

**Advanced Algebra**

Name \_\_\_\_\_ hr \_\_\_\_\_

**Exponent Rules and Shortcuts Practice –**

MULTIPLYING LIKE BASES

Shortcut:  $b^m b^n = b^{m+n}$

DIVIDING LIKE BASES

Shortcut:  $\frac{b^m}{b^n} = b^{m-n}$

PARENTHESIS EXPONENTS

Shortcut:  $(ab)^n = a^n b^n$  and  $(b^m)^n = b^{m \cdot n}$

NEGATIVE EXPONENTS

Shortcuts:  $b^{-m} = \frac{1}{b^m}$  and  $\frac{a^{-n}}{b^{-m}} = \frac{b^m}{a^n}$

ZERO EXPONENTS

Shortcut:  $b^0 = 1$

**Use two of the rules together to simplify these expressions.**

1.  $(2x^2)^2 x^5$

6.  $a^5 b^7 c^3 a^{-4} b^3 c^{-7}$

2.  $(a^3 b^2)^7 ab^3$

7.  $(x^2 y^4)^{-2}$

3.  $\frac{(a^3 b^2)^7}{ab^3}$

8.  $(a^4 b^9)^{-10}$

4.  $\frac{(2x^2)^2}{x^5}$

9.  $\left(\frac{a^6}{2b}\right)^3$

5.  $x^{-1} y^2 z^3 x^{-2} y^3 z^7$

10.  $\frac{4w^{-11} y^{-3}}{16w^{-51} y^7}$

All Together Now – remember what third (& fifth ) roots means!

1.  $\sqrt[3]{54x^6y^9}$

7.  $\frac{x^2y^{-3}z^{-1}}{\left(a^{\frac{2}{5}}b^{\frac{1}{5}}c^{\frac{3}{5}}\right)^{10}}$

2.  $\left(\frac{b^xb^{3x}}{b^3}\right)^2$

8.  $\frac{27x^3 \cdot 63x^5}{9x^2}$

3.  $2^{3k+1}4^{k-1}$

9.  $\frac{27x^3 - 63x^5}{9x^2}$

4.  $\left(x^{\frac{1}{2}}y^{\frac{1}{5}}\right)^{20}$

10.  $\sqrt{f}(f^{3.5} - 2f^{1.5})$

5.  $(6^5\sqrt{6})(\sqrt{6^3})$

11.  $\sqrt{f}(f^{3.5} \cdot 2f^{1.5})$

6.  $\frac{a^2b^{\frac{1}{3}}c^{-1}}{a^{\frac{1}{2}}b^{\frac{4}{3}}c^2}$