1. A garage door remote has 10 code switches. Each switch can be positioned up or down to create a wireless code. How many codes are possible?

Use a tree diagram.

Switch

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>U</th>
<th>2^1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td>U</td>
<td>2^2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>D</td>
<td>U</td>
<td>2^3</td>
</tr>
</tbody>
</table>

This pattern continues.

For 10 switches, there are 2^{10} or 1024 possible codes.
2. **Multiple Choice** A restaurant offers a meal combo that consists of a beverage, a main course, and a dessert. There are 5 beverages, 6 main courses, and 4 desserts. How many meal combos are available?

A. 15 B. 30 C. 20 D. 120

3. Morse code uses arrangements of 5 characters to represent the digits 0 through 9. Each character is either a dot or a dash. How many arrangements of 5 characters are possible?

There are 5 characters. There are 2 choices for each character: dot or dash. So, the number of arrangements of 5 characters is: 

\[ 2 \times 2 \times 2 \times 2 \times 2 = 32 \]

4. **Multiple Choice** How many 5-letter permutations of YUKON can be created?

A. 6 B. 24 C. 120 D. 3125

5. A family of six is to be seated in a row for a photo. The mother and father must be at either end. How many ways can the family be arranged?

There are 4 children. The number of ways to arrange 4 children is: 

\[ 4! = 24 \]

There are 2 ways to arrange the mother and father: MF and FM. So, the number of ways the family can be arranged is: 

\[ 2 \times 24 = 48 \]

6. An under-10 house-league soccer team has 11 players. Seven players are on the field at a time. How many ways can 7 starters be chosen from the members of the team?

Use the formula: 

\[ n \text{P}_r = \frac{n!}{(n-r)!} \]

Substitute: 

\[ n = 11, \quad r = 7 \]

\[ 11 \text{P}_7 = \frac{11!}{(11-7)!} \]

\[ = \frac{11!}{4!} \]

\[ = 1663200 \]

There are 1663 200 ways starters can be chosen.
7. Solve each equation for \( n \) or \( r \).

a) \( nP_2 = 42 \)

\[
\frac{n!}{(n-2)!} = 42 \\
\Rightarrow n = 7
\]

b) \( 7P_r = 840 \)

\[
\frac{7!}{(7-r)!} = 840 \\
\Rightarrow 7-r = 3 \\
\Rightarrow r = 4
\]

8. Multiple Choice  How many ways can 2 pennies, 3 nickels, and 5 quarters be arranged in a row?

A. 30  B. 2520  C. 5040  D. 3,628,800

9. What is the number of permutations of all the letters in the name of each provincial park?

a) VERMILION  

There are 9 letters. 
2 are Is.  
Number of permutations: 
\[
\frac{9!}{2!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3}{2 \cdot 1} = 181,440
\]

b) OPAPISKAW  

There are 9 letters.  
2 are Ps and 2 are As.  
Number of permutations: 
\[
\frac{9!}{2!2!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3}{2 \cdot 2 \cdot 1} = 90,720
\]

10. How many ways are there to get from F to G travelling along grid lines and moving only to the left or up?

\[
\text{Total number of grid squares travelled: 8} \\
\text{Squares travelled left: 5; squares travelled up: 3} \\
\text{So, the number of ways to get from F to G is:} \\
\frac{8!}{5!3!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = 56
\]