KIDSLEARN MATH · PRACTICE ASSIGNMENT

# Probability

Name: Date: Score: / 50

$P(\text{event}) = \dfrac{\text{favourable outcomes}}{\text{total outcomes}}$. *Dice, coins and spinners are fair, and every choice is made at random. Give probabilities as fractions in lowest terms. Answers are at the end.*

## Part A — Warm-up

**1.** A drawer holds 7 green, 6 purple, 3 orange and 6 red socks. One sock is taken out without looking. What is the probability that it is green?

**2.** A bag holds 5 green, 4 orange and 7 blue counters. One counter is taken out without looking. What is the probability that it is blue?

**3.** A bag holds 5 white and 3 black counters. One counter is taken out without looking. What is the probability that it is black?

**4.** A bag holds 1 blue, 4 yellow, 5 orange and 9 purple marbles. One marble is taken out without looking. What is the probability that it is purple?

**5.** A fair 20-sided die, numbered 1 to 20, is rolled. What is the probability of getting a number less than 3?

**6.** A fair six-sided die is rolled. What is the probability of getting a number greater than 3?

**7.** A fair 8-sided die, numbered 1 to 8, is rolled. What is the probability of getting a number less than 5?

**8.** A fair six-sided die is rolled. What is the probability of getting a prime number?

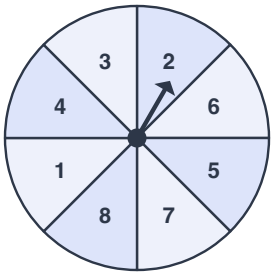
**9.** A bag holds 6 purple, 3 blue and 6 green counters. One is picked at random. What is the probability that it is not blue?

**10.** A tin holds 7 black, 6 blue and 8 green buttons. One is picked at random. What is the probability that it is not green?

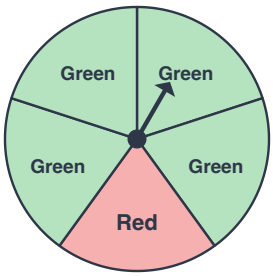
**11.** There is a 40% chance that a light bulb is faulty. What is the probability that it is not faulty? Give a fraction.

**12.** The probability that the phone battery lasts all day is $\frac{1}{4}$. What is the probability that it does not last all day?

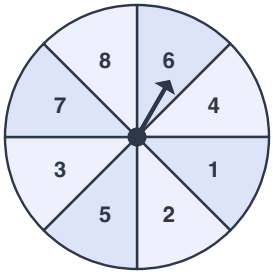
**13.** This spinner has 8 equal sections. What is the probability that it lands on a number less than 7?




**14.** This spinner has 5 equal sections. What is the probability that it lands on red?




**15.** This spinner has 8 equal sections. What is the probability that it lands on a multiple of 5?




## Part B — Core practice

**16.** One card is drawn from a well-shuffled standard deck of 52 playing cards. What is the probability that it is a red picture card?

**17.** One card is drawn from a well-shuffled standard deck of 52 playing cards. What is the probability that it is a spade picture card?

**18.** One card is drawn from a well-shuffled standard deck of 52 playing cards. What is the probability that it is a red card?

**19.** One card is drawn from a well-shuffled standard deck of 52 playing cards. What is the probability that it is a black ace?

**20.** A coin is flipped and a die is rolled. What is the probability of tails and an even number?

**21.** A coin is flipped and a die is rolled. What is the probability of tails and a prime number?

**22.** A coin is flipped twice. What is the probability of heads on the first flip and tails on the second?

**23.** A die is rolled twice. What is the probability that the first roll is a number greater than 3 and the second roll is a square number?

**24.** A fair 12-sided die numbered 1 to 12 is rolled. What is the probability of rolling 3, 4 or 12?

**25.** A bag holds 6 white, 7 black, 5 red and 8 orange counters. One is picked at random. What is the probability that it is white or red?

**26.** A card is drawn from a standard deck of 52 cards. What is the probability that it is a 2 or a 3?

**27.** A card is drawn from a standard deck of 52 cards. What is the probability that it is a diamond or the ace of spades?

**28.** Two dice are rolled and the numbers are added. The table shows all 36 equally likely results. What is the probability that the two numbers differ by 1?

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 | 7 |
| **2** | 3 | 4 | 5 | 6 | 7 | 8 |
| **3** | 4 | 5 | 6 | 7 | 8 | 9 |
| **4** | 5 | 6 | 7 | 8 | 9 | 10 |
| **5** | 6 | 7 | 8 | 9 | 10 | 11 |
| **6** | 7 | 8 | 9 | 10 | 11 | 12 |

**29.** Two dice are rolled and the numbers are added. The table shows all 36 equally likely results. What is the probability that the total is a multiple of 3?

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 | 7 |
| **2** | 3 | 4 | 5 | 6 | 7 | 8 |
| **3** | 4 | 5 | 6 | 7 | 8 | 9 |
| **4** | 5 | 6 | 7 | 8 | 9 | 10 |
| **5** | 6 | 7 | 8 | 9 | 10 | 11 |
| **6** | 7 | 8 | 9 | 10 | 11 | 12 |

**30.** Two dice are rolled and the numbers are added. The table shows all 36 equally likely results. What is the probability that the total is even?

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 | 7 |
| **2** | 3 | 4 | 5 | 6 | 7 | 8 |
| **3** | 4 | 5 | 6 | 7 | 8 | 9 |
| **4** | 5 | 6 | 7 | 8 | 9 | 10 |
| **5** | 6 | 7 | 8 | 9 | 10 | 11 |
| **6** | 7 | 8 | 9 | 10 | 11 | 12 |

**31.** Two dice are rolled and the numbers are added. The table shows all 36 equally likely results. What is the probability that the total is 11?

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 | 7 |
| **2** | 3 | 4 | 5 | 6 | 7 | 8 |
| **3** | 4 | 5 | 6 | 7 | 8 | 9 |
| **4** | 5 | 6 | 7 | 8 | 9 | 10 |
| **5** | 6 | 7 | 8 | 9 | 10 | 11 |
| **6** | 7 | 8 | 9 | 10 | 11 | 12 |

**32.** A spinner landed on blue 26 times in 50 spins. Using this result, how many times would you expect blue in 200 spins?

**33.** A spinner landed on blue 13 times in 25 spins. Using this result, how many times would you expect blue in 125 spins?

**34.** A spinner landed on blue 11 times in 50 spins. Using this result, how many times would you expect blue in 300 spins?

**35.** The probability of picking a blue marble from a bag is $\frac{1}{3}$. There are 3 blue marbles. How many marbles are in the bag?

**36.** The probability of picking a blue marble from a bag is $\frac{3}{8}$. There are 3 blue marbles. How many marbles are in the bag?

**37.** The probability of picking a black marble from a bag is $\frac{3}{4}$. There are 3 black marbles. How many marbles are in the bag?

**38.** A spinner lands on one of four colours. The table shows the probabilities. Find the missing probability.

| Colour | Red | Yellow | Green | Blue |
|---|---|---|---|---|
| $P$ | 0.05 | 0.1 | ? | 0.75 |

## Part C — Challenge

**39.** A bag holds 4 red and 5 blue balls. One ball is taken out at random and not put back, and then a second ball is taken. What is the probability that both are blue?

**40.** A bag holds 5 yellow and 6 green balls. One ball is taken out at random and not put back, and then a second ball is taken. What is the probability that they are the same colour?

**41.** A bag holds 2 blue and 6 red balls. One ball is taken out at random and not put back, and then a second ball is taken. What is the probability that both are red?

**42.** A bag holds 5 green and 4 blue balls. One ball is taken out at random and not put back, and then a second ball is taken. What is the probability that both are blue?

**43.** The probability that a basketball player scores a free throw is $\frac{1}{6}$. She takes two shots (they are independent). What is the probability that she scores at least once?

**44.** A coin is flipped 3 times. What is the probability of getting exactly 2 heads?

**45.** The probability that a basketball player scores a free throw is $\frac{2}{3}$. She takes two shots (they are independent). What is the probability that she scores at least once?

**46.** The probability that a basketball player scores a free throw is $\frac{3}{4}$. She takes two shots (they are independent). What is the probability that she scores at least once?

**47.** A whole number from 1 to 50 is chosen at random. What is the probability that it is a multiple of 3 or a multiple of 5 (or both)?

**48.** A jar has only red and yellow sweets. There are 10 yellow sweets, and the probability of picking a red one is $\frac{2}{7}$. How many red sweets are there?

**49.** A bag holds 3 red and 6 blue marbles. How many more red marbles must be added so that the probability of picking red is $\frac{3}{4}$?

**50.** A jar has only red and green sweets. There are 15 green sweets, and the probability of picking a red one is $\frac{3}{8}$. How many red sweets are there?

# Answer Key — Probability

1. $\frac{7}{22}$
   There are 7 green out of $7 + 6 + 3 + 6 = 22$ socks: $P(\text{green}) = \frac{7}{22}$.

2. $\frac{7}{16}$
   There are 7 blue out of $5 + 4 + 7 = 16$ counters: $P(\text{blue}) = \frac{7}{16}$.

3. $\frac{3}{8}$
   There are 3 black out of $5 + 3 = 8$ counters: $P(\text{black}) = \frac{3}{8}$.

4. $\frac{9}{19}$
   There are 9 purple out of $1 + 4 + 5 + 9 = 19$ marbles: $P(\text{purple}) = \frac{9}{19}$.

5. $\frac{1}{10}$
   The favourable outcomes are 1 and 2: 2 out of 20, so $P = \frac{2}{20} = \frac{1}{10}$.

6. $\frac{1}{2}$
   The favourable outcomes are 4, 5 and 6: 3 out of 6, so $P = \frac{3}{6} = \frac{1}{2}$.

7. $\frac{1}{2}$
   The favourable outcomes are 1, 2, 3 and 4: 4 out of 8, so $P = \frac{4}{8} = \frac{1}{2}$.

8. $\frac{1}{2}$
   The favourable outcomes are 2, 3 and 5: 3 out of 6, so $P = \frac{3}{6} = \frac{1}{2}$.

9. $\frac{4}{5}$
   12 of the 15 counters are not blue: $P = \frac{12}{15} = \frac{4}{5}$. (Or $1 - \frac{1}{5}$.)

10. $\frac{13}{21}$
    13 of the 21 buttons are not green: $P = \frac{13}{21}$. (Or $1 - \frac{8}{21}$.)

11. $\frac{3}{5}$
    $1 - 40\% = 60\% = \frac{60}{100} = \frac{3}{5}$.

12. $\frac{3}{4}$
    $P(\text{not } A) = 1 - P(A) = 1 - \frac{1}{4} = \frac{3}{4}$.

13. $\frac{3}{4}$
    The sections 1, 2, 3, 4, 5 and 6 work: 6 out of 8, so $P = \frac{6}{8} = \frac{3}{4}$.

14. $\frac{1}{5}$
    1 section out of 5 is red: $P = \frac{1}{5}$.

15. $\frac{1}{8}$
    Only section 5 works: 1 out of 8, so $P = \frac{1}{8}$.

16. $\frac{3}{26}$
    6 of the 52 cards are red picture cards: $P = \frac{6}{52} = \frac{3}{26}$.

17. $\frac{3}{52}$
    3 of the 52 cards are spade picture cards: $P = \frac{3}{52}$.

18. $\frac{1}{2}$
    26 of the 52 cards are red: $P = \frac{26}{52} = \frac{1}{2}$.

19. $\frac{1}{26}$
    2 of the 52 cards are black aces: $P = \frac{2}{52} = \frac{1}{26}$.

20. $\frac{1}{4}$
    $P(\text{tails}) \times P(\text{even number}) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.

21. $\frac{1}{4}$
    $P(\text{tails}) \times P(\text{prime number}) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.

22. $\frac{1}{4}$
    $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$. Each of HH, HT, TH, TT is equally likely.

23. $\frac{1}{6}$
    $\frac{1}{2} \times \frac{1}{3} = \frac{6}{36} = \frac{1}{6}$.

24. $\frac{1}{4}$
    These outcomes cannot happen together, so add: $\frac{1}{12} + \frac{1}{12} + \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$.

25. $\frac{11}{26}$
    A counter cannot be both colours, so add: $\frac{3}{13} + \frac{5}{26}$ — that is $\frac{11}{26}$.

26. $\frac{2}{13}$
    No card is both, so add: $\frac{4}{52} + \frac{4}{52} = \frac{8}{52} = \frac{2}{13}$.

**27.** $\frac{7}{26}$

No card is both, so add: $\frac{13}{52} + \frac{1}{52} = \frac{14}{52} = \frac{7}{26}$.

**28.** $\frac{5}{18}$

Count the cells in the table: 10 of the 36 results work, so $P = \frac{10}{36} = \frac{5}{18}$.

**29.** $\frac{1}{3}$

Count the cells in the table: 12 of the 36 results work, so $P = \frac{12}{36} = \frac{1}{3}$.

**30.** $\frac{1}{2}$

Count the cells in the table: 18 of the 36 results work, so $P = \frac{18}{36} = \frac{1}{2}$.

**31.** $\frac{1}{18}$

Count the cells in the table: 2 of the 36 results work, so $P = \frac{2}{36} = \frac{1}{18}$.

**32.** $104$

Experimental probability $\frac{26}{50} = \frac{13}{25}$, so expect $\frac{13}{25} \times 200 = 104$.

**33.** $65$

Experimental probability $\frac{13}{25}$, so expect $\frac{13}{25} \times 125 = 65$.

**34.** $66$

Experimental probability $\frac{11}{50}$, so expect $\frac{11}{50} \times 300 = 66$.

**35.** $9$

$\frac{1}{3}$ of the marbles is 3, so $\frac{1}{3}$ is 3 and the whole bag is $3 \times 3 = 9$.

**36.** $8$

$\frac{3}{8}$ of the marbles is 3, so $\frac{1}{8}$ is 1 and the whole bag is $1 \times 8 = 8$.

**37.** $4$

$\frac{3}{4}$ of the marbles is 3, so $\frac{1}{4}$ is 1 and the whole bag is $1 \times 4 = 4$.

**38.** $\frac{1}{10}$

All the probabilities add up to 1: $1 - (0.05 + 0.1 + 0.75) = 0.1 = \frac{1}{10}$.

**39.** $\frac{5}{18}$

$\frac{5}{9} \times \frac{4}{8} = \frac{5}{18}$. After the first pick there are only 8 balls left.

**40.** $\frac{5}{11}$

$\frac{5}{11} \times \frac{4}{10} + \frac{6}{11} \times \frac{5}{10} = \frac{5}{11}$. After the first pick there are only 10 balls left.

**41.** $\frac{15}{28}$

$\frac{6}{8} \times \frac{5}{7} = \frac{15}{28}$. After the first pick there are only 7 balls left.

**42.** $\frac{1}{6}$

$\frac{4}{9} \times \frac{3}{8} = \frac{1}{6}$. After the first pick there are only 8 balls left.

**43.** $\frac{11}{36}$

$P(\text{miss both}) = \left(\frac{5}{6}\right)^2 = \frac{25}{36}$, so $P(\text{at least one}) = 1 - \frac{25}{36} = \frac{11}{36}$.

**44.** $\frac{3}{8}$

There are $2^3 = 8$ equally likely results, and 3 of them have exactly 2 heads: $P = \frac{3}{8}$.

**45.** $\frac{8}{9}$

$P(\text{miss both}) = \left(\frac{1}{3}\right)^2 = \frac{1}{9}$, so $P(\text{at least one}) = 1 - \frac{1}{9} = \frac{8}{9}$.

**46.** $\frac{15}{16}$

$P(\text{miss both}) = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$, so $P(\text{at least one}) = 1 - \frac{1}{16} = \frac{15}{16}$.

**47.** $\frac{23}{50}$

Multiples of 3: 16. Multiples of 5: 10. Multiples of both (of 15): 3, counted twice. So $16 + 10 - 3 = 23$ numbers, and $P = \frac{23}{50}$.

**48.** $4$

$P(\text{yellow}) = 1 - \frac{2}{7} = \frac{5}{7}$, so $\frac{5}{7}$ of the jar is 10 sweets: the jar has 14 sweets, and $14 - 10 = 4$ are red.

**49.** $15$

Add $x$ red: $\frac{3 + x}{9 + x} = \frac{3}{4}$. Cross-multiply: $4(3 + x) = 3(9 + x)$, so $12 + 4x = 27 + 3x$ and $x = 15$.

**50.** $9$

$P(\text{green}) = 1 - \frac{3}{8} = \frac{5}{8}$, so $\frac{5}{8}$ of the jar is 15 sweets: the jar has 24 sweets, and $24 - 15 = 9$ are red.