**Lesson1**  **The Fundamental Counting Principle**

A **tree diagram** is a good way to visualize all outcomes of an event.

1. A café has a lunch special consisting of an egg or a ham sandwich (E or H); milk, juice, or coffee (M, J, or C); and yogurt or pie for dessert (Y or P).
2. One item is chosen from each category. List all possible meals.
3. How many possible meals are there?
4. How can you determine the number of possible meals without listing all of them?

**The Fundamental Counting Principle**

If one item can be selected in *m* ways, and for each way a second item can be selected in *n* ways, then the two items can be selected in ways.

1. The café also features ice cream in 24 flavours. You can order regular, sugar, or waffle cones. Suppose you order a double cone with two scoops of ice cream. (vanilla chocolate is different than chocolate vanilla)
2. How many choices of type of cone do you have?
3. How many choices of flavour for the first scoop of ice cream do you have?
4. How many choices do you have for the second scoop?
5. How many different double cones are possible?
6. How many different triple cones are possible?
7. A computer store sells 5 different computers, 3 different monitors, 5 different printers, and 2 different multimedia packages. How many different computer systems are available?
8. How many 2-digit numbers are there?
9. In each case, how many 2-digit numbers can be formed using the digits 0, 1, 3, 5, 7 and 9?
10. Repetitions are allowed
11. Repetitions are not allowed
12. In each case, how many 2-digit numbers can be formed using the digits 0, 2, 4, 6, and 8?
13. Repetitions are allowed
14. Repetitions are not allowed
15. How many even 2-digit whole numbers are there?
16. A true-false test has 7 questions. Suppose students answer each question by guessing randomly.
17. How many possible answers are there for each question?
18. How many different patterns are possible for the answers to the 7 questions on the test?
19. What is the probability that a student answers all 7 questions correctly?
20. A multiple-choice test has 5 questions, with 4 possible answers for each question. Suppose students answer each question by guessing randomly.
21. How many possible answers are there for each question?
22. How many different patterns are possible for the answers to the 7 questions on the test?
23. What is the probability that all 7 questions will be answered correctly?
24. A bank card pin consists of a minimum of 4 digits and a maximum of 6 digits. How many different PIN’s are possible?
25. How many different words can be made using all the letters in the word ROADS once?

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| **Factorial Notation:**    **1** |

1. Evaluate and/or simplify:
2. 5! = f) =
3. = g) =
4. =
5. =
6. =
7. Solve for
8. Solve for :