Permutations (Part 1)

These notes are intended as a summary of section 8.2 (p. 696 – 701) in your workbook. You should also read the section for more complete explanations and additional examples.

A **permutation** is an arrangement of objects into a specific order. To permute a set of objects means to rearrange them.

For example, if the letters of the word CAT are rearranged, there are 6 possible permutations:

CAT	ACT	TAC
CTA	ATC	TCA

Using the fundamental counting principle, there are three ways to choose the first letter, two ways to choose the second letter, and one way to choose the third letter. Thus, the total number of permutations possible is

$$3 \times 2 \times 1 = 6$$

The number of permutations of n objects into r available positions, written $_nP_r$ or $P(n,r)$, is given by the formula

$$_nP_r = \frac{n!}{(n-r)!}$$

Note: On your graphing calculator, press MATH then PRB then 2.

Example (not in workbook)
How many permutations of the word KELOWNA are possible?

Example (not in workbook)
In a game of Scrabble, Eva drew the letters A, W, L, N, S, O, and D. How many permutations of four of these letters are possible?

Example (not in workbook)
The Hawaiian alphabet has 12 letters. How many permutations could be made using

   a) 2 different letters?

   b) all 12 letters, without repetition?

Example 1 (sidebar p. 698)
A puzzle designer decides to scramble the letters in the word EDUCATION to create a jumble puzzle. How many 9-letter permutations of EDUCATION can be created?

Example 2 (sidebar p. 699)
Eight students are competing in a 200 m race. How many ways can the students finish first, second, and third?

Example 3 (sidebar p. 700)
Solve each equation for *n* or *r*.

   a) $_nP_2 = 56$

   b) $_5P_r = 20$

Homework: #4 – 10 in the section 8.2 exercises (p. 701 – 705). Answers on p. 706.

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