



MATHS

NCERT - NCERT MATHEMATICS(BENGALI)

PROBABILITY

Example

1. Two coin (a one rupee coin and a two rupee coin) are tossed once. Find a sample space.



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2. Find a sample space associated with the experiment of rolling a dice .



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3. In each of the following experiments specify appropriate sample space

A boy has 1 rupee coin, a 2 rupee coin and a 5 rupee coin in his pocket. He takes out two coins out of his pocket, one after the other.



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4. A coin is tossed. If it shows head, we draw a ball from a bag consisting of 3 blue and 4 white balls, if it shows tail we throw a die. Describe the sample space of this experiment.



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5. Consider the experiment in which a coin is tossed repeatedly until a head comes up. Describe the sample space.

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6. Consider the experiment of rolling die. Let A be the event 'getting a prime number'. B be the event 'getting an odd number'. Write the sets representing the events (i) A or B (ii) A and B (iii) A but not B (iv) 'not A '.

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7. Two dice are thrown and the sum of the number which come up on the dice is noted. Let us consider the following events associated with the experiment

A : 'the sum is even'.

B: 'the sum is a multiple of 3'.

C: 'the sum is less than 4'.

D: 'the sum is greater than 11'.

Which pairs of these events are mutually exclusive?



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8. A coin is tossed three times consider the following events. A: 'No head appears', B: 'Exactly one head appears' and C: 'Atleast two heads appear'.



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9. Let a sample space be $S = \{\omega - (1), \omega_2, \dots, \omega_6\}$. Which of the following assignments of probabilities to each outcomes are valid?

Outcomes ω_1 ω_2 ω_3 ω_4 ω_5 ω_6

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

(b) 100000

(c) $\frac{1}{8} \frac{2}{3} \frac{1}{3} \frac{1}{3} - \frac{1}{4} - \frac{1}{3}$

(d) $\frac{1}{12} \frac{1}{12} \frac{1}{6} \frac{1}{6} \frac{1}{6} \frac{3}{2}$

(e) 0.6 0.6 0.6 0.6 0.6 0.6.

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10. One card is drawn from a well shuffled deck of 52 cards. If each outcomes is equally likely, calculate the probability that the card will be

(i) a diamond

(ii) not a ace

(iii) a black card (i.e., a club or, a spade) (iv) not a diamond

(v) not a black card.

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11. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be (i) red, (ii) yellow, (iii) blue, (iv) not blue, (v) either red or blue.

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12. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability of qualifying the examination is 0.02. Find the probability that

(a) Both Anil and Ashima will not qualify the examination.

(b) At least one of them will qualify the examination and (c) Only one of them will qualify the examination.

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13. A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man? (b) one man? (c) two men?



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14. On her vacations Veena visits four cities(A, B, C and D) in random order. What is the probability that she visits

(i) A before B? (ii) A before B and B before C?

(iii) A first and B last? (iv) A either first or second? (v) A just before B?



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15. Find the probability that when a hand of 7 cards is drawn from well sheffled deck of 52 cards, it contians (i) all kings (ii) 3 Kings

(iii) at least 3 Kings.

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16. If A, B, C are three events associated with a random experiment, prove that

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$$

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17. In a relay race there are five terms A, B, C, D and E .

(a) What is the probability that A, B and C finish first, second and third, respectively.

(ii) What is the probability that A, B and C are first three to finish (In any order) (Assume that all finishing orders are equally likely).

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Exercise 16 1

1. Write the sample space in each of the following :A coin is tossed three times.

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2. Write the sample space in each of the following :A die is thrown two times.

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3. Write the sample space in each of the following : A coin is tossed four times.



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4. Write the sample space in each of the following : A coin is tossed and a die is thrown.

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5. Write the sample space in each of the following : A coin is tossed and then a die is rolled only in case head is shown on the coin.

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6. 2 boys and 2 girls are in Room X, and 1 boy and 3 girls are in Room Y. Specify the sample space for the experiment in which a room is selected and then a person.

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7. One die of red colour, one of die white colour and one of blue colour are placed in a bag. One die is selected at random and rolled, its colour and the number on its uppermost face is noted. Describe the sample space.

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8. An experiment consists of recording boy-girl composition of families with 2 children.

(i) What is the sample space if we are interested in knowing whether it is a boy or girl in the order of their births?

(ii) What is the sample space if we are interested in the number of girls in the family?

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9. A box contains 1 red and 3 identical white balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.



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10. An experiment consists of tossing a coin and then throwing it second time if a head occurs on the first toss, then a die is rolled once. Find the sample space.



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11. Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defective(N). Write the sample space for the experiment?

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12. A coin is tossed. If the out come is a head, a die is thrown. If the die shows up an even number, the die is thrown again. What is the sample space for the experiment?

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13. The number 1, 2, 3 and 4 are written seprately on four slips of paper. The slips are put in a box and mixed thoroughly. A person draws two slips from the box, one after the other, without replacement. Descrebe the sample space for the experiment?

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14. An experiment consists of rolling a die and then tossing a coin if the number on the die is even. If the number on the die is odd, the coin is tossed twice. Write the sample space for this experiment.

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15. A coin is tossed. If it shows tail, we draw a ball from a box contains of 2 red and 3 black balls. If it shows heads, we throw a die. Find the sample space of this experiment.

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16. A die is thrown repeatedly until a six comes up. What is the sample space for this experiment?

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Exercise 16 2

1. A die is rolled. Let E be the event "die shows 4" and F be the event "die shows even number". Are E and F mutually exclusive?



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2. A die is thrown. Describe the following events:

(i) A : a number less than 7 (ii) B : a number greater than 7

(iii) C : a multiple of 3 (iv) D : a number less than 4

(v) E : an even number greater than 4 (vi) F : a number not less than

3

Also

find

$A \cup B, A \cap B, B \cup C, E \cap E, D \cap E, A - C, D - E, E \cap F', F'$



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3. An experiment involves rolling pair of dice and recording the numbers that come up. Describe the following events:

A: the sum is greater than 8, B: 2 occurs on either die

C: the sum is the least 7 and a mutually exclusive?

Which pairs of three events are mutually exclusive?

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4. Three coins are tossed once. Let A denote the event 'three heads show', B denote the event "two heads and one tail show", C denote the event" three tails show and D denote the event 'a head shows on the first coin". Which events are

(i) mutually exclusive? (ii) simple (iii) Compound?

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5. Three coins tossed. Describe.

(i) Two events which are mutually exclusive.

(ii) Three events which are mutually exclusive and exhaustive.

(iii) Two events, which are not mutually exclusive.

(iv) Two events which are mutually exclusive but not exhaustive.

(v) Three events which are mutually exclusive but not exhaustive.



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6. Two dice are thrown. The events A, B and C are as follows:

A: getting an even number on the first die.

B: getting odd number on the first die.

C: getting the sum of the numbers on the dice ≤ 5 .

Describe the events

(i) A, (ii) not B, (iii) A or B

(iv) A and B , (v) A but not B, (vi) B or C, (vii) B and C, (viii)

$$A \cap B' \cap C'$$



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7. Refer to question 6 above, state true or false: (give reason for your answer)

(i) A and B are mutually exclusive

(ii) A and B are mutually exclusive and exhaustive

(iii) $A = B'$

(iv) A and C are mutually exclusive.

(v) A and B' are mutually exclusive.

(vi) A, B', C are mutually exclusive and exhaustive.



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1. Which of the following can not be valid assignment of probabilities for outcomes of sample Space

$$S = \{\omega_1, \omega_2, \omega_3, \omega_4, \omega_5, \omega_6, \omega_7\}$$

Assignment

$$\omega_1 \quad \omega_2 \quad \omega_3 \quad \omega_4 \quad \omega_5 \quad \omega_6$$

(a) 0.1 0.01 0.05 0.03 0.01 0.2 0.6

(b) $\frac{1}{7} \frac{1}{7} \frac{1}{7} \frac{1}{7} \frac{1}{7} \frac{1}{7} \frac{1}{7}$

(c) 0.1 0.2 0.3 0.4 0.5 - 0.6 - 0.7

(d) - 0.1 0.2 0.3 0.4 - 0.2 0.1 0.3

(e) $\frac{1}{14} \frac{2}{14} \frac{3}{14} \frac{4}{14} \frac{5}{14} \frac{6}{14} \frac{15}{14}$



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2. A coin is tossed twice, what is the probability that atleast one tail occurs?



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3. A die is thrown, find the probability of following events:

- (i) A prime number will appear,
- (ii) A number less than or equal to 3 will appear,
- (iii) A number less than or equal to one will appear,
- (iv) A number more than 6 will appear,
- (v) A number less than 6 will appear.

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4. A card is selected from a pack of 52 cards.

- (a) How many points are there in the sample space?
- (b) Calculate the probability that the card is an ace of spades.
- (c) Calculate the probability that the card is (i) an ace (ii) black card.

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5. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is i. 9 ii) 12.

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6. There are four men and six women on the city council. If one council member is selected for a committee at random, how likely is it that it is a women?

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7. A fair coin is tossed four times, and a person win Re 1 for each head and lose Rs 1.50 for each tail that turns up.

From the sample space calculate how many different amounts of

money you can have after four tossed once. Find the probability of getting.



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8. Three coin are tossed once. Find the probability of getting

(i) 3 heads, (ii) 2 heads, (iii) atleast 2 heads,

(iv) atmost 2 heads, (v) no heads, (vi) 3 tails,

(vii) exactly two tail, (viii) no tail, (ix) atmost two tails.



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9. If $\frac{2}{11}$ Is the probability of occurring an event, what is the probability of the event will not occurs.



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

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11. In a lottery, a person chosen six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of winning the prize in the game? [Hint order of the number is not important.]

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12. Check whether the following probabilities $P(A)$ and $P(B)$ consistently defined

(i) $P(A) = 0.5, P(B) = 0.7, P(A \cap B) = 0.6$

(ii) $P(A) = 0.5, P(B) = 0.4, P(A \cup B) = 0.8$



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13. Fill up the blanks in following table:

$P(A)$	$P(B)$	$P(A \cap B)$	$P(A \cup B)$
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(i) $\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{15}$...

(ii) 0.35 ... 0.25 0.6

(iii) 0.5 0.35 ... 0.7.



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14. Given $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find $P(A \text{ or } B)$, if A and B are mutually exclusive events.



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15. If E and F are events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$, find (i) $P(E \text{ or } F)$, (ii) $P(\text{not } E \text{ and not } F)$.

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16. Events E and F are such that $P(\text{not } E \text{ or not } F) = 0.25$, State whether E and F are mutually exclusive.

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17. A and B are events such that $P(A) = 0.42$, $P(B) = 0.48$ and $P(A \text{ and } B) = 0.16$, Determine (i) $P(\text{not } A)$, (ii) $P(\text{not } B)$ and (iii) $P(A \text{ or } B)$.

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18. In Class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both mathematics and biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology.

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19. In an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing at least one of them is 0.95. What is the probability of passing both?

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20. The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither

is 0.1. If the probability of passing the English examination is 0.75.

What is the probability of passing the Hindi examination?



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21. In a class of 60 students. 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that

- (i) The student opted for NCC or NSS.
- (ii) The student has opted neither NCC nor NSS.
- (iii) The students has opted NSS but not NCC.



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Miscellaneous Exercise Chapter 16

1. A box contains 10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box, what is the probability that

(i) all will be blue? (ii) atleast one will be green?

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Miscellaneous Exercise Chapter 17

1. 4 cards are drawn from a well - shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and one spade?

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Miscellaneous Exercise Chapter 18

1. A die has two faces each with number '1', three faces each number '2' and one face with number '3'. If die is rolled once, determine

(i) $P(2)$, (ii) $P(1 \text{ or } 3)$, (iii) $P(\text{not } 3)$.



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Miscellaneous Exerciseon Chapter 19

1. In a certains lottery 10,000 tickets are sold and ten equal prizes are awarded. What Is the probability of not getting a prize if you buy (a) one ticket (b) two tikets (c) 10 tickets.



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Miscellaneous Exerciseon Chapter 20

1. Out of 100 students, two sections of 40 and 60 are formed. If you and your friend are among the 100 students, what is the probability that

(a) you both enter the same section?

(b) you both enter the different sections?

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Miscellaneous Exerciseon Chapter 21

1. Three letters are dictated to three person and an envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.

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Miscellaneous Exerciseon Chapter 22

1. A and B are two events such that

$$P(A) = 0.54, P(B) = 0.69 \text{ and } P(A \cap B) = 0.35$$

Find (i) $P(A \cup B)$ (ii) $P(A' \cap B')$ (iii) $P(A \cap B')$ (iv) $P(B \cap A')$



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Miscellaneous Exercise Chapter 23

1. From the employees of a company, 5 person are selected to represent them in the managing committee of the company.

Particular of five persons are as follows:

S.No.	Name	sex	age in years
1.	harish	<i>M</i>	30
2.	Rohon	<i>M</i>	33
3.	sheetal	<i>F</i>	46
4.	Alis	<i>F</i>	28
5.	Salim	<i>M</i>	41

A person is selected at random from this group to act as a

spokespersons. What is the probability that the spokespersons will be either male or over 35 years?

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Miscellaneous Exercise on Chapter 24

1. If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5, and 7, what is the probability of forming a number divided by 5 when,

(i) the digits are repeated? (ii) the repetition of digits is not allowed?

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Miscellaneous Exercise on Chapter 25

1. The number lock of a suitcase has 4 wheels, each labelled with ten digits i.e., from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?



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