

12.5 Book pg 688 #23-33 odd

Write each expression in expanded form and find the sum.

$$23. \sum_{r=1}^3 (r-3)$$

$$-2 + -1 + 0 = -3$$

$$29. \sum_{n=3}^6 (3^n + 1)$$

$$28 + 82 + 244 + 730 = 1084$$

$$25. \sum_{b=4}^8 (4-2b)$$

$$-4 + -6 + -8 + -10 + -12 = -40$$

$$31. \sum_{p=1}^4 (3^{p-1} + \frac{1}{2})$$

$$1\frac{1}{2} + 3\frac{1}{2} + 9\frac{1}{2} + 27\frac{1}{2} = 42$$

$$27. \sum_{b=2}^5 (b^2 + b)$$

$$6 + 12 + 20 + 30 = 68$$

$$33. \sum_{r=1}^{\infty} 4(\frac{1}{2})^k$$

$$2 + 1 + \frac{1}{2} \quad r=42 \quad S_n = \frac{2}{1-\frac{1}{2}} = 4$$

Worksheet --Factorials: Day 6

Write each product in factorial notation:

$$1. 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6$$

$$6!$$

$$2. 8 \cdot 7 \cdot 6 \cdot 5$$

$$\frac{8!}{4!}$$

$$3. 12 \cdot 11 \cdot 10 \cdot 9 \cdot 8$$

$$\frac{12!}{7!}$$

$$4. 100 \cdot 99 \cdot 98$$

$$\frac{100!}{97!}$$

Evaluate each expression using factorial knowledge:

$$5. 5!$$

$$120$$

$$6. \frac{6!}{4! \cdot 3!}$$

$$5$$

$$7. 3(6!)$$

$$2160$$

$$8. 3!4!$$

$$144$$

$$9. \frac{10!}{8!}$$

$$90$$

$$10. \frac{(8-2)!}{(4+1)!}$$

$$6$$

$$11. \frac{12!}{11!}$$

$$12$$

$$12. \frac{6!}{7! - 6!}$$

$$\frac{1}{6}$$

$$13. \frac{4! \cdot 6!}{7!}$$

$$\frac{24}{7}$$

$$14. \frac{3!}{0!}$$

$$6$$

$$15. \frac{5!}{4! - 3!}$$

$$\frac{20}{3}$$

$$16. \frac{3! + 5!}{5! - 3!}$$

$$\frac{21}{19}$$

$$17. \frac{n!}{n!(n-1)!}$$

$$n \frac{1}{(n-1)!}$$

$$18. \frac{(n+2)!}{n!}$$

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

$$19. \frac{(n+1)!}{(n-1)!}$$

$$(n+1)(n)$$

$$20. \frac{(x-y)!}{(x-y-1)!}$$

$$x-y$$

$$21. \frac{(x-3)!x!}{(x-2)!(x-1)!}$$

$$(x-3)(x-2)(x-1)x$$

$$22. \frac{(x+3)!(x-1)!}{(x-2)!(x+1)!}$$

$$(x+3)(x+2)(x-1)$$

Expand using Pascal's Triangle:

$$1. (2x+y)^6$$

$$64x^6 + 192x^5y + 240x^4y^2 + 160x^3y^3 + 60x^2y^4 + 12xy^5 + y^6$$

$$4. (a^3 - 2b^2)^6$$

$$a^{18} - 12a^{15}b^2 + 60a^{12}b^4 - 160a^9b^6 + 240a^6b^8 - 192a^3b^{10} + 32b^{12}$$

$$2. (3a-5b)^4$$

$$81a^4 - 540a^3b + 135a^2b^2 - 1500ab^3 + 625b^4$$

$$5. \left(1 + \frac{1}{x}\right)^6$$

$$1 + \frac{6}{x} + \frac{15}{x^2} + \frac{20}{x^3} + \frac{15}{x^4} + \frac{6}{x^5} + \frac{1}{x^6}$$

$$3. (x^2 - 3y)^4$$

$$x^8 - 12x^6y + 54x^4y^2 - 108x^2y^3 + 81y^4$$