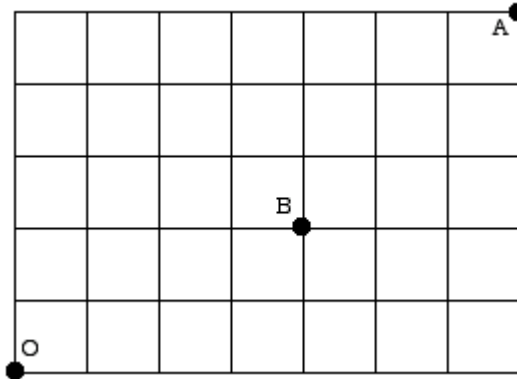


1. How many different numbers can be obtained by rearranging the digits 2233344455, in all possible ways?
2. (a) How many permutations can be made using the letters of the word **institution**, taken all at a time?
(b) How many of these begin with **t** and end with **s**?
3. Find the number of ways in which nine A's and six B's can be placed in a row so that no two B's come together.
4. (a) Find the number of arrangements of the letters of the word **discrete**, taken all together.
(b) In how many of these are the two **e**'s together?
(c) In how many are the two **e**'s separated?
5. In how many ways can ten identical flags be arranged on a row of six flagpoles, numbered one to six, if at least one flag must appear on each pole?
6. (a) In how many ways can you get from point O to point A always going through point B?
(b) In how many ways can you get from point O to point A always avoiding point B?



7. (a) Find the number of arrangements of the letters of the word **engineering**, taken all together.
(b) In how many of these are the three **e**'s together?
(c) In how many of these are the three **e**'s apart?
(d) In how many are exactly two **e**'s together?
(e) In how many are at least two **e**'s together?