Pre-Calculus 12 Permutations with Identical Objects

> The number of permutations of n objects with r identical objects is:
>
> $$\frac{n!}{r!}$$

Ex. 1) Determine the number of permutations of the word BOOK.

> Given a set of n objects with:
> - n_1 of one kind
> - n_2 of a second kind
> - n_3 of a third kind etc
>
> The number of **distinguishable** permutations is:
>
> $$\frac{n!}{n_1! \cdot n_2! \dots n_k!} \text{, } where \; n_1 + n_2 + n_3 + n_k = n$$

Ex. 2) Determine the number of permutations of the word
  a.) HONOLULU

  b.) MISSISSIPPI

Ex. 3) Seven boxes of cereal on a shelf are 5 Shreddies, 1 Fruit Loops and 1 box of Captain Crunch. How many ways can the boxes be arranged?

Ex. 4) A kabob recipe calls for 3 mushrooms, 4 shrimp, 2 cherry tomatoes and 5 slices of red pepper. How many ways can you arrange the items on a skewer?

Restrictions

Ex. 5) How many whole numbers are less than 300 (no repetition)?

Ex. 6) Using all of the letters of the word PARALLELOGRAM,

    a)   how many arrangements can be made using all the letters?

    b)   how many of these arrangements have all the L's together?

    c)   how many of these arrangements have all the A's together?

    d)   how many of these arrangements have all the R's together?

    e)   how many of these arrangements have all the L's, all the A's, and all the R's together?