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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Systematic Listing** |
| 1. Combination | A collection of things, where the **order does not matter**. | How many combinations of two ingredients can you make with apple, banana and cherry?  Apple, Banana  Apple, Cherry  Banana, Cherry  3 combinations |
| 2. Permutation | A collection of things, where the **order does matter**. | You want to visit the homes of three friends, Alex (A), Betty (B) and Chandra (C) but haven’t decided the order. What choices do you have?  ABC  ACB  BAC  BCA  CAB  CBA |
| 3. Permutations with Repetition | When something has different types, there are  **choices each time**.  Choosing of something that has different types, the permutations are: | How many permutations are there for a three-number combination lock?  10 numbers to choose from and we choose 3 of them 🡪  permutations. |
| 4. Permutations without Repetition | We have to **reduce the number of available choices each time**.  One you have chosen something, you cannot choose it again. | How many ways can you order 4 numbered balls? |
| 5. Factorial | The factorial symbol ‘!’ means to multiply a series of descending integers to 1.  Note: |  |
| 6. Product Rule for Counting | If there are  **ways of doing something** and  **ways of doing something else**, then there are  **ways of performing both**. | To choose one of and one of means to choose one of  The rule says that there are choices. |

**Knowledge Organiser**