

Lesson 103: Advanced Polynomial Division
 3rd Degree Polynomial in x, y . (★ Exponents must add to 3! ★)
 (Decrease x 's & Increase y 's)

$$x^3 + x^2y + xy^2 + y^3 = x^3 + x^2y + xy^2 + y^3$$

1.) Divide $x^3 + y^3$
 by $x + y$.

$$\begin{array}{r}
 x^2 - xy + y^2 \\
 x + y \overline{) x^3 + 0x^2y + 0xy^2 + y^3} \\
 \underline{-(x^3 + x^2y)} \\
 -x^2y + 0xy^2 + y^3 \\
 \underline{+(x^2y + xy^2)} \\
 xy^2 + y^3 \\
 \underline{-(xy^2 + y^3)} \\
 0
 \end{array}$$

$$x^2 - xy + y^2$$

2.) Divide $8x^3 - 64y^3$
 by $2x - 4y$

$$\begin{array}{r}
 4x^2 + 8xy + 16y^2 \\
 2x - 4y \overline{) 8x^3 + 0x^2y + 0xy^2 - 64y^3} \\
 \underline{-(8x^3 - 16x^2y)} \\
 16x^2y + 0xy^2 - 64y^3 \\
 \underline{-(16x^2y - 32xy^2)} \\
 32xy^2 - 64y^3 \\
 \underline{-(32xy^2 - 64y^3)} \\
 0
 \end{array}$$

3.) Divide $27x^3 + 8y^3$
 by $3x + 2y$

$$\begin{array}{r}
 9x^2 - 6xy + 4y^2 \\
 3x + 2y \overline{) 27x^3 + 0x^2y + 0xy^2 + 8y^3} \\
 \underline{-(27x^3 + 18x^2y)} \\
 -18x^2y + 0xy^2 + 8y^3 \\
 \underline{+(18x^2y + 12xy^2)} \\
 12xy^2 + 8y^3 \\
 \underline{-(12xy^2 + 8y^3)} \\
 0
 \end{array}$$