Algebra 2 Notes

Name Key

Use Properties of Exponents-

	Expanded Form	Simplified
1. $a^5 \cdot a^2$	$aaaaaaa$	a^7
2. $(a^5)^2$	$(a^5)(a^5) = aaaaaaaaaa$	a^{10}
3. $(4a^2)^3$	$(4a^2)(4a^2)(4a^2) = 4\cdot4\cdot4aaaaaa$	$64a^6$
4. $(3a^2b^3)^4$	$(3a^2b^3)(3a^2b^3)(3a^2b^3)(3a^2b^3)$	$81a^8b^{12}$

Remember: An exponent affects what is to its immediate left!!!

$3 \cdot 4^2 = 3 \cdot 16 = 48$ $\quad (3\cdot4)^2 = (12)^2 = (12)(12) = 144$

$(-3\cdot4)^2 = (-12)^2 \rightarrow (-12)(-12) = 144$ $\quad -(3\cdot4)^2 = -1(12)^2 = -1(144) = -144$

Rules for Multiplying Monomials

Product of Powers	$a^m \cdot a^n$	a^{m+n}
Power of a Power	$(a^m)^n$	a^{mn}
Power of Products	$(ab)^m$	$a^m b^m$
Power of a Monomial	$(a^m b^n)^p$	$a^{mp} b^{np}$

Examples- Simplify the following:

5. $\left(\frac{1}{2}a^2b\right)^3 \rightarrow \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)a^6b^3$ $\quad \frac{1}{8}a^6b^3$ or $\frac{a^6b^3}{8}$

6. $(2a^4)(3a^3b)(-4a^2b^3)^2$ $\quad (2a^4)(3a^3b)(16a^4b^6)$ $\quad 96a^{11}b^7$

7. $9\left(\frac{1}{3}a^3b^4\right)^2$ $\quad 9\left(\frac{1}{9}a^6b^8\right)$ $\quad a^6b^8$

8. $(-4x^5)^3$ $\quad (-4\cdot(-4)(-4))x^{15}$ $\quad -64x^{15}$

9. $(-5a^3)^2 + (3a)^3$ $\quad 25a^6 + 27a^3$

10. $(5a^3)^2 + (2a^2)^3$ $\quad 25a^6 + 8a^6$ $\quad 33a^6$

	Expanded Form	Simplified
11. $\frac{a^5}{a^3}$	$\frac{\cancel{a}\cancel{a}\cancel{a}aa}{\cancel{a}\cancel{a}\cancel{a}} = 1\cdot1\cdot1\cdot a\cdot a \rightarrow a^2$	a^2
12. $\frac{a^3}{a^5}$ a^{-2}	$\frac{\cancel{a}\cdot\cancel{a}\cdot\cancel{a}}{\cancel{a}\cdot\cancel{a}\cdot\cancel{a}\cdot a\cdot a} \rightarrow \frac{1\cdot1\cdot1}{a\cdot a} \rightarrow \frac{1}{a^2}$	$\frac{1}{a^2}$
13. $\frac{4a^2b^3}{8ab^5}$ $\frac{1ab^{-2}}{2}$	$\frac{\cancel{2}\cdot\cancel{2}\cancel{a}a\cancel{b}\cancel{b}\cancel{b}}{\cancel{2}\cdot\cancel{2}\cdot 2\cancel{a}\cancel{b}\cancel{b}\cancel{b}\cancel{b}\cancel{b}} \rightarrow \frac{a}{2b^2}$	$\frac{a}{2b^2}$
14. $\frac{a^4}{a^4}$ a^0	$\frac{a\cdot a\cdot a\cdot a}{a\cdot a\cdot a\cdot a} = 1$	

Rules for Dividing Monomials

Quotient of Powers	$\frac{a^m}{a^n}$	a^{m-n}
Zero Exponent	a^0	1
Negative Exponent	a^{-1}	$\frac{1}{a}$

Examples- Simplify the following:

15. $\frac{144x^5y^{-3}z^4}{12x^6y^2z^4}$ $12x^{-1}y^{-5}z^0$ $\rightarrow \frac{12}{xy^5}$

16. $\frac{(3x^5)^2}{(-2x^3)^{-3}} \rightarrow (9x^{10})(-2x^3)^3 \rightarrow (9x^{10})(-8x^9) \rightarrow -72x^{19}$

17. $\frac{x^5y^2}{xy^3}$ x^4y^{-1} $\rightarrow \frac{x^4}{y}$

18. $\left(\frac{2a^3}{b^{-4}}\right)^{-2}\left(\frac{b^{-4}}{2a^3}\right)^2 \rightarrow \frac{b^{-8}}{4a^6} \rightarrow \frac{1}{4a^6b^8}$

19. $\frac{(x^4y^{-7})^0}{(-3)^2} = \frac{1}{9}$

20. $\frac{1}{x^0 + y^0} = \frac{1}{1+1} \rightarrow \frac{1}{2}$