



CLASS 9 MATHEMATICS



CHAPTER 7 – THE MATHEMATICS OF MAYBE: INTRODUCTION TO PROBABILITY



FREE WORKSHEET | New NCERT Ganita Manjari | 2026–27

This worksheet follows **Chapter 7 of the new Class 9 Ganita Manjari**, which covers randomness, experimental probability, theoretical probability, sample spaces, events, tables and tree diagrams.

Name: _____

Class: IX **Section:** _____

Date: _____



Instructions

- Attempt all questions.
 - Show your working wherever required.
 - Express probabilities in simplest fraction form.
 - Total Marks: **40**
-



SECTION A – MCQs

1 × 8 = 8 marks

1. Probability measures:

- A. The size of an event
 - B. The likelihood of an event
 - C. The number of outcomes only
 - D. The frequency of an event only
-

2. The probability of an impossible event is:

- A. 0
 - B. 1
 - C. $1/2$
 - D. 2
-

3. The probability of a certain event is:

- A. 0
 - B. $1/2$
 - C. 1
 - D. 2
-

4. The probability of any event E lies between:

- A. -1 and 1
 - B. 0 and 1
 - C. 1 and 2
 - D. $-\infty$ and ∞
-

5. A fair die has how many possible outcomes?

- A. 4
 - B. 5
 - C. 6
 - D. 8
-

6. When a fair coin is tossed once, the sample space is:

- A. $\{H\}$
 - B. $\{T\}$
 - C. $\{H, T\}$
 - D. $\{HT\}$
-

7. The theoretical probability of an event is:

- A. Total outcomes / favourable outcomes
 - B. Favourable outcomes / total possible outcomes
 - C. Favourable outcomes $\times$ total outcomes
 - D. Total outcomes – favourable outcomes
-

8. A tree diagram is mainly used to:

- A. Measure length
 - B. Find area
 - C. Visualise possible outcomes
 - D. Draw circles
-

SECTION B – FILL IN THE BLANKS

1 $\times$ 6 = 6 marks

- 9. Probability is a measure of the _____ of an event.
 - 10. The probability of an impossible event is _____.
 - 11. The probability of a certain event is _____.
 - 12. A list of all possible outcomes of a random experiment is called the _____.
 - 13. The probability of an event is denoted by _____.
 - 14. Experimental probability is calculated using the number of times an event occurs divided by the total number of _____.
-

SECTION C – SHORT ANSWER QUESTIONS

2 $\times$ 5 = 10 marks

- 15. A coin is tossed 50 times and heads appears 27 times.

Find the experimental probability of getting heads.

16. A die is rolled once.

Find the probability of getting:

- a) 3
 - b) an even number
-

17. A bag contains 5 red balls, 3 blue balls and 2 green balls.

Find the probability of selecting:

- a) a red ball
 - b) a green ball
-

18. Write the sample space when a coin is tossed twice.

19. What is the difference between **experimental probability** and **theoretical probability**?

SECTION D – APPLICATION QUESTIONS

3 × 4 = 12 marks

20. 🎲 **Rolling a Die**

A fair six-sided die is rolled once.

Find the probability of getting:

- a) an odd number
- b) a number greater than 4
- c) a multiple of 3

21. 🍬 Sweets

A box contains 30 sweets:

- 10 red
- 8 green
- 7 yellow
- 5 blue

A sweet is selected randomly.

Find the probability of selecting:

- a) a green sweet
- b) a yellow sweet
- c) a sweet that is not blue

This type of sample-based probability is included in the textbook's Exercise Set 7.2.

22. 🪙 Coin Toss

A coin is tossed twice.

- a) Write the sample space.
 - b) Find the probability of getting two heads.
 - c) Find the probability of getting exactly one head.
-

23. 🎯 Number Spinner

A spinner has the numbers:

1, 2, 3, 4, 5, 6, 7, 8

All outcomes are equally likely.

Find the probability that the spinner lands on:

- a) 8
- b) an odd number
- c) a number greater than 2

SECTION E – CASE-BASED QUESTION

4 marks

A Classroom Experiment

A student rolls a fair die **60 times** and records the following results:

Number	Frequenc y
1	8
2	12
3	9
4	11
5	10
6	10

24 (a). What is the experimental probability of getting a 2?
(1 mark)

24 (b). What is the experimental probability of getting an even number?
(1 mark)

24 (c). What is the experimental probability of getting a number greater than 4?
(1 mark)

24 (d). Compare the experimental probability of getting a 6 with its theoretical probability.
(1 mark)

BONUS CHALLENGE

25.  Outfit Combinations

A child has:

- 2 shirts: **Red and Blue**
- 3 types of pants: **Jeans, Khakis and Shorts**

a) List all possible outfits.

b) How many possible outfits are there?

c) If each combination is equally likely, what is the probability of wearing the **blue shirt with jeans**?

The textbook itself uses a 2-shirt/3-pants situation to practise listing outcomes in a table.



THINK & SOLVE

26. TREE DIAGRAM CHALLENGE

A box contains:

- 3 red pens
- 4 black pens
- 2 green pens

A pen is selected, replaced, and then another pen is selected.

a) Draw a tree diagram showing all possible colour outcomes.

b) Find the probability that both selected pens are the **same colour**.

c) Find the probability that the first pen is red and the second pen is black.

This type of replacement experiment and tree-diagram problem is included in Chapter 7.



ANSWER KEY



SECTION A

1. **B** – The likelihood of an event
2. **A** – 0

3. **C** – 1
 4. **B** – 0 and 1
 5. **C** – 6
 6. **C** – {H, T}
 7. **B** – Favourable outcomes / total possible outcomes
 8. **C** – Visualise possible outcomes
-

SECTION B

9. **likelihood**
 10. **0**
 11. **1**
 12. **sample space**
 13. **P(E)**
 14. **trials**
-

SECTION C

15.

Heads = 27

Total trials = 50

Experimental probability = 27/50

 **Answer: 27/50**

16.

Sample space:

$S = \{1, 2, 3, 4, 5, 6\}$

a) Getting 3

Favourable outcomes = 1

$$P(3) = 1/6$$

✓ 1/6

b) Getting an even number

Even numbers:

$$\{2, 4, 6\}$$

Favourable outcomes = 3

$$P(\text{even}) = 3/6 = 1/2$$

✓ 1/2

17.

Total balls:

$$5 + 3 + 2 = 10$$

a) Red

$$P(\text{red}) = 5/10 = 1/2$$

✓ 1/2

b) Green

$$P(\text{green}) = 2/10 = 1/5$$

✓ 1/5

18.

When a coin is tossed twice:

$$S = \{HH, HT, TH, TT\}$$

✓ Sample space = {HH, HT, TH, TT}

19.

Experimental probability is based on actual results obtained from repeated experiments.

Experimental probability = Number of times event occurs / Total number of trials

Theoretical probability is based on all possible equally likely outcomes.

$P(E) = \text{Number of favourable outcomes} / \text{Number of possible outcomes}$

The textbook specifically distinguishes these two approaches.

SECTION D

20. 🎲

Sample space:

{1, 2, 3, 4, 5, 6}

a) Odd number

{1, 3, 5}

$P(\text{odd}) = 3/6 = 1/2$

✓ 1/2

b) Number greater than 4

{5, 6}

$P(>4) = 2/6 = 1/3$

✓ 1/3

c) Multiple of 3

$\{3, 6\}$

$$P(\text{multiple of 3}) = 2/6 = 1/3$$

✓ **1/3**

21. 🎁

Total sweets = 30

a) Green

$$P(\text{green}) = 8/30 = 4/15$$

✓ **4/15**

b) Yellow

$$P(\text{yellow}) = 7/30$$

✓ **7/30**

c) Not blue

$$\text{Not blue} = 30 - 5 = 25$$

$$P(\text{not blue}) = 25/30 = 5/6$$

✓ **5/6**

22. 🏛️

a) Sample space

$$S = \{HH, HT, TH, TT\}$$

b) Two heads

Only HH

$$P(HH) = 1/4$$

✓ 1/4

c) Exactly one head

Outcomes:

HT, TH

$$P(\text{exactly one head}) = 2/4 = 1/2$$

✓ 1/2

The textbook similarly gives $P(HH) = 1/4$ for two coin tosses.

23. 🎯

Total outcomes = 8

a) 8

$$P(8) = 1/8$$

✓ 1/8

b) Odd number

Odd numbers:

1, 3, 5, 7

$$P(\text{odd}) = 4/8 = 1/2$$

✓ 1/2

c) Greater than 2

3, 4, 5, 6, 7, 8

$$P(>2) = 6/8 = 3/4$$

✓ 3/4

SECTION E

24 (a)

Number 2 occurred 12 times.

$$P(2) = 12/60$$

✓ 1/5

24 (b)

Even numbers are:

2, 4, 6

Frequency:

$$12 + 11 + 10 = 33$$

$$P(\text{even}) = 33/60 = 11/20$$

✓ 11/20

24 (c)

Numbers greater than 4:

5, 6

Frequency:

$$10 + 10 = 20$$

$$P(>4) = 20/60 = 1/3$$

✓ 1/3

24 (d)

Experimental probability of 6:

$$10/60 = 1/6$$

Theoretical probability of getting 6 on a fair die:

$$1/6$$

✓ They are equal in this experiment.

BONUS

25.  Outfit Combinations

Shirts:

R, B

Pants:

J, K, S

Possible combinations:

1. Red + Jeans
2. Red + Khakis
3. Red + Shorts
4. Blue + Jeans
5. Blue + Khakis
6. Blue + Shorts

a) ✓ 6 possible outfits

b) ✓ 6 combinations

c)

Blue + Jeans = 1 favourable outcome

$$P = 1/6$$

✓ Answer: 1/6



THINK & SOLVE

26.

Total pens:

$$3 + 4 + 2 = 9$$

Because the pen is **replaced**, the probabilities remain the same for the second selection.

Same colour

Both red:

$$P(RR) = 3/9 \times 3/9 = 1/9$$

Both black:

$$P(BB) = 4/9 \times 4/9 = 16/81$$

Both green:

$$P(GG) = 2/9 \times 2/9 = 4/81$$

Therefore:

$$P(\text{same colour})$$

$$= 1/9 + 16/81 + 4/81$$

$$= 9/81 + 16/81 + 4/81$$

$$= 29/81$$

✓ 29/81

First red, second black

$P(R \text{ then } B)$

$= 3/9 \times 4/9$

$= 12/81$

$= 4/27$

✓ **4/27**

CHAPTER 7 FORMULA & CONCEPT BOX

Probability

$0 \leq P(E) \leq 1$

Experimental Probability

$P(E) = \text{Number of times event occurs} / \text{Total number of trials}$

Theoretical Probability

$P(E) = \text{Number of favourable outcomes} / \text{Number of possible outcomes}$

This is applicable when the possible outcomes are **equally likely**.

Sample Space

The **sample space** is the set of all possible outcomes.

Example:

$$S = \{H, T\}$$

for one coin toss.

★ Event

An **event** is one outcome or a group of outcomes from the sample space.

🌳 Tree Diagram

A tree diagram helps us:

- list possible outcomes
- visualise combinations
- calculate probabilities
- solve multi-step random experiments.

The chapter specifically introduces tree diagrams for visualising possible outcomes.

🏆 STUDENT SELF-CHECK

- ☐ I understand the meaning of probability.
- ☐ I know impossible and certain events.
- ☐ I can find experimental probability.
- ☐ I can find theoretical probability.
- ☐ I can write a sample space.
- ☐ I can identify favourable outcomes.
- ☐ I can solve coin and dice problems.
- ☐ I can solve probability problems using tables.
- ☐ I can draw tree diagrams.
- ☐ I can solve multi-step probability problems.

★ MY SCORE: _____ / 40

35–40: 🌟 Excellent!

28–34: 👏 Very Good!

20–27: 👍 Good – keep practising!

Below 20: 📖 Revise Chapter 7 and try again!