Permutations Exercise (Section 7.2) NAMES:

These are selected questions (numbers copied from book) from Set II of the exercise set. Turn in one paper per group but be sure all members of the group have seen the final answers. Circle your name if the paper that gets turned in is your copy.

Here is a table of the values of 1! through 15!. Use this table to *show whether* each of the following equations is true or false. [Do *not* just state true or false. Give a justification.]

$1! = 1$
$2! = 2$
$3! = 6$
$4! = 24$
$5! = 120$
$6! = 720$
$7! = 5{,}040$
$8! = 40{,}320$
$9! = 362{,}880$
$10! = 3{,}628{,}800$
$11! = 39{,}916{,}800$
$12! = 479{,}001{,}600$
$13! = 6{,}227{,}020{,}800$
$14! = 87{,}178{,}291{,}200$
$15! = 1{,}307{,}674{,}368{,}000$

Example: $2! \times 5! = 10!$

Answer: False, because $2 \times 120 \neq 3{,}628{,}800$

1. $3! + 3! = 6!$

2. $10! = 10 \times 9!$

3. $1! + 4! + 5! = 145$

4. $\dfrac{8!}{4!} = 2!$

5. $6! \times 7! = 10!$

Use the fundamental counting principle to find the value of each of the following.

6. ${}_{8}P_{3}$

7. ${}_{11}P_{1}$

8. ${}_{9}P_{5}$

Use the table of factorials and a calculator to find the value of each of the following.

9. $\frac{8!}{5!}$

10. $\frac{11!}{10!}$

11. $\frac{9!}{4!}$

12. Compare your answers to exercises 9-11 with your answers to exercises 6-8. How do you think the value of ${}_{15}\mathrm{P}_4$ could be expressed in terms of factorials.

[What do you think is the general formula for permutations of n things, taken r at a time? This would be abbreviated as ${}_nP_r$. We will use this formula as we move forward.]