Station 1: Factoring special products

Find the GCF of each term, and write the polynomial as a product of the GCF and the remainder.

Examples:

$10x^2 + 15x^3$ GCF = $5x^2$

$= 5x^2(2) + 5x^2(3x)$ factor out the GCF

$= 5x^2(2 + 3x)$

$-4x^5y^2 + 10x^4y - 6x^2y^2$ GCF = $2x^2y$

$= 2x^2y(-2x^3y) + 2x^2y(5x^2) + 2x^2y(-3y)$ factor out the GCF

$= 2x^2y(-2x^3y + 5x^2 - 3y)$

Student problems: Factor the following.

Maroon	White
1. $10y^2 + 12y^3$	1. $12t^5 + 15t^2$
2. $5x^4y - 8x^2y^2$	2. $9x^5y^3 - 10x^4y$
3. $6x^4 + 15x^3 - 9x^2$	3. $8x^5 - 6x^4 + 14x^2$
4. $11x^4y^2 - 7x^3y + 4xy^3$	4. $8x^5y + 18xy^4 - 9x^2y^2$

Station 2: Factoring by grouping

Write in standard form. Group pairs of terms, factor out the GCF of each group to get a common factor, then combine.

Examples:

$2x^3 + +5 + 2x + 5x^2$

$= 2x^3 + 5x^2 + 2x + 5$ (put in standard form)

$= (2x^3 + 5x^2) + (2x + 5)$ (group terms)

$= \big(x^2(2x) + x^2(5)\big) + \big(1(2x) + 1(5)\big)$ (factor out the GCF of each group)

$= \big(x^2(2x + 5)\big) + \big(1(2x + 5)\big)$

$= (x^2 + 1)(2x + 5)$

$4m^3 - 12m^2 + 15 - 5m$

$= 4m^3 - 12m^2 - 5m + 15$ (put in standard form)

$= (4m^3 - 12m^2) - (5m + 15)$ (group terms)

$= \big(4m^2(m) + 4m^2(-3)\big) + \big(5(-m) + 5(3)\big)$ (factor out the GCF of each group)

$= \big(4m^2(m - 3)\big) + \big(5(-m + 3)\big)$

$= (4m^2(m - 3)) - \big(5(m - 3)\big)$ (factor out -1 to get $(m - 3)$ in common)

$= (4m^2 - 5)(m - 3)$

Student problems: Factor the following.

Maroon	White
1. $2y^3 + 6y^2 + y + 3$	1. $3n^4 + 2n^3 - 15n - 10$
2. $12a^2 + 30a - 14a - 35$	2. $15x^2 + 12x - 5x - 4$
3. $3b^4 - 24b^3 + b - 8$	3. $3x^3 - 12x^2 + 20 - 5x$
4. $6x^3 + 3x^2y + 10xy + 5y^2$	4. $4x^2 + 3x - 8xy^2 - 6y^2$

Station 3: Solving by factoring

Find which special product the polynomial matches, and use the rule to factor.

Examples:

$x^2 = 16$

$x^2 - 16 = 0$	(move everything to one side)
$(x + 4)(x - 4) = 0$	(factor the polynomial)
$(x + 4) = 0$ or $(x - 4) = 0$	(since the product is 0)
$x = -4$ or $x = 4$	(solve both equations)

$4x^2 + 4x = -1$

$4x^2 + 4x + 1 = 0$	(move everything to one side)
$(2x + 1)(2x + 1) = 0$	(factor the polynomial
$(2x + 1) = 0$ or $(2x + 1) = 0$	(since the product is 0)
$2x = -1$ or $2x = -1$	(solve both equations)
$x = -\frac{1}{2}$ or $x = -\frac{1}{2}$	
$x = -\frac{1}{2}$	(since both equations have the same answer)

Student problems: Solve by factoring.

Maroon	White
1. $x^2 = 25$	1. $x^2 = 4$
2. $x^2 - 6x + 9 = 0$	2. $x^2 - 10x + 25 = 0$
3. $4x^2 - x = 3$	3. $5x^2 + 13x = 6$
4. $4x^2 + 14x + 12 = 0$	4. $6x^2 + 9x + 3 = 0$

Station 4: Factoring $x^2 + bx + c$

The coefficient of x^2 is 1, so after finding a table of factors there is no need to factor by grouping.

Guess and check, or use a table of factors of c.

Examples:

$x^2 - 6x + 8$

Product	Factors	Sum	
$8 =$	-1×-8	$-1x + -8x =$	$-9x$
$8 =$	-2×-4	$-2x + -4x =$	$-8x$

$x^2 + 6x + 8 = (x - 2)(x - 4)$.

$x^2 + 3x - 4$

Product	Factors	Sum	
$-4 =$	-1×4	$-1x + 4x =$	$3x$
$-4 =$	-2×2	$-2x + 2x =$	$0x$

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

Student problems: Factor the following.

Maroon	White
1. $x^2 + 10x + 24$	1. $x^2 + 12y + 20$
2. $y^2 - 16y + 28$	2. $a^2 - 20a + 36$
3. $z^2 - 2z - 63$	3. $g^2 - 2g - 48$
4. $b^2 + 11b - 42$	4. $z^2 + 3z - 28$

Station 5: Factoring $ax^2 + bx + c$ (part 1)

The coefficient of x^2 is not 1, so after finding a table of factors of ac, factor by grouping.

Examples:

$3x^2 + x - 4$

$3(-4) = -12$

Product	Factors	Sum	
$-12 =$	-1×12	$-1x + 12x =$	$11x$
$-12 =$	1×-12	$1x - 12x =$	$-11x$
$-12 =$	-2×6	$-2x + 6x =$	$4x$
$-12 =$	2×-6	$2x - 6x =$	$-4x$
$-12 =$	-3×4	$-3x + 4x =$	x
$-12 =$	3×-4	$3x - 4x =$	$-x$

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

Student problems: Factor the following.

Maroon	White
1. $5x^2 + 17x + 6$	1. $3x^2 + 17x + 20$
2. $5x^2 + 7x - 6$	2. $2x^2 - 11x - 13$
3. $5x^2 - 22x + 8$	3. $5x^2 - 48x + 27$

Station 6: Factoring $ax^2 + bx + c$ (part 2)

The coefficient of x^2 is not 1, so after finding a table of factors of ac, factor by grouping.

Examples:

$9x^2 - 3x - 2$

$9(-2) = -18$

Product	Factors	Sum	
$-18 =$	-1×18	$-1x + 18x =$	$17x$
$-18 =$	1×-18	$1x - 18x =$	$-17x$
$-18 =$	-2×9	$-2x + 9x =$	$7x$
$-18 =$	2×-9	$2x - 9x =$	$-7x$
$-18 =$	-3×6	$-3x + 6x =$	$3x$
$-18 =$	3×-6	$3x - 6x =$	$-3x$

$$9x^2 - 3x - 2 = 9x^2 + 3x - 6x - 2$$
$$= 3x(3x + 1) - 2(3x + 1)$$
$$= (3x - 2)(3x + 1)$$

Student problems: Factor the following.

Maroon	White
1. $4x^2 + 24x + 27$	1. $4x^2 + 11x + 7$
2. $8x^2 + 29x - 12$	2. $6x^2 + x - 40$
3. $8x^2 - 73x + 9$	3. $6x^2 - 23x + 20$

Name _____ **Required:** 3 problems each station. 4 problems for bonus points Maroon / White

Station 1	**Station 2**	**Station 3**

2 problems required for stations 5 and 6, or 3 problems for bonus

Station 4	Station 5	Station 6