**Four Ways to Factor**

I. Step one is to pull out any GCF (greatest common factor)

II. Step two is to find the correct “numbers” that:
   (a) are factors of (the first x last coefficients)
   (b) sum to equal the middle coefficient

\[2x^2 - 7x - 4\]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>-8</td>
<td></td>
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<tr>
<td>1</td>
<td>-8</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
</tbody>
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**TAKE OUT THE TRASH**

1. use the square term (without the exponent) in both parenthesis
2. use each of the two “numbers” to fill in the parenthesis
3. identify any GCF in each of the two terms
4. factor out the GCF and “throw it away” (*the GCFs will equal the coefficient of the square term)
5. remaining terms are the factors

Ex: \[2x^2 - 7x - 4\]

\[(2x+1)(2x-8)\]

\[(2x+1)\ 2(x-4)\]

\[(2x+1)(x-4)\]

**FRACTION ACTION**

1. use the “numbers” as numerators of two fractions
2. place the leading coefficient of the square term as the denominator of each fraction
3. reduce the fractions if possible (do not simply; just reduce)
4. place an “x” with each number in the denominators
5. going from bottom to top, write the two terms as factors in parenthesis

Ex: \[\frac{1}{2} \quad \frac{-8}{2}\]

\[\frac{1}{2} \quad \frac{-4}{1}\]

\[\frac{1}{2x} \quad \frac{-4}{1x}\]

\[(2x+1)(x-4)\]
**Four Ways to Factor**

I. Step one is to pull out any GCF (greatest common factor)

II. Step two is to find the correct “numbers” that:
   (c) are factors of (the first x last coefficients)
   (d) sum to equal the middle coefficient

\[ 2x^2 - 7x - 4 \]

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**BY GROUPING**

1. Using the “numbers” as the two middle “x-terms”, write a four-term statement, beginning with the original square term and ending with the original last term
2. Group the 1st two terms in parenthesis, and group the last two terms in parenthesis
3. Factor out the GCF for the first group, and then factor out the GCF for the second group.
4. Write the two GCFs together in one set of parenthesis, and the second parenthesis is the common one from step 3

Ex: \[ 2x^2 - 7x - 4 \]

\[ 2x^2 + 1x - 8x - 4 \]

\[ (2x^2 + 1x)(-8x - 4) \]

\[ x(2x + 1) - 4(2x + 1) \]

*the “leftovers” must be the same

\[ (x - 4)(2x + 1) \]

**MAGIC BOX**

1. Draw a 2X2 table

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>2x²</td>
<td>x</td>
</tr>
<tr>
<td>-8x</td>
<td>-4</td>
</tr>
</tbody>
</table>

2. Enter the first term in the first box, the last term in the last box, and the “numbers” with an “x” in the other two boxes

3. Factor out the GCFs both horizontally and vertically

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4. Write the results in parenthesis

\[ (x - 4)(2x + 1) \]