

# Probability of Compound Events

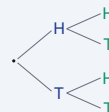
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## Quick Review and Helpful Hints

For *independent* events,  $P(A \text{ and } B) = P(A) \cdot P(B)$  – multiply. For *mutually exclusive* events,  $P(A \text{ or } B) = P(A) + P(B)$  – add. Every probability is a number between 0 and 1, often written as a fraction.

▶ **Example:** A coin is flipped twice. Find  $P(\text{heads and heads})$ .

**Work:** Each flip has  $P(H) = \frac{1}{2}$ . Multiply:  $\frac{1}{2} \cdot \frac{1}{2}$ . ★ **Answer:**  $\frac{1}{4}$



Multiply along the branches.

### Practice Problems

Find each probability.

- |  |       |  |       |
|--|-------|--|-------|
| 1. Two coins, $P(H \text{ and } H)$  | _____ | 8. $P(\text{red or blue})$ if each is $\frac{1}{4}$                      | _____ |
| 2. Roll a die twice, $P(6 \text{ and } 6)$   | _____ | 9. Roll a die, $P(\text{odd})$   | _____ |
| 3. $P(\text{red}) = \frac{1}{2}$ , $P(\text{blue}) = \frac{1}{3}$ : $P(\text{red and blue})$ | _____ | 10. Spinner of 4 equal parts, $P(\text{one part})$                       | _____ |
| 4. Coin and die: $P(H \text{ and } 4)$   | _____ | 11. Two draws, $P(\text{ace and ace})$ if $P(\text{ace}) = \frac{1}{13}$ | _____ |
| 5. $P(1 \text{ or } 2)$ on a die   | _____ | 12. $P(3 \text{ or } 5)$ on a die  | _____ |
| 6. $P(\text{even})$ on a die   | _____ | 13. Two coins, $P(H \text{ then } T)$                                    | _____ |
| 7. Two coins, $P(T \text{ and } T)$  | _____ | 14. $P(\text{not } 6)$ on a die  | _____ |

### Word Problems

15. Flip a coin and roll a die. Find  $P(\text{tails and a } 3)$ . \_\_\_\_\_
16. A bag is  $\frac{1}{2}$  red. Draw twice with replacement. Find  $P(\text{red then red})$ . \_\_\_\_\_
17. Roll two dice. Find  $P(\text{both show } 1)$ . \_\_\_\_\_
18. On one die, find  $P(\text{rolling a } 2 \text{ or a } 5)$ . \_\_\_\_\_



## Answer Keys

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

2.  $\frac{1}{36}$

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

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

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

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

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

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

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

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

11.  $\frac{1}{169}$

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

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

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

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

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

17.  $\frac{1}{36}$

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

### Step-by-Step Explanations

1. Start by naming the process: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .

2. A good way to think about this is: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$ . So the final answer is  $\frac{1}{36}$ .

3. Step by step: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$ . So the final answer is  $\frac{1}{6}$ .

4. Take it one move at a time: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$ . So the final answer is  $\frac{1}{12}$ .

5. Start by naming the process: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

6. A good way to think about this is: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\{2, 4, 6\}$ :  $\frac{3}{6} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

7. Step by step: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .

8. Take it one move at a time: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

9. Start by naming the process: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\{1, 3, 5\}$ :  $\frac{3}{6} = \frac{1}{2}$ . So the final answer is  $\frac{1}{2}$ .

10. A good way to think about this is: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is One of four equal parts:  $\frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .

11. Step by step: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{13} \cdot \frac{1}{13} = \frac{1}{169}$ . So the final answer is  $\frac{1}{169}$ .

12. Take it one move at a time: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .

13. Start by naming the process: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .

14. A good way to think about this is: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is 5 faces are not 6:  $\frac{5}{6}$ . So the final answer is  $\frac{5}{6}$ .

15. Step by step: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$ . So the final answer is  $\frac{1}{12}$ .

16. Take it one move at a time: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ . So the final answer is  $\frac{1}{4}$ .

17. Start by naming the process: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$ . So the final answer is  $\frac{1}{36}$ .

18. A good way to think about this is: For compound probability, find each probability first and multiply them when the events happen together. The setup/work is  $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$ . So the final answer is  $\frac{1}{3}$ .



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