Factoring by the AC Method

Trinomials of the form: \(Ax^2 + Bx + C\)

Factor: \(6x^2 + 23x + 20\)

1. Multiply ‘A’ times ‘C’: \((6)(20) = 120\)
2. Factor the product \((AC)\) so that the factors combine to make \(B\):

<table>
<thead>
<tr>
<th>Factors of 120</th>
<th>Combine to Give 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 \cdot 120</td>
<td>1 + 120 = 121</td>
</tr>
<tr>
<td>2 \cdot 60</td>
<td>2 + 60 = 62</td>
</tr>
<tr>
<td>3 \cdot 40</td>
<td>3 + 40 = 43</td>
</tr>
<tr>
<td>4 \cdot 30</td>
<td>4 + 30 = 34</td>
</tr>
<tr>
<td>5 \cdot 24</td>
<td>5 + 24 = 29</td>
</tr>
<tr>
<td>6 \cdot 20</td>
<td>6 + 20 = 26</td>
</tr>
<tr>
<td>8 \cdot 15</td>
<td>8 + 15 = 23</td>
</tr>
</tbody>
</table>

3. Use the two factors to rewrite the middle term, giving you a polynomial with 4 terms.
   \[6x^2 + 23x + 20\]
   \[6x^2 + 8x + 15x + 20\]

4. Factor the resulting polynomial by grouping the first two terms together and the last two terms together.
   \[(6x^2 + 8x) + (15x + 20)\]
   \[2x(3x + 4) + 5(3x + 4)\]
   \[(3x + 4)(2x + 5)\]

5. Check your answer using FOIL.

**Example #1:** Factor \(4x^2 + 13x - 12\)

1. \((4)(-12) = -48\)
2. \((16)(-3) = -48\) and \(16 + (-3) = 13\)
3. \(4x^2 + 16x - 3x - 12\)
4. \((4x^2 + 16x) + (-3x - 12) = 4x(x + 4) - 3(x + 4) = (x + 4)(4x - 3)\)

**Example #2:** Factor \(6x^2 - 19xy + 14y^2\)

1. \((6)(14) = 84\)
2. \((-12)(-7) = 84\) and \((-12) + (-7) = -19\)
3. \(6x^2 - 12xy - 7xy + 14y^2\)
4. \((6x^2 - 12xy) + (-7xy + 14y^2) = 6x(x - 2y) - 7y(x - 2y) = (x - 2y)(6x - 7y)\)

5. **Be sure to check your answers using FOIL.**