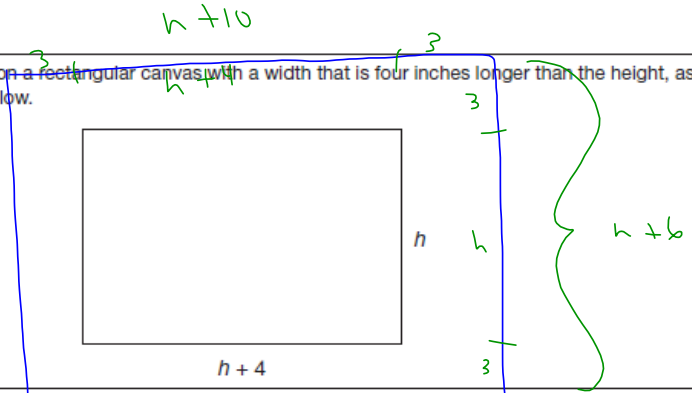
warm up:

Standard A1.1.1

Keng creates a painting on a rectangular canvas with a width that is four inches longer than the height, as shown in the diagram below.



A. Write a polynomial expression, in simplified form, that represents the area of the canvas.

$h(h+4) = h^2 + 4h$

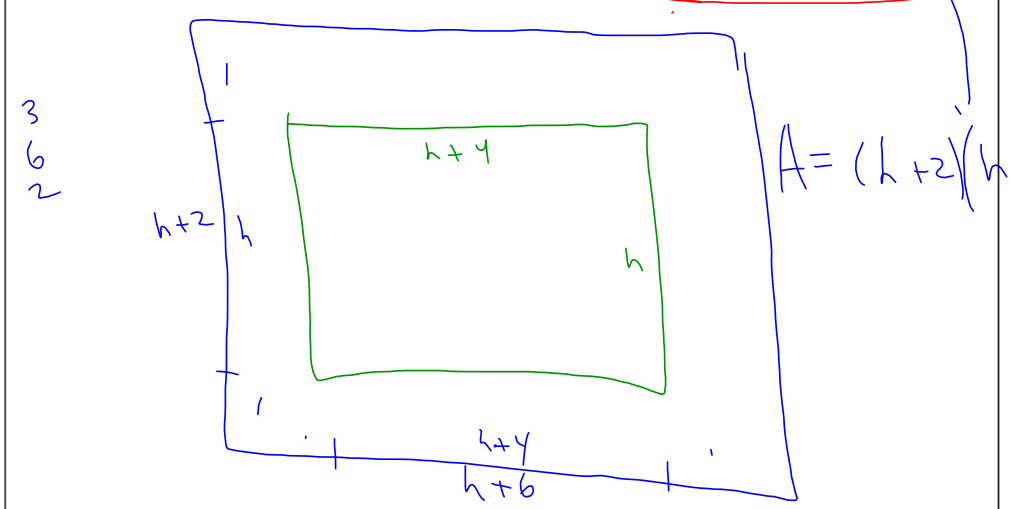
Keng adds a 3-inch-wide frame around all sides of his canvas.

B. Write a polynomial expression, in simplified form, that represents the **total area** of the canvas and the frame.

$(h+10)(h+6)$

Keng is unhappy with his 3-inch-wide frame, so he decides to put a frame with a different width around his canvas. The total area of the canvas and the new frame is given by the polynomial $h^2 + 8h + 12$, where h represents the height of the canvas.

C. Determine the width of the new frame. Show all your work. Explain why you did each step.



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1. $8x^2 + 10x + 3$

$x^2 + 10x + 24$

$(x+\frac{6}{8})(x+\frac{4}{8})$

$(x+\frac{3}{4})(x+\frac{1}{2})$

$(4x+3)(2x+1)$

2. $15x^2 + x - 6$

$x^2 + x - 90$

$(x+\frac{10}{15})(x-\frac{9}{15})$

$(x+\frac{2}{3})(x-\frac{3}{5})$

$(3x+2)(5x-3)$

5. $6x^2 + 7x - 3$

$x^2 + 7x - 18$

$(x-\frac{2}{6})(x+\frac{9}{6})$

$(x-\frac{1}{3})(x+\frac{3}{2})$

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

6. $2x^2 + 11x - 21$

$x^2 + 11x - 42$

$(x-\frac{3}{2})(x+\frac{14}{2})$

$(x-\frac{3}{2})(x+7)$

$(2x-3)(x+7)$

3. $3x^2 + 19x + 20$

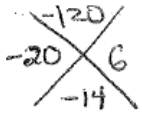
$x^2 + 19x + 60$

$(x+\frac{4}{3})(x+\frac{15}{3})$

$(x+\frac{4}{3})(x+5)$

$(3x+4)(x+5)$

4. $8x^2 - 14x - 15$



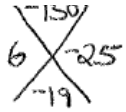
$x^2 - 14x - 120$

$(x-\frac{20}{8})(x+\frac{6}{8})$

$(x-\frac{5}{2})(x+\frac{3}{4})$

$(2x-5)(4x+3)$

7. $10x^2 - 19x - 15$



$x^2 - 19x - 150$

$(x+\frac{6}{10})(x-\frac{25}{10})$

$(x+\frac{3}{5})(x-\frac{5}{2})$

$(5x+3)(2x-5)$

8. $12x^2 - 8x - 15$

$x^2 - 8x - 180$

$(x+\frac{10}{12})(x-\frac{18}{12})$

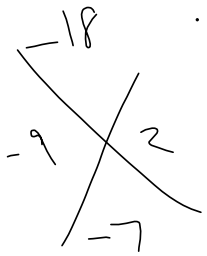
$(x+\frac{5}{6})(x-\frac{3}{2})$

$(6x+5)(2x-3)$

REVIEW

$3x^2 - 7x - 6$

M: $x^2 - 7x - 18$

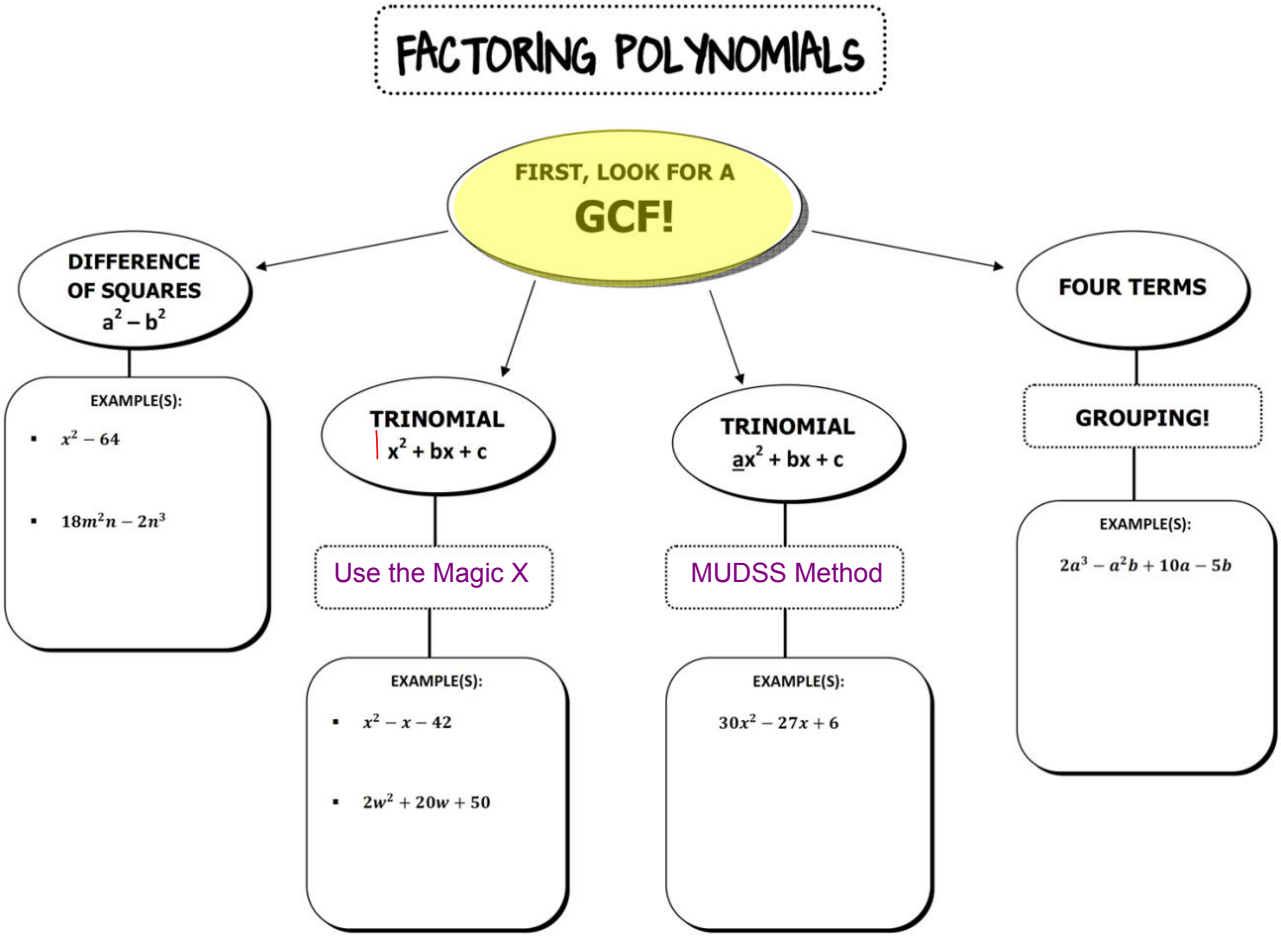


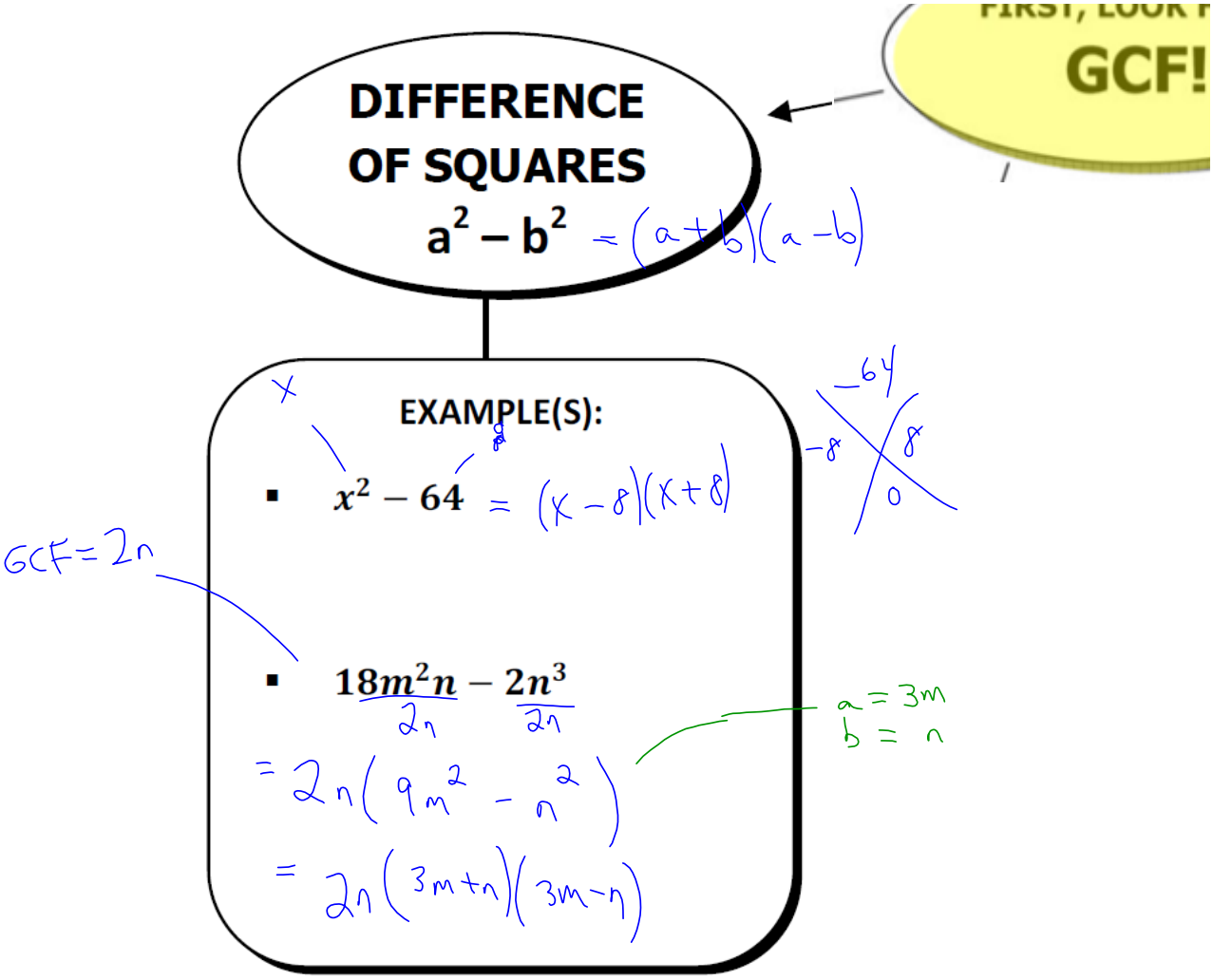
U: $(x - 9)(x + 2)$

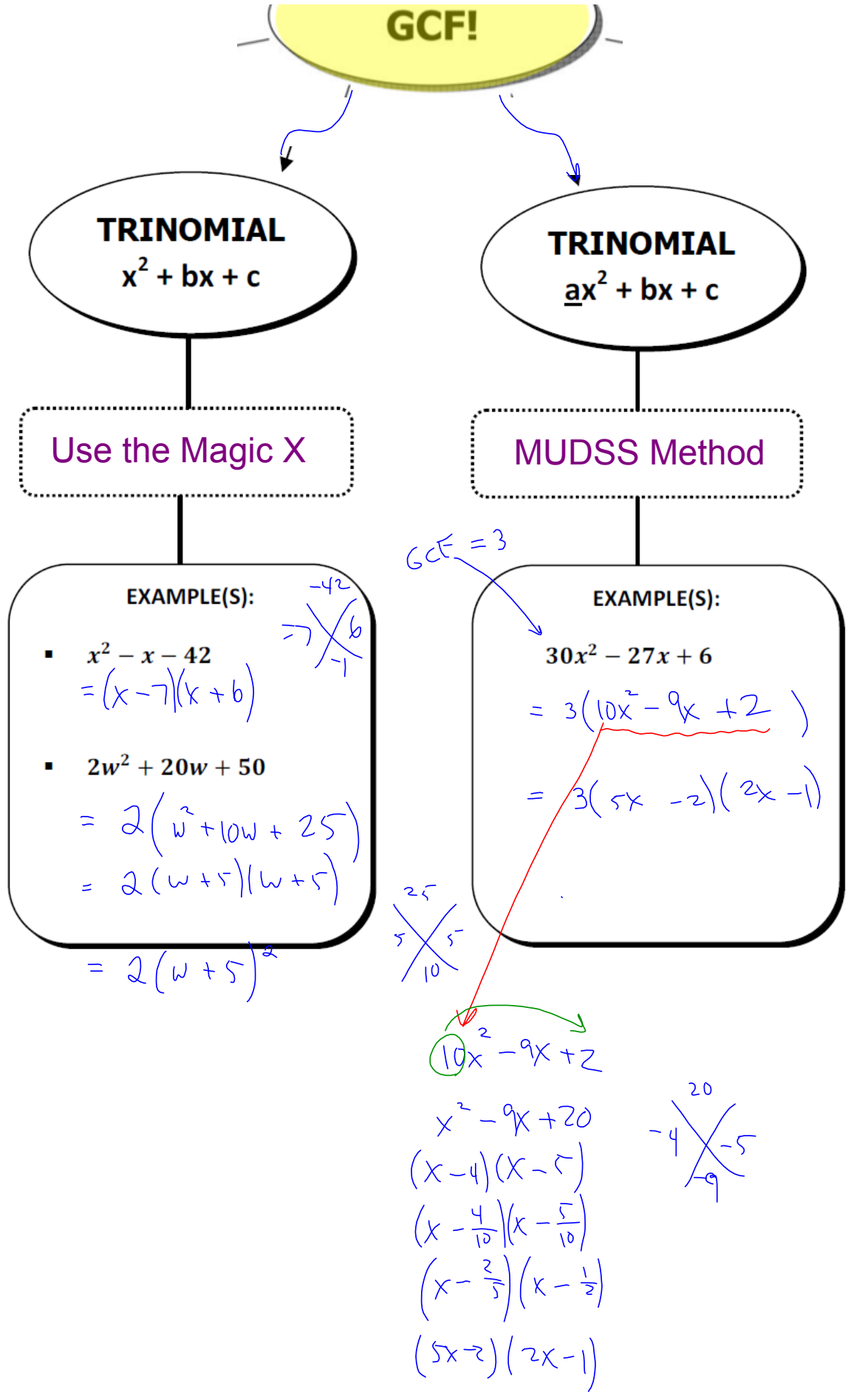
D: $\left(x - \frac{9}{3}\right)\left(x + \frac{2}{3}\right)$

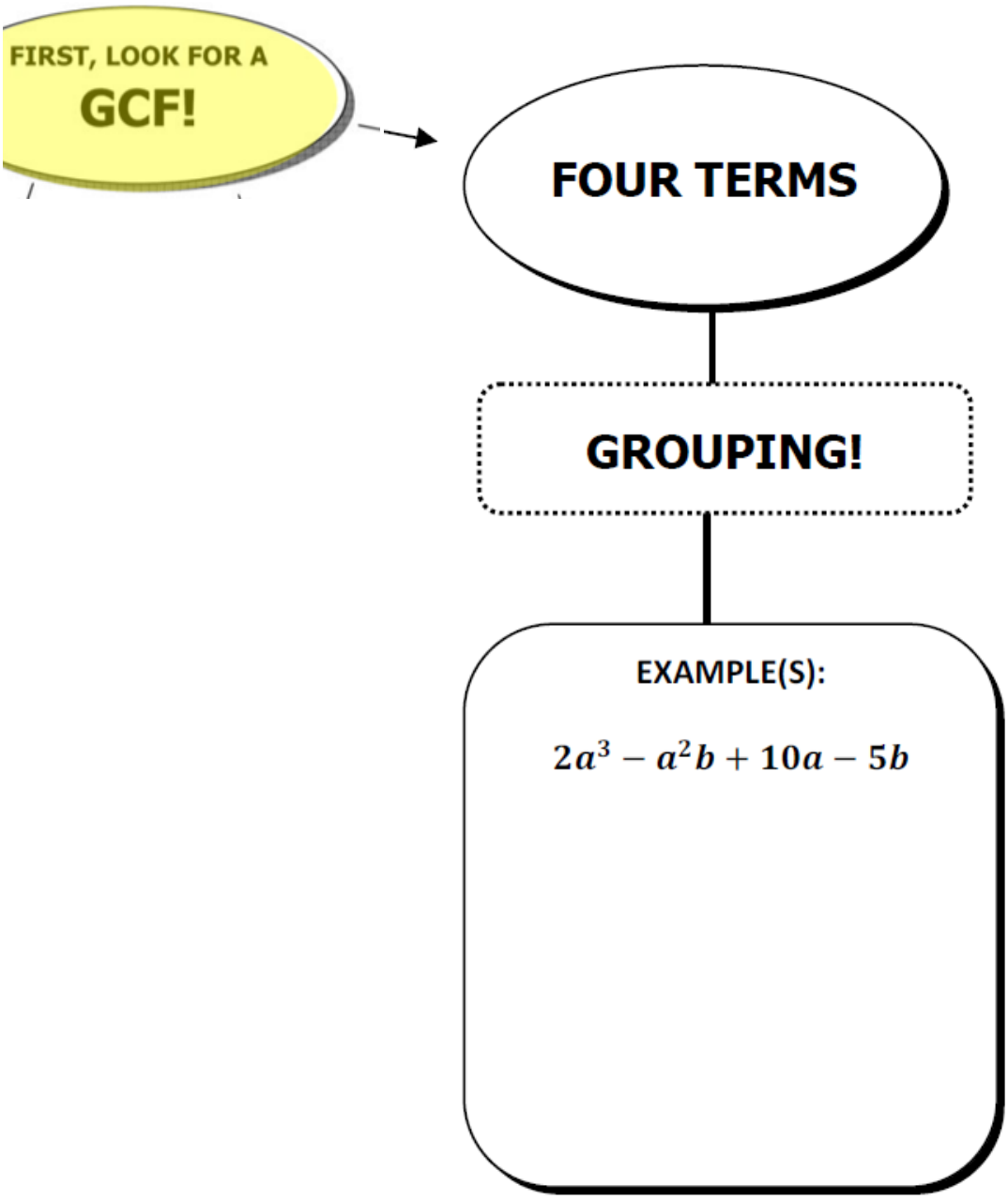
S: $(x - 3)(x + \frac{2}{3})$

S: $(x - 3)(3x + 2)$


FACTORING POLYNOMIALS
FIRST, LOOK FOR A GCF!
DIFFERENCE OF SQUARES $a^2 - b^2$
EXAMPLE(S):
$x^2 - 64$
$18m^2n - 2n^3$
TRINOMIAL $x^2 + bx + c$
Use the Magic X
EXAMPLE(S):
$x^2 - x - 42$
$2w^2 + 20w + 50$
TRINOMIAL $ax^2 + bx + c$
MUDSS Method
EXAMPLE(S):
$30x^2 - 27x + 6$
FOUR TERMS
GROUPING!
EXAMPLE(S):
$2a^3 - a^2b + 10a - 5b$


GCF!
DIFFERENCE OF SQUARES
$a^2 - b^2 = (a+b)(a-b)$
EXAMPLE(S):
$x^2 - 64 = (x-8)(x+8)$
-64
-8
8
0
GCF = $2n$
$18m^2n - 2n^3$
$2n$
$2n$
$= 2n(9m^2 - n^2)$
$= 2n(3m+n)(3m-n)$
$a = 3m$
$b = n$


GCF!
TRINOMIAL
$x^2 + bx + c$
TRINOMIAL
$ax^2 + bx + c$
Use the Magic X
MUDSS Method
EXAMPLE(S):
$x^2 - x - 42$
$= (x-7)(x+6)$
$2w^2 + 20w + 50$
$= 2(w^2 + 10w + 25)$
$= 2(w+5)(w+5)$
$= 2(w+5)^2$
EXAMPLE(S):
$30x^2 - 27x + 6$
GCF = 3
$= 3(10x^2 - 9x + 2)$
$= 3(5x-2)(2x-1)$
$10x^2 - 9x + 2$
$x^2 - 9x + 20$
$(x-4)(x-5)$
$\left(x - \frac{4}{10}\right)\left(x - \frac{5}{10}\right)$
$\left(x - \frac{2}{5}\right)\left(x - \frac{1}{2}\right)$
$(5x-2)(2x-1)$


FIRST, LOOK FOR A
GCF!
FOUR TERMS
GROUPING!
EXAMPLE(S):
$2a^3 - a^2b + 10a - 5b$

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Factoring Patterns Side by Side - Review

Simple Trinomials	MUDSS Trinomials ($a \neq 1$)	Perfect Square Trinomials	Difference of Squares
a. $x^2 + 6x + 8$	d. $8x^2 + 2x - 21$	f. $x^2 - 10x + 25$	h. $x^2 - 49$
b. $x^2 + 5x - 24$	e. $4x^2 + 5x - 9$	g. $9x^2 + 48x + 64$	i. $25x^2 - 81$
c. $x^2 - 4x - 77$			

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Patterns in Hiding

Sometimes an easy problems will be hiding in a tougher looking problem. Look for common factors (GCF) that need to be factored out first.

Examples:

1. $5x^2 - 10x - 75$

$= 5(x^2 - 2x - 15)$

$= 5(x + 3)(x - 5)$

2. $7x^2 - 63$

$= 7(x^2 - 9)$

$= 7(x + 3)(x - 3)$

3. $2x^2 - 28x + 98$

$= 2(x^2 - 14x + 49)$

$= 2(x - 7)(x - 7)$

$= 2(x - 7)^2$

4. $4x^2 + 14x + 6$

$= 2(2x^2 + 7x + 3)$

$= 2(2x + 1)(x + 3)$

M $x^2 + 7x + 6$

U $(x + 1)(x + 6)$

D $(x + \frac{1}{2})(x + \frac{6}{2})$

S $(x + \frac{1}{2})(x + 3)$

S $(2x + 1)(x + 3)$

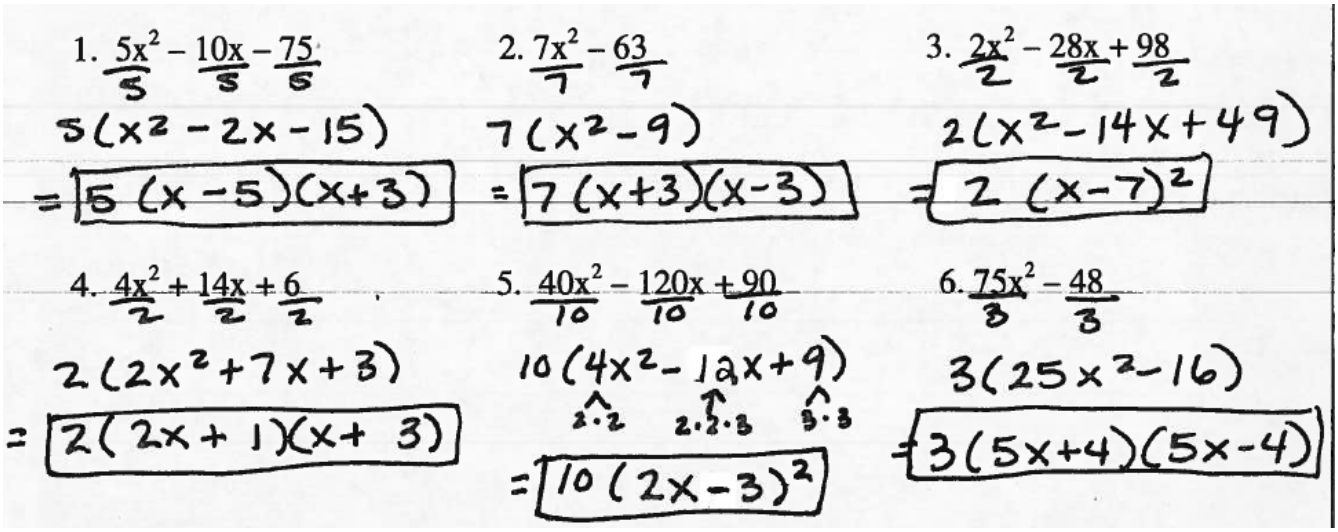
5. $40x^2 - 120x + 90$

$= 10(2x - 3)^2$

6. $75x^2 - 48$

$= 3(25x^2 - 16)$

$= 3(5x + 4)(5x - 4)$


1. $\frac{5x^2}{5} - \frac{10x}{5} - \frac{75}{5}$
$5(x^2 - 2x - 15)$
$= 5(x-5)(x+3)$
2. $\frac{7x^2}{7} - \frac{63}{7}$
$7(x^2 - 9)$
$= 7(x+3)(x-3)$
3. $\frac{2x^2}{2} - \frac{28x}{2} + \frac{98}{2}$
$2(x^2 - 14x + 49)$
$= 2(x-7)^2$
4. $\frac{4x^2}{2} + \frac{14x}{2} + \frac{6}{2}$
$2(2x^2 + 7x + 3)$
$= 2(2x+1)(x+3)$
5. $\frac{40x^2}{10} - \frac{120x}{10} + \frac{90}{10}$
$10(4x^2 - 12x + 9)$
$2 \cdot 2 \quad 2 \cdot 2 \cdot 3 \quad 3 \cdot 3$
$= 10(2x-3)^2$
6. $\frac{75x^2}{3} - \frac{48}{3}$
$3(25x^2 - 16)$
$= 3(5x+4)(5x-4)$