Class 10 Mathematics · Chapter 14: Probability

Answer key and marking scheme · 20 marks · about 40 minutes · based on NCERT

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1. A token is drawn 'at random' from a box of tokens. This phrase means that [1]

(a) every token in the box is equally likely to be drawn

(b) the token drawn is the one on top

(c) tokens of the most common colour cannot be drawn

(d) the token is drawn after looking into the box

Answer: (a) Drawing at random is a short way of saying that all the tokens are equally likely to be drawn.

2. A letter is chosen at random from the letters of the word KOLKATA. The probability that it is the letter K is [1]

(a) $\frac{1}{5}$

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

(c) $\frac{2}{7}$

(d) $\frac{2}{5}$

Answer: (c) KOLKATA has 7 letters, 2 of them K: P = 2/7. 1/5 and 2/5 count only the 5 different letters, which are not equally likely.

3. A card is drawn from a well-shuffled deck of 52 playing cards. The probability that it is a black ace is [1]

(a) $\frac{1}{52}$

(b) $\frac{1}{13}$

(c) $\frac{1}{26}$

(d) $\frac{2}{13}$

Answer: (c) The black aces are the ace of spades and the ace of clubs: P = 2/52 = 1/26. 1/13 counts all four aces.

4. Every token in a box is red, green or yellow. For a token drawn at random, P(red) = $\frac{1}{4}$ and P(green) = $\frac{5}{12}$. Then P(yellow) is [1]

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

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

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

(d) $\frac{5}{12}$

Answer: (a) The probabilities of the elementary events add to 1: P(yellow) = 1 − 1/4 − 5/12 = 12/12 − 3/12 − 5/12 = 4/12 = 1/3.

5. A packet has 12 pencils and every one of them is an HB pencil. A pencil is taken out at random. The probability that it is an HB pencil is [1]

(a) 1

(b) 0

(c) $\frac{1}{12}$

(d) 12

Answer: (a) All 12 outcomes are favourable: P = 12/12 = 1, a sure event. 12 cannot be a probability, since it exceeds 1.

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6. A tea stall in Darjeeling keeps 60 tea bags in a box: 18 green tea, 30 masala tea and the rest lemon tea. A tea bag is taken out at random. Find the probability that it is (i) lemon tea, (ii) not masala tea. [2]

Lemon tea bags = 60 − 18 − 30 = 12. (i) P(lemon) = 12/60 = 1/5. (ii) P(masala) = 30/60 = 1/2, so P(not masala) = 1 − 1/2 = 1/2.

- P(lemon) = 12/60 = 1/5 (1)
- P(not masala) = 1 − 30/60 = 1/2 (1)

7. The probability that a student of a class of 40 in Bhopal, chosen at random, travels to school by bus is 0.35. Find the probability that the student does not travel by bus, and the number of students who do not. [2]

P(not by bus) = 1 − 0.35 = 0.65. Number not travelling by bus = 0.65 × 40 = 26.

- P(not by bus) = 0.65 (1)
- 26 students (1)

8. A month is picked at random from the twelve months of a year. Find the probability that (i) it has 31 days, (ii) its name begins with the letter J. [2]

(i) January, March, May, July, August, October and December have 31 days: P = 7/12. (ii) January, June and July begin with J: P = 3/12 = 1/4.

- seven 31-day months, P = 7/12 (1)
- three months begin with J, P = 1/4 (1)

9. At a school fete in Lucknow, tickets numbered 1 to 40 are put in a box and one is drawn at random. Find the probability that the number on it is (i) a multiple of 5, (ii) a perfect square, (iii) a number whose digits add up to 4. [3]

40 equally likely outcomes. (i) 5, 10, ..., 40: 8 numbers, P = 8/40 = 1/5. (ii) 1, 4, 9, 16, 25, 36: P = 6/40 = 3/20. (iii) 4, 13, 22, 31, 40: P = 5/40 = 1/8.

- P(multiple of 5) = 1/5 (1)
- P(perfect square) = 3/20 (1)
- P(digit sum 4) = 1/8 (1)

10. A bag has 2 green and 8 yellow tennis balls. Arjun says, 'A ball drawn at random is either green or yellow, so P(green) = $\frac{1}{2}$.' Is he right? Find P(green) and P(yellow), and check that they add to 1. [3]

He is wrong: the 10 balls are equally likely, the two colours are not. P(green) = 2/10 = 1/5, P(yellow) = 8/10 = 4/5, and 1/5 + 4/5 = 1.

- says he is wrong, the colours are not equally likely outcomes (1)
- P(green) = 1/5, P(yellow) = 4/5 (1)
- sum = 1 (1)

11. Two dice, one white and one black, are thrown together. Find the probability that (i) both show the same number, (ii) the product of the numbers is less than 5, (iii) the number on the white die is greater than the number on the black die. [3]

36 equally likely ordered pairs. (i) (1, 1), ..., (6, 6): P = 6/36 = 1/6. (ii) (1, 1), (1, 2), (2, 1), (1, 3), (3, 1), (1, 4), (4, 1), (2, 2): P = 8/36 = 2/9. (iii) Off the 6 doublets, the other 30 pairs split equally: P = 15/36 = 5/12.

- P(same number) = 1/6 (1)
- 8 pairs, P = 2/9 (1)
- 15 pairs, P = 5/12 (1)

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