ALGEBRA II

PERMUTATIONS

NOTES

A permutation is an arrangement of items in a particular order.

If the order changes, the arrangement looks different and therefore it is a different permutation.

For example:

The batting order of a softball team is a permutation. (The order is important to the strategy of the game. Change the order; change the strategy.)

Your telephone number is a permutation. (Change the order of the numbers and you call the wrong person.)

What is not a permutation? A list of the members of a softball team or the numbers you choose to win the lottery

There is a formula used to find permutations. That formula is

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

Yes, that is an exclamation point. It stands for the factorial process which means multiply together all the numbers from the point given down to 1.

For example: 8! = 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1 = 40,320

Do: 13! =

How about 15! =

The factorial can be done on the calculator:

Now try this one: 6!4! =

How about--- $\frac{8!}{4!}$

One more--- $\frac{5!3!}{6!}$

So, now let's look at that formula again

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

Evaluate: P(7, 3)

Now try this one: P(12, 10)

One more: P(5, 5)

Now let's try one that is an actual problem.

Ex. 1 Suppose you want to arrange 12 books on a shelf. How many ways can that be done?

Ex. 2 Suppose you only want to arrange 5 of the 12 books from example 1; how many ways could that be done?

Ex. 3 Seven bands are entered in a contest. First, second, and third place awards will be given. How many ways could the prizes be awarded?

Now, you do these:

4. In how many ways can 8 basketball players huddle around their coach during a time out?

5. In how many ways can a basketball team of 5 players be made from a group of 8 potential players? (If selected by position)

6. How many ways can 6 cards be selected from a deck of cards if the order of selection is important?

7. How many ways can 2 aces be selected from a deck of cards if the order of selection is important?

Now do the worksheet being distributed to you.

Answers:

Do: 6,227,020,800
How about: 1,307,674,368,000

Now try this one: 17,280
How about: 1,680
One more: 1

Evaluate: 210
Now try this one: 239,500,800
One more: 1

Ex. 1: 479,001,600
Ex. 2: 95,040
Ex. 3: 210

4) 40,320
5) 6,720
6) 14,658,134,400
7) 12