8.1 & 8.2 – **Product and Quotient Exponent Properties**

Property	Completed Examples	Additional Examples
Product of Powers $a^m \bullet a^n = a^{m+n}$	$x^2 \bullet x^7 \bullet x = x^{2+7+1} = x^{10}$ $3^2 \bullet 3^7 = 3^{2+7} = 3^9 = 19{,}683$	
Power of a Power $(a^m)^n = a^{mn}$	$(n^3)^4 = n^{3\bullet 4} = n^{12}$ $(4^2)^3 = 4^{2\bullet 3} = 4^6 = 4{,}096$	
Power of Product $(ab)^m = a^m b^m$	$(xy)^5 = x^5 y^5$ $(42 \bullet 12)^2 = 42^2 \bullet 12^2 = 254{,}016$	
Quotient of Powers $\frac{a^m}{a^n} = a^{m-n}$	$\frac{x^{11}}{x^4} = x^{11-4} = x^7$ $\frac{6^{12}}{6^8} = 6^{12-8} = 6^4 = 1{,}296$	
Power of a Quotient $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$, $b \neq 0$	$\left(\frac{x}{y}\right)^5 = \frac{x^5}{y^5}$ $\left(\frac{x^2}{4y}\right)^3 = \frac{x^{2\bullet 3}}{4^3 y^3} = \frac{x^6}{64y^3}$	

8.3 - Negative Exponents & Zero as an Exponent

Rules	Completed Examples	Additional Examples
Zero as an exponent • **Any** number raised to the power of zero equals 1 $a^0 = 1 \qquad a \neq 0$	Ex 1) Evaluate 5^0 • Any number raised to the power of 0 equals 1, so $5^0 = 1$ Ex 2) Evaluate x^0 • Even though we don't know what x equals, we know that any number raised to the power of 0 equals 1, so $x^0 = 1$	
Negative Exponents *We can't evaluate negative exponents, no matter where/how they appear** We need to rewrite them so that they become positive, using the rules below. $a^{-n} = \frac{1}{a^n} \qquad a \neq 0$ If the term with a negative exponent is a part of a fraction, move the term and its exponent to the denominator, and make the exponent positive. If the term with a negative exponent is NOT a part of a fraction, make a fraction, and move the term and its exponent to the denominator, and make the exponent positive. $a^n = \frac{1}{a^{-n}} \qquad a \neq 0$ If there is a term with a negative exponent in the denominator of a fraction, bring the term and its exponent to the numerator, and make the exponent positive.	Ex 3) Evaluate 2^{-1} • We can make the exponent positive by creating a fraction-1 would be the numerator and the denominator would be the given expression, but with a positive exponent $2^{-1} = \frac{1}{2^1} = \frac{1}{2}$ Ex 4) Evaluate d^{-2} Using the same method used in ex 3: $d^{-2} = \frac{1}{d^2}$ Ex 5) Evaluate $\frac{1}{2^{-3}}$ • We can make the exponent positive by bringing 2^{-3} to the numerator, and in turn making the exponent positive $\frac{1}{2^{-3}} = 2^3 = 8$ Ex 6) Evaluate $\frac{1}{y^{-7}}$ Using the same method as ex 5: $\frac{1}{y^{-7}} = y^7$	