Year 8 · Probability: Working Out the Chances

Name: _____ Date: _____

Hi! This sheet helps you practise theoretical probability, working out how likely something is when all outcomes are equally likely. You'll write answers as fractions, decimals and percentages, compare events, and use complements. Have your working handy!

Warm-up

1. A fair six-sided dice is rolled once. What is the probability of rolling a 4? Give your answer as a fraction.

2. A spinner has 5 equal sections coloured red, blue, blue, green and yellow. What is the probability of landing on blue? Give your answer as a fraction and a decimal.

3. A single card is drawn from a standard 52-card deck. What is the probability it is a heart? Give your answer as a fraction.

4. The probability that it rains on Saturday in Avondale is 0.35. What is the probability that it does NOT rain?

Practice

5. A bag holds 20 marbles: 8 red, 7 blue and 5 green. One marble is taken at random. Find P(red) as a fraction, a decimal and a percentage.

6. Using the same bag of 20 marbles (8 red, 7 blue, 5 green), which is more likely: drawing a blue marble or drawing a green marble? Explain using probabilities.

7. A dice is rolled once. Find the probability of rolling a number greater than 4. Then find the probability of NOT rolling a number greater than 4.

8. Mereana spins a spinner with 8 equal sections numbered 1 to 8. What is the probability she spins an even number? Give your answer as a fraction and a percentage.

9. At the Avondale market, a raffle has 200 tickets. Tama buys 15 tickets. If one winning ticket is drawn at random, what is the probability Tama wins? Give your answer as a fraction and a decimal.

10. A pencil case contains 12 pens: 3 black, 4 blue, 2 red and 3 green. Aroha takes one pen without looking. Find P(black or red). Then find the probability she picks a pen that is neither black nor red.

Challenge

11. Two fair coins are tossed together. List all possible outcomes, then find the probability of getting exactly one head. Give your answer as a fraction and a percentage.

12. Two fair six-sided dice are rolled and the numbers are added. Use a table of all 36 outcomes to find the probability the total is 7. Then find the probability the total is NOT 7.

Answer key (for parents and tutors)

1. A fair six-sided dice is rolled once. What is the probability of rolling a 4? Give your answer as a fraction.
   There is 1 way to roll a 4 and 6 possible outcomes. P(4) = 1/6.

2. A spinner has 5 equal sections coloured red, blue, blue, green and yellow. What is the probability of landing on blue? Give your answer as a fraction and a decimal.
   There are 2 blue sections out of 5. P(blue) = 2/5 = 0.4.

3. A single card is drawn from a standard 52-card deck. What is the probability it is a heart? Give your answer as a fraction.
   There are 13 hearts out of 52 cards. P(heart) = 13/52 = 1/4.

4. The probability that it rains on Saturday in Avondale is 0.35. What is the probability that it does NOT rain?
   An event and its complement add to 1. P(no rain) = 1 − 0.35 = 0.65.

5. A bag holds 20 marbles: 8 red, 7 blue and 5 green. One marble is taken at random. Find P(red) as a fraction, a decimal and a percentage.
   There are 8 red out of 20 marbles. P(red) = 8/20 = 2/5 = 0.4 = 40%.

6. Using the same bag of 20 marbles (8 red, 7 blue, 5 green), which is more likely: drawing a blue marble or drawing a green marble? Explain using probabilities.
   P(blue) = 7/20 = 0.35 and P(green) = 5/20 = 1/4 = 0.25. Since 0.35 > 0.25, drawing a blue marble is more likely.

7. A dice is rolled once. Find the probability of rolling a number greater than 4. Then find the probability of NOT rolling a number greater than 4.
   Numbers greater than 4 are 5 and 6, so 2 outcomes out of 6. P(>4) = 2/6 = 1/3. The complement: P(not >4) = 1 − 1/3 = 2/3.

8. Mereana spins a spinner with 8 equal sections numbered 1 to 8. What is the probability she spins an even number? Give your answer as a fraction and a percentage.
   Even numbers are 2, 4, 6, 8, that's 4 out of 8. P(even) = 4/8 = 1/2 = 50%.

9. At the Avondale market, a raffle has 200 tickets. Tama buys 15 tickets. If one winning ticket is drawn at random, what is the probability Tama wins? Give your answer as a fraction and a decimal.
   Tama holds 15 tickets out of 200. P(win) = 15/200 = 3/40 = 0.075.

10. A pencil case contains 12 pens: 3 black, 4 blue, 2 red and 3 green. Aroha takes one pen without looking. Find P(black or red). Then find the probability she picks a pen that is neither black nor red.
    Black or red pens: 3 + 2 = 5 out of 12. P(black or red) = 5/12. The complement is neither black nor red: P = 1 − 5/12 = 7/12. (Check: blue + green = 4 + 3 = 7, so 7/12. ✓)

11. Two fair coins are tossed together. List all possible outcomes, then find the probability of getting exactly one head. Give your answer as a fraction and a percentage.
    List all outcomes: HH, HT, TH, TT, that's 4 equally likely outcomes. Exactly one head happens in HT and TH, so 2 outcomes. P(exactly one head) = 2/4 = 1/2 = 50%.

12. Two fair six-sided dice are rolled and the numbers are added. Use a table of all 36 outcomes to find the probability the total is 7. Then find the probability the total is NOT 7.
    There are 6 × 6 = 36 equally likely outcomes. Totals of 7 come from: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1), that's 6 ways. P(total = 7) = 6/36 = 1/6. The complement: P(not 7) = 1 − 1/6 = 5/6.