9.3 DIVISION USING EXPONENTS

Division with exponents can be done using the **QUOTIENT PROPERTY RULE.** This rule tells us to **subtract** the exponents when dividing numbers or letters that have the same base and keep the base the same. [$x^a \div x^b = x^{a-b}$]

EXAMPLES:

1. $8^{12} \div 8^3 = 8^{12-3} = 8^9$
2. $x^{15} \div x^{12} = x^{15-12} = x^3$
3. $(x^6 y^5) \div (x^4 y^2) = x^{6-4} y^{5-2} = x^2 y^3$
4. $(a^3 b^{-4} c^4) \div (a^{-2} b^2 c^2) = a^{(3)-(-2)} b^{(-4)-(2)} c^{(4)-(2)} = a^5 b^{-6} c^2$
5. $\dfrac{21 x^3 y^7 z^2}{24 x^4 y^3 z} = \left(\frac{21}{24}\right) x^{3-4} y^{7-3} z^{2-1} = \frac{7}{8} x^{-1} y^4 z^1$

A. Perform the following divisions using the Quotient Property Rule and leave your answers in simplest exponential form.

1. $x^5 \div x^2$
2. $y^3 \div y^2$
3. $z^7 \div z^6$
4. $b^7 \div b^9$
5. $s^6 \div s^3$
6. $x^{-7} \div x^{14}$
7. $x^5 \div x^9$
8. $x^6 \div x$
9. $y^{10} \div y^5$
10. $x^0 \div x^{-5}$
11. $x^1 \div x^{12}$
12. $x^1 \div x^{-12}$
13. $y^0 \div y^0$
14. $c^8 \div c^8$
15. $x^{-12} \div x^{-16}$

B. Simplify the following using the Quotient Property Rule and leave your answers in simplest exponential form.

1. $\dfrac{x^3 y^4}{x^2 y^2}$
2. $\dfrac{18 x^8 y^5}{6 x^6 y^3}$
3. $\dfrac{x^{-4} b^7}{x^{11} b^{-8}}$
4. $\dfrac{a^{-5} b^6 c^{-2}}{c^7 b^8}$
5. $\dfrac{a b^{14} c^{-30}}{a^{12} b^{32} c^{15}}$
6. $\dfrac{(x^7)(x^3)(x^{-5})}{(x^6)(x^{-5})}$
7. $\dfrac{20 a^{11} b^{-8} c^{15} b^{10} a^{-8}}{25 a^5 c^7 b^{-5} c^{15}}$
8. $\dfrac{a^{15} a^{-3} a^{17}}{a^{16} a^{-3}}$
9. $\dfrac{24 a^{10} b^{13} a^{-6} c^{12} b^{19} c^{-2}}{36 a^4 c^7 a^{12} b^{-12} c^{12}}$
10. $\dfrac{a^4 b^3 a^{-7} b^{14}}{a^1 b^{10}}$
11. $\dfrac{x^0 y^0 z^0}{y^0 z^0 x^0}$
12. $\dfrac{25 r^{-13} s^{11} r^9 t^2 p^6 s^{-24}}{35 t^{10} p^{-2} s^8 q^{-14}}$