Name _____ Date _____

LESSON 6.1

Challenge Practice

For use with the lesson "Use Combinations and the Binomial Theorem"

In Exercises 1–4, use the binomial theorem to write the binomial expansion.

1. $(\sqrt{x} - 4)^4$
2. $(2\sqrt{x} + 1)^3$
3. $(x^{2/3} - y^{1/3})^3$
4. $(x^{3/5} + 2)^5$

In Exercises 5–8, use the binomial theorem to expand the complex number. Simplify your result.

5. $(4 - 3i)^8$
6. $(2 + \sqrt{-25})^3$
7. $\left(-\frac{1}{2} + \frac{\sqrt{3}}{2}i\right)^4$
8. $(6 - i\sqrt{3})^3$

In Exercises 9 and 10, verify the identity. Show your work.

9. ${}_nC_{n-1} = {}_nC_1$
10. ${}_nC_r = \frac{{}_nP_r}{r!}$

11. Without calculating the numbers, determine which of the following is greater. *Explain* your reasoning.
    - The number of combinations of 10 elements taken 6 at a time.
    - The number of permutations of 10 elements taken 6 at a time.

12. A state lottery game is played by drawing five silver balls out of a drum of 63 silver balls (numbered 1–63) and one green money ball out of a drum of 50 green balls (numbered 1–50). The jackpot is won by matching all five silver balls in any order and the green money ball.
    a. How many different combinations of winning numbers are possible?
    b. Smaller amounts of money are won by matching one or more of the numbers. How many ways can a person match two of the numbers on the silver balls?
    c. How many ways can a person match three of the numbers on the silver balls and the green money ball?
    d. How many ways can a person match all five of the numbers on the silver balls?
    e. If order was important, how do the answers to parts (a)–(d) change? Is the lottery easier to win if order is important? *Explain* your reasoning.