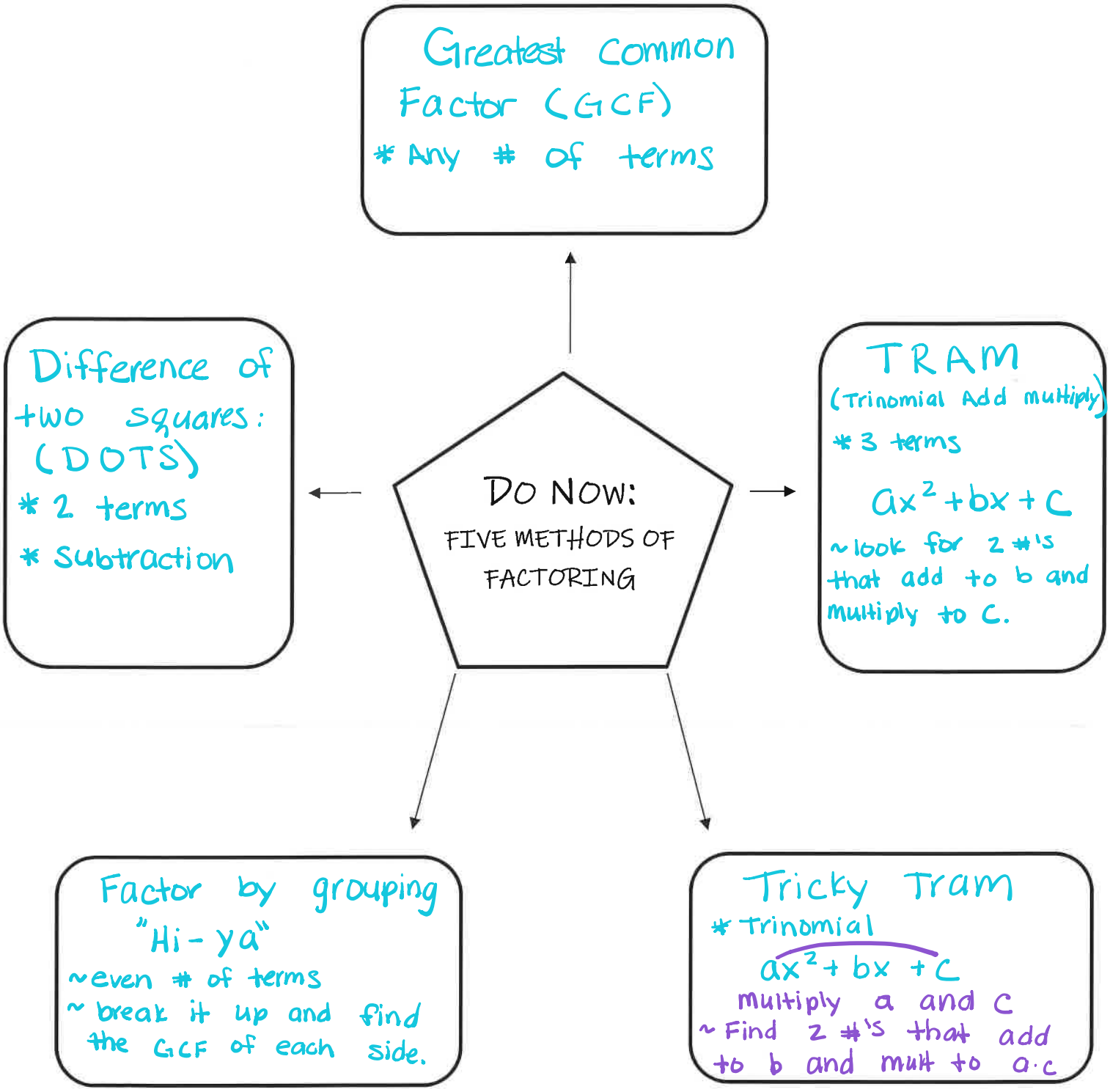
Name: Answer Key
Algebra II

Date: _____
Lesson 1-5

USING STRUCTURE TO FACTOR



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***Ex*#1:** Consider the following expression: $x^4-4x^2+8x^3-32x+12x^2-48$

(a) Which type of factoring does the overall structure of this expression suggest?

grouping

(b) Simplify the expression in so that it is factored completely.

$x^4-4x^2+8x^3-32x+12x^2-48$

$x^2(x^2-4)+8x(x^2-4)+12(x^2-4)$

DOTS $(x^2-4)(x^2+8x+12)$ ← TRAM (A, M)

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

$\boxed{(x+2)^2(x+6)(x-2)}$

6, 12, 8, 2

***Ex* #2:** Consider the following expression: $x^5-13x^3+36x+x^4-13x^2+36$

(a) Which type of factoring does the overall structure of this expression suggest?

grouping

put into standard form!

(b) Simplify the expression in so that it is factored completely.

$x^5-13x^3+36x+x^4-13x^2+36$

$x^5+x^4-13x^3-13x^2+36x+36$

$x^4(x+1)-13x^2(x+1)+36(x+1)$ ← TRAM

$(x+1)(x^4-13x^2+36)$

$(x+1)(x^2-9)(x^2-4)$

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

36, −9, −4, −13

***Ex*#3:** Consider the following expression: $4x^3(x^2+1)-2x(x^2+1)^2$

(a) Which type of factoring does the overall structure of this expression suggest?

GCF

* Both terms have something in common...

(b) Simplify the expression in so that it is factored completely.

GCF = $2x(x^2+1)$

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

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

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

$\boxed{2x(x^2+1)(x+1)(x-1)}$

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Algebra II Lesson 1-5

USING STRUCTURE TO FACTOR PRACTICE

1.) Factor completely: $x^4+2x^3+6x^2+12x^2-4x^2-8x-24x-48$

* Grouping!

$x^3(x+2) \mid 6x^2(x+2) \mid -4x(x+2) \mid -24(x+2)$

$(x+2)(x^3+6x^2-4x-24)$ ← grouping

$(x+2)(x^2(x+6) \mid -4(x+6))$

$(x+2)(x+6)(x^2-4)$ ← DOTS

$\boxed{(x+2)(x+6)(x+2)(x-2)}$

2.) Factor completely: $(2x+1)(5x-2)-(x+7)(2x+1)$

* GCF

$(2x+1)((5x-2)-(x+7))$

$(2x+1)(5x-2-x-7)$

$\boxed{(2x+1)(4x-9)}$ ← not DOTS because the x is not a perfect square!

3.) Factor completely: $2x^5+16x^2-5x^4-40x-3x^3-24$

* Grouping

$2x^2(x^3+8) \mid -5x(x^3+8) \mid -3(x^3+8)$

$(x^3+8)(2x^2-5x-3)$ ← sum of a cubes; ← tricky tram

$a=x$, $b=2$

$(x+2)(x^2-2x+(2)^2)(2x^2-6x+1x-3)$

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

$\boxed{(x+2)(x^2-2x+4)(x-3)(2x+1)}$

-6, -6, 1, -5

4.) Factor completely: $6x^3(x^2+4)-3x(x^2+4)^2$ * GCF

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

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

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

$\boxed{3x(x^2+4)(x+2)(x-2)}$

5.) Factor completely: $2x^3-14x^2+20x+3x^2-21x+30$ * grouping

$2x^3+3x^2 \mid -14x^2-21x \mid +20x+30$

$x^2(2x+3) \mid -7x(2x+3) \mid +10(2x+3)$

$(2x+3)(x^2-7x+10)$

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

10, -5, -2, -7

Answers

1. $(x-2)((x+6)(x+2)^2$

2. $(2x+1)(4x-9)$

3. $(2x+1)(x-3)(x+2)(x^2-2x+4)$

4. $3x(x^2+4)(x-2)(x+2)$

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