Warm-up 3-7

Factor each trinomial.

1. $5x^2 - 18x - 8$

2. Factor the perfect-square trinomial $16x^4 + 40x^2y + 25y^2$

3. Factor $9x^2 - 25y^2$ using the difference of two squares

Warm-up 3-7

Factor each trinomial.

-40
$-20(2)$

1. $5x^2 - 18x - 8$

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

$-40x^2$

$-20x \times 2x$

$-18x$

$\times$	$5x$	2
$\times$	$5x^2$	$2x$
-4	$-20x$	-8

2. Factor the perfect-square trinomial $16x^4 \oplus 40x^2y + 25y^2$

$(4x^2 + 5y)^2$

$(4x^2)^2 \quad 2(4x^2)(5y) \quad (5y)^2$

$40x^2y \checkmark$

$$a^2 \pm 2ab + b^2 = (a \pm b)^2$$

3. Factor $9x^2 - 25$ using the difference of two squares

$(3)^2 - (5)^2$

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

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

X. **Factoring: Putting It All Together**

$$5x^2 + 20x - 60 = 5(x^2 + 4x - 12) = 5(x + 6)(x - 2)$$

Factor Completely, write prime if prime.

1. $2x^2 - 8$
2. $2x^2 + 8x + 6$
3. $3n^2 + 9n - 30$
4. $6x^2 - 26x - 20$
5. $2x^2 + 12x - 80$
6. $5t^2 + 15t + 10$
7. $8n^2 - 18$
8. $14x^2 + 7x - 21$

9. $4x^2 + 16x + 16$
10. $18x + 12x^2 + 2x^3$
11. $2x - 2xy^2$
12. $3t^3 - 27t$
13. $24a^2 - 30a + 9$
14. $10x^2 + 15x - 10$
15. $3x^2 - 42x + 147$
16. $4x^4 - 4x^2$

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

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

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

XI.   ...More Factoring: Putting It All Together

1. $16x^2 - 40x - 24$
2. $27x^2 - 36x + 12$
3. $5x^2 - 60x - 140$
4. $6m^3 + 54m^2 - 6m$
5. $5k^4 + 8k^3 - 4k^2$
6. $x^2y^4 - x^6$
7. $y^4 - 6y^2 - 16$

8. $x^4 - 3x^2 - 4$
9. $h^2 - (a^2 - 6a + 9)$
10. $81x^4 - 16y^4$
11. $4mn^2 - 4m^2n^2 + m^3n^2$
12. $(2a + 3)^2 - (a - 1)^2$
13. $16d^8 - 8d^4 + 1$
14. $x^2(x^2 - 4) + 4x(x^2 - 4) + 4(x^2 - 4)$

$$x^2y^4 - x^6$$

$$x^2(y^4 - x^4)$$

$$(y^2)^2 - (x^2)^2$$

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

$$(x)^2 - (y)^2$$

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

XII.   Extra: Factoring by Grouping

$$6ax - 2b - 3a + 4bx = 6ax - 3a + 4bx - 2b$$
$$= 3a(2x - 1) + 2b(2x - 1)$$
$$= (2x - 1)(3a + 2b)$$

1. $x^2 + 2x + xy + 2y$
2. $3a^2 - 2b - 6a + ab$
3. $t^3 - t^2 + t - 1$ Hint: $t - 1 = 1(t - 1)$
4. $10 + 2t - 5s - st$
5. $\frac{2}{3}bc - \frac{14}{3}b + c - 7$
6. $4u^2 + v + 2uv + 2u$
7. $ad + 3a - d^2 - 3d$

8. $n^2 + 2n + 3mn + 6m$
9. $2ax^2 + bx^2 - 2ay^2 - by^2$
10. $yz^2 - y^3 + z^3 - y^2z$
11. $y^3 - y^2 - 4y + 4$
12. $x^2a + x^2b - 16a - 16b$
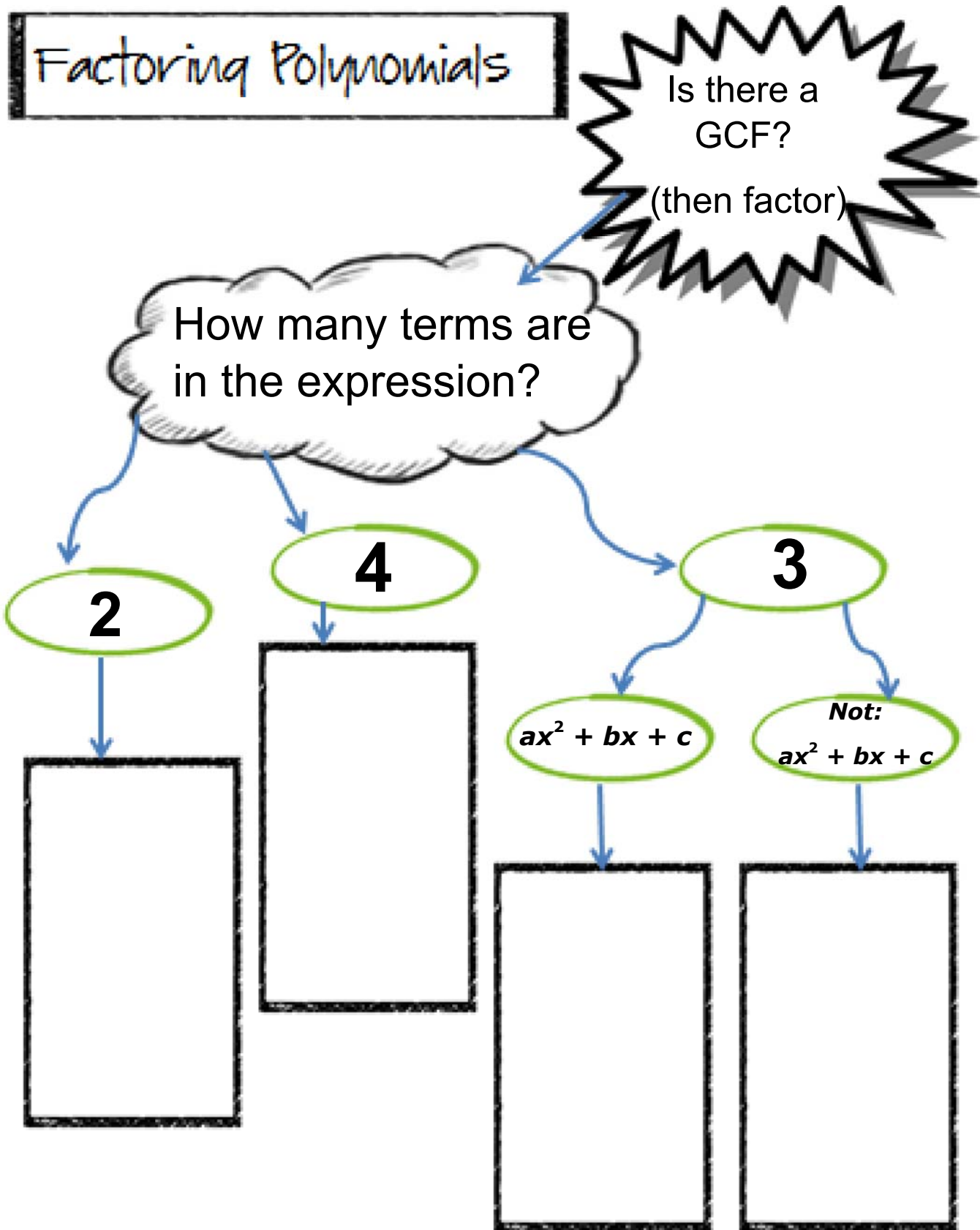13. $x^3 + x^2 - x - 1$
14. $a^3 - a^2 - 8a + 8$

$(t^3 - t^2) + (t - 1)$

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

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

$(3a^2 - 2b) + (6a + ab)$

$(3a^2 - 6a) + (-2b + ab)$

$3a(a - 2) + b(-2 + a)$

$a - 2$

$(a - 2)(3a + b)$

Today's Goals

I can...
- choose an appropriate method for factoring a polynomial.
- combine methods for factoring a polynomial.

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

4

3

Grouping

First 2 and last 2.

Factor out GCF.

Check binomial for the same #'s

*Can rearrange #'s as needed

$ax^2 + bx + c$

Not:
$ax^2 + bx + c$

Difference of squares.
$a^2 - b^2 =$
$(a+b)(a-b)$

"Bottom-up"

$a \cdot c$

a $\quad$ a

b

*If large #'s, use perfect square.

Perfect Square
$a^2 \pm 2ab + b^2$
$(a \pm b)^2$
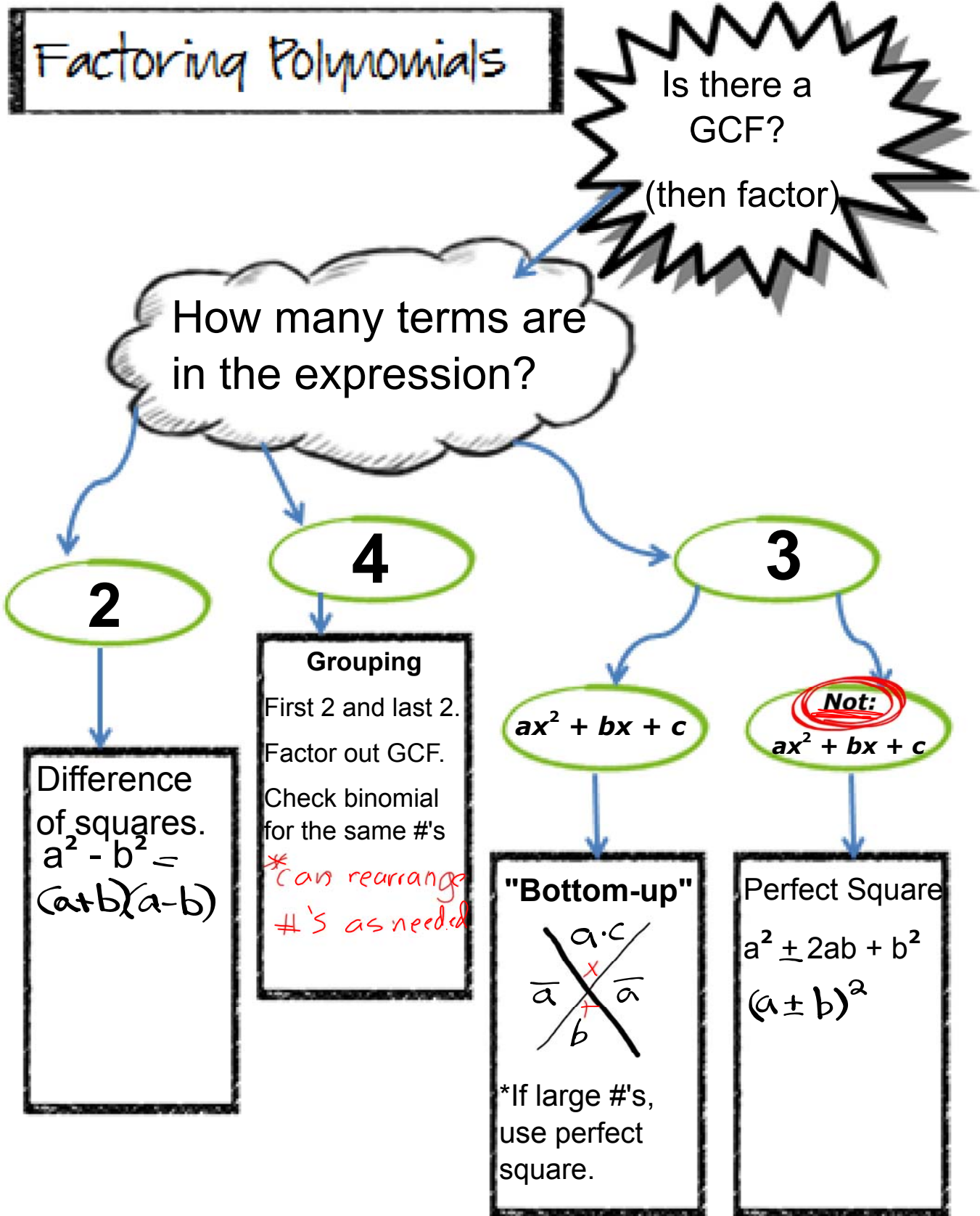
$$(2x^3 - 6x^2) + (3x - 9)$$

$$2 \cdot x \cdot x \cdot x \qquad 3 \cdot x$$
$$-2 \cdot 3 \cdot x \cdot x \qquad -3 \cdot 3$$

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

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

$$(8x^3 - 6x^2)(-4x + 3)$$

$$2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \qquad -2 \cdot 2 \cdot x$$
$$-2 \cdot 3 \cdot x \cdot x \qquad\qquad 3$$

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

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

$$x^2 + 15x + 50$$

$50x^2$

$5x \quad 10x$

$15x$

$$(x+10)(x+5)$$

	x	10
x	x^2	$10x$
5	$5x$	50

50

$5(10)$

$2(25)$

$1(50)$

$$2x^2 - x - 6$$

$-12x^2$

$3x \quad -4x$

$-x$

	x	-2
$2x$	$2x^2$	$-4x$
3	$3x$	-6

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

-12

$1(12)$

$3(4)$

$2(6)$

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

$$x^2 - 25$$

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

$$(x+5)(x-5)$$

	x	5
x	x^2	$\cancel{5x}$
-5	$\cancel{-5x}$	-25

$$x^2 - 25$$

$$9x^2 - 16$$

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

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

$$8x^2 - 18$$

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

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

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

$$\begin{array}{l} 2 \cdot 2 \cdot 2 \cdot x \cdot x \\ -2 \cdot 3 \cdot 3 \end{array}$$

$$a^2 \pm 2ab + b^2 = (a \pm b)^2$$

$$x^2 \oplus 10x + 25$$

$$(x)^2 \quad 2(x)(5) \quad (5)^2$$

$$10x \checkmark$$

$$\left(x + 5 \right)^2$$

	x	5
x	x^2	$5x$
5	$5x$	25

$$x^2 + 10x + 25 \checkmark$$

$$49x^4 \ominus 56x^2 + 16$$

$$(7x^2)^2 \quad 2(\;\;\;\;\;) \quad (4)^2$$

$$56x^2 \checkmark$$

$$\left(7x^2 - 4 \right)^2$$

Scavenger Hunt!

GET ORGANIZED
Copy the graphic organizer. Draw an arrow from each expression to the method you would use to factor it.

Factoring Methods	
Polynomial	**Method**
1. $16x^4 - 25y^8$	**A.** Factoring out the GCF
2. $x^2 + 10x + 25$	**B.** Factoring by grouping
3. $9t^2 + 27t + 18t^4$	**C.** Unfactorable
4. $a^2 + 3a - 7a - 21$	**D.** Difference of two squares
5. $100b^2 + 81$	**E.** Perfect-square trinomial

GET ORGANIZED
Copy the graphic organizer. Draw an arrow from each expression to the method you would use to factor it.

Factoring Methods	
Polynomial	**Method**
1.	
2.	
3.	
4.	
5.	

Homework

8 problems or #12, 13, 15, 18