Algebra 1 Notes

P37 7-8 Factoring Polynomials Completely
\[ ax^2 + bx + c \]

Find two numbers that Add to \(b\) and Multiply to \(ac\)

\[ \frac{ac}{b} = \frac{34}{19} = 2, 17 \]

\[ 2x^2 + 19x + 17 \]

2/2 and 2/17 ???

1/1 and 2/17

Factor \( (x+1)(2x+17) \)
\[ ax^2 + bx + c \]

Find two numbers that Add to \( b \) and Multiply to \( ac \)

\[ a \cdot c = 60 \]
\[ b = -17 \]

3/\(-5\) and 3/\(-12\) ???

3/\(-5\) and 1/\(-4\)

Factor \( 3x^2 + 17x + 20 \)

\( (3x + 5)(x + 4) \)
Factor by Grouping

Group the first 2 parts and the second 2 parts.

\[
\begin{align*}
\text{GCF} & \quad \text{GCF} \\
5x^4 + 20x^3 + 6x + 24 & \quad 2x^3 + x^2 - 14x = 7 \\
5x^3(x + 4) + 6(x + 4) & \quad x^2(2x + 1) - 7(2x + 1) \\
(x + 4)(5x^3 + 6) & \quad (2x + 1)(x^2 + 7) \\
& \quad -1
\end{align*}
\]
Factor Completely

\[ 45x^4 - 9x^3 + 30x^2 - 6x \]

\[
3x \left( \frac{15x^3 - 3x^2 + 10x - 2}{3x^2(5x+1) + 2(5x+1)} \right)
\]

\[
3x(5x+1)(3x^2 + 2)
\]
Factor Completely

\[8x^4 + 12x^3 + 16x^2 + 24x\]

\[4x\left(\frac{2x^3 + 3x^2 + 4x + 6}{x^2(2x+3) + 2(2x+3)}\right)\]

\[4x(2x+3)(x^2 + 2)\]
Solving...

Solve the equation.

1. \( w^3 - 8w^2 + 16w = 0 \)
   \[ w(w^2 - 8w + 16) \]
   \[ w(w - 4)^2 \]
   \[ 0, 4 \]

2. \( x^3 - 25x = 0 \)
   \[ x(x^2 - 25) \]
   \[ x(x + 5)(x - 5) \]
   \[ 0, -5, 5 \]
Solve the equation.

3. \( c^3 - 7c^2 + 12c = 0 \)

\[
\begin{align*}
& \frac{ac = 12}{b = -7} \quad \frac{c^2 + (-7)c + 12}{-3, -4} \\
& \frac{c}{?3, ?4} \\
& (c - 3)(c - 4) \\
& 0, 3, 4
\end{align*}
\]

4. \( 2x^3 + 8x^2 = 10x \)

\[
\begin{align*}
& \frac{-10x}{2x^3 + 8x^2 + (-10)x = 0} \\
& 2x(x^2 + 4x + 5) = 0 \\
& \frac{ac = -5}{b = 4} \quad \frac{-1, 5}{?1, ?5} \\
& 2x(x - 1)(x - 5) \\
& 0, 1, -5
\end{align*}
\]
HW #44
7-8  P407 #3-6,11-15,23,24

Please put your name and class period at the top of the homework.
Also include the homework number.
Factor each polynomial by grouping.

1. $a^3 + 3a^2 + a + 3$
2. $y^2 + 2x + yx + 2y$
Factor each polynomial by grouping.

3. \( x^3 + 3x^2 + 2x + 6 \)  
4. \( x^2 + y + x + xy \)
General Factoring Rules

Summary

Factoring Polynomials

1. Factor out the greatest common factor (GCF).
2. If the polynomial has two terms or three terms, look for a difference of two squares, a product of two squares, or a pair of binomial factors.
3. If there are four or more terms, group terms and factor to find common binomial factors.
4. As a final check, make sure there are no common factors other than 1.
A terrarium in the shape of a rectangular prism has a volume of 4608 cubic inches. Its length is more than 10 inches. The dimensions of the terrarium in terms of its width are shown. Find the length, width, and height of the terrarium.
Match the standard form of the polynomial in factored form.

a. $x^3 + x^2$  
   A. $x(x + 1)(x - 1)$

b. $x^3 - x$       
   B. $x(x - 1)^2$

c. $x^3 + x^2 - 2x$  
   C. $x(x + 1)^2$

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

e. $x^3 - 2x^2 - 3x$  
   E. $x(x - 1)(x - 2)$
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>f.</strong> $x^3 - 2x^2 + x$</td>
<td><strong>F.</strong> $(x + 2)(x - 2)$</td>
</tr>
<tr>
<td><strong>g.</strong> $x^3 - 4x$</td>
<td><strong>G.</strong> $(x - 2)^2$</td>
</tr>
<tr>
<td><strong>h.</strong> $x^3 + 2x^2$</td>
<td><strong>H.</strong> $(x + 2)^2$</td>
</tr>
<tr>
<td><strong>i.</strong> $x^3 - x^2$</td>
<td><strong>I.</strong> $x^2(x - 1)$</td>
</tr>
<tr>
<td><strong>j.</strong> $x^3 - 3x^2 + 2x$</td>
<td><strong>J.</strong> $x^2(x + 1)$</td>
</tr>
</tbody>
</table>
k. \(x^3 + 2x^2 - 3x\)  \quad K. \(x^2(x - 2)\)

l. \(x^3 - 4x^2 + 3x\)  \quad L. \(x^2(x + 2)\)

m. \(x^3 - 2x^2\)  \quad M. \(x(x + 3)(x - 1)\)

n. \(x^3 + 4x^2 + 4x\)  \quad N. \(x(x + 1)(x - 3)\)

o. \(x^3 + 2x^2 + x\)  \quad O. \(x(x - 1)(x - 3)\)