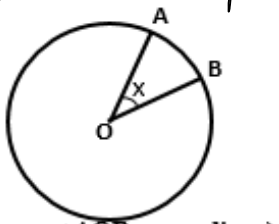
CSIR NET PYQ DISCUSSION

CH.13 PROBABILITY

A point is chosen at random from a circular disc shown in the figure. What is the probability that the point lies in the sector OAB?

(1) 2x/π **(2) x/π**

(3) x/2π **(4) x/4π**



(where ∠AOB = x radians)

(CSIR NET/JRF JUNE 2013)

Explanation:

Area of a sector = $\frac{n}{360}\pi r^2$,

where, n = Degree of the central angle of the sector.

Here n = x (x as seen in above figure)

In order to find the probability, we just need to find the share of the sector OAB in the full circle.

So, Probability that the point lies in the sector OAB

$$= \frac{\text{Area of sector OAB}}{\text{Area of Circle}}$$

$$= \frac{\left(\frac{\pi r^2 x}{360}\right)}{\pi r^2} = \frac{x}{360} = \frac{x}{2\pi}$$

Answer (3)

Two integers are picked at random from the first 15 positive integers without replacement. What is the probability that the sum of the two numbers is 20?

(1) 3/4 **(2) 1/21** **(3) 1/105** **(4) 1/20** **(CSIR NET/JRF JUNE 2013)**

Explanation:

We have to take 2 positive integers from the total 15 positive integers.

Probability = $\frac{\text{Number of succesful outcomes}}{\text{Total number of possible outcomes}}$

Total number of possible outcomes = Number of ways in which two positive integers can be selected from 15 positive integers

= $15C_2 = \frac{15 \times 14}{2} = 105$.

Now, the possible pairs for which the sum is 20 is (5,15), (6,14), (7,13), (8,12), (9,11).

That is, there are 5 such pairs.

Therefore, number of successful outcomes = 5.

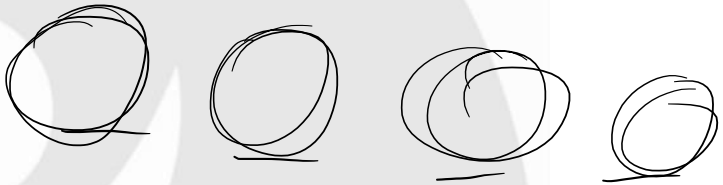
Thus Probability = $\frac{5}{105} = \frac{1}{21}$.

Answer (2)

Students of a school are divided into 4 groups. What is the probability that three friends get into the same group?

(1) 3/4 **(2) 1/64**

(3) 1/16 **(4) 1/3** **(CSIR NET/JRF DEC 2013)**



Explanation:

Let boy 1, boy 2 and boy 3 be the three friends.

Let P, Q, R and S be four groups.

Let us consider one group, say P

Group P is one of the 4 groups.

So, the probability of student 1 getting into group P = $\frac{1}{4}$

Probability of student 2 getting into group P = $\frac{1}{4}$

Probability of student 3 getting into group P = $\frac{1}{4}$

Then, probability that the three friends get into group P = $(\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4})$

However, since there are four groups,

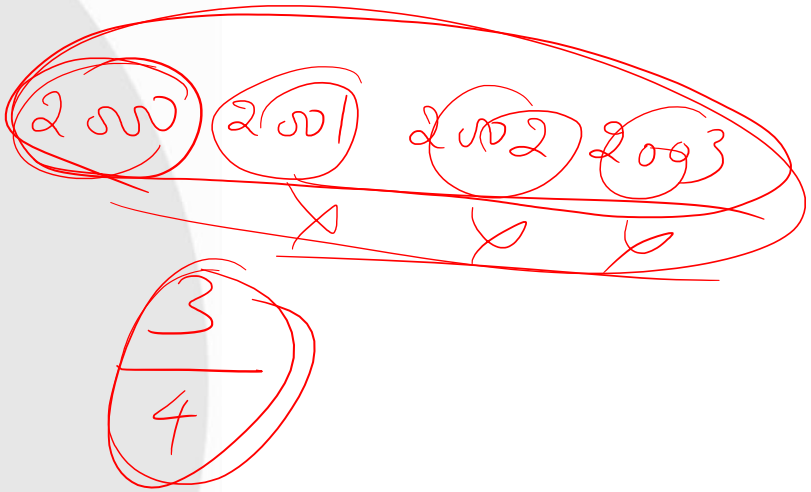
Probability that the three friends get into any one of these 4 groups = $4 \times (\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}) = \frac{1}{16}$

Answer (3)

If a 4 digit year (e.g. 1927) is chosen randomly, what is the probability that it is NOT a leap year?

(1) ¾ **(2) ¼**

(3) < ¼ **(4) > ¾** **(JUNE 2014)**



Explanation:

Criteria 1 – It should by divisible be 4

Criteria 2 – If it is divisible by 100 it should also be divisible by 400

In every 4 consecutive numbers, there will be3 numbers that are not divisible by 4 . thus by the criteria (1) chances for a randomly chosen year to be non-leap year is $\frac{3}{4}$ and by the criteria (2) , more years becomes non leap year and hence our answer is $>\frac{3}{4}$

Answer (4)

The probability that a ticketless traveller is caught during a trip is 0.1. If the traveller makes 4 trips, the probability that he/she will be caught during at least one of the trips is:

(1) $1 - (0.9)^4$
(2) $(1 - 0.9)^4$
(3) $1 - (1 - 0.9)^4$
(4) $(0.9)^4$

(CSIR NET/JRF DEC 2015)

Explanation:

Given: The probability of caught = 0.1

Note: The total probability is always 1

So the probability of not caught in 1st trip = 1 – 0.1 = 0.9

So the probability of not caught in 2nd trip = 1 – 0.1 = 0.9

So the probability of not caught in 3rd trip = 1 – 0.1 = 0.9

So the probability of not caught in 4th trip = 1 – 0.1 = 0.9

Therefore, probability of getting caught in none of the 4 trips = 0.9 x 0.9 x 0.9x 0.9 = $(0.9)^4$

So, probability of getting caught in at least one of the trip = $1 - (0.9)^4$

Answer (1)

A fair die was thrown three times and the outcome was repeatedly six. If the die is thrown again what is the probability of getting six?

(1) 1/6
(2) 1/216
(3) 1/1296
(4) 1 **(CSIR NET/JRF JUNE 2017)**

Explanation:
Since throwing a die is a random experiment.
Any number of die thrown won't change the probability of a particular event.
So, we just need to find out the probability of 6 in a die and that is 1/6.
Answer: (1)

Two students are solving the same problem independently. If the probability that the first one solves the problem is $\frac{3}{5}$ and the probability that the second solves the problem is $\frac{4}{5}$. what is the probability that at least one of them solves the problem?

(1) $\frac{17}{25}$ **(2)** $\frac{19}{25}$

(3) $\frac{21}{25}$ **(4)** $\frac{23}{25}$ **(CSIR NET/JRF JUNE 2018)**

Explanation:

Given: Probability of first to solve problem, $P_1 = 3/5$

So probability of first **not** to solve the problem, $\overline{P_1} = 1 - P_1 = 1 - 3/5 = 2/5$

Given: Probability of second to solve problem, $P_2 = 4/5$

So probability of second **not** to solve the problem, $\overline{P_2} = 1 - P_2 = 1 - 4/5 = 1/5$

Probability (At Least 1) = 1 – Probability (None)

$= 1 - \overline{P_1} \times \overline{P_2}$

$= 1 - 2/5 \times 1/5 = 23/25$

Answer (4)

Out of 6 unbiased coins, 5 are tossed independently and they all result in heads. If the 6th is now independently tossed, the probability of getting head is?

(1) 1 **(2) 0**

(3) 1/2 **(4) 1/6** **(CSIR NET/JRF DEC 2018)**

Explanation:

Total number of outcomes when 6th coin is tossed = 2
(Either Head or Tail)

Number of outcomes in which head comes = 1 (because other outcome is Tail)

Probability of getting Head =

$$\frac{Number\ of\ outcomes\ in\ which\ Head\ comes}{Total\ number\ of\ outcomes} = \frac{1}{2}$$

Answer: (3)

12 balls, 3 each of the colour red, green, blue and yellow are put in a box and mixed. If 3 balls are picked at random, without replacement, the probability that all 3 balls are of the same colour is:

(1) 1/4 **(2) 1/12**

(3) 1/36 **(4) 1/55** **(CSIR NET/JRF JUNE 2019)**

Explanation:

Let's first calculate Probability of getting all 3 balls as Red:

Probability of getting first ball as red = 3/12

(We know: **P (Event) =** $\frac{\textbf{Number of successful outcomes}}{\textbf{Total number of possible outcomes}}$)

Probability of getting second ball as red = 2/11

(Here Successful outcomes now is 2 because 1 red ball is already taken and remaining total balls in box is 11)

Probability of getting third ball as red = 1/10

(Here Successful outcomes now is 1 because 2 red ball is already taken and remaining total balls in box is 10)

So the probability of getting all 3 balls as red = 3/12 x 2/11 x 1/10 = 1/220

Similarly, probability of getting all 3 balls as green = 1/220

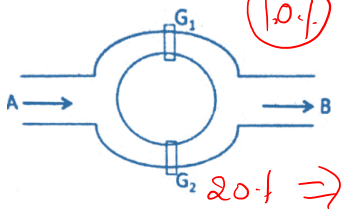
And, probability of getting all 3 balls as blue = 1/220

And probability of getting all 3 balls as yellow = 1/220

So, probability of getting either of all 3 as red, green, blue or yellow = 1/220 + 1/220 + 1/220 + 1/220 = 1/55

Answer: (4)

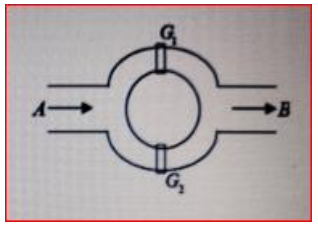
A canal system is shown in the figure:



Water flows from A and B through two channels.
Gates G_1 and G_2 are operated independently to regulate the flow.
Probability of G_1 to be open is 20%. The probability that water will flow from A to B is

(1)10% **(2) 20%**
(3) 28% **(4) 30%** **(JUNE 2019)**

Explanation:
Probability of



$G_1 open = 10\% = 0.1$
Probability of $G_2\ open = 20\% = 0.2$
Probability of $G_1 open = 90\% = 0.9$
Probability of $G_2 close = 80\% = 0.8$
Possibility of water moving from A to B
With $G_1 open\ and\ G_2 close = 0.1 \times 0.8 \times = -0.08$
With $G_2 open\ and\ G_1 close = 0.2 \times 0.9 = 0.18$
From both = $G_1 \times G_2 = 0.1 \times 0.2 = 0.02$
Hence total probability = $0.08 + 0.18 + 0.02 = 0.28$
Its means $= 28\%$
Answer: (3)

$P(\text{Atleast 1 open}) = 1 - P[\text{No Gate open}]$
$= 1 - [0.8 \times 0.9]$
$= 1 - [0.72]$
$= 0.28$
$= 28\%$

A dart is randomly thrown at a circular board on which two concentric rings of radii R and 2R having the same width (width much less than R) are marked. The probability of the dart hitting the smaller ring is?

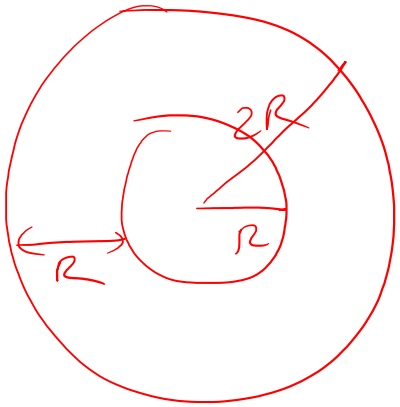
(1) twice the probability that it hits the larger ring.

(2) half of the probability that it hits the larger ring.

(3) four times the probability that it hits the larger ring.

(4) one-fourth the probability that it hits the larger ring.

(DECEMBER 2019)



Explanation:

Given two rings of radius R & 2R

Perimeter of larger ring $= 2\pi \times 2R = 4\pi R$

Perimeter $= 2\pi R$

Probability of hitting large ring $= \frac{4\pi R}{4\pi R} = 1$

Probability of hitting smaller ring $= \frac{2\pi R}{4\pi R} = \frac{1}{2}$

$\Rightarrow$ probability of hitting smaller ring is half of probability of hitting larger ring .

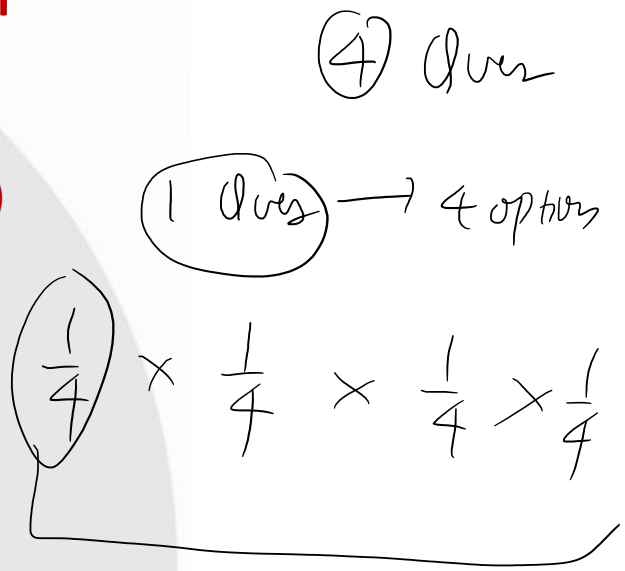
Answer: (2)

A multiple choice exam has 4 questions, each with 4 answer choices. Every question has only one correct answer. The probability of getting all answers correct by independent random guesses for each one is?

(1) 1/4 **(2) $(1/4)^4$**

(3) 1/16 **(4) (3/4)**

(CSIR NET/JRF DEC 2019)



Explanation:

Probability of getting first answer correct = ¼

Probability of getting second answer correct = ¼

Probability of getting third answer correct = ¼

Probability of getting fourth answer correct = ¼

Probability of getting all answers correct = $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \left(\frac{1}{4}\right)^4$

Answer (2)

A marksman had four successes in six attempts. What is the probability that he had three consecutive successes?

(1) 9/15 **(2) 12/15**

(3) 13/15 **(4) 6/15** **(CSIR NET/JRF NOV 2020)**

Explanation:

Here Sample Space is:

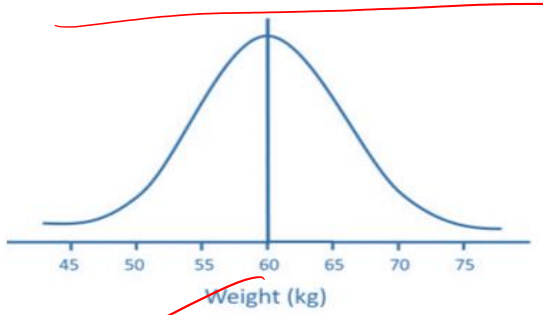
S = {FFSSSS, SFFSSS, SSFFSS, SSSFFS, SSSSFF, FSSSSF, FSFSSS, FSSFSS, FSSSFS, SFSFSS, SFSSFS, SFSSSF, SSFSFS, SSSFSF, SSFSSF}

Event = {FFSSSS, SFFSSS, SSSFFS, SSSSFF, FSSSSF, FSFSSS, FSSSFS, SFSSSF, SSSFSF,}

Therefore, Probability(of three consecutive successes) = 9/15

Answer (1)

The probability distribution of weights of a certain population is normal as shown in the figure. What is the probability that the weight of a person picked at random is more than 60 kg?



(1) 1/2
(2) 1
(3) 2/3
(4) 1/3

(CSIR NET/JRF NOV 2020)

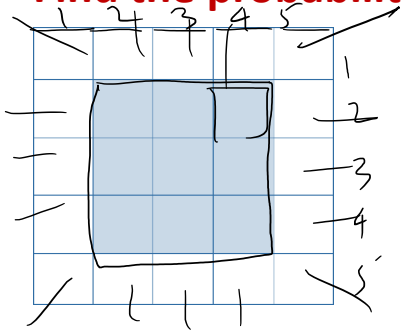
Explanation:

From the graph it is clear that there are 50% people having weights less than 60 kg and 50% people having more than 60 kg weights.

Therefore, P(weight of a person randomly picked is more than 60 kg) = 1/2

Answer (1)

Consider a solid cube of side 5 units. After painting, it is cut into cubes of 1 unit. Find the probability that a randomly chosen unit cube has only one side painted.



$25 \times 5 = 125$

$6 \times 9 = 54$

$P(E) = \frac{54}{125}$

(1) 56/125
(2) 36/125
(3) 44/125
(4) 54/125

Ans

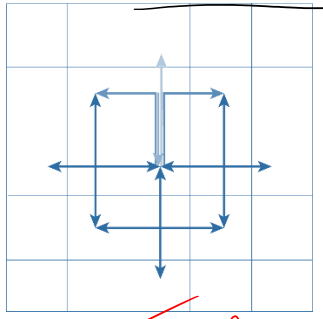
(CSIR NET/JRF JUNE2021)

Explanation:

In such a cube there will be 5×5square boxes on each side. Out of them the corner cubes will be painted in two sides. So we should not count them when to find the cubes which are painted in one side. So on each side there will be $3 \times 3 = 9$ cubes which are painted on one side. So total such cubes are= $9 \times 6 = 54$, and the total such cubes will be $5 \times 25 = 125$ as set of 25 cubes will come in 5 slices. So the probability to find such a cube is $\frac{54}{125}$.

Answer: (4)

A piece in a board game starts at the centre of the board having 5x5 squares. The piece can be moved one square horizontally or vertically in one move. If all its moves are random, the chance that it will be in one of the outer squares at the end of 2 move is



(1) 1/4
(2) 2/3
(3) 16/25
(4) 1/2

(CSIR NET/JRF JUNE2021)

Explanation:

Only four times the piece can move to the corner, as you can see in the photograph all the arrows denote the paths in which it can travel. So out of them only 4 times it can reach to the corner, and total such paths are 16 in number.

Hence probability $\frac{4}{16} = \frac{1}{4}$

Answer: (1)

A fair cubic die is rolled 5 times and we get the face with number 1 all 5 times on top. The probability of getting the same face on the sixth trial is,

(1) (1-5/6)(1/6) **(2) (1/6)**

(3) (1/6)6 **(4) 5/6** **(JUNE 2022)**

Explanation:

As, this is independent event hence the previous events don't affect.

Hence, Probability of getting 1 when die is rolled is $\frac{1}{6}$.

Answer: (2)



THANK YOU