FACTORIAL NOTATION Practice

2. Match each expression on the left with an equivalent expression on the right.

(a) $\frac{14!}{13!}$	(i) 10 100
(b) $\frac{52!}{51!}$	(ii) 6!
(c) $\frac{101!}{99!}$	(iii) 52
(d) $20 \times 19!$	(iv) 10!
(e) $90 \times 8!$	(v) 14
(f) $30 \times 4!$	(vi) 20!

3. Find the value for each expression.

(a) $\frac{8!}{5!}$ (b) $\frac{19!}{13!}$

(c) $\frac{21!}{17!4!}$ (d) $\frac{9!}{7!2!}$

(e) $\frac{155!}{152!}$ (f) $\frac{93!}{89!4!}$

4. Evaluate each of the expressions, using the definition of the factorial operation to simplify the work.

(a) $\frac{10!}{5!}$ (b) $\frac{21!}{14!}$

(c) $\frac{9!}{3!6!}$ (d) $\frac{12!}{8!4!}$

(e) $\frac{7!}{2!5!} + \frac{7!}{4!3!}$ (f) $\frac{15!}{9!6!} + \frac{15!}{10!5!}$

(g) $2 \times \frac{5!}{3!2!}$ (h) $3 \times \frac{11!}{7!4!}$

6. On the assembly line at Micro Manufacturing, six-digit serial numbers are assigned to products according to the following regulations: only the digits 4 to 9 are used; no digit may be used twice in the same serial number.

(a) Use the Fundamental Counting Principle to calculate the number of possible serial numbers under this system. (Hint: The first action is picking the first digit of the serial number, the second action, the second digit and so on.)

(b) Write this answer using factorial notation.

7. In rearranging the letters of a word such as KETCHUP, the number of possibilities for the first letter is seven because any one of the seven letters is eligible. For the second letter, there are only six possibilities because the letter used first will not be reused.

Write the number of arrangements of the letters of the word KETCHUP using factorial notation.

8. Simplify,

(a) $n(n-1)!$ (b) $n!(n+1)$

(c) $(n-1)!(n^2+n)$ (d) $n!(n^2+3n+2)$

(e) $\frac{n!}{(n-2)!}$ (f) $\frac{(n+2)!}{(n-1)!}$