Day 5

Compound Probability EXAMPLES

Decide whether the events are *independent* or *dependent*.

1. Each whole number from 1 through 10 is written on a piece of paper and placed in a hat. You randomly choose a piece of paper, do not put it back, then randomly choose another piece of paper.
   EVENT A: Choose the 5 first.
   EVENT B: Choose an odd number second.
   Dependent Events

2. You flip a coin and roll a number cube.
   EVENT A: Get tails when flipping the coin.
   EVENT B: Get a 2 when rolling the number cube.
   Independent Events

You spin a spinner that has 12 equal-sized sections numbered 1 to 12. Find each probability.

1. P (3 or 4)

   no overlap

   $\frac{1}{12} + \frac{1}{12} = \frac{2}{12} = \frac{1}{6}$

2. P(even or 7)

   $\frac{6}{12} + \frac{1}{12} = \frac{7}{12}$

   no overlap

3. P(even or odd)

   no overlap

   $\frac{6}{12} + \frac{6}{12} = \frac{12}{12} = 1$

4. P(multiple of 3 or odd)

   $\frac{4}{12} + \frac{6}{12} - \frac{2}{12} = \frac{8}{12} = \frac{2}{3}$

   overlap: 3, 9

5. P(odd or multiple of 5)

   overlap: 5

   $\frac{6}{12} + \frac{2}{12} - \frac{1}{12} = \frac{7}{12}$

6. P(less than 5 or greater than 9)

   $\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

   no overlap

7. P(even or less than 8)

   overlap: 2, 4, 6

   $\frac{6}{12} + \frac{7}{12} - \frac{3}{12} = \frac{10}{12} = \frac{5}{6}$

8. P(multiple of 2 or multiple of 3)

   $\frac{6}{12} + \frac{4}{12} - \frac{2}{12} = \frac{8}{12} = \frac{2}{3}$

   overlap: 6, 12

9. P(odd or greater than 4)

   overlap: 5, 7, 9, 11

   $\frac{6}{12} + \frac{8}{12} - \frac{4}{12} = \frac{10}{12} = \frac{5}{6}$

10. P(multiple of 5 or multiple of 2)

    $\frac{2}{12} + \frac{6}{12} - \frac{1}{12} = \frac{7}{12}$

    overlap: 10

You roll a red number cube and a blue number cube. Find each probability. Independent

1. P(red 2 and blue 2) $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$	2. P(red odd and blue even) $\frac{3}{6} \cdot \frac{3}{6} = \frac{9}{36} = \frac{1}{4}$
3. P(red greater than 2 and blue 4) $\frac{4}{6} \cdot \frac{1}{6} = \frac{4}{36} = \frac{1}{9}$	4. P(red odd and blue less than 4) $\frac{3}{6} \cdot \frac{3}{6} = \frac{9}{36} = \frac{1}{4}$
5. P(red greater than 4 and blue greater than 3 $\frac{2}{6} \cdot \frac{3}{6} = \frac{6}{36} = \frac{1}{6}$	6. P(red 6 and blue even) $\frac{1}{6} \cdot \frac{3}{6} = \frac{3}{36} = \frac{1}{12}$
7. P(red 1 or 2 and blue 5 or 6) $\left(\frac{\text{Red}}{\frac{1}{6}+\frac{1}{6}}\right) \cdot \left(\frac{\text{Blue}}{\frac{1}{6}+\frac{1}{6}}\right) = \frac{\text{Red}}{\frac{2}{6}} \cdot \frac{\text{Blue}}{\frac{2}{6}} = \frac{4}{36} = \frac{1}{9}$	

You choose a marble at random from a bag containing 3 blue marbles, 5 red marbles, and 2 green marbles. You replace the marble and then choose again. Find each probability. Independent

1. P(both blue) $\frac{3}{10} \cdot \frac{3}{10} = \frac{9}{100}$	2. P(both red) $\frac{5}{10} \cdot \frac{5}{10} = \frac{25}{100} = \frac{1}{4}$	3. P(blue then green) $\frac{3}{10} \cdot \frac{2}{10} = \frac{6}{100} = \frac{3}{50}$
4. P(red them blue) $\frac{5}{10} \cdot \frac{3}{10} = \frac{15}{100} = \frac{3}{20}$	5. P(green then red) $\frac{2}{10} \cdot \frac{5}{10} = \frac{10}{100} = \frac{1}{10}$	6. P(both green) $\frac{2}{10} \cdot \frac{2}{10} = \frac{4}{100} = \frac{1}{25}$

You choose a tile at random from a bag containing 2 tiles with X, 6 tiles with Y, and 4 tiles with Z. You pick a second tile without replacing the first. Find each probability. Dependent

7. P(X then Y) $\frac{2}{12} \cdot \frac{6}{11} = \frac{12}{132} = \frac{1}{11}$	8. P(both Y) $\frac{6}{12} \cdot \frac{5}{11} = \frac{30}{132} = \frac{5}{22}$	9. P(Y then X) $\frac{6}{12} \cdot \frac{2}{11} = \frac{12}{132} = \frac{1}{11}$
10. P(Z then X) $\frac{4}{12} \cdot \frac{2}{11} = \frac{8}{132} = \frac{2}{33}$	11. P(both Z) $\frac{4}{12} \cdot \frac{3}{11} = \frac{12}{132} = \frac{1}{11}$	12. P(Y then Z) $\frac{6}{12} \cdot \frac{4}{11} = \frac{24}{132} = \frac{2}{11}$

13. There are 12 girls and 14 boys in math class. The teacher puts the names of students in a hat and randomly picks one name. Then the teacher picks another name without replacing the first. What is the probability that both students picked are boys?

$$\frac{14}{26} \cdot \frac{13}{25} = \frac{182}{650} = \frac{7}{25}$$