*AAT (IC/HW)-Day 1
Chapter 10: 10-5 The Binomial Theorem

Name Key
Date: ____________ Period: __________

Evaluate the expression.

1. $2!6!$

$2 \cdot 720$

$= 1440$

2. $7!0!$

$5040 \cdot 1$

$= 5040$

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

$\frac{8 \cdot 7 \cdot 6 \cdot \cancel{5!}}{\cancel{5!}}$

$= 336$

4. $\binom{5}{5}$

$= \frac{\cancel{5!}}{\cancel{5!}\,0!} = 1$

5. $\binom{7}{5}$

$\frac{7!}{5!\,2!}$

$= \frac{7 \cdot 6 \cdot \cancel{5!}}{\cancel{5!} \cdot 2} = 21$

6. $\binom{13}{4}$

$\frac{13!}{4!\,9!}$

$\frac{13 \cdot 12 \cdot 11 \cdot 10 \cdot \cancel{9!}}{4 \cdot 3 \cdot 2 \cdot \cancel{9!}}$

$= 715$

Rewrite as an expression that does not contain factorials.

7. $\frac{n!}{(n-2)!} = \frac{n(n-1)\cancel{(n-2)!}}{\cancel{(n-2)!}}$

$= n(n-1)$

8. $\frac{(2n+2)!}{(2n)!}$ $\frac{(2n+2)(2n+1)\cancel{(2n)!}}{\cancel{(2n)!}}$

$= (2n+2)(2n+1)$

9. $\frac{(3n+1)!}{(3n-1)!}$

$= \frac{(3n+1)(3n)\cancel{(3n-1)!}}{\cancel{(3n-1)!}}$

$= (3n+1)(3n)$

Use the binomial theorem to expand.

10. $(4x - y)^3 = \binom{3}{0}(4x)^3(-y)^0 + \binom{3}{1}(4x)^2(-y)^1 +$

$\binom{3}{2}(4x)^1(-y)^2$

$+ \binom{3}{3}(4x)^0(-y)^3$

$1(64x^3)(1) - 3(16x^2)y + 3(4x)(y^2) - (1)(1)y^3$

$= 64x^3 - 48x^2y + 12xy^2 - y^3$

11. $(3x - 5y)^4$ $\binom{4}{0}(3x)^4(-5y)^0 + \binom{4}{1}(3x)^3(-5y)^1$

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

$\binom{4}{4}(3x)^0(-5y)^4$

$= 1(81x^4)(1) + 4(27x^3)(-5y) +$

$6(9x^2)(25y^2) + 4(3x)(-125y^3)$

$+(1)(1)(625y^4)$

$= 81x^4 - 540x^3y + 1350x^2y^2 - 1500xy^3 + 625y^4$

Use Pascal's Triangle to expand.

12. $(a + b)^6$

13. $(a - b)^7$

$a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$

$a^7 - 7a^6b + 21a^5b^2 - 35a^4b^3 + 35a^3b^4 - 21a^2b^5 + 7ab^6 - b^7$

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

$(a+b)^6$ 1 6 15 20 15 6 1

$(a-b)^7$ 1 7 21 35 35 21 7 1