

## Factoring w/ Simplifying

$$1. \quad 2(x+1)^2 + 3(x+1) - 27$$

$$2u^2 + 3u - 27$$

$$(2u^2 + 9u) - 6u - 27$$

$$u(2u+9) - 3(2u+9)$$

$$(u-3)(2u+9)$$

$$(x+1-3)(2(x+1)+9)$$

$$(x-2)(2x+11)$$

SUBSTITUTE  $u = x+1$

FACTOR

GROUP

SUB  $x+1$  BACK IN!

SIMPLIFY

$$2. \quad 5(x-3)^2 + 19(x-3) + 12$$

$$5u^2 + 19u + 12$$

$$(5u^2 + 4u) + 15u + 12$$

$$u(5u+4) + 3(5u+4)$$

$$(u+3)(5u+4)$$

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

$$x(5x-11)$$

SUB  $u = x-3$

FACTOR

GROUP

SUB  $x-3$  BACK IN!

SIMPLIFY

$$3. \quad 5(2x-1)^2 - 14(2x-1) + 8$$

$$5u^2 - 14u + 8$$

$$(5u^2 - 10u) - 4u + 8$$

$$5u(u-2) - 4(u-2)$$

$$(5u-4)(u-2)$$

$$(5(2x-1)-4)((2x-1)-2)$$

$$(10x-9)(2x-3)$$

SUB  $u = 2x-1$

FACTOR

GROUP

SUB  $2x-1$  IN!

SIMPLIFY

$$4. \quad x^{-2}(x+3) + x^{-1}(x-5)$$

$$x^{-2} \left[ (x+3) + x(x-5) \right]$$

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

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

FACTOR OUT GCF

REMEMBER IT IS SMALLEST  
EXPONENT

Simplify [ ]

NEG EXPONENT  $x^{-N} = \frac{1}{x^N}$

$$5. \quad \underline{(x-2)^3} (2x+1) + (4x-3) \underline{(x-2)^2}$$

$$(x-2)^2 \left[ (x-2)(2x+1) + (4x-3) \right]$$

$$(x-2)^2 \left[ 2x^2 + x - 4x - 2 + 4x - 3 \right]$$

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

FACTOR OUT GCF

Simplify [ ]

Combine like terms

$$6. \quad 8x^3(x-5)^4 + 32x^2(x-5)^5$$

$$8x^2(x-5)^4 \left[ x + 4(x-5) \right]$$

$$8x^2(x-5)^4 \left[ x + 4x - 20 \right]$$

$$8x^2(x-5)^4 (5x-20)$$

FACTOR GCF

Simplify [ ]

Combine like terms