

MATHEMATICS · JEE MAIN

Probability — Advanced

Chapter-wise previous year questions, with answer key

76

PYQS

2020–2025

PAPERS

5

TOPICS

Binomial Distribution

Random Variables and Distributions

Bayes' Theorem

Conditional Probability

Independent Events

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

Practise this chapter online with instant answer checking: prepwise.in/learn · No signup needed to browse

Binomial Distribution · 22 PYQs

Q1 JEE Main 2024 · 4 Apr · Shift 2

In a tournament, a team plays 10 matches with probabilities of winning and losing each match as $\frac{1}{3}$ and $\frac{2}{3}$ respectively. Let x be the number of matches that the team wins, and y be the number of matches that team loses. If the probability $P(|x - y| \leq 2)$ is p , then $3^9 p$ equals _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/KZT4COv_AS](https://www.prepwiser.in/questions/KZT4COv_AS)

Q2 JEE Main 2023 · 13 Apr · Shift 2

The random variable X follows binomial distribution $B(n, p)$, for which the difference of the mean and the variance is 1. If $2P(X = 2) = 3P(X = 1)$, then $n^2 P(X > 1)$ is equal to :

- (A) 15 (B) 12
(C) 11 (D) 16

[Step-by-step solution ► prepwiser.in/questions/8oq-xwmsqW](https://www.prepwiser.in/questions/8oq-xwmsqW)

Q3 JEE Main 2023 · 10 Apr · Shift 2

Let a die be rolled n times. Let the probability of getting odd numbers seven times be equal to the probability of getting odd numbers nine times. If the probability of getting even numbers twice is $\frac{k}{2^{15}}$, then k is equal to :

- (A) 15 (B) 60
(C) 30 (D) 90

[Step-by-step solution ► prepwiser.in/questions/xf6npbTcWb](https://www.prepwiser.in/questions/xf6npbTcWb)

Q4 JEE Main 2023 · 6 Apr · Shift 1

A pair of dice is thrown 5 times. For each throw, a total of 5 is considered a success. If the probability of at least 4 successes is $\frac{k}{3^{11}}$, then k is equal to :

- (A) 82 (B) 164
(C) 123 (D) 75

[Step-by-step solution ► prepwiser.in/questions/0WhaknkSNI](https://www.prepwiser.in/questions/0WhaknkSNI)

Q5 JEE Main 2023 · 1 Feb · Shift 1

In a binomial distribution $B(n, p)$, the sum and the product of the mean and the variance are 5 and 6 respectively, then $6(n + p - q)$ is equal to :

- (A) 52 (B) 50
(C) 51 (D) 53

[Step-by-step solution ► prepwiser.in/questions/7OFb2Vm_hQ](https://www.prepwiser.in/questions/7OFb2Vm_hQ)

Q6 JEE Main 2022 · 29 Jul · Shift 2

The sum and product of the mean and variance of a binomial distribution are 82.5 and 1350 respectively. Then the number of trials in the binomial distribution is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/6bXz6vtcJu](https://www.prepwiser.in/questions/6bXz6vtcJu)

Q7 JEE Main 2022 · 27 Jul · Shift 2

Let X have a binomial distribution $B(n, p)$ such that the sum and the product of the mean and variance of X are 24 and 128 respectively. If $P(X > n - 3) = \frac{k}{2^n}$, then k is equal to :

- (A) 528 (B) 529
(C) 629 (D) 630

Step-by-step solution ► [prepwiser.in/questions/rQcI9Pq159](https://www.prepwiser.in/questions/rQcI9Pq159)

Q8 JEE Main 2022 · 26 Jul · Shift 1

The mean and variance of a binomial distribution are α and $\frac{\alpha}{3}$ respectively. If $P(X = 1) = \frac{4}{243}$, then $P(X = 4 \text{ or } 5)$ is equal to :

- (A) $\frac{5}{9}$ (B) $\frac{64}{81}$
(C) $\frac{16}{27}$ (D) $\frac{145}{243}$

Step-by-step solution ► [prepwiser.in/questions/ATIrM_rB3A](https://www.prepwiser.in/questions/ATIrM_rB3A)

Q9 JEE Main 2022 · 26 Jul · Shift 2

Let X be a binomially distributed random variable with mean 4 and variance $\frac{4}{3}$. Then, $54 P(X \leq 2)$ is equal to :

- (A) $\frac{73}{27}$ (B) $\frac{146}{27}$
(C) $\frac{146}{81}$ (D) $\frac{126}{81}$

Step-by-step solution ► [prepwiser.in/questions/OoGNwQtnmU](https://www.prepwiser.in/questions/OoGNwQtnmU)

Q10 JEE Main 2022 · 25 Jul · Shift 1

If the sum and the product of mean and variance of a binomial distribution are 24 and 128 respectively, then the probability of one or two successes is :

- (A) $\frac{33}{2^{32}}$ (B) $\frac{33}{2^{29}}$
(C) $\frac{33}{2^{28}}$ (D) $\frac{33}{2^{27}}$

Step-by-step solution ► [prepwiser.in/questions/qbfckNml6H](https://www.prepwiser.in/questions/qbfckNml6H)

Q11 JEE Main 2022 · 30 Jun · Shift 1

If a random variable X follows the Binomial distribution $B(5, p)$ such that $P(X = 0) = P(X = 1)$, then $\frac{P(X=2)}{P(X=3)}$ is equal to :

- (A) 1 (B) 10
(C) 25 (D) 5

Step-by-step solution ► [prepwiser.in/questions/zB4Ql48eGF](https://www.prepwiser.in/questions/zB4Ql48eGF)

Q12 JEE Main 2022 · 27 Jun · Shift 1

Let X be a random variable having binomial distribution $B(7, p)$. If $P(X = 3) = 5P(X = 4)$, then the sum of the mean and the variance of X is :

- (A) $\frac{105}{16}$ (B) $\frac{7}{16}$
(C) $\frac{77}{36}$ (D) $\frac{49}{16}$

Step-by-step solution ► [prepwiser.in/questions/8ihW7Zj-O9](https://www.prepwiser.in/questions/8ihW7Zj-O9)

Q13 JEE Main 2022 · 26 Jun · Shift 1

Let a biased coin be tossed 5 times. If the probability of getting 4 heads is equal to the probability of getting 5 heads, then the probability of getting atmost two heads is :

- (A) $\frac{275}{6^5}$ (B) $\frac{36}{5^4}$
(C) $\frac{181}{5^5}$ (D) $\frac{46}{6^4}$

Step-by-step solution ► [prepwisser.in/questions/2cq2T4psYo](https://www.prepwisser.in/questions/2cq2T4psYo)

Q14 JEE Main 2022 · 24 Jun · Shift 1

If a random variable X follows the Binomial distribution B(33, p) such that

$3P(X = 0) = P(X = 1)$, then the value of $\frac{P(X=15)}{P(X=18)} - \frac{P(X=16)}{P(X=17)}$ is equal to :

- (A) 1320 (B) 1088
(C) $\frac{120}{1331}$ (D) $\frac{1088}{1089}$

Step-by-step solution ► [prepwisser.in/questions/YBRy8aSnQN](https://www.prepwisser.in/questions/YBRy8aSnQN)

Q15 JEE Main 2021 · 27 Jul · Shift 2

A student appeared in an examination consisting of 8 true-false type questions. The student guesses the answers with equal probability. the smallest value of n, so that the probability of guessing at least 'n' correct answers is less than $\frac{1}{2}$, is :

- (A) 5 (B) 6
(C) 3 (D) 4

Step-by-step solution ► [prepwisser.in/questions/GvcFow4g_G](https://www.prepwisser.in/questions/GvcFow4g_G)

Q16 JEE Main 2021 · 25 Jul · Shift 2

A fair coin is tossed n-times such that the probability of getting at least one head is at least 0.9. Then the minimum value of n is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/0XRKImkDbW](https://www.prepwisser.in/questions/0XRKImkDbW)

Q17 JEE Main 2021 · 18 Mar · Shift 2

Let in a Binomial distribution, consisting of 5 independent trials, probabilities of exactly 1 and 2 successes be 0.4096 and 0.2048 respectively. Then the probability of getting exactly 3 successes is equal to :

- (A) $\frac{40}{243}$ (B) $\frac{128}{625}$
(C) $\frac{80}{243}$ (D) $\frac{32}{625}$

Step-by-step solution ► [prepwisser.in/questions/BlT Xt9kyHK](https://www.prepwisser.in/questions/BlT Xt9kyHK)

Q18 JEE Main 2021 · 26 Feb · Shift 1

A fair coin is tossed a fixed number of times. If the probability of getting 7 heads is equal to probability of getting 9 heads, then the probability of getting 2 heads is :

- (A) $\frac{15}{2^8}$ (B) $\frac{15}{2^{12}}$
(C) $\frac{15}{2^{13}}$ (D) $\frac{15}{2^{14}}$

Step-by-step solution ► [prepwisser.in/questions/OeSvQNKtGU](https://www.prepwisser.in/questions/OeSvQNKtGU)

Q19 JEE Main 2021 · 24 Feb · Shift 1

An ordinary dice is rolled for a certain number of times. If the probability of getting an odd number 2 times is equal to the probability of getting an even number 3 times, then the probability of getting an odd number for odd number of times is :

- (A) $\frac{5}{36}$ (B) $\frac{3}{16}$
(C) $\frac{1}{2}$ (D) $\frac{1}{32}$

[Step-by-step solution ► prepwiser.in/questions/jyxTPayevr](https://www.prepwiser.in/questions/jyxTPayevr)

Q20 JEE Main 2020 · 5 Sep · Shift 2

In a bombing attack, there is 50% chance that a bomb will hit the target. Atleast two independent hits are required to destroy the target completely. Then the minimum number of bombs, that must be dropped to ensure that there is at least 99% chance of completely destroying the target, is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/FawM3hGF8T](https://www.prepwiser.in/questions/FawM3hGF8T)

Q21 JEE Main 2020 · 5 Sep · Shift 1

Four fair dice are thrown independently 27 times. Then the expected number of times, at least two dice show up a three or a five, is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/jWzf3v1vcz](https://www.prepwiser.in/questions/jWzf3v1vcz)

Q22 JEE Main 2020 · 7 Jan · Shift 2

In a workshop, there are five machines and the probability of any one of them to be out of service on a day is $\frac{1}{4}$. If the probability that at most two machines will be out of service on the same day is $\left(\frac{3}{4}\right)^3 k$, then k is equal to :

- (A) $\frac{17}{4}$ (B) $\frac{17}{2}$
(C) $\frac{17}{8}$ (D) 4

[Step-by-step solution ► prepwiser.in/questions/tmAeGZ68PX](https://www.prepwiser.in/questions/tmAeGZ68PX)

Random Variables and Distributions · 23 PYQs

Q23 JEE Main 2025 · 7 Apr · Shift 2

Let a random variable X take values 0, 1, 2, 3 with $P(X=0)=P(X=1)=p$, $P(X=2)=P(X=3)$ and $E(X^2)=2E(X)$. Then the value of $8p-1$ is :

- (A) 2
(B) 0
(C) 3
(D) 1

[Step-by-step solution ► prepwiser.in/questions/dnSKIS81J7](https://www.prepwiser.in/questions/dnSKIS81J7)

Q24 JEE Main 2025 · 4 Apr · Shift 1

A box contains 10 pens of which 3 are defective. A sample of 2 pens is drawn at random and let X denote the number of defective pens. Then the variance of X is

- (A) $\frac{11}{15}$ (B) $\frac{2}{15}$
(C) $\frac{3}{5}$ (D) $\frac{28}{75}$

Step-by-step solution ► [prepwiser.in/questions/PuvFDZoxXP](https://www.prepwiser.in/questions/PuvFDZoxXP)

Q25 JEE Main 2025 · 3 Apr · Shift 2

If the probability that the random variable X takes the value x is given by

$P(X = x) = k(x + 1)3^{-x}$, $x = 0, 1, 2, 3 \dots$, where k is a constant, then $P(X \geq 3)$ is equal to

- (A) $\frac{1}{9}$ (B) $\frac{8}{27}$
(C) $\frac{7}{27}$ (D) $\frac{4}{9}$

Step-by-step solution ► [prepwiser.in/questions/14oq2XEZNR](https://www.prepwiser.in/questions/14oq2XEZNR)

Q26 JEE Main 2025 · 29 Jan · Shift 2

Let $A = [a_{ij}]$ be a 2×2 matrix such that $a_{ij} \in \{0, 1\}$ for all i and j . Let the random variable X denote the possible values of the determinant of the matrix A . Then, the variance of X is:

- (A) $\frac{5}{8}$
(B) $\frac{1}{4}$
(C) $\frac{3}{4}$
(D) $\frac{3}{8}$

Step-by-step solution ► [prepwiser.in/questions/LPUN1TtAN8](https://www.prepwiser.in/questions/LPUN1TtAN8)

Q27 JEE Main 2025 · 22 Jan · Shift 1

A coin is tossed three times. Let X denote the number of times a tail follows a head. If μ and σ^2 denote the mean and variance of X , then the value of $64(\mu + \sigma^2)$ is:

- (A) 64 (B) 32
(C) 51 (D) 48

Step-by-step solution ► [prepwiser.in/questions/Be_t3LJB0A](https://www.prepwiser.in/questions/Be_t3LJB0A)

Q28 JEE Main 2024 · 8 Apr · Shift 1

Three balls are drawn at random from a bag containing 5 blue and 4 yellow balls. Let the random variables X and Y respectively denote the number of blue and yellow balls. If $\bar{X}$ and $\bar{Y}$ are the means of X and Y respectively, then $7\bar{X} + 4\bar{Y}$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/1ETvpX1bxF](https://www.prepwiser.in/questions/1ETvpX1bxF)

Q29 JEE Main 2024 · 6 Apr · Shift 2

From a lot of 12 items containing 3 defectives, a sample of 5 items is drawn at random. Let the random variable X denote the number of defective items in the sample. Let items in the sample be drawn one by one without replacement. If variance of X is $\frac{m}{n}$, where $\gcd(m, n) = 1$, then $n - m$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/p5uinw3U--](https://www.prepwiser.in/questions/p5uinw3U--)

Q30 JEE Main 2024 · 5 Apr · Shift 1

From a lot of 10 items, which include 3 defective items, a sample of 5 items is drawn at random. Let the random variable X denote the number of defective items in the sample. If the variance of X is σ^2 , then $96\sigma^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/mb1lk7T35l](https://www.prepwisar.in/questions/mb1lk7T35l)

Q31 JEE Main 2024 · 4 Apr · Shift 2

If the mean of the following probability distribution of a random variable X :

X	0	2	4	6	8
$P(X)$	a	$2a$	$a + b$	$2b$	$3b$

is $\frac{46}{9}$, then the variance of the distribution is

(A) $\frac{581}{81}$

(B) $\frac{566}{81}$

(C) $\frac{151}{27}$

(D) $\frac{173}{27}$

[Step-by-step solution ► prepwisar.in/questions/fk0W9jM-nc](https://www.prepwisar.in/questions/fk0W9jM-nc)

Q32 JEE Main 2024 · 31 Jan · Shift 1

Three rotten apples are accidentally mixed with fifteen good apples. Assuming the random variable x to be the number of rotten apples in a draw of two apples, the variance of x is

(A) $\frac{57}{153}$

(B) $\frac{40}{153}$

(C) $\frac{37}{153}$

(D) $\frac{47}{153}$

[Step-by-step solution ► prepwisar.in/questions/8ReznRekMy](https://www.prepwisar.in/questions/8ReznRekMy)

Q33 JEE Main 2024 · 27 Jan · Shift 1

A fair die is tossed repeatedly until a six is obtained. Let X denote the number of tosses required and let

$a = P(X = 3)$, $b = P(X \geq 3)$ and $c = P(X \geq 6 \mid X > 3)$. Then $\frac{b+c}{a}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/0SXfXyLxcg](https://www.prepwisar.in/questions/0SXfXyLxcg)

Q34 JEE Main 2023 · 13 Apr · Shift 1

A coin is biased so that the head is 3 times as likely to occur as tail. This coin is tossed until a head or three tails occur. If X denotes the number of tosses of the coin, then the mean of X is :

(A) $\frac{81}{64}$

(B) $\frac{37}{16}$

(C) $\frac{21}{16}$

(D) $\frac{15}{16}$

[Step-by-step solution ► prepwisar.in/questions/0ADjgYEz9W](https://www.prepwisar.in/questions/0ADjgYEz9W)

Q35 JEE Main 2023 · 11 Apr · Shift 2

Let the probability of getting head for a biased coin be $\frac{1}{4}$. It is tossed repeatedly until a head appears. Let N be the number of tosses required. If the probability that the equation $64x^2 + 5Nx + 1 = 0$ has no real root is $\frac{p}{q}$, where p and q are coprime, then $q - p$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/1rwqGTH5Sj](https://www.prepwiser.in/questions/1rwqGTH5Sj)

Q36 JEE Main 2023 · 8 Apr · Shift 2

If the probability that the random variable X takes values x is given by $P(X = x) = k(x + 1)3^{-x}$, $x = 0, 1, 2, 3, \dots$, where k is a constant, then $P(X \geq 2)$ is equal to :

(A) $\frac{7}{18}$

(B) $\frac{20}{27}$

(C) $\frac{7}{27}$

(D) $\frac{11}{18}$

[Step-by-step solution ► prepwiser.in/questions/v9kQxKC4pP](https://www.prepwiser.in/questions/v9kQxKC4pP)

Q37 JEE Main 2023 · 29 Jan · Shift 1

Three rotten apples are mixed accidentally with seven good apples and four apples are drawn one by one without replacement. Let the random variable X denote the number of rotten apples. If μ and σ^2 represent mean and variance of X , respectively, then $10(\mu^2 + \sigma^2)$ is equal to :

(A) 20

(B) 30

(C) 250

(D) 25

[Step-by-step solution ► prepwiser.in/questions/Fe2Vou7R1e](https://www.prepwiser.in/questions/Fe2Vou7R1e)

Q38 JEE Main 2022 · 28 Jul · Shift 2

A bag contains 4 white and 6 black balls. Three balls are drawn at random from the bag. Let X be the number of white balls, among the drawn balls. If σ^2 is the variance of X , then $100\sigma^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/fzkJiFt55Y](https://www.prepwiser.in/questions/fzkJiFt55Y)

Q39 JEE Main 2022 · 27 Jul · Shift 2

A six faced die is biased such that

$$3 \times P(\text{a prime number}) = 6 \times P(\text{a composite number}) = 2 \times P(1).$$

Let X be a random variable that counts the number of times one gets a perfect square on some throws of this die. If the die is thrown twice, then the mean of X is :

(A) $\frac{3}{11}$

(B) $\frac{5}{11}$

(C) $\frac{7}{11}$

(D) $\frac{8}{11}$

[Step-by-step solution ► prepwiser.in/questions/SlyUFtIQXI](https://www.prepwiser.in/questions/SlyUFtIQXI)

Q40 JEE Main 2022 · 24 Jun · Shift 2

A random variable X has the following probability distribution :

X	0	1	2	3	4
P(X)	k	2k	4k	6k	8k

The value of $P(1 < X < 4 \mid X \leq 2)$ is equal to :

(A) $\frac{4}{7}$

(B) $\frac{2}{3}$

(C) $\frac{3}{7}$

(D) $\frac{4}{5}$

[Step-by-step solution ► prepwisar.in/questions/wk_hv6zmg3](https://www.prepwisar.in/questions/wk_hv6zmg3)

Q41 JEE Main 2021 · 1 Sep · Shift 2

Let X be a random variable with distribution.

x	-2	-1	3	4	6
P(X = x)	$\frac{1}{5}$	a	$\frac{1}{3}$	$\frac{1}{5}$	b

If the mean of X is 2.3 and variance of X is σ^2 , then $100\sigma^2$ is equal to :

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/IU8D65Dtgb](https://www.prepwisar.in/questions/IU8D65Dtgb)

Q42 JEE Main 2021 · 27 Aug · Shift 2

The probability distribution of random variable X is given by :

X	1	2	3	4	5
P(X)	K	2K	2K	3K	K

Let $p = P(1 < X < 4 \mid X < 3)$. If $5p = \lambda K$, then λ equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/tHQz_jAP3Y](https://www.prepwisar.in/questions/tHQz_jAP3Y)

Q43 JEE Main 2021 · 25 Jul · Shift 2

Let X be a random variable such that the probability function of a distribution is given by $P(X = 0) = \frac{1}{2}$, $P(X = j) = \frac{1}{3^j}$ ($j = 1, 2, 3, \dots, \infty$). Then the mean of the distribution and $P(X \text{ is positive and even})$ respectively are :

(A) $\frac{3}{8}$ and $\frac{1}{8}$

(B) $\frac{3}{4}$ and $\frac{1}{8}$

(C) $\frac{3}{4}$ and $\frac{1}{9}$

(D) $\frac{3}{4}$ and $\frac{1}{16}$

[Step-by-step solution ► prepwisar.in/questions/WSOkRZMYVS](https://www.prepwisar.in/questions/WSOkRZMYVS)

Q44 JEE Main 2020 · 9 Jan · Shift 2

A random variable X has the following probability distribution :

X:	1	2	3	4	5
P(X):	K^2	$2K$	K	$2K$	$5K^2$

Then $P(X > 2)$ is equal to :

- (A) $\frac{1}{6}$ (B) $\frac{7}{12}$
(C) $\frac{1}{36}$ (D) $\frac{23}{36}$

[Step-by-step solution ► prepwisar.in/questions/dtOrWPkUGd](https://www.prepwisar.in/questions/dtOrWPkUGd)

Q45 JEE Main 2020 · 7 Jan · Shift 1

An unbiased coin is tossed 5 times. Suppose that a variable X is assigned the value of k when k consecutive heads are obtained for $k = 3, 4, 5$, otherwise X takes the value -1 . Then the expected value of X , is :

- (A) $-\frac{3}{16}$ (B) $-\frac{1}{8}$
(C) $\frac{1}{8}$ (D) $\frac{3}{16}$

[Step-by-step solution ► prepwisar.in/questions/s10nBo6cTT](https://www.prepwisar.in/questions/s10nBo6cTT)

Bayes' Theorem · 17 PYQs

Q46 JEE Main 2025 · 7 Apr · Shift 2

A bag contains 19 unbiased coins and one coin with head on both sides. One coin drawn at random is tossed and head turns up. If the probability that the drawn coin was unbiased, is $\frac{m}{n}$, $\gcd(m, n) = 1$, then $n^2 - m^2$ is equal to :

- (A) 64
(B) 80
(C) 60
(D) 72

[Step-by-step solution ► prepwisar.in/questions/LJXjJqW_I](https://www.prepwisar.in/questions/LJXjJqW_I)

Q47 JEE Main 2025 · 4 Apr · Shift 2

A card from a pack of 52 cards is lost. From the remaining 51 cards, n cards are drawn and are found to be spades. If the probability of the lost card to be a spade is $\frac{11}{50}$, then n is equal to _____ .

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/VMSDpnSRCz](https://www.prepwisar.in/questions/VMSDpnSRCz)

Given three identical bags each containing 10 balls, whose colours are as follows :

	Red	Blue	Green
Bag I	3	2	5
Bag II	4	3	3
Bag III	5	1	4

A person chooses a bag at random and takes out a ball. If the ball is Red, the probability that it is from bag I is p and if the ball is Green, the probability that it is from bag III is q , then the value of $\left(\frac{1}{p} + \frac{1}{q}\right)$ is:

- (A) 6 (B) 9
(C) 7 (D) 8

Step-by-step solution ► [prepwisser.in/questions/t5gx-W82qd](https://www.prepwisser.in/questions/t5gx-W82qd)

Bag B_1 contains 6 white and 4 blue balls, Bag B_2 contains 4 white and 6 blue balls, and Bag B_3 contains 5 white and 5 blue balls. One of the bags is selected at random and a ball is drawn from it. If the ball is white, then the probability that the ball is drawn from Bag B_2 is:

- (A) $\frac{2}{5}$
(B) $\frac{4}{15}$
(C) $\frac{1}{3}$
(D) $\frac{2}{3}$

Step-by-step solution ► [prepwisser.in/questions/jMtsnMAbsP](https://www.prepwisser.in/questions/jMtsnMAbsP)

Two balls are selected at random one by one without replacement from a bag containing 4 white and 6 black balls. If the probability that the first selected ball is black, given that the second selected ball is also black, is $\frac{m}{n}$, where $\gcd(m, n) = 1$, then $m + n$ is equal to :

- (A) 4 (B) 14
(C) 11 (D) 13

Step-by-step solution ► [prepwisser.in/questions/o0vLCIf0_n](https://www.prepwisser.in/questions/o0vLCIf0_n)

There are three bags X , Y and Z . Bag X contains 5 one-rupee coins and 4 five-rupee coins; Bag Y contains 4 one-rupee coins and 5 five-rupee coins and Bag Z contains 3 one-rupee coins and 6 five-rupee coins. A bag is selected at random and a coin drawn from it at random is found to be a one-rupee coin. Then the probability, that it came from bag Y , is :

- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$
(C) $\frac{5}{12}$ (D) $\frac{1}{4}$

Step-by-step solution ► [prepwisser.in/questions/VSFFJloPJ0](https://www.prepwisser.in/questions/VSFFJloPJ0)

Q52 JEE Main 2024 · 6 Apr · Shift 1

A company has two plants A and B to manufacture motorcycles. 60% motorcycles are manufactured at plant A and the remaining are manufactured at plant B . 80% of the motorcycles manufactured at plant A are rated of the standard quality, while 90% of the motorcycles manufactured at plant B are rated of the standard quality. A motorcycle picked up randomly from the total production is found to be of the standard quality. If p is the probability that it was manufactured at plant B , then $126p$ is

- (A) 54 (B) 66
(C) 56 (D) 64

[Step-by-step solution ► prepwisser.in/questions/-HK-5bJVBP](https://www.prepwisser.in/questions/-HK-5bJVBP)

Q53 JEE Main 2024 · 4 Apr · Shift 1

Three urns A , B and C contain 7 red, 5 black; 5 red, 7 black and 6 red, 6 black balls, respectively. One of the urn is selected at random and a ball is drawn from it. If the ball drawn is black, then the probability that it is drawn from urn A is :

- (A) $\frac{4}{17}$ (B) $\frac{5}{16}$
(C) $\frac{5}{18}$ (D) $\frac{7}{18}$

[Step-by-step solution ► prepwisser.in/questions/ztEih07A_F](https://www.prepwisser.in/questions/ztEih07A_F)

Q54 JEE Main 2024 · 1 Feb · Shift 1

A bag contains 8 balls, whose colours are either white or black. 4 balls are drawn at random without replacement and it was found that 2 balls are white and other 2 balls are black. The probability that the bag contains equal number of white and black balls is :

- (A) $\frac{2}{5}$ (B) $\frac{2}{7}$
(C) $\frac{1}{7}$ (D) $\frac{1}{5}$

[Step-by-step solution ► prepwisser.in/questions/tLFgW2O8cV](https://www.prepwisser.in/questions/tLFgW2O8cV)

Q55 JEE Main 2023 · 8 Apr · Shift 1

In a bolt factory, machines A , B and C manufacture respectively 20%, 30% and 50% of the total bolts. Of their output 3, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product. If the bolt drawn is found the defective, then the probability that it is manufactured by the machine C is :

- (A) $\frac{2}{7}$ (B) $\frac{9}{28}$
(C) $\frac{5}{14}$ (D) $\frac{3}{7}$

[Step-by-step solution ► prepwisser.in/questions/igmVKyW1IR](https://www.prepwisser.in/questions/igmVKyW1IR)

Q56 JEE Main 2023 · 31 Jan · Shift 1

A bag contains 6 balls. Two balls are drawn from it at random and both are found to be black. The probability that the bag contains at least 5 black balls is :

- (A) $\frac{3}{7}$ (B) $\frac{5}{6}$
(C) $\frac{5}{7}$ (D) $\frac{2}{7}$

[Step-by-step solution ► prepwisser.in/questions/m2zZEW0MgD](https://www.prepwisser.in/questions/m2zZEW0MgD)

Q57 JEE Main 2023 · 25 Jan · Shift 2

25% of the population are smokers. A smoker has 27 times more chances to develop lung cancer than a non smoker. A person is diagnosed with lung cancer and the probability that this person is a smoker is $\frac{k}{10}$. Then the value of k is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/4O8C0K-jtV](https://www.prepwiser.in/questions/4O8C0K-jtV)

Q58 JEE Main 2022 · 29 Jul · Shift 2

Bag I contains 3 red, 4 black and 3 white balls and Bag II contains 2 red, 5 black and 2 white balls. One ball is transferred from Bag I to Bag II and then a ball is drawn from Bag II. The ball so drawn is found to be black in colour. Then the probability, that the transferred ball is red, is :

(A) $\frac{4}{9}$

(B) $\frac{5}{18}$

(C) $\frac{1}{6}$

(D) $\frac{3}{10}$

[Step-by-step solution ► prepwiser.in/questions/dcCGy14TJE](https://www.prepwiser.in/questions/dcCGy14TJE)

Q59 JEE Main 2022 · 28 Jul · Shift 1

Out of 60% female and 40% male candidates appearing in an exam, 60% candidates qualify it. The number of females qualifying the exam is twice the number of males qualifying it. A candidate is randomly chosen from the qualified candidates. The probability, that the chosen candidate is a female, is :

(A) $\frac{2}{3}$

(B) $\frac{11}{16}$

(C) $\frac{23}{32}$

(D) $\frac{13}{16}$

[Step-by-step solution ► prepwiser.in/questions/VbXrxikGOy](https://www.prepwiser.in/questions/VbXrxikGOy)

Q60 JEE Main 2021 · 16 Mar · Shift 1

A pack of cards has one card missing. Two cards are drawn randomly and are found to be spades. The probability that the missing card is not a spade, is :

(A) $\frac{39}{50}$

(B) $\frac{3}{4}$

(C) $\frac{22}{425}$

(D) $\frac{52}{867}$

[Step-by-step solution ► prepwiser.in/questions/_8VbI6be_](https://www.prepwiser.in/questions/_8VbI6be_)

Q61 JEE Main 2021 · 25 Feb · Shift 2

In a group of 400 people, 160 are smokers and non-vegetarian; 100 are smokers and vegetarian and the remaining 140 are non-smokers and vegetarian. Their chances of getting a particular chest disorder are 35%, 20% and 10% respectively. A person is chosen from the group at random and is found to be suffering from the chest disorder. The probability that the selected person is a smoker and non-vegetarian is :

(A) $\frac{14}{45}$

(B) $\frac{8}{45}$

(C) $\frac{7}{45}$

(D) $\frac{28}{45}$

[Step-by-step solution ► prepwiser.in/questions/SsSaGCi0xy](https://www.prepwiser.in/questions/SsSaGCi0xy)

Q62 JEE Main 2020 · 2 Sep · Shift 1

Box I contains 30 cards numbered 1 to 30 and Box II contains 20 cards numbered 31 to 50. A box is selected at random and a card is drawn from it. The number on the card is found to be a non-prime number. The probability that the card was drawn from Box I is :

- (A) $\frac{8}{17}$ (B) $\frac{2}{3}$
(C) $\frac{2}{5}$ (D) $\frac{4}{17}$

[Step-by-step solution ► prepwiser.in/questions/-rrlmynetIz](https://www.prepwiser.in/questions/-rrlmynetIz)

Conditional Probability · 10 PYQs

Q63 JEE Main 2025 · 8 Apr · Shift 2

If A and B are two events such that $P(A) = 0.7$, $P(B) = 0.4$ and $P(A \cap \overline{B}) = 0.5$, where $\overline{B}$ denotes the complement of B , then $P(B | (A \cup \overline{B}))$ is equal to

- (A) $\frac{1}{3}$
(B) $\frac{1}{2}$
(C) $\frac{1}{4}$
(D) $\frac{1}{6}$

[Step-by-step solution ► prepwiser.in/questions/UnXGY5JCSs](https://www.prepwiser.in/questions/UnXGY5JCSs)

Q64 JEE Main 2025 · 29 Jan · Shift 2

Bag 1 contains 4 white balls and 5 black balls, and Bag 2 contains n white balls and 3 black balls. One ball is drawn randomly from Bag 1 and transferred to Bag 2. A ball is then drawn randomly from Bag 2. If the probability, that the ball drawn is white, is $\frac{29}{45}$, then n is equal to:

- (A) 5
(B) 6
(C) 4
(D) 3

[Step-by-step solution ► prepwiser.in/questions/Io2k0Z8_iu](https://www.prepwiser.in/questions/Io2k0Z8_iu)

Q65 JEE Main 2025 · 22 Jan · Shift 2

If A and B are two events such that $P(A \cap B) = 0.1$, and $P(A | B)$ and $P(B | A)$ are the roots of the equation $12x^2 - 7x + 1 = 0$, then the value of $\frac{P(\overline{A \cup B})}{P(A \cap B)}$ is :

- (A) $\frac{4}{3}$ (B) $\frac{7}{4}$
(C) $\frac{9}{4}$ (D) $\frac{5}{3}$

[Step-by-step solution ► prepwiser.in/questions/wnI7uMYN7E](https://www.prepwiser.in/questions/wnI7uMYN7E)

Q66 JEE Main 2022 · 28 Jul · Shift 2

Let A and B be two events such that $P(B | A) = \frac{2}{5}$, $P(A | B) = \frac{1}{7}$ and $P(A \cap B) = \frac{1}{9}$. Consider

(S1) $P(A' \cup B) = \frac{5}{6}$,

(S2) $P(A' \cap B') = \frac{1}{18}$

Then :

(A) Both (S1) and (S2) are true

(B) Both (S1) and (S2) are false

(C) Only (S1) is true

(D) Only (S2) is true

[Step-by-step solution ► prepwisar.in/questions/CNhxZjh3JX](https://www.prepwisar.in/questions/CNhxZjh3JX)

Q67 JEE Main 2022 · 25 Jun · Shift 1

Let E_1 and E_2 be two events such that the conditional probabilities $P(E_1|E_2) = \frac{1}{2}$, $P(E_2|E_1) = \frac{3}{4}$ and $P(E_1 \cap E_2) = \frac{1}{8}$. Then :

(A) $P(E_1 \cap E_2) = P(E_1) \cdot P(E_2)$

(B) $P(E'_1 \cap E'_2) = P(E'_1) \cdot P(E'_2)$

(C) $P(E_1 \cap E'_2) = P(E_1) \cdot P(E'_2)$

(D) $P(E'_1 \cap E_2) = P(E'_1) \cdot P(E_2)$

[Step-by-step solution ► prepwisar.in/questions/wuZq6wU57J](https://www.prepwisar.in/questions/wuZq6wU57J)

Q68 JEE Main 2021 · 26 Aug · Shift 2

A fair die is tossed until six is obtained on it. Let x be the number of required tosses, then the conditional probability $P(x \geq 5 | x > 2)$ is :

(A) $\frac{125}{216}$

(B) $\frac{11}{36}$

(C) $\frac{5}{6}$

(D) $\frac{25}{36}$

[Step-by-step solution ► prepwisar.in/questions/OJm0WluDn5](https://www.prepwisar.in/questions/OJm0WluDn5)

Q69 JEE Main 2021 · 17 Mar · Shift 2

Let a computer program generate only the digits 0 and 1 to form a string of binary numbers with probability of occurrence of 0 at even places be $\frac{1}{2}$ and probability of occurrence of 0 at the odd place be $\frac{1}{3}$. Then the probability that '10' is followed by '01' is equal to :

(A) $\frac{1}{18}$

(B) $\frac{1}{3}$

(C) $\frac{1}{9}$

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

[Step-by-step solution ► prepwisar.in/questions/w-wlFntKbH](https://www.prepwisar.in/questions/w-wlFntKbH)

Q70 JEE Main 2021 · 25 Feb · Shift 1

When a missile is fired from a ship, the probability that it is intercepted is $\frac{1}{3}$ and the probability that the missile hits the target, given that it is not intercepted, is $\frac{3}{4}$. If three missiles are fired independently from the ship, then the probability that all three hit the target, is :

(A) $\frac{3}{4}$

(B) $\frac{3}{8}$

(C) $\frac{1}{27}$

(D) $\frac{1}{8}$

[Step-by-step solution ► prepwisar.in/questions/ufbBiXqFCz](https://www.prepwisar.in/questions/ufbBiXqFCz)

Q71 JEE Main 2020 · 3 Sep · Shift 1

A dice is thrown two times and the sum of the scores appearing on the die is observed to be a multiple of 4. Then the conditional probability that the score 4 has appeared atleast once is :

- (A) $\frac{1}{8}$ (B) $\frac{1}{9}$
(C) $\frac{1}{4}$ (D) $\frac{1}{3}$

[Step-by-step solution ► prepwiser.in/questions/Gx71_6ysSZ](https://www.prepwiser.in/questions/Gx71_6ysSZ)

Q72 JEE Main 2020 · 2 Sep · Shift 2

Let E^C denote the complement of an event E. Let E_1 , E_2 and E_3 be any pairwise independent events with $P(E_1) > 0$

and $P(E_1 \cap E_2 \cap E_3) = 0$.

Then $P(E_2^C \cap E_3^C / E_1)$ is equal to :

- (A) $P(E_3^C) - P(E_2)$
(B) $P(E_2^C) + P(E_3)$
(C) $P(E_3^C) - P(E_2^C)$
(D) $P(E_3) - P(E_2^C)$

[Step-by-step solution ► prepwiser.in/questions/5niKU_9nPk](https://www.prepwiser.in/questions/5niKU_9nPk)

Independent Events · 4 PYQs

Q73 JEE Main 2021 · 26 Aug · Shift 1

Let A and B be independent events such that $P(A) = p$, $P(B) = 2p$. The largest value of p, for which P (exactly one of A, B occurs) = $\frac{5}{9}$, is :

- (A) $\frac{1}{3}$ (B) $\frac{2}{9}$
(C) $\frac{4}{9}$ (D) $\frac{5}{12}$

[Step-by-step solution ► prepwiser.in/questions/JwesGQYoTJ](https://www.prepwiser.in/questions/JwesGQYoTJ)

Q74 JEE Main 2021 · 17 Mar · Shift 1

Let there be three independent events E_1 , E_2 and E_3 . The probability that only E_1 occurs is α , only E_2 occurs is β and only E_3 occurs is γ . Let 'p' denote the probability of none of events occurs that satisfies the equations

$(\alpha - 2\beta)p = \alpha\beta$ and $(\beta - 3\gamma)p = 2\beta\gamma$. All the given probabilities are assumed to lie in the interval (0, 1).

Then,

$$\frac{\text{Probability of occurrence of } E_1}{\text{Probability of occurrence of } E_3}$$

is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/F-kA1x68jI](https://www.prepwiser.in/questions/F-kA1x68jI)

Q75 JEE Main 2021 · 24 Feb · Shift 1

Let B_i ($i = 1, 2, 3$) be three independent events in a sample space. The probability that only B_1 occur is α , only B_2 occurs is β and only B_3 occurs is γ . Let p be the probability that none of the events B_i occurs and these 4 probabilities satisfy the equations $(\alpha - 2\beta)p = \alpha\beta$ and $(\beta - 3\gamma)p = 2\beta\gamma$ (All the probabilities are assumed to lie in the interval $(0, 1)$).

Then $\frac{P(B_1)}{P(B_3)}$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/ITXAkBJWmO](https://www.prepwiser.in/questions/ITXAkBJWmO)

Q76 JEE Main 2020 · 8 Jan · Shift 1

Let A and B be two independent events such that

$P(A) = \frac{1}{3}$ and $P(B) = \frac{1}{6}$.

Then, which of the following is TRUE?

(A) $P\left(\frac{A}{A \cup B}\right) = \frac{1}{4}$

(B) $P\left(\frac{A}{B}\right) = \frac{2}{3}$

(C) $P\left(\frac{A'}{B'}\right) = \frac{1}{3}$

(D) $P\left(\frac{A}{B'}\right) = \frac{1}{3}$

Step-by-step solution ► [prepwiser.in/questions/INu8IfRfNw](https://www.prepwiser.in/questions/INu8IfRfNw)

Answer key — Probability — Advanced

Numbers match the question numbers above. For full working, open the solution link under each question.

1	8288	2	C	3	B	4	C	5	A	6	96	7	B	8	C
9	B	10	C	11	D	12	C	13	D	14	A	15	A	16	4
17	D	18	C	19	C	20	11	21	11	22	C	23	A	24	D
25	A	26	D	27	D	28	17	29	71	30	56	31	B	32	B
33	12	34	C	35	27	36	C	37	A	38	57	39	D	40	A
41	781	42	30	43	B	44	D	45	C	46	B	47	2	48	C
49	B	50	B	51	B	52	A	53	C	54	B	55	C	56	C
57	9	58	B	59	A	60	A	61	D	62	A	63	C	64	B
65	C	66	A	67	C	68	D	69	C	70	D	71	B	72	A
73	D	74	6	75	6	76	D								

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