

Pre-AP Algebra 2**Unit 7 - Lesson 4 – Factoring by u-Substitution; Solving Polynomial Equations; Factoring Flow Chart**

Objectives: Students will be able to:

- factor by using a u-substitution to write polynomials in quadratic form.
- solve polynomial equations by factoring.
- select the appropriate factoring technique for a given polynomial (using a factoring flowchart).

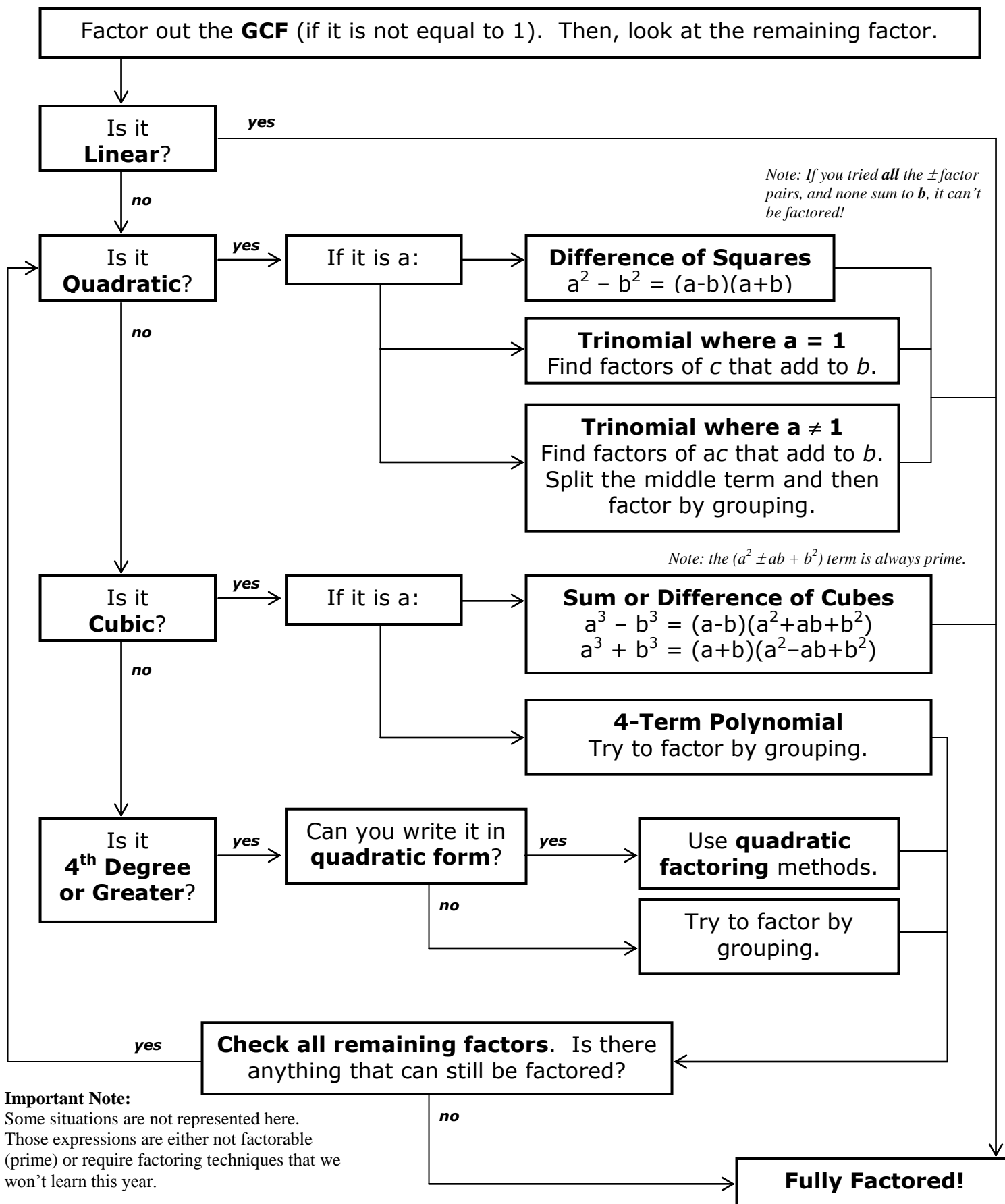
Materials: Hw #7-3 overhead; tally sheets; note-taking templates; factoring flow charts; pair work; hw #7-4

Time	Activity
5 min	Homework Review Show answer to hw #7-3 on the overhead. Pass around tally sheets.
10 min	Homework Presentation Review top 2 or 3 problems from tally sheets. Problems to grade:
25 min	Direct Instruction Lesson 3: Factoring Methods: u-Substitution & Solving Polynomial Equations Section: Polynomials and Exponents Background Information: Factor: 1) $u^2 - 25$ 2) $u^2 + 5u - 36$ Concepts: 1) Factoring Method: u-Substitution <ul style="list-style-type: none">- Let u equal an expression in x.- Factor in terms of u.- Substitute the expression back in for u. <p>This is great for rewriting polynomials in quadratic form: $au^2 + bu + c$, where u is any expression of x.</p> Examples: Factor $x^4 + 5x^2 - 36$. (Let $u = x^2$) Factor $32x^4 - 2$ (Factor out the 2, then let $u = 4x^2$) Concepts: 2) Solving Polynomial Equations <ul style="list-style-type: none">- Put in standard form on one side (get 0 on the other side).- Factor completely.- Set each factor equal to 0 and solve. Solution may include complex numbers! Examples: Solve $28x^4 + 8 = 10 - 4x^4$. (Note that we already factored this in the previous example!)
10 min	Direct Instruction Hand out the Factoring Flow Chart. Show it on the overhead. Explain how it works and then use it to help factor $2x^4 + 4x^3 - 50x^2 - 100x$.
30 min	Pair Work Students work on factoring and solving polynomial equations, using the flow chart as an aid.

Homework #7-4: Advanced Factoring II

Pre-AP Algebra 2
Factoring Flow Chart

Name: _____



Important Note:

Some situations are not represented here. Those expressions are either not factorable (prime) or require factoring techniques that we won't learn this year.

Pair Work: Factoring and Solving Polynomials

Directions:

- 1) Write each equation in standard form first.
- 2) Fully factor each polynomial. Use the flow chart if you're not sure what to do.
- 3) Set each factor equal to zero and solve. Find all real and complex solutions.

Problems:

1) $x^3 - 3x^2 = 0$

2) $3x^4 + 15x^2 = 72$

3) $x^3 + 2x^2 = x + 2$

4) $40x^3 - 5 = 0$

$$5) 6x^2 + x - 35 = 0$$

$$6) 3x^4 + 3x^3 = 6x^2 + 6x$$

$$7) 2x^5 - 12x^3 = -16x$$

Hw #7-4: Factoring and Solving Polynomials

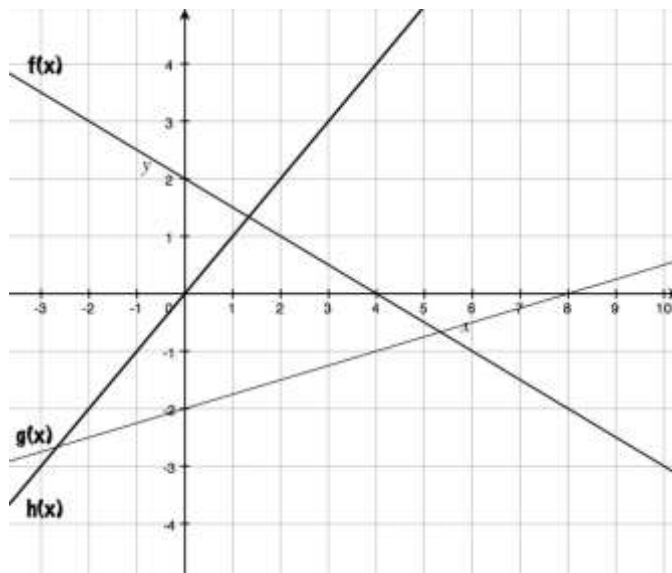
Do all work on a separate sheet of paper. Write answers on this handout. Staple your work to the back.

Solve each polynomial. Make sure to include all real and complex solutions.

- 1) $3x^7 = 81x^4$
- 2) $15x^2 - 4x - 4 = 0$
- 3) $x^4 - 13x^2 = 48$
- 4) $4x^3 + 12x^2 = 9x + 27$

Solve each inequality. To do this, you need to factor first and then make a number line model.

- 5) $2x^3 + 5x^2 - 200x - 500 \leq 0$
- 6) $-2x^4 + 26x^2 - 72 > 0$
- 7) Let $p(x) = f(x)g(x)h(x)$, using the graphs shown. Sketch $p(x)$ on the same coordinate plane. Then, solve the inequality $p(x) > 0$.



HW #7-3 (Advanced Factoring I)

Tally Sheet

1)

2)

a)

b)

c)

d)

e)

f)

3)

a)

b)

HW #7-3 (Advanced Factoring I)

1) Volume I = $x^2(x-2)$, Volume II = $2x(x-2)$
Volume III = $4(x-2)$, $x^3 - 8 = (x-2)(x^2 + 2x + 4)$

2)

a) $5(x-1)(x^2 + x + 1)$

b) $x(2x-3)(4x^2 + 6x + 9)$

c) $(10x+7y)(100x^2 - 70xy + 49y^2)$

d) $(3x^2 + 1)(x-2)$

e) $(x+2)(x-2)(2x+3)$

f) $2x(x^2 - 18)(x+2)$

3) a) $[-5, -2/3] \cup [4, \infty)$

b) $(-\infty, -5) \cup (-1, 5)$