $3 \times 2 = 6$

$$P(\text{Red face card}) = \frac{6}{52} = \frac{3}{26}$$

iv) There is only one Jack of hearts.

$$P(\text{Jack of hearts}) = \frac{1}{52}$$

v) There are 13 spades in total.

$$\text{So, } P(\text{Spade}) = \frac{13}{52} = \frac{1}{4}$$

vi) There is only one queen diamond.

$$\text{Hence, } P(\text{Queen diamond}) = \frac{1}{52}$$

#465270

Topic: Probability

Five cards—the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.

(i) What is the probability that the card is the queen?

(ii) If the queen is drawn and put aside, what is the probability that the second card picked up is (a) an ace? (b) a queen?

Solution

i) Total number of cards $n(S) = 5$

Let $Q \equiv$ Event that queen of diamonds is drawn.

$$\therefore n(Q) = 1$$

$$\text{So, } P(Q) = \frac{n(Q)}{n(S)} = \frac{1}{5}$$

ii)

a) If the queen is put aside, then the total number of cards $n(S) = 4$

Let $A \equiv$ Event that ace of diamonds is drawn.

$$\therefore n(A) = 1$$

$$\text{So, } P(A) = \frac{n(A)}{n(S)} = \frac{1}{4}$$

b) If the queen is put aside, then the total number of cards $n(S) = 4$

Let $B \equiv$ Event that queen of diamonds is drawn.

$$\therefore n(B) = 0 \quad \dots \text{Since the queen was already put aside.}$$

$$\text{So, } P(B) = \frac{n(B)}{n(S)} = 0$$

#465271

Topic: Probability

12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one

Solution

Number of good pens = 132

Number of defective pens = 12

Total number of pens = $132 + 12 = 144$

$$P(\text{Good pen}) = \frac{132}{144} = \frac{11}{12}$$

#465272

Topic: Probability

(i) A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective?

(ii) Suppose the bulb drawn in (i) is not defective and is not replaced. Now one bulb is drawn at random from the rest. What is the probability that this bulb is not defective?

Solution

$$\text{i) } P(\text{Defective bulb}) = \frac{\text{Defective Bulbs}}{\text{Total Bulbs}} = \frac{4}{20} = \frac{1}{5}$$

ii) Since one bulb is already drawn, the number of bulbs remaining is 19.

Number of non defective bulbs is 15 as one bulb is picked.

$$P(\text{Non-defective}) = \frac{15}{19}$$

#465273

Topic: Probability

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square number (iii) a number divisible by 5

Solution

i) Number of 2 digit numbers from 1 to 90 = 81.

$$P(\text{2 digit number}) = \frac{81}{90} = \frac{9}{10}$$

ii) Number of perfect squares between 1 and 90 = (1, 4, 9, 16, 25, 36, 49, 64, 81) = 9

$$P(\text{Perfect square}) = \frac{9}{90} = \frac{1}{10}$$

iii) Multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90

Number of multiples of 5 = 18

$$P(\text{Multiples of 5}) = \frac{18}{90} = \frac{1}{5}$$

#465274

Topic: Probability



A child has a die whose six faces show the letters as given below:

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

Solution

Total possible outcomes when a dice is thrown $n(S) = 6$

i) $A \equiv$ Event that A shows up on the dice.

$$\therefore n(A) = 2$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{2}{6} = \frac{1}{3}$$

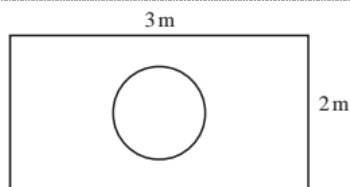
ii) $D \equiv$ Event that D shows up on the dice.

$$\therefore n(A) = 1$$

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

#465275

Topic: Probability



Suppose you drop a die at random on the rectangular region shown in fig. What is the probability that it will land inside the circle with diameter 1m?

Solution

$$\text{Area of the circle} = \pi r^2 = \frac{\pi(1)^2}{4} = \frac{\pi}{4} \text{ sq m.}$$

$$\text{Area of the rectangle} = 3 \times 2 = 6 \text{ sq m.}$$

$$P(\text{Die will land in the circle}) = \frac{\text{Area of circle}}{\text{Area of rectangle}} = \frac{\pi}{24}$$

$$P(\text{Die will land in the circle}) = \frac{\pi}{24}$$

#465276

Topic: Probability

A lot consists of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that

- (i) She will buy it ?
- (ii) She will not buy it ?

Solution

Total number of pens = 144

No. of defective pens = 20

No. of good pen = 124

i) $P(\text{Good pen}) = \frac{124}{144} = \frac{31}{36}$

ii) $P(\text{Defective pen}) = \frac{20}{144} = \frac{5}{36}$

#465279

Topic: Probability

(i) Complete the following table:

Event: 'Sum on 2 dice'	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$						$\frac{5}{36}$				$\frac{1}{36}$

(ii) A student argues that there are 11 possible outcomes 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. Therefore, each of them has a probability $\frac{1}{11}$. Do you agree with this argument?

Justify your answer.

Solution

Event: Sum of 2 dice	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

(i) From the table it can be observed that,

To get sum as 2, possible outcomes = (1, 1)

To get sum as 3, possible outcomes = (2, 1), (1, 2)

To get sum as 4, possible outcomes = (3, 1), (1, 3), (2, 2)

To get sum as 5, possible outcomes = (2, 3), (3, 2), (1, 4), (4, 1)

To get sum as 6, possible outcomes = (1, 5), (5, 1), (2, 4), (4, 2), (3, 3)

To get sum as 7, possible outcomes = (1, 6), (6, 1), (3, 4), (4, 3), (2, 5), (5, 2)

To get sum as 8, possible outcome = (2, 6), (6, 2), (3, 5), (5, 3), (4, 4)

To get sum as 9, possible outcomes = (3, 6), (6, 3), (4, 5), (5, 4)

To get sum as 10, possible outcome = (4, 6), (6, 4), (5, 5)

To get sum as 11, possible outcome = (5, 6), (6, 5)

To get sum as 12, possible outcome = (6, 6)

(ii) The probability of each of these sums will not be $\frac{1}{11}$, as these sums are not equally likely.

#465280

Topic: Probability

A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game

Solution

Sample space = {HHH, HHT, HTH, HTT, THH, THT, TTH, TTT}

Outcomes when he does not choose 3 heads or 3 tails = {HHT, HTH, HTT, THH, THT, TTH}

$$\text{Probability of losing} = \frac{6}{8} = \frac{3}{4}$$

#465281

Topic: Probability

A die is thrown twice. What is the probability that

(i) 5 will not come up either time? (ii) 5 will come up at least once?

Solution

Throwing a die twice and throwing two dice simultaneously are treated as the same experiment.

Sample space = {(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)}

i) $P(5 \text{ will not come up either time}) = \text{Number of times 5 does not show divided by total number of outcomes}$

$$P(5 \text{ will not come up either time}) = \frac{25}{36}$$

ii) $P(5 \text{ will come up at least once}) = \text{Number of times 5 shows up at least once divided by total number of outcomes}$

$$P(5 \text{ will come up at least once}) = \frac{11}{36}$$

#465285

Topic: Probability

Which of the following arguments are correct and which are not correct? Give reasons for your answer.

(i) If two coins are tossed simultaneously there are three possible outcomes—two heads, two tails or one of each. Therefore, for each of these outcomes, the probability is $\frac{1}{3}$

(ii) If a die is thrown, there are two possible outcomes—an odd number or an even number. Therefore, the probability of getting an odd number is $\frac{1}{2}$

Solution

i) Possible outcomes = {HH, HT, TH, TT}

The number of outcomes is 4.

$$\text{Hence, the probability for each of these outcomes} = \frac{1}{4}$$

The argument is false.

ii) Possible outcomes = {1, 2, 3, 4, 5, 6}

$$P(\text{Odd number}) = \frac{\text{Number of odd numbers shown}}{\text{Total outcomes}}$$

$$P(\text{Odd number}) = \frac{3}{6} = \frac{1}{2}$$

The argument is correct.

#465286

Topic: Probability

Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day.

What is the probability that both will visit the shop on (i) the same day? (ii) consecutive days? (iii) different days?

Solution

i) Possibility of visiting the shop on same day = $\{(tue, tue), (wed, wed), (thurs, thurs), (fri, fri), (sat, sat)\}$

Total outcomes is $5 \times 5 = 25$

$$P(\text{on the same day}) = \frac{5}{25} = \frac{1}{5}$$

ii) Possibility of visiting the shop on consecutive days = $\{(tue, wed), (wed, thurs), (thurs, fri), (fri, sat), (thurs, wed), (fri, thurs), (sat, fri), (wed, tue)\}$

Total outcomes is 25.

$$P(\text{on consecutive days}) = \frac{8}{25}$$

iii) Possibility of visiting the shop on different days = $\{(tue, wed, thurs, fri, sat)\}$

$$P(\text{on different days}) = 1 - P(\text{on same day}) = 1 - \frac{1}{5} = \frac{4}{5}$$

#465288

Topic: Probability

		Number in first throw					
+		1	2	2	3	3	6
Number in second throw	1	2	3	3	4	4	7
	2	3	4	4	5	5	8
	2					5	
	3						
	3			5			9
	6	7	8	8	9	9	12

A die is numbered in such a way that its faces show the numbers 1, 2, 2, 3, 3, 6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws:

What is the probability that the total score is

(i) even? (ii) 6? (iii) at least 6?

Solution

+	1	2	2	3	3	6
1	2	3	3	4	4	7
2	3	4	4	5	5	8
2	3	4	4	5	5	8
3	4	5	5	6	6	9
3	4	5	5	6	6	9
6	7	8	8	9	9	12

Total no. of possible outcomes when 2 dice are thrown $6 \times 6 = 36$

i) Total times when the sum is even = 18

$$P(\text{Getting an even no.}) = \frac{18}{36} = \frac{1}{2}$$

ii) Total times when the sum is 6 = 4

$$P(\text{Getting sum as 6}) = \frac{4}{36} = \frac{1}{9}$$

iii) Total times when the sum is atleast 6 = 15

$$P(\text{Getting sum atleast 6.}) = \frac{15}{36} = \frac{5}{12}$$

#465289

Topic: Probability

A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag

Solution

Let there be x blue balls.

So, the total number of balls = $x + 5$

$$P(\text{Blue ball}) = \frac{x}{(x + 5)}$$

$$P(\text{Red ball}) = \frac{5}{(x + 5)}$$

Given,

$$P(\text{Blue}) = 2 \times P(\text{Red})$$

$$\frac{x}{(x + 5)} = 2 \times \frac{5}{(x + 5)}$$

Solving, we get x as 10.

So, the number of blue balls = 10.

#465290

Topic: Probability

A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball?

If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x .

Solution

Initially, total number of balls = 12

No. of black balls = x

$$\text{So, } P(\text{black ball}) = \frac{x}{12}$$

If 6 more black balls are added, total number of balls = $12 + 6 = 18$

NO. of black balls = $x + 6$

$$P(\text{black ball}) = \frac{x + 6}{18}$$

Given the probability of drawing a black ball is now double of what it was before

$$\text{So, } \frac{2x}{12} = \frac{(x + 6)}{18}$$

$$\frac{x}{6} = \frac{(x + 6)}{18}$$

$$3x = x + 6 \quad 2x = 6 \quad x = 3$$

So, the number of black balls present initially = 3.

#465292

Topic: Probability

A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. Find the number of blue balls in the jar.

Solution

Total number of marbles = 24

Let there be x green marbles and $(24 - x)$ blue marbles.

$$P(\text{green}) = \frac{x}{24} = \frac{2}{3}$$

Solving, we get x as 16.

So, the number of green marbles = 16 and blue marbles = $24 - 16 = 8$ marbles.