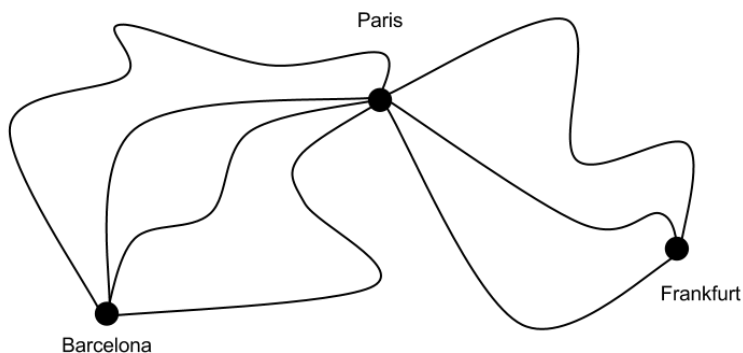


# Math Circle - Homework 1

1. The famous explorer Ferdinand Magellan wants to travel from Barcelona to Paris, and then from Paris to Frankfurt. Between Barcelona and Paris, Magellan has a choice of 4 different roads to take. Between Paris and Frankfurt, he has a choice of 3 different roads. How many different ways are there in which Magellan can make his trip?



2. The famous french chef Pierre Blanc needs to boil an egg for precisely 15 minutes, but he only has an 11-minute hourglass and a 7-minute hourglass. Can you show Pierre how to use his two hourglasses to measure exactly 15 minutes?



3. Can you arrange the digits 1 to 5 in a line from left to right, in such a way that the number formed by the first digit is divisible by 1, the number formed by the first two digits is divisible by 2, and so forth, so that the number formed by all five digits is divisible by 5? If it's not possible, make sure you can explain why not. What about using the digits 1 to 6, and going up to a six-digit number?



4. Steve has a new collection of 9 identical gold coins. Chris has replaced one of Steve's coins with a counterfeit coin that looks identical to the others, but it weighs slightly more. Using a balance scale, what is the smallest number of weighings you can have Steve perform in order to locate the heavier fake coin? How would you do it?