**Theoretical Probability of Compound Events**

**Reteach**

**Compound probability** is the likelihood of two or more events occurring.

1. To identify the sample space, use a list, tree diagram, or table. If order does not matter, cross out repeated combinations that differ only by order.
2. Count the number of outcomes in the desired event.
3. Divide by the total number of possible outcomes.

A student spins the spinner and rolls a number cube. What is the probability that she will randomly spin a 1 and roll a number less than 4?

1. Identify the sample space.
2. Count the number of desired outcomes: 3.
3. Divide by the total number of possibilities: 18.

\[
\text{Probability (1 and } < 4) = \frac{3}{18} = \frac{1}{6}
\]

At a party, sandwiches are served on 5 types of bread: multi-grain, pita, rye, sourdough, and whole wheat. Sam and Ellen each randomly grab a sandwich. What is the probability that Ellen gets a sandwich on pita or rye and Sam gets a sandwich on multi-grain or sourdough?

1. The table shows the sample space. Draw an X in each cell in which Ellen gets a sandwich on pita or rye.
2. Draw a circle in each cell in which Sam gets a sandwich on multi-grain or sourdough.
3. Count the number of possibilities that have both an oval and a rectangle.
4. Divide the number you counted in Step 4 by the total number of possibilities in the sample space.

\[
\text{This is the probability that Ellen gets a pita or a rye sandwich and that Sam gets a multi-grain or a sourdough sandwich.}
\]
b. an outfielder
   c. \( \frac{3}{9} \) or \( \frac{1}{3} \)

3. a. outcomes
   b. event
   c. theoretical probability

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1. \( \frac{6}{18} \) or \( \frac{1}{3} \)
2. \( \frac{5}{13} \)

LESSON 13-2

Practice and Problem Solving: A/B
1. (Taco, Cheese), (Taco, Salsa), (Taco, Veggie)
2. (Burrito, Cheese), (Taco, Cheese), (Wrap, Cheese)
3. \( P(\text{Burrito}/\text{Cheese}) = \frac{1}{9} \); \( P(\text{Taco or Wrap with salsa}) = \frac{2}{9} \)
   
   \[ P(\text{Burrito}/\text{Cheese and Taco or Wrap with Salsa}) = \frac{1 \times 2}{9 \times 9} = \frac{2}{81}, \] since these are independent events.
4. \( \frac{1}{8} \)
5. \( 1 - \frac{3}{20} = \frac{17}{20} \)
6. \( P = \frac{1}{8} \times \frac{17}{20} = \frac{17}{160}, \) since these are independent events.
7. \( P = 0. \) There are no pliers in the second basket.

Practice and Problem Solving: C
1. \( P(\text{blue}) + P(\text{white}) = P(\text{blue or white}) = 1 \)
2. Let \( B = \text{blue} \) and \( W = \text{white} \). \( P(X) \cdot P(B) = 0.18, P(X) \cdot P(W) = 0.12; 0.18 \cdot P(W) = 0.12 \cdot P(B) \) and from Ex. 1, \( P(B) + P(W) = 1 \), which gives \( P(B) = 0.6 \) and \( P(W) = 0.4 \).

3. The values of \( P(B) \) and \( P(W) \) can be used with either row of brands X, Y, and Z to find those values by a process of elimination:
   \[ P(X) = 0.3; P(Y) = 0.2; P(Z) = 0.5 \]

4. \( P(B) \cdot P(Y) = 0.6 \cdot 0.2 = 0.12 \)
5. \( P(W) \cdot P(Z) = 0.4 \cdot 0.5 = 0.2 \)
6. a. \( P(\text{metamorphic}) \cdot P(\text{pebbles}) = 0.6 \cdot 0.6 = 0.36 \)
   b. \( P(\text{igneous}) = 0.25, \) so \( P(\text{pebbles}) = (0.25)(0.25) = 0.0625; P(\text{small rocks}) = (0.25)(0.2) = 0.05; P(\text{medium rocks}) = (0.25)(0.15) = 0.0375; P(\text{boulders}) = (0.25)(0.05) = 0.0125 \)

Practice and Problem Solving: D
1. calculator: \( \frac{1}{4} \); \( \frac{1}{4} \); \( \frac{1}{4} \); \( \frac{1}{4} \); \( \frac{1}{4} \); \( \frac{1}{4} \);
2. \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \); \( \frac{1}{3} \)
3. \( \frac{1}{3} \)
4. \( \frac{1}{3} \times \frac{1}{2} = \frac{1}{6} \)
5. a. two: (heads, tails)
   b. six: (1, 2, 3, 4, 5, 6)
   c. twelve: (H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6)

Reteach
1–2.

<table>
<thead>
<tr>
<th>Ellen</th>
<th>M</th>
<th>P</th>
<th>R</th>
<th>S</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sam</td>
<td>M</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>×</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>×</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>×</td>
<td>×</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. 4 possibilities
4. \( P = \frac{4}{25} \)

**Reading Strategies**

1. There are 3 events: picking pants, shirts, and scarves; 2 pants \( \times \) 2 shirts \( \times \) 2 scarves give 8 choices. Answers will vary. Sample answer: Use a tree diagram.

2. There are two events: person, movie genre; 2 people \( \times \) 2 movie genres give 4 choices. Answers will vary. Sample answer: Use a list.

3. There are more than three events: 36 products and 36 sums. For an even product, there are 27 choices; for an even sum, there are 18 choices. Use a table.

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1. They are duplicates.
2. Sample answer: The “doubles” such as C-C ad GO-GO form a diagonal from upper left to lower right.
3. Sample answer: tree diagram

**LESSON 13-3**

**Practice and Problem Solving: A/B**

1. \( \frac{1}{2} \)
2. 32
3. \( \frac{1}{5} \)
4. 12
5. \( \frac{1}{3} \)
6. 13
7. \( \frac{5}{8} \)
8. 125
9. 26
10. about 26
11. about 153
12. 4

**Practice and Problem Solving: C**

1. a. 36
   b. \( \frac{5}{36} \)
   c. 25
   d. 25
2. a. 36
   b. 20
   c. 30
   d. 85
3. a. 16
   b. 36
   c. 24

**Practice and Problem Solving: D**

1. \( \frac{1}{2} \)
2. \( \frac{1}{3} \)
3. \( \frac{1}{5} \)
4. \( \frac{2}{5} \)
5. \( \frac{1}{2} \times 4 = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2} = 2 \)
6. \( \frac{1}{4} \times 16 = \frac{1}{4} \times \frac{16}{1} = \frac{16}{4} = 4 \)
7. \( \frac{1}{6} \times 12 = \frac{1}{6} \times \frac{12}{1} = \frac{12}{6} = 2 \)
8. \( \frac{1}{3} \times 15 = \frac{1}{3} \times \frac{15}{1} = \frac{15}{3} = 5 \)

**Reteach**

1. \( \frac{1}{2} \)
2. 10
3. \( \frac{1}{4} \)
4. 20