

Shuttle: Round 1 (of 4)

Question 1 (of 4)

We throw two fair dice continuously and each time we record their sum. Let P denote the probability that the sum of five will make an appearance before the sum of seven. Find P and pass it on.

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Question 2 (of 4)

P can be written as $\frac{A}{B}$, the ratio of two primes. An urn contains 1000 tickets numbered from 1 to 1000. We choose a ticket at random. Let Q denote the probability that the chosen ticket has a number which is a multiple of two or B . Find Q and pass it on.

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Question 3 (of 4)

In a box there are $\frac{20}{3} \times Q$ big red balls, 6 small red balls, 6 big yellow balls and N small yellow balls. Compute N so that the size and colour of a ball are independent (for a ball selected at random) and pass it on.

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Question 4 (of 4)

Two equally skilled archers alternatively shoot at a target. The first one who hits the target obtains a prize. If the probability of hitting a target with a single shot is $\frac{1}{N-6}$, what is the probability that the archers obtain the prize in the second shoot?

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Question 1 (of 4)

Twelve boys and nine girls are in a room. They are leaving the room one by one. What is the probability that the last person to leave the room is a girl? Find this probability and express it as $\frac{p}{q}$, where p and q are primes. Pass on p and q .

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Question 2 (of 4)

Using sampling with replacement we choose five digits from the set $\{0, 1, \dots, 9\}$. Let P denote the probability that digit d , where $d = q \pmod{p}$, is the greatest digit chosen. P can be expressed as $\frac{a}{b}$ where a is a prime. Find a and pass it on.

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Question 3 (of 4)

Ava and Bob are playing the following game: Ava rolls a fair die once and Bob has to guess what number she rolled. Bob keeps guessing until he guesses Ava's number. If he guesses in the first attempt he gets $\pounds(a - 26)$, if he guesses in the second attempt he gets $\pounds 4$, if he guesses in the third attempt he gets $\pounds 3$, if he guesses in the fourth attempt he gets $\pounds 2$, if he guesses in the fifth attempt he gets $\pounds 1$ and if he guesses in the sixth attempt he gets $\pounds 0$. Let E denote Bob's expected winnings. Find E and pass it on.

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Question 4 (of 4)

The probability that it rains tomorrow is $\frac{1}{E}$. The probability that it rains the day after tomorrow is $\frac{2}{E}$. Let R denote the event that it rains either tomorrow or the day after tomorrow. What is the minimum value that $\mathbb{P}(R)$ can take?