ILLAWARRA TUTORING

In this worksheet, you will practise constructing and interpreting probability distribution tables and graphs for various scenarios.

Easy Questions

1. Construct the probability distribution table for a single coin toss. List the outcomes (Heads, Tails) and their probabilities using $\frac{1}{2}$ for each.

2. A fair six-sided die is rolled. Construct the probability distribution table showing the outcomes $1, 2, 3, 4, 5, 6$ and their probabilities.

3. A spinner is divided into three equal regions labelled 1, 2 and 3. Construct the probability distribution table for a single spin.

4. The following table shows a probability distribution for a random variable X:

X	Heads	Tails
x	1	0
$P(X = x)$	$\frac{1}{2}$	$\frac{1}{2}$

   Verify that the sum of the probabilities is 1.

5. When a fair coin is tossed twice, let X be the number of heads obtained. Construct the probability distribution table for X listing the outcomes $0, 1, 2$ and their corresponding probabilities.

Intermediate Questions

6. A spinner has three numbered sections: 1, 2 and 3 with probabilities 0.3, 0.4 and 0.3 respectively. Construct the probability distribution table.

7. A bag contains 10 balls: 4 red, 3 blue and 3 green. Construct the probability distribution table for the colour obtained when one ball is drawn at random.

8. A loaded four-sided die shows outcomes 1, 2, 3 and 4 with probabilities 0.05, 0.25, 0.35 and 0.35 respectively. Construct the probability distribution table. Also, sketch a bar graph (using pen and paper) representing the distribution.

9. A machine produces items of three quality ratings: Good, Acceptable and Poor. The probabilities are: Good: 0.7, Acceptable: x, Poor: 0.1. Find x and construct the complete probability distribution table.

10. When two fair coins are tossed, let X denote the number of heads. Construct the probability distribution table for X with outcomes $0, 1, 2$.

11. In a quality control study, the number of defective items is recorded over 20 batches of 30 items each. The frequencies are: 0 defects in 10 batches, 1 defect in 7 batches, and 2 defects in 3 batches. Construct the probability distribution table.

12. In a survey about favourite ice cream flavours, 20 respondents chose Vanilla, 30 chose Chocolate and 10 chose Strawberry (total 60). Construct the probability distribution table of the flavours.

13. When three fair coins are tossed, let X be the number of heads obtained. Construct the probability distribution table for X.

14. A random variable X has outcomes $1, 2, 3$ with probabilities 0.2, x and 0.5 respectively. Compute the value of x and complete the table.

15. A spinner has four numbered sectors: 1, 2, 3 and 4 with probabilities 0.1, 0.2, 0.3 and 0.4 respectively. Construct the probability distribution table and draw a corresponding bar graph on paper.

16. An urn contains balls of four colours with the following probabilities: Red: 0.25, Blue: 0.25, Green: 0.2 and Yellow: 0.3. Construct the probability distribution table.

17. A deck consists of 4 cards numbered 1 through 4. The cards have probabilities 0.1, 0.2, 0.3 and 0.4 respectively. Construct the corresponding probability distribution table.

18. A discrete random variable X takes the values -1, 0 and 1 with probabilities 0.25, 0.5 and 0.25 respectively. Construct the probability distribution table and draw a bar graph on paper.

19. A spinner is labelled with letters L, M, N and O. The probabilities are: $P(L) = 0.15$, $P(M) = 0.35$, $P(N) = 0.25$ and $P(O) = x$. Compute x and construct the complete probability distribution table.

20. A game involves drawing a number from the set $1, 2, 3, 4, 5$ with probabilities 0.1, 0.2, 0.3, 0.2 and 0.2 respectively. Construct the probability distribution table.

Hard Questions

21. Two fair dice are rolled. Construct the probability distribution table for the sum of the two dice (possible sums: 2 to 12).

22. When three fair coins are tossed, let X represent the number of tails obtained. Construct the probability distribution table for X.

23. A random variable X takes the values 2, 4, 6 and 8 with probabilities given by $P(X = x) = k \cdot x$. Find k and construct the probability distribution table.

24. A bag contains 10 balls: 5 red, 3 blue and 2 green. Construct the probability distribution table for the colour of a ball drawn at random.

25. Five tickets numbered $1, 2, 3, 4, 5$ are in a box. The probability of drawing ticket i is proportional to i; that is, $P(i) = k \cdot i$. Determine k and construct the corresponding probability distribution table.

26. A spinner is divided into five sectors numbered 1 to 5 with probabilities 0.05, 0.15, 0.35, 0.25 and 0.20 respectively. Construct the probability distribution table and draw a bar graph on paper.

27. Two numbers are drawn independently from the set $1, 2, 3$. Let X be the absolute difference between the two numbers. Construct the probability distribution table for X.

28. A spinner is divided into five colour regions: Red, Blue, Green, Yellow and Purple. The probabilities are: $P(\text{Red}) = 0.1$, $P(\text{Blue}) = 0.2$, $P(\text{Green}) = 0.3$, $P(\text{Yellow}) = 0.25$ and $P(\text{Purple}) = x$. Compute x and construct the probability distribution table.

29. In a random experiment, the outcomes are labelled A, B, C, D and E with probabilities: $P(A) = 0.05$, $P(B) = 0.15$, $P(C) = x$, $P(D) = 0.25$ and $P(E) = 0.35$. Find x and construct the probability distribution table.

30. A discrete random variable X takes values 0, 1, 2 and 3 with probability function $P(X = x) = k\,(x + 1)$. Determine k and construct the probability distribution table. Then, draw a corresponding bar graph on paper.