



7th
Basic

8th
Advanced

Helping With Math

USA
GRADES

Fundamental Counting Principle

*Suitable for students
aged 11-13*



This pack is suitable for learners aged 11-13 years old or 7th to 8th graders (USA). The content covers fact files and relevant basic and advanced activities involving fundamental counting principle.

Fundamental counting principle is a method or rule that allows you to find the size of the sample space or total number of outcomes for a given situation, event or experiment.

There are ways on how to count the number of outcomes when two or more events occur. Let us consider the example below.

Flavors of Ice Cream

Chocolate

Mango

Vanilla

Cheese

Toppings

Sprinkles

Nuts

Oreo

Marshmallow



In how many ways can you select one flavor of ice cream and one topping?

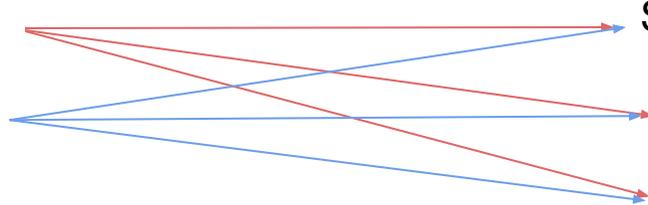


TREE DIAGRAM

Flavors of Ice Cream

Chocolate

Mango



Toppings

Sprinkles

Nuts

Oreo

LISTING METHOD

Chocolate - Sprinkles

Mango - Sprinkles

Chocolate - Nuts

Mango - Nuts

Chocolate - Oreo

Mango - Oreo



MULTIPLICATION



This multiplication method works every time there are several categories and one of each category will be chosen. Using the example above, we have 2 categories (flavors & toppings) and there are 2 flavors and 3 toppings available. Therefore, we can have

$$2 \times 3 = 6 \text{ different ways}$$



ILLUSTRATIVE EXAMPLES

How many possible combinations of party decorations can you make from the set of items below?



Banner

Blue

Yellow



Balloon

Blue

Yellow

Red



Ribbon

Blue

Pink

Purple

Among the three methods, multiplication method is the most commonly used method compared to the other two.

Solution:

Banner

2 colors

Balloon

3 colors

Ribbon

3 colors

$$2 \times 3 \times 3 = 18$$

There will be 18 possible combinations of party decorations.



TABLE OF ACTIVITIES

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HAPPY BIRTHDAY

G7
Basic

Stephanie is celebrating her birthday today. Before she celebrates, her objective is to determine first which of the following statements are correct by writing TRUE and making the statement correct if it is false. Help Stephanie answer.

1. Fundamental counting principle is also called the counting rule.
2. In fundamental counting rule, we usually always use addition.
3. We can use the laws of exponents if the events or categories have the same number of choices.
4. The number of possible ways in the events with 3 possible outcomes each is 6.
5. To find the answer in number 4, we use the expression 6^3 .
6. We can make 16 different banner designs if we have 4 colors, 2 shapes and 2 sizes.

1.	4.
2.	5.
3.	6.



OUTFIT OF THE DAY!

G7
Basic

Six of Stephanie's friends are having a hard time choosing what clothes to wear for her birthday party because they have a lot of options. Help them know how many options can they have if they have the following:

1. Alexa

5 t-shirts, 2 pairs of pants, and 3 pairs of shoes



2. Olivia

4 t-shirts, 5 pairs of pants, and 2 pairs of shoes

3. James

2 t-shirts, 3 pairs of pants, and 4 pairs of shoes



4. Sydney

5 t-shirts, 4 pairs of pants, and 4 pairs of shoes

5. Denver

6 t-shirts, 2 pairs of pants, and 3 pairs of shoes



6. Mia

8 t-shirts, 2 pairs of pants, and 1 pair of shoes



BEST CAKE EVER!

G7
Basic

Two of Stephanie's friends decided to buy her a personalized cake as a birthday present. They are choosing the number of layers of the cake, colors of the icing, and flavor. Help them choose the best cake for her.



Flavor	Colors of the icing	Design
Chocolate	Blue	Unicorn
Vanilla	White	Rainbow
Mocha	Pink	Mermaid
Strawberry		

1. Make a tree diagram.

2. How many different cakes can be made out of the choices above?



IT'S PIZZA TIME!

G7
Basic

While Stephanie is preparing the pizza, her friends have already arrived in their house and asked them if they can help her add more toppings on the pizza.

1. Pepperoni pizza

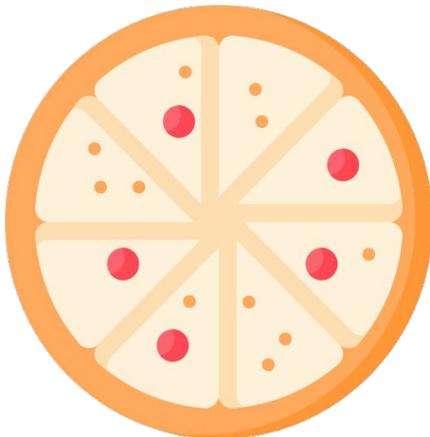
- Cheese (Cheddar or Mozzarella or Cream Cheese)
- Olives (Black or Green)
- Bell Pepper (Red or Green)
- Pizza Sauce (Sweet or Spicy)



How many ways can they make a pizza choosing one for each category?

2. Garlic Shrimp

- Crust (Thin or Thick)
- Meat (Chicken or Beef)
- Bell Pepper (Red or Green)
- Pizza Sauce (Pesto or Barbecue)
- Seasoning (Basil or Oregano)



How many ways can they make a pizza choosing one for each category?



GIVEAWAY GOODIES

G7
Basic

While the other friends of Stephanie are preparing the pizza, some are sorting the loot bags. Here are the choices for each loot bag.

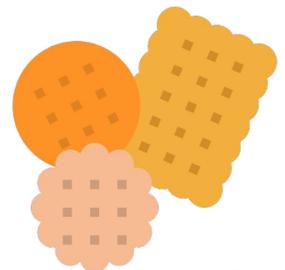
Candies	Biscuits	Fruits	Cupcakes
Chocolate	Chocolate	Apple	Mocha
Bubble Gum	Strawberry	Orange	Cheese
Jelly Beans	Peanut Butter	Banana	Ube

1. How many different loot bags can be made if they can only choose 1 from each category?



2. How many different loot bags can be made if they choose chocolate for the candies and apple and banana for the fruits?

3. How many different loot bags can be made if they will only choose one from each set of candies, biscuits, fruits, and cupcakes is available?



LET'S PLAY!

G8
Advanced

The food is ready and the party has all set up! Stephanie and her visitors will play some games before eating. Let us join them!

1. During the game, players need to line up. There are 6 players in game 1 and 4 players in game 2. How many ways can they line up?

Game 1

Game 2

2. There are 5 different games to be played in no particular order. How many possible arrangements of games can be played?



3. In game 3, they need to find how many numbers can be formed using all the digits from 0 - 9 if:

a. digits can be repeated?

a. digits cannot be repeated?

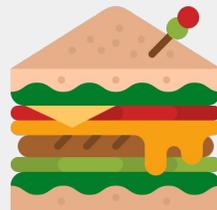


FEASTING TIME!

G8
Advanced

It's eating time. Stephanie prepared variety of foods for her visitors. Help them choose what combination of food to eat.

1. Alexa choose to eat sandwich. The sandwich has three types: ham, bacon, and chicken and each can be partnered with white bread, wheat bread or rye bread. How many possible combinations of sandwich are there?



2. Sydney likes to eat salad! She can pick one type of lettuce from 3 choices, one dressing from 6 choices, one vegetable from 3 choices, and one fruit from 4 choices, how many salads can she put together?



3. One of the favorite drinks of Stephanie is milk tea, that is why she prepared 7 different flavors, 5 sinkers, and 4 amounts of sugar. If Stephanie will choose one from each,
 - a. how many kinds of milk tea can she made?
 - b. If one of her friends will not put any sinker, how many kinds of milk tea can he made?

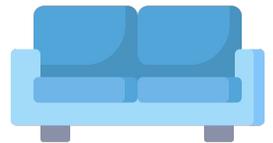


LET'S PLAY AGAIN!

G8
Advanced

Since all are energized after eating, Stephanie prepared another set of games and prizes for the winners if they answered all the questions below.

1. If 8 players will be seated in a row, in how many ways will they be seated?



2. If there are 3 boys and 4 girls playing the game and will be seated in a row,

- a. how many ways can they be seated alternately?



- b. how many ways can they be seated if boys are together and girls are together?



3. If the letters in the name ALEXA will be shuffled, how many combinations of the letters can be formed if A stays as the first and last letters?



BIRTHDAY WISHES

G8
Advanced

The birthday party is about to end and every one is asked to give a birthday message for Stephanie. Whoever gets the highest or perfect score will be the last to give a message. If you are one of Stephanie's friends, will you be the last person?

- Denver drove his brand new car going to Stephanie's house. It has no plate number yet. If Denver can choose his own plate number with 3 letters and 4 numbers, how many different plate numbers can be made if same letter or number can be repeated?
A. 175 760 000 C. 17 576
B. 27 576 D. 10 000
- How many different plate numbers can be made if same letter cannot be repeated? (Refer to question #1)
A. 5 040 C. 20 640
B. 15 600 D. 78 624 000
- The car model of Denver comes with different options: 8 colors, automatic transmission or manual transmission, with or without push start button, and with or without LCD monitor. In how many ways can the card be ordered?
A. 128 B. 64 C. 32 D. 16
- In how many ways can the car be ordered if one color is only available? (Refer to questions #3)
A. 4 B. 6 C. 8 D. 16



REST AND REFLECT

G8
Advanced

Before they leave Stephanie's house, they wanted to eat an ice cream. However, Stephanie told them that they should answer these questions first. Help them out!

1. When do we use fundamental counting rule? How does it help counting?



2. Give at least 2 examples of an event where counting rule is very important.



ANSWER GUIDE

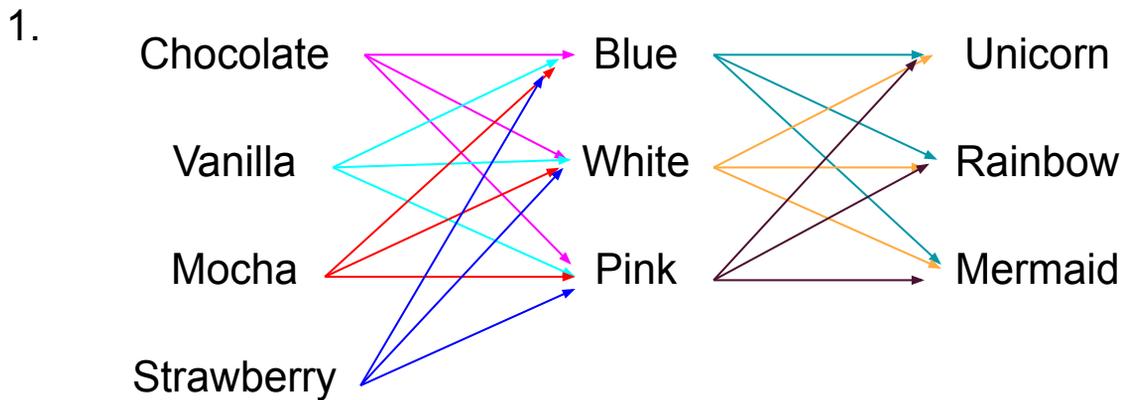
Activity 1

- 1.) True 2.) multiplication 3.) True
4.) 9 5.) 3×3 or 3^2 6.) True

Activity 2

- 1.) 30 2.) 40 3.) 24 4.) 80 5.) 36 6.) 16

Activity 3



2. 36

Activity 4

- 1.) 24 2.) 32

Activity 5

- 1.) 81 2.) 18 3.) 1



ANSWER GUIDE

Activity 6

- 1.) Game 1: 720 Game 2: 24
2.) 120
3.) a. 9 000 000 000 b. 3 265 920

Activity 7

- 1.) 9 2.) 216 3.) a. 140 b. 28

Activity 8

- 1.) 40 320
2.) a. 144 b. 288
3.) 6

Activity 9

- 1.) A 2.) D 3.) B 4.) C

Activity 10

- 1.) Answers may vary.
2.) Answers may vary.



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