EXAMPLE 4 on p. 692 for Exs. 19–23

19. USING PATTERNS Copy Pascal's triangle on page 692 and add rows for $n = 6, 7, 8, 9$, and 10.

PASCAL'S TRIANGLE **Use the rows of Pascal's triangle from Exercise 19 to write the binomial expansion.**

20. $(x + 3)^6$ **21.** $(y - 3z)^{10}$ **22.** $(a + b^2)^8$ **23.** $(2s - t^4)^7$

EXAMPLES 5 and 6 on p. 693 for Exs. 24–31

BINOMIAL THEOREM **Use the binomial theorem to write the binomial expansion.**

24. $(x + 2)^3$ **25.** $(c - 4)^5$ **26.** $(a + 3b)^4$ **27.** $(4p - q)^6$

28. $(w^3 - 3)^4$ **29.** $(2s^4 + 5)^5$ **30.** $(3u + v^2)^6$ **31.** $(x^3 - y^2)^4$

EXAMPLE 7 on p. 694 for Exs. 32–35

32. Find the coefficient of x^5 in the expansion of $(x - 2)^{10}$.

33. Find the coefficient of x^3 in the expansion of $(3x + 2)^5$.

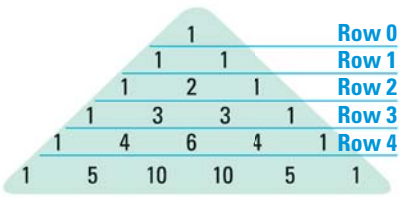
34. Find the coefficient of x^6 in the expansion of $(x^2 - 3)^8$.

35. TAKS REASONING Which is the coefficient of x^4 in the expansion of $(x - 3)^7$?

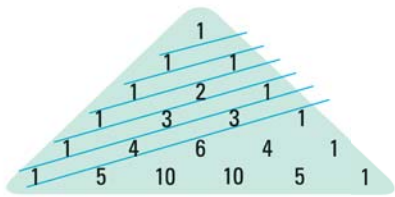
(A) -945 (B) -35 (C) -27 (D) 2835

PASCAL'S TRIANGLE **In Exercises 36 and 37, use the diagrams shown.**

36. What is the sum of the numbers in each of rows 0–4 of Pascal's triangle? What is the sum in row n?



37. *Describe* the pattern formed by the sums of the numbers along the diagonal segments of Pascal's triangle.



REASONING **In Exercises 38 and 39, decide whether the problem requires *combinations* or *permutations* to find the answer. Then solve the problem.**

38. NEWSPAPER Your school newspaper has an editor-in-chief and an assistant editor-in-chief. The staff of the newspaper has 12 students. In how many ways can students be chosen for these two positions?

39. STUDENT COUNCIL Five representatives from a senior class of 280 students are to be chosen for the student council. In how many ways can students be chosen to represent the senior class on the student council?

40. TAKS REASONING A relay race has a team of 4 runners who run different parts of the race. There are 20 students on your track squad. In how many ways can the coach select students to compete on the relay team?

(A) 4845 (B) 40,000 (C) 116,280 (D) 160,000

41. TAKS REASONING *Explain* how the formula for ${}_nC_n$ suggests the definition $0! = 1$.

CHALLENGE **Verify the identity. *Justify* each of your steps.**

42. ${}_nC_0 = 1$ **43.** ${}_nC_n = 1$ **44.** ${}_nC_r \cdot {}_rC_m = {}_nC_m \cdot {}_{n-m}C_{r-m}$

45. ${}_nC_1 = {}_nP_1$ **46.** ${}_nC_r = {}_nC_{n-r}$ **47.** ${}_{n+1}C_r = {}_nC_r + {}_nC_{r-1}$