M10 - 5.0 - Poly Notes

Factoring: $ax^2/bx + c$

$12x + 8$
$4(3x + 2)$
$GCF = 4$ ✓

In Your head!
$4(3x + 2)$
$12x + 8$
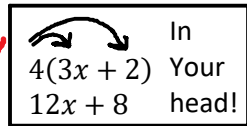
$12x^2 + 8x$
$4x(3x + 2)$
$GCF = 4x$

$-2x + 8$
$-2(x - 4)$
$GCF = -2$

$x^2 + x^3 =$
$x^2(1 + x)$
$GCF = x^2$

$8x^2y + 4xy =$
$4xy(2x + 1)$
$GCF = 4xy$

$(2 - x) =$
$-1(-2 + x) =$
$-(x - 2)$
$GCF = -1$

$2x - \dfrac{1}{2}$
$2\left(x - \dfrac{1}{4}\right)$
$GCF = 2$

$\left(\dfrac{1}{2}x + 4\right)$
$\dfrac{1}{2}(x + 8)$
$GCF = \dfrac{1}{2}$

$$\frac{1}{2} \div \frac{2}{1} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$x(x + 2) + 4(x + 2) =$
$(x + 2)(x + 4)$
$GCF = (x + 2)$

$2x^2 + 3x + 4x + 6$
$(2x^2 + 3x) | (+4x + 6)$ Group
$x(2x + 3) + 2(2x + 3)$ GCFx3
$(2x + 3)(x + 2)$

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

⋯ | Rearrange Order of Terms

Factoring: $ax^2 + bx + c$

$x^2 + 5x + 6$
$(x + 2)(x + 3)$ ✓ | $a = 1$ |

$\underline{}2\underline{} \times \underline{}3\underline{} = c \; 6$
$\underline{}2\underline{} + \underline{}3\underline{} = b \; 5$

| 1,6 |
| 2,3 |

List them!

| $(x + 2)(x + 3)$ |
| $x^2 + 5x + 6$ |

$x^2 - 3x - 10$
$(x - 5)(x + 2)$

$x^4 + 5x^2 + 6$
$(x^2 + 3)(x^2 + 2)$

$-x^2 - 5x - 6$
$-(x^2 + 5x + 6)$
$-(x + 2)(x + 3)$

$2x^2 + 10x + 12$
$2(x^2 + 5x + 6)$
$2(x + 2)(x + 3)$

$x^3 + 5x^2 + 6x$
$x(x^2 + 5x + 6)$
$x(x + 2)(x + 3)$

$x^2 + 5xy + 6y^2$
$(x + 2y)(x + 3y)$

| $x^2 + 5x + 8$ Cannot Factor |

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

$2x^2 + 7x + 6$ | $a \neq 1$ |

$\underline{}3\underline{} \times \underline{}4\underline{} = ac \; 12$
$\underline{}3\underline{} + \underline{}4\underline{} = b \; 7$ ✓

$2x^2 + 3x + 4x + 6$
$(2x^2 + 3x) | (+4x + 6)$
$x(2x + 3) + 2(2x + 3)$
$(x + 2)(2x + 3)$

Decompose
Group
GCF
GCF

Quick Method
$2x^2 + 7x + 6$
$(x +)(2x)$
$(x + 2)(2x + 3)$

$2x^2 + 3x - 2$

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

Perfect Squares

$4x^2 - 20x + 25$
$(2x - 5)(2x - 5)$
$(2x - 5)^2$

| $\pm\sqrt{4} \times \sqrt{25} \times 2 = \pm 20$ |

Factoring: $a^2 - b^2$ *Differences of Squares*

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

$4x^2 - 9y^2$
$(2x + 3y)(2x - 3y)$

$4x^2 - 36$
$4(x^2 - 9)$
$4(x + 3)(x - 3)$

$-x^2 + 49$
$49 - x^2$
$(7 + x)(7 - x)$

$(1 - x^{10})$
$(1 - x^5)(1 + x^5)$

$x^4 - 5x^2 - 36$
$(x^2 - 9)(x^2 + 4)$
$(x - 3)(x + 3)(x^2 + 4)$

| $x^2 + 4$ Cannot Factor |

| $x^2 - 5$ | $x - 5$ |
| $(x + \sqrt{5})(x - \sqrt{5})$ | $(\sqrt{x} + \sqrt{5})(\sqrt{x} - \sqrt{5})$ |

Substitution

$(m + 1)^2 + 5(m + 1) + 6$
$x^2 + 5x + 6$ | Let $x = m + 1$ |
$(x + 2)(x + 3)$
$((m + 1) + 2)((m + 1) + 3)$
$(m + 3)(m + 4)$

$x^2 - 6x + 9 - y^2$
$(x^2 - 6x + 9) - y^2$
$(x - 3)^2 - y^2$
⋯
$(x - 3 + y)(x - 3 - y)$

$9(x + 2)^2 - 16(x - 1)^2$
$9a^2 - 16b^2$
$(3a + 4b)(3a - 4b)$

| Let $a = x + 2$ |
| Let $b = x - 1$ |

$(3(x + 2) + 4(x - 1))(3(x + 2) - 4(x - 1))$
$(3x + 6 + 4x - 4)(3x + 6 - 4x + 4)$
$(7x + 2)(-x + 10)$
$-(7x + 2)(x - 10)$

$x^4 - 81$
$(x^2 - 9)(x^2 + 9)$
$(x + 3)(x - 3)(x^2 + 9)$

$4x^2 - (x + 2)^2$
$(2x)^2 - (x + 2)^2$
$a^2 - b^2$
$(a + b)(a - b)$
$(2x + (x + 2))(2x - (x + 2))$
$(3x + 2)(x - 2)$

| let $a = 2x$ |
| let $b = (x + 2)$ |

M10 - 5.0 - Polys Notes

Find possible dimensions and Area if $x = -1\ m$.

$$A = x^3 + 2x^2 + x + 2 \qquad w = x + 2$$
$$l = x^2 + 1$$

$A = (x^3 + 2x^2)|(+x + 2)$
$A = x^2(x + 2) + 1(x + 2)$
$A = (x^2 + 1)(x + 2) \qquad \boxed{A = lw}$

$A = ((-1)^2 + 1)((-1) + 2)$
$\boxed{A = 2\ m^2}$

Find possible dimensions.

$$A = 4x^2 - (x + 2)^2 \qquad w = x - 2$$
$$l = 3x + 2$$

$A = (2x)^2 - (x + 2)^2$
$A = a^2 - b^2$ $\boxed{\text{let } a = 2x}$
$A = (a + b)(a - b)$ $\boxed{\text{let } b = (x + 2)}$
$A = (2x + (x + 2))(2x - (x + 2))$
$A = (3x + 2)(x - 2)$

Find possible dimensions.

$$A = (m + 1)^2 + 5(m + 1) + 6 \qquad l = m + 3$$
$$w = m + 4$$

$A = x^2 + 5x + 6$ $\boxed{\text{Let } x = m + 1}$
$A = (x + 2)(x + 3)$
$A = ((m + 1) + 2)((m + 1) + 3)$
$A = (m + 3)(m + 4)$

Find "k" so factorable.

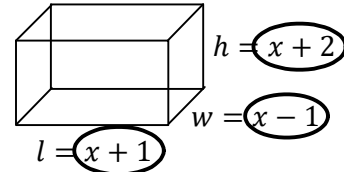$x^2 + kx + 6$ ____ X ____ = 6   1,6 $1 + 6 = 7$ $k = 7$
                ____ + ____ = k   2,3 $2 + 3 = 5$ $k = 5$
                              $-1, -6$ $-1 + -6 = -7$ $k = -7$
$x^2 + 7x + 6$ $\boxed{\text{Test}}$ $-2, -3$ $-2 + -3 = -5$ $k = -5$
$(x + 1)(x + 6)$

Find possible dimensions and Volume if $x = 3m$.

$$V = x^3 + 2x^2 - x - 2$$

$h = x + 2$
$w = x - 1$
$l = x + 1$

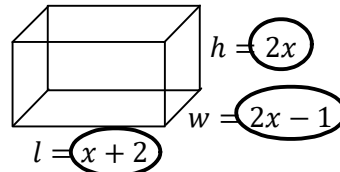$V = (x^3 + 2x^2)|(-x - 2)$
$V = x^2(x + 2) - 1(x + 2)$
$V = (x^2 - 1)(x + 2)$
$V = (x + 1)(x - 1)(x + 2) \qquad \boxed{V = lwh}$

$V = (3 + 1)(3 - 1)(3 + 2)$
$V = 40\ m^3$

Find possible dimensions.

$$V = 4x^3 + 6x^2 - 4x$$

$h = 2x$
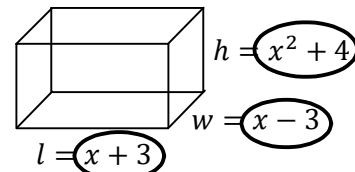$w = 2x - 1$
$l = x + 2$

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

Find possible dimensions.

$$V = x^4 - 5x^2 - 36$$

$h = x^2 + 4$
$w = x - 3$
$l = x + 3$

$V = (x^2 - 9)(x^2 + 4)$
$V = (x + 3)(x - 3)(x^2 + 4)$