

# Probability Problems

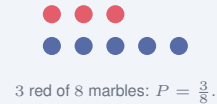
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## Quick Review and Helpful Hints

Probability =  $\frac{\text{number of favorable outcomes}}{\text{total number of equally likely outcomes}}$ . It is always between 0 (impossible) and 1 (certain). Write it as a fraction in simplest form. For two *independent* events both happening, multiply their probabilities.

▶ **Example:** A bag has 3 red and 5 blue marbles. Find the probability of drawing red. **Work:** There are 3 red marbles out of  $3 + 5 = 8$  total, so  $P(\text{red}) = \frac{3}{8}$ .

★ **Answer:**  $\frac{3}{8}$



### Practice Problems

Find each probability. Write answers in simplest form.

- |  |   |
|--|---|
| <p>1. Roll a die: <math>P(4)</math> _____</p> <p>2. Roll a die: <math>P(\text{even})</math> _____</p> <p>3. Flip a coin: <math>P(\text{heads})</math> _____</p> <p>4. Bag of 6 with 2 red: <math>P(\text{red})</math> _____</p> <p>5. Roll a die: <math>P(\text{more than } 4)</math> _____</p> <p>6. Spinner 1–8: <math>P(\text{odd})</math> _____</p> <p>7. 4 red, 4 blue: <math>P(\text{blue})</math> _____</p> | <p>8. Roll a die: <math>P(1 \text{ or } 2)</math> _____</p> <p>9. Cards 1–10: <math>P(\text{prime})</math> _____</p> <p>10. Roll a die: <math>P(\text{not } 6)</math> _____</p> <p>11. 3 green of 9: <math>P(\text{green})</math> _____</p> <p>12. Flip a coin twice: <math>P(\text{two heads})</math> _____</p> <p>13. Roll a die: <math>P(\text{less than } 3)</math> _____</p> <p>14. Spinner 1–5: <math>P(5)</math> _____</p> |
|--|---|

### Word Problems

15. A bag has 5 red, 3 blue, and 2 green marbles. What is the probability of drawing red? \_\_\_\_\_
16. A fair die is rolled. What is the probability of an odd number? \_\_\_\_\_
17. A jar has 20 marbles, 8 of them yellow. What is the probability of drawing yellow? \_\_\_\_\_
18. Two coins are flipped. What is the probability of getting two tails? \_\_\_\_\_



## Answer Keys

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

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

3.  $\frac{1}{2}$

4.  $\frac{1}{3}$

5.  $\frac{1}{3}$

6.  $\frac{1}{2}$

7.  $\frac{1}{2}$

8.  $\frac{1}{3}$

9.  $\frac{2}{5}$

10.  $\frac{5}{6}$

11.  $\frac{1}{3}$

12.  $\frac{1}{4}$

13.  $\frac{1}{3}$

14.  $\frac{1}{5}$

15.  $\frac{1}{2}$

16.  $\frac{1}{2}$

17.  $\frac{2}{5}$

18.  $\frac{1}{4}$

### Step-by-Step Explanations

1. Start by naming the process: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is There is one 4 out of 6 equally likely faces, so  $P = \frac{1}{6}$ . So the final answer is  $\frac{1}{6}$ .

2. A good way to think about this is: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Even faces are  $\{2, 4, 6\} - 3$  out of 6:  $\frac{3}{6} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

3. Step by step: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is A coin has 2 sides, one of which is heads:  $\frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

4. Take it one move at a time: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is 2 red out of 6 total:  $\frac{2}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

5. Start by naming the process: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Outcomes more than 4 are  $\{5, 6\} - 2$  of 6:  $\frac{2}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

6. A good way to think about this is: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Odd numbers  $\{1, 3, 5, 7\} - 4$  of 8:  $\frac{4}{8} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

7. Step by step: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is 4 blue out of 8:  $\frac{4}{8} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

8. Take it one move at a time: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is  $\{1, 2\} - 2$  of 6:  $\frac{2}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

9. Start by naming the process: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Primes from 1 to 10 are  $\{2, 3, 5, 7\} - 4$  of 10:  $\frac{4}{10} = \frac{2}{5}$ . So the final answer is  $\frac{2}{5}$ .

10. A good way to think about this is: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Five of the six faces are not 6:  $\frac{5}{6}$ . So the final answer is  $\frac{5}{6}$ .

11. Step by step: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is 3 green out of 9:  $\frac{3}{9} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

12. Take it one move at a time: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Independent events multiply:  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .

13. Start by naming the process: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is  $\{1, 2\} - 2$  of 6:  $\frac{2}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

14. A good way to think about this is: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is One of five equal sections:  $\frac{1}{5}$ . So the final answer is  $\frac{1}{5}$ .

15. Step by step: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is 5 red out of  $5 + 3 + 2 = 10$  total:  $\frac{5}{10} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

16. Take it one move at a time: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Odd faces  $\{1, 3, 5\} - 3$  of 6:  $\frac{3}{6} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

17. Start by naming the process: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is 8 yellow out of 20:  $\frac{8}{20} = \frac{2}{5}$ . So the final answer is  $\frac{2}{5}$ .

18. A good way to think about this is: Probability compares favorable outcomes to total equally likely outcomes, so write that ratio and simplify. The setup/work is Independent flips multiply:  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .



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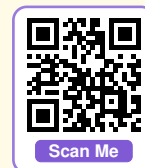
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