

UNIQUE STUDY POINT

By Sumeet Sahu

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Website: uniquestudyonline.com

Contact: Unique Study Point, Amitesh Nagar, Indore, MP

PRACTICE PAPER 02 (2025-26)

CHAPTER 14: PROBABILITY

SUBJECT: MATHEMATICS STANDARD

MAX. MARKS: 40

CLASS: X

DURATION: 1½ hrs

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five Sections A, B, C, D and E.
3. Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 4 questions of 2 marks each. Section C comprises of 3 questions of 3 marks each. Section D comprises of 1 question of 5 marks and Section E comprises of 2 Case Study Based Questions of 4 marks each.
4. There is no overall choice.
5. Use of Calculators is not permitted.

SECTION - A

Questions 1 to 10 carry 1 mark each.

1. A box contains 18 balls. Out of these, 6 are red, 8 are blue and 4 are green. If one ball is chosen randomly, what is the probability that it is neither red nor green?
 - (a) $\frac{1}{3}$
 - (b) $\frac{4}{9}$
 - (c) $\frac{5}{9}$
 - (d) $\frac{2}{3}$
2. Three unbiased coins are tossed together. The probability of getting exactly two heads is:
 - (a) $\frac{1}{8}$
 - (b) $\frac{1}{4}$
 - (c) $\frac{3}{8}$
 - (d) $\frac{1}{2}$
3. A card is drawn from a well-shuffled deck of 52 cards. What is the probability that the card is a spade or an ace?
 - (a) $\frac{4}{13}$
 - (b) $\frac{17}{52}$
 - (c) $\frac{16}{52}$
 - (d) $\frac{15}{52}$
4. The probability that a student will pass the exam is 0.75. What is the probability that the student will fail?
 - (a) 0.25
 - (b) 0.5

- (c) 0.75
- (d) 1

5. A jar contains 24 marbles. Some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. How many blue marbles are in the jar?

- (a) 6
- (b) 8
- (c) 12
- (d) 16

6. If $P(E) = 0.73$, then what is the value of $P(\text{not } E)$?

- (a) 0.27
- (b) 0.37
- (c) 0.63
- (d) 0.73

7. A number x is chosen at random from the numbers $-3, -2, -1, 0, 1, 2, 3$. What is the probability that $|x| < 2$?

- (a) $\frac{2}{7}$
- (b) $\frac{3}{7}$
- (c) $\frac{4}{7}$
- (d) $\frac{5}{7}$

8. From a well-shuffled pack of cards, a card is drawn at random. Find the probability of getting a black face card.

- (a) $\frac{1}{26}$
- (b) $\frac{3}{26}$
- (c) $\frac{3}{13}$
- (d) $\frac{1}{2}$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** If two coins are tossed simultaneously, then the probability of getting no head is $\frac{1}{4}$.

Reason (R): The probability of getting a head in a single toss of a coin is $\frac{1}{2}$.

10. **Assertion (A):** The probability of selecting a girl from a class of 10 boys and 15 girls is $\frac{3}{5}$.

Reason (R): $P(\text{girl}) = \frac{\text{Number of girls}}{\text{Total students}}$

SECTION - B

Questions 11 to 14 carry 2 marks each.

11. A box contains 90 discs numbered 1 to 90. If one disc is drawn at random from the box, find the probability that it bears:

- (i) a two-digit number
- (ii) a number divisible by 6

12. All the jacks, queens and kings are removed from a deck of 52 playing cards. The remaining cards are well shuffled and then one card is drawn at random. Find the probability of getting:

- (i) a red card
- (ii) a card of hearts

13. A bag contains 3 red and 5 black balls. Another bag contains 4 red and 6 black balls. If one ball is drawn from each bag, find the probability that:

- (i) both balls are red
- (ii) both balls are black

14. It is given that the probability of winning a game is 0.7. What is the probability of losing the game?

SECTION - C

Questions 15 to 17 carry 3 marks each.

15. A bag contains white, black and red balls only. A ball is drawn at random from the bag. The probability of getting a white ball is $\frac{3}{10}$ and that of a black ball is $\frac{2}{5}$. Find the probability of getting a red ball. If the bag contains 20 black balls, find the total number of balls in the bag.

16. A game of chance consists of spinning an arrow on a circular board, divided into 8 equal parts, which comes to rest pointing at one of the numbers 1, 2, 3, ..., 8 which are equally likely outcomes. What is the probability that the arrow will point at:

- (i) an odd number?
- (ii) a number greater than 3?
- (iii) a number less than 9?

17. A bag contains 5 white and 7 red balls. One ball is drawn at random. What is the probability that the ball drawn is:

- (a) white?
- (b) red?
- (c) not white?

SECTION - D

Question 18 carries 5 marks.

18. A piggy bank contains hundred 50-paise coins, fifty ₹1 coins, twenty ₹2 coins and ten ₹5 coins. If it is equally likely that one of the coins will fall out when the piggy bank is turned upside down, find the probability that the coin:

- (a) will be a 50-paise coin
- (b) will not be a ₹5 coin
- (c) will be a ₹1 or ₹2 coin
- (d) will be neither ₹2 nor ₹5 coin
- (e) will be a coin of value more than ₹1

SECTION - E (CASE STUDY BASED QUESTIONS)

Questions 19 to 20 carry 4 marks each.

19. School Library Survey

A survey was conducted in a school library to find out the reading preferences of students. Out of 200 students surveyed:

- 80 students prefer fiction books
- 50 students prefer non-fiction books
- 40 students prefer science magazines
- 30 students prefer comics

Based on the above information, answer the following questions:

- (i) If a student is selected at random, what is the probability that the student prefers fiction books? (1)
- (ii) What is the probability that a randomly selected student does not prefer comics? (1)
- (iii) (a) Find the probability that the student selected prefers either science magazines or comics. (1)

OR

- (b) Find the probability that the student selected prefers non-fiction books. (1)
- (iv) Which type of reading material is most preferred by students? What is the probability of selecting a student who prefers this type? (1)

20. Spinner Game

In a school carnival, there is a circular spinner divided into 12 equal sectors numbered from 1 to 12. Players spin the arrow and win prizes based on where it stops.

Prize rules:

- If the arrow stops at a prime number, the player wins ₹50
- If the arrow stops at a perfect square, the player wins ₹100
- If the arrow stops at a multiple of 4, the player wins ₹25

Based on the above information, answer the following questions:

- (i) (a) What is the probability of winning ₹50? (1)

OR

- (b) What is the probability of winning ₹100? (1)
- (ii) What is the probability of winning ₹25? (1)
- (iii) What is the probability that a player does not win any prize? (Note: Consider that a number may satisfy more than one condition) (2)

DETAILED ANSWER KEY

SECTION A - ANSWERS

1. Answer: (b) 4/9

Solution:

Total balls = 18

Red balls = 6, Blue balls = 8, Green balls = 4

Neither red nor green means blue balls only

$$P(\text{blue ball}) = 8/18 = 4/9$$

2. Answer: (c) 3/8

Solution:

When three coins are tossed, total outcomes = $2^3 = 8$

Outcomes = {HHH, HHT, HTH, HTT, THH, THT, TTH, TTT}

Exactly two heads: HHT, HTH, THH = 3 outcomes

$$P(\text{exactly two heads}) = 3/8$$

3. Answer: (a) 4/13

Solution:

Total cards = 52

Number of spades = 13

Number of aces = 4

Note: One ace is already counted in spades (Ace of Spades)

Using: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$$\text{Favorable cards} = 13 + 4 - 1 = 16$$

$$P(\text{spade or ace}) = 16/52 = 4/13$$

4. Answer: (a) 0.25

Solution:

$$P(\text{pass}) = 0.75$$

$$P(\text{fail}) = 1 - P(\text{pass}) = 1 - 0.75 = 0.25$$

5. Answer: (b) 8

Solution:

Total marbles = 24

$$P(\text{green}) = 2/3$$

$$\text{Number of green marbles} = (2/3) \times 24 = 16$$

$$\text{Number of blue marbles} = 24 - 16 = 8$$

6. Answer: (a) 0.27

Solution:

$$P(E) = 0.73$$

$$P(\text{not } E) = 1 - P(E) = 1 - 0.73 = 0.27$$

7. Answer: (b) 3/7

Solution:

Numbers: -3, -2, -1, 0, 1, 2, 3 (Total = 7 numbers)

$$|x| < 2 \text{ means } -2 < x < 2$$

Numbers satisfying this: -1, 0, 1 = 3 numbers

$$P(|x| < 2) = 3/7$$

8. Answer: (b) 3/26

Solution:

Total cards = 52

Black face cards = Jack, Queen, King of Spades and Clubs

$$\text{Number of black face cards} = 3 + 3 = 6$$

$$P(\text{black face card}) = 6/52 = 3/26$$

9. Answer: (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Solution:

Assertion (A) is TRUE: When two coins are tossed, outcomes = {HH, HT, TH, TT}

No head means TT = 1 outcome, so $P = 1/4$

Reason (R) is TRUE: $P(\text{head in single toss}) = 1/2$

However, R does not directly explain A. They are related but R is not the explanation of A.

10. Answer: (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Solution:

Total students = 10 boys + 15 girls = 25

$P(\text{girl}) = 15/25 = 3/5$

Assertion (A) is TRUE: $P(\text{girl}) = 3/5$

Reason (R) is TRUE and correctly explains how to calculate $P(\text{girl})$

SECTION B - ANSWERS

11. Solution:

Discs numbered 1 to 90 = 90 discs

(i) P(two-digit number):

Two-digit numbers: 10, 11, 12, ..., 90

Count = $90 - 10 + 1 = 81$ numbers

$P(\text{two-digit}) = 81/90 = 9/10$

(ii) P(divisible by 6):

Multiples of 6 from 1 to 90: 6, 12, 18, ..., 90

These form an AP with $a = 6$, $d = 6$, $l = 90$

Number of terms = $(90 - 6)/6 + 1 = 15$

$P(\text{divisible by 6}) = 15/90 = 1/6$

12. Solution:

Face cards removed = 12 (4 jacks + 4 queens + 4 kings)

Remaining cards = $52 - 12 = 40$

(i) P(red card):

Red face cards removed = 6 (3 hearts + 3 diamonds)

Red cards remaining = $26 - 6 = 20$

$$P(\text{red card}) = 20/40 = 1/2$$

(ii) P(card of hearts):

$$\text{Hearts face cards removed} = 3$$

$$\text{Hearts remaining} = 13 - 3 = 10$$

$$P(\text{hearts}) = 10/40 = 1/4$$

13. Solution:

$$\text{Bag 1: } 3 \text{ red} + 5 \text{ black} = 8 \text{ balls}$$

$$\text{Bag 2: } 4 \text{ red} + 6 \text{ black} = 10 \text{ balls}$$

(i) P(both balls are red):

$$P(\text{red from bag 1}) = 3/8$$

$$P(\text{red from bag 2}) = 4/10 = 2/5$$

$$P(\text{both red}) = (3/8) \times (2/5) = 6/40 = 3/20$$

(ii) P(both balls are black):

$$P(\text{black from bag 1}) = 5/8$$

$$P(\text{black from bag 2}) = 6/10 = 3/5$$

$$P(\text{both black}) = (5/8) \times (3/5) = 15/40 = 3/8$$

14. Solution:

$$P(\text{winning}) = 0.7$$

$$P(\text{losing}) = 1 - P(\text{winning}) = 1 - 0.7 = 0.3$$

Therefore, probability of losing = 0.3

SECTION C - ANSWERS

15. Solution:

$$P(\text{white}) = 3/10$$

$$P(\text{black}) = 2/5 = 4/10$$

$$P(\text{white}) + P(\text{black}) + P(\text{red}) = 1$$

$$3/10 + 4/10 + P(\text{red}) = 1$$

$$7/10 + P(\text{red}) = 1$$

$$P(\text{red}) = 1 - 7/10 = 3/10$$

Finding total balls:

$$P(\text{black}) = \text{Number of black balls} / \text{Total balls}$$

$$2/5 = 20 / \text{Total balls}$$

$$\text{Total balls} = 20 \times 5/2 = 50 \text{ balls}$$

Therefore, $P(\text{red}) = 3/10$ and Total balls = 50

16. Solution:

Numbers on board: 1, 2, 3, 4, 5, 6, 7, 8

Total outcomes = 8 (equally likely)

(i) P(odd number):

Odd numbers: 1, 3, 5, 7 = 4 numbers

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

(ii) P(number > 3):

Numbers greater than 3: 4, 5, 6, 7, 8 = 5 numbers

$$P(> 3) = 5/8$$

(iii) P(number < 9):

All numbers (1 to 8) are less than 9

$$P(< 9) = 8/8 = 1 \text{ (sure event)}$$

17. Solution:

Total balls = 5 white + 7 red = 12 balls

(a) P(white):

$$P(\text{white}) = 5/12$$

(b) P(red):

$$P(\text{red}) = 7/12$$

(c) P(not white):

$$P(\text{not white}) = 1 - P(\text{white}) = 1 - 5/12 = 7/12$$

$$\text{Or, } P(\text{not white}) = P(\text{red}) = 7/12$$

SECTION D - ANSWERS

18. Solution:

Coins in piggy bank:

- 50-paise coins = 100
- ₹1 coins = 50
- ₹2 coins = 20
- ₹5 coins = 10

Total coins = $100 + 50 + 20 + 10 = 180$

(a) P(50-paise coin):

$$P(50\text{-paise}) = 100/180 = 5/9$$

(b) P(not ₹5 coin):

Coins that are not ₹5 = $180 - 10 = 170$

$$P(\text{not ₹5}) = 170/180 = 17/18$$

(c) P(₹1 or ₹2 coin):

₹1 or ₹2 coins = $50 + 20 = 70$

$$P(\text{₹1 or ₹2}) = 70/180 = 7/18$$

(d) P(neither ₹2 nor ₹5):

Coins that are neither ₹2 nor ₹5 = $100 + 50 = 150$

$$P(\text{neither ₹2 nor ₹5}) = 150/180 = 5/6$$

(e) P(value more than ₹1):

Coins worth more than ₹1 = ₹2 + ₹5 = $20 + 10 = 30$

$$P(> ₹1) = 30/180 = 1/6$$

SECTION E - ANSWERS

19. School Library Survey - Solutions:

Total students surveyed = 200

Fiction = 80, Non-fiction = 50, Science magazines = 40, Comics = 30

(i) P(fiction books):

$$P(\text{fiction}) = 80/200 = 2/5$$

(ii) P(does not prefer comics):

Students not preferring comics = $200 - 30 = 170$

$P(\text{not comics}) = 170/200 = 17/20$

(iii)(a) P(science magazines or comics):

Students preferring science magazines or comics = $40 + 30 = 70$

$P(\text{science magazines or comics}) = 70/200 = 7/20$

OR

(iii)(b) P(non-fiction books):

$P(\text{non-fiction}) = 50/200 = 1/4$

(iv) Most preferred type:

Fiction books are most preferred with 80 students

$P(\text{fiction}) = 80/200 = 2/5$

20. Spinner Game - Solutions:

Numbers on spinner: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Total outcomes = 12

Analyzing the numbers:

Prime numbers: 2, 3, 5, 7, 11 = 5 numbers (₹50 prize)

Perfect squares: 1, 4, 9 = 3 numbers (₹100 prize)

Multiples of 4: 4, 8, 12 = 3 numbers (₹25 prize)

(i)(a) P(winning ₹50):

$P(\text{prime}) = 5/12$

OR

(i)(b) P(winning ₹100):

$P(\text{perfect square}) = 3/12 = 1/4$

(ii) P(winning ₹25):

$P(\text{multiple of 4}) = 3/12 = 1/4$

(iii) P(no prize):

Numbers that win prizes: 1, 2, 3, 4, 5, 7, 8, 9, 11, 12

Note: 4 satisfies two conditions (perfect square AND multiple of 4)

Numbers that don't win any prize: 6, 10 = 2 numbers

$P(\text{no prize}) = 2/12 = 1/6$

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