Warm-up 3-5

Factor the following trinomials.

1. $p^2 - 2p - 15$

2. $n^2 + 5n - 24$

4. $4n^2 - 15n - 25$

3. Let x be any real number. Then the statement $x^3 > 0$ is true for

A. $x > 0$ only.

B. $x < 0$ only.

C. no values of x.

D. all real values of x.

Warm-up 3-5

Factor the following trinomials.

1. $p^2 - 2p - 15$

$(p+3)(p-5)$

$-15p^2$, $-5p$, $+3p$, $-2p$

$p^2+3p-5p-15$

$p^2-2p-15$ ✓

	p	3
p	p^2	$3p$
-5	$-5p$	-15

2. $n^2 + 5n - 24$

$(n-3)(n+8)$

$-24n^2$, $8n$, $-3n$, $+5n$

$n^2-3n+8n-24$

$n^2+5n-24$ ✓

	n	-3
n	n^2	$-3n$
8	$8n$	-24

3. Let x be any real number. Then the statement $x^3 > 0$ is true for

A. $x > 0$ only. ✓

~~B. $x < 0$ only.~~

~~C. no values of x.~~

~~D. all real values of x.~~

$(4)^3 = 64 > 0$ ✓

$(2)^3 = 8 > 0$ ✓

$(-5)^3 = -125 > 0$ no

4. $4n^2 - 15n - 25$

$-100n^2$, $-20n$, $5n$, $-15n$

	$4n$	5
n	$4n^2$	$5n$
-5	$-20n$	-25

$(4n+5)(n-5)$

$4n^2-20n+5n-25$

$4n^2-15n-25$ ✓

$7x^2+15x+2$

$7(2)$

14

$2=\frac{14}{7}$ $\quad$ $\frac{1}{7}$

15

$(x+2)(x+\frac{1}{7})$

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

$3x^2-19x+20$ $\qquad$ ax^2+bc+c

$3(20)$

60

$-5=\frac{-15}{3}$ $\quad$ $\frac{-4}{3}$

-19

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

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

60
30·2
3·20
15·4 ✓

$3x^2-19x+20$

60

$-5=\frac{-15}{3}$ $\quad$ $\frac{-4}{3}$

-19

60
X 6·10
X 3·20
X 12·5
-15(-4)

$(x-\frac{5}{1})(x-\frac{4}{3})$

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

	$2x$	-1
x	$2x^2$	$-x$
-2	$-4x$	2

$2x^2-x-4x+2$

$2x^2-5x+2$ $\qquad$ $a=2$ $\quad$ $b=-5$ $\quad$ $c=2$

4

$\frac{-1}{2}$ $\quad$ $\frac{-4}{2}=-2$

-5

4
2·2
-1(4)

$(2x-1)(x-2)$

Examples

$3n^2 - 8n + 4$

$5x^2 + 19x + 12$

$2m^2 + 5m + 2$

$7a^2 + 53a + 28$

$9k^2 + 66k + 21$

Examples

$3n^2 - 8n + 4$

$a=3$
$b=-8$
$c=4$

$-2 = \frac{-6}{3} \times \frac{-2}{3}$ (12, -8)

$(n-2)(n-\frac{2}{3})$

$(n-2)(3n-2)$

$5x^2 + 19x + 12$

$a=5$
$b=19$
$c=12$

$3 = \frac{15}{5} \times \frac{4}{5}$ (60, 19)

2,30
6,10
3,20
15,4

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

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

$2m^2 + 5m + 2$

$(2m+1)(m+2)$ $2 = \frac{4}{2} \times \frac{1}{2}$ (4, 5)

$(m+\frac{1}{2})(m+2)$

$7a^2 + 53a + 28$

$(a+7)(7a+4)$

196, $\frac{4}{7}$, $\frac{49}{7}=7$, 53

$(a+\frac{4}{7})(a+7)$

$9k^2 + 66k + 21$

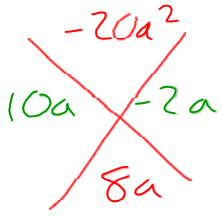
$(k+7)(9k+3)$

189, $\frac{3}{9}$, $\frac{63}{9}=7$, 66

$(3k+1)(k+7)$
$3k^2+k+21k+7$

$4a^2 + 8a - 5$

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

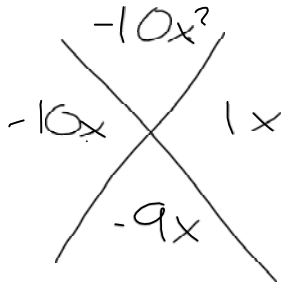


	$2a$	-1
$2a$	$4a^2$	$-2a$
5	$10a$	-5

20

$2(10)$

17. $10x^2 - 9x = 1$



10

$(-10)(1)$

	$10x$	1
$1x$	$10x^2$	$1x$
(-1)	$-10x$	-1

$(10x+1)(x-1)$

$10x^2 - 10x + x - 1$

$10x^2 - 9x - 1$ ✓

Today's Goal

I can identify and factor *special* polynomials

Section 9.5: Factoring Special Products

Perfect Square Trinomial

$a^2 + 2ab + b^2 = (a + b)(a + b)$ or $(a + b)^2$

	a	b
a	a^2	ab
b	ab	b^2

$a^2 + 2ab + b^2$

$a^2 - 2ab + b^2 = (a - b)(a - b)$ or $(a - b)^2$

	a	-b
a	a^2	$-ab$
-b	$-ab$	b^2

$a^2 - 2ab + b^2$

Examples

Determine whether each trinomial is a perfect square. If so, factor. If not, explain why not.

$x^2 + 4x + 4$

$(x)^2$ $(2)^2$

$2(x)(2)$

$4x$ ✓

$(x + 2)^2$

	x	2
x	x^2	$2x$
2	$2x$	4

$x^2 + 4x + 4$ ✓

$x^2 - 14x + 49$

$(x)^2$ $(7)^2$

$2(x)(7)$

$14x$ ✓

$(x - 7)^2$

$9x^2 - 6x + 4$

$(3x)^2$ $(2)^2$

$2(3x)(2)$

$12x$

Try These!!!

Determine whether each trinomial is a perfect square. If so, factor. If not, explain why not.

1. $9x^2 - 15x + 64$

2. $81x^2 + 90x + 25$

$(9x)^2$ $(5)^2$

$2(9x)(5)$

$90x$ ✓

$(9x + 5)^2$

$2025x^2$

$90x$

3. $4x^4 - 20x^2z + 25z^2$

$(2x^2)^2$ $(5z)^2$

$2(2x^2)(5z)$

$20x^2z$ ✓

$(2x^2 - 5z)^2$

Difference of Two Squares

$a^2 - b^2 = (a + b)(a - b)$

	a	b
a	a^2	$+ab$
$-b$	$-ab$	$-b^2$

$a^2 - b^2$

$x^2 - 81$

$(x)^2 - (9)^2$

$(x+9)(x-9)$

$x^2 - 9x + 9x - 81$

$x^2 - 81$ ✓

$m^2 - 16$

$(m)^2 - (4)^2$

$(m+4)(m-4)$

$m^2 - 4m + 4m - 16$

$m^2 - 16$ ✓

$f^4 + 25$

cannot be factored

$9p^4 - 16q^2$

$(3p^2)^2 - (4q)^2$

$(3p^2+4q)(3p^2-4q)$

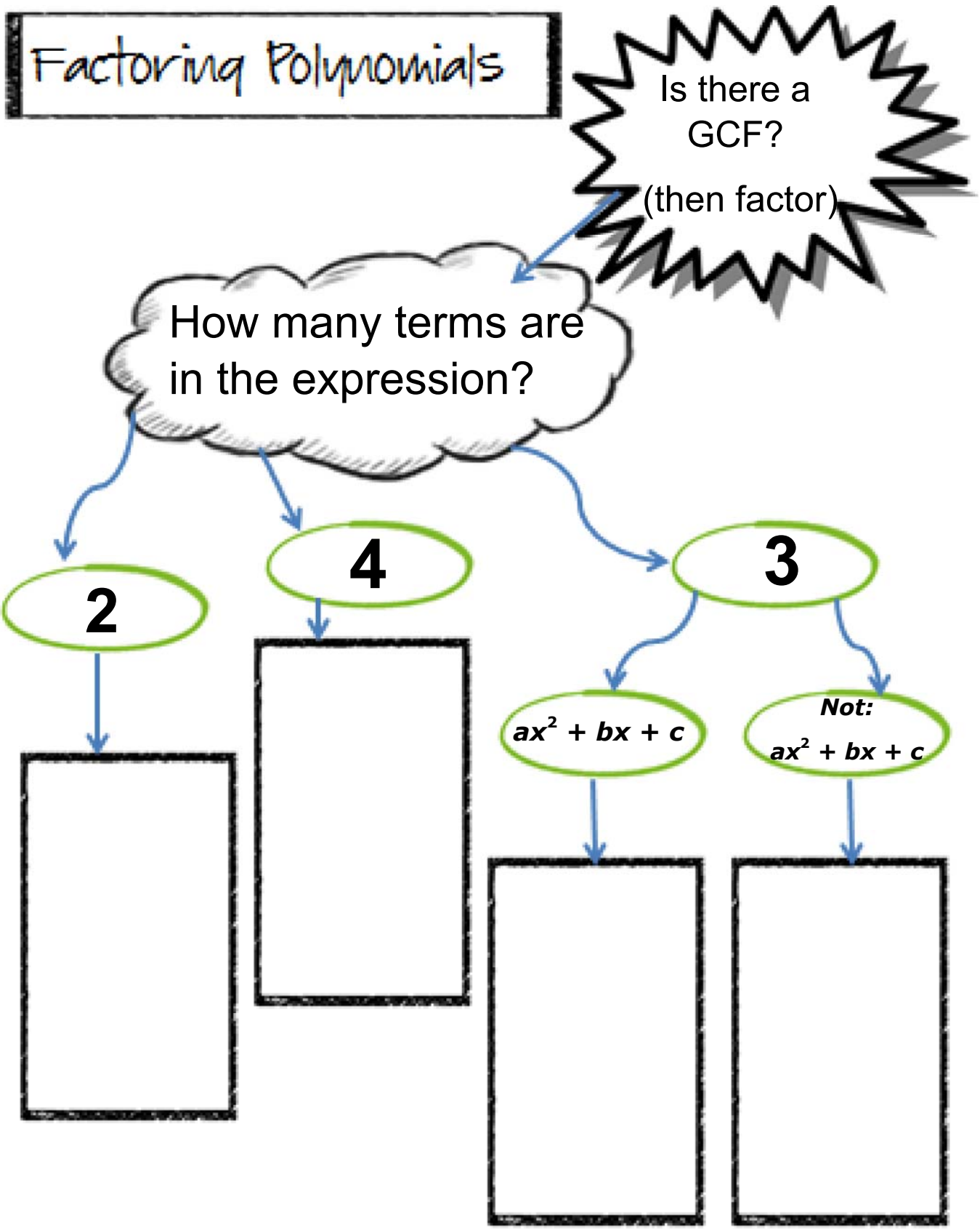
Examples

Determine whether the binomial is a difference of two squares. If so, factor. If not, explain.

$1 - 4x^2$

$p^8 - 49q^6$

$16x^2 + 4y^5$


Factoring Polynomials
Is there a GCF?
(then factor)
How many terms are in the expression?
2
4
3
$ax^2 + bx + c$
Not:
$ax^2 + bx + c$

Factoring Polynomials

Is there a GCF?

(then factor)

How many terms are in the expression?

2

Difference of squares.

$a^2 - b^2 =$

$(a+b)(a-b)$

4

Grouping

First 2 and last 2.

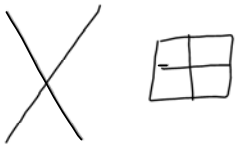
Factor out GCF.

Check binomial for the same #'s

3

$ax^2 + bx + c$

"x-box"



*If large #'s, use perfect square.

Not:

$ax^2 + bx + c$

Perfect Square

$a^2 \pm 2ab + b^2$

$(a \pm b)^2$

X #11 $2x - 2xy^2$

$-(2)(x)(x)yy$

$2x(1-y^2)$

$1 - y^2$

$(1)^2 - (y)^2$

$(1+y)(1-y)$

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

XI

#13 $16d^8 - 8d^4 + 1$

$(4d^4)^2$ $(1)^2$

$2(4d^4)(1)$

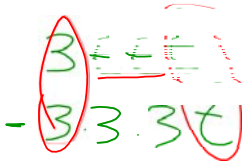
$8d^4$ ✓

$(4d^4 - 1)^2$

X

#12

$3t^3 - 27t$



$3t(t^2-9)$

$t^2 - 9$

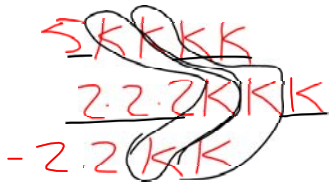
$(t)^2 - (3)^2$

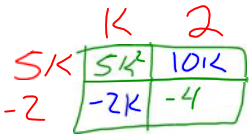
$(t+3)(t-3)$

$3t(t+3)(t-3)$

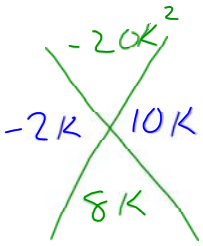
XI

#5 $5k^4 + 8k^3 - 4k^2$





$k^2(5k^2+8k-4)$



$k^2(5k-2)(k+2)$

Groups with 4 or less wrong on the quiz should be working on the problems below.

X-7, 8, 15, 16

XI-1, 2, 3, 6

XII-1, 2, 3

Homework

Worksheet

X-7, 8, 15, 16

XI-1, 2, 3, 6

XII-1, 2, 3