

FACTORING *Key*

1st step in factoring is finding the greatest common factor(GCF).

Ex 1) Factor $\frac{4s^2}{2s} + \frac{14s}{2s}$

~~1/2~~ $2s(2s+7)$

Check: $2s(2s+7)$
 $4s^2 + 14s$

Ex 2) Factor $\frac{5}{5} + \frac{15m^2}{5} - \frac{10m^3}{5}$ GCF = 5

$5(1 + 3m^2 - 2m^3)$

Ex 3) $\frac{-a^2}{-a^2} - \frac{a^3}{-a^2}$ GCF = $-a^2$

$-a^2(1+a)$

Ex 4) $\frac{4s^2t^2}{4st^2} + \frac{12s^2t^3}{4st^2} + \frac{36st^2}{4st^2}$ GCF = $4st^2$

$4st^2(s + 3st + 9)$

Then check to see if it is a difference of square, perfect square trinomial or a trinomial with a leading coefficient of 1.

Ex 4) $z^2 - 12z + 35$ GCF = 1
Sum factors
 $z^2 - 5z - 7z + 35$ Group first 2 terms

$(z^2 - 5z) + (-7z + 35)$

$z(z-5) - 7(z-5)$

$(z-5)(z-7)$

Factors of 35	Sum of factors -12
$1 \times 35 = 35$	$1 + 35 = 36$
$5 \times 7 = 35$	$5 + 7 = 12$
$-5 \times -7 = 35$	$-5 + -7 = -12$

Ex 5) $\frac{-4t^2}{-4} - \frac{16t}{-4} + \frac{128}{-4}$ GCF = -4

$-4(t^2 + 4t - 32)$

$-4(t^2 + 8t - 4t - 32)$

$-4[(t^2 + 8t) - 4(t - 32)]$

$-4[t(t+8) - 4(t-8)]$

$-4(t+8)(t-4)$

Factors of -32	Sum of factors
$-8 \times 4 = -32$	$-8 + 4 = -4$
$8 \times -4 = -32$	$8 + -4 = 4$

FACTORING

Ex 6) $4h^2 + 20h + 9$ ^{NO GCF.} Perfect Square trinomial?

$2h \cdot 2h$ $3 \cdot 3$

$(2h + 3)(2h + 3)$ NO! Doesn't give us $20h$.

Check: $(2h+3)(2h+3)$
 $2h(2h+3) + 3(2h+3)$
 $4h^2 + 6h + 6h + 9 \rightarrow 4h^2 + 12h + 9$ doesn't work

Ex 7) $4 - 20x + 25x^2$ ^{NO GCF} Perfect Square Trinomial

$2 \cdot 2$ $5x \cdot 5x$

$(2 - 5x)(2 - 5x)$ ✓

Check: $2(2-5x) - 5x(2-5x)$
 $4 - 10x - 10x + 25x^2$
 $4 - 20x + 25x^2$ ✓

Ex 8) $25 - 36x^2$ → Binomial

$5 \cdot 5$ $6x \cdot 6x$

$(5 - 6x)(5 + 6x)$

Check: $5(5+6x) - 6x(5+6x)$
 $25 + 30x - 30x - 36x^2$
 $25 - 36x^2$ ✓

Ex 9) $5x^4 - 80y^4$ GCF = 5

$5(x^4 - 16y^4)$
 $x^2 \cdot x^2$ $4y \cdot 4y$ Difference of Squares = Binomial

$5(x^2 + 4y^2)(x^2 - 4y^2)$
 Difference of Squares.

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