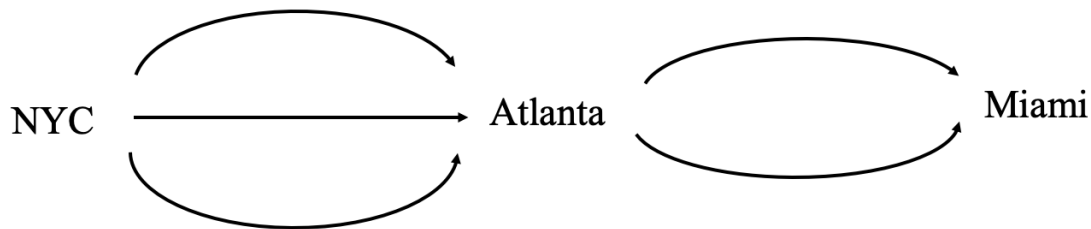**Problem 1**

There are three cities: NYC, Atlanta, and Miami. NYC and Atlanta are connected by three roads, and Atlanta and Miami by two roads. How many routes are there to travel from NYC to Miami? You can only move in the direction of the arrows - from left to right.


Solution: Whichever road one takes from NYC to Atlanta, they have two ways to get from Atlanta to Miami. It means, road from NYC to Atlanta serves as the start of two routes from Atlanta to Miami. So, the number of routes from NYC to Miami is twice the number of roads from NYC to Atlanta. And it gives $3 \cdot 2 = 6$ routes.

Problem 2

You want to buy potted flower as a gift for a friend. Florist has 4 types of flowers: Rose, Tulip, Sunflower, and Lily. They are sold in 3 different pots: brown, green, and yellow. How many different potted flowers (for example, Rose in a green pot) you can buy?
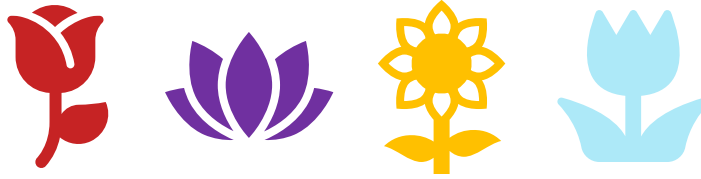
Solution: You can pick any flower and any pot. You could have a brown pot, a green pot and yellow pot. For each of these pots you could have any flower: Rose, Tulip, Sunflower and Lily. For each pot there are 4 possible flowers. So, there are 3 pots and each of them could have 4 possible flowers. In total it will be $3 \cdot 4 = 12$ possible potted flowers. You see those possibilities on the picture below. And if we count them, indeed there are 12 different flower - pot pairs.
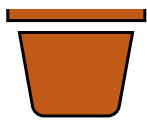
Rose Lily Sunflower Lily

Rose Lily Sunflower Lily

Rose Lily Sunflower Lily

Homework

1. The cafe sells four types of milkshakes (Vanilla, Chocolate, Strawberry and Banana) and three types of an ice cream (Frozen Yogurt, Mochi, and Gelato). You have enough money for one milkshake and one ice cream. In how many ways can you choose your food? Write down all possible combinations.

2. A musketeer has 2 beautiful hats (blue and brown) and four elegant tabards (blue, brown, black, and green). How many different costumes can he wear? Write down all possible costumes.

(tabard - a sleeveless jerkin consisting only of front and back pieces with a hole for the head.

3. In the restaurant, there are 3 choices of starters, 4 choices of entrees and 5 choices of tasty desserts in the fix price dinner menu. How many different ways are there to fix a dinner for the restaurant's clients?

4. John took two pairs of boots, two pairs of shorts and six T-shirts with him to the summer vacation. In how many ways can John dress up in the camp? (The clothing set consists of a pair of shorts, a T-shirt, and a pair of matching boots.)

5. Mary and Paula have to mail 1000 envelopes for a new marketing campaign. Mary can do the job alone in 5 hours. Paula can get the job done in 10 hours. How long would it take them to do the job if they work together?

6. Find the value of the expression for given values of variables:
   1) $a + 52$; if $a = 0$; 18; 49;
   2) x^2; if $x = 5, 11, 13$
   3) $b^3 : 9$; if $b = 0$; 3; 9;
   4) $c \cdot (25 - c)$; if $c = 16$; 24; 25;