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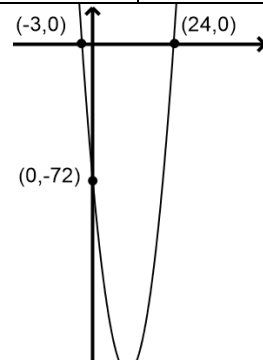
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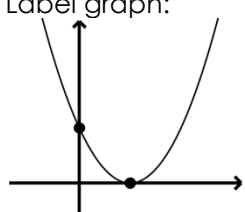
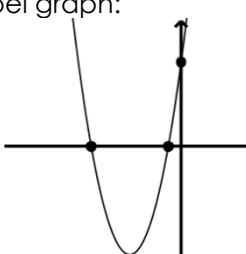
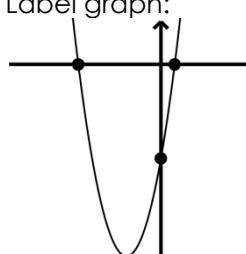
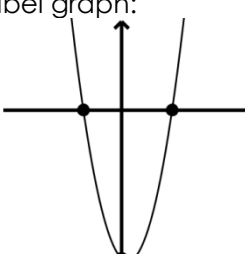
### Math Lab: Changing Standard Form to Intercept Form

Factoring is the process used to change a quadratic expression from standard form  $y = x^2 + bx + c$  into intercept form  $y = (x - p)(x - q)$ .

**EXAMPLE:** Factor the quadratic expression  $y = x^2 - 21x - 72$  and rewrite it in intercept form.

<p><b>Step 1:</b> Write the constant above and the coefficient on the x-term below. Next you will look for two numbers that multiply to get the top number and add to get the bottom number.</p> <div style="text-align: center;"> <math display="block">\begin{array}{c} -72 \\ \times \\ -21 \end{array}</math> </div>	<p><b>Step 2:</b> Make a list of all integers that multiply together to equal the top number.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 2px;">1</td><td style="border: 1px solid black; padding: 2px;">-72</td> <td style="border: 1px solid black; padding: 2px;">-1</td><td style="border: 1px solid black; padding: 2px;">72</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">2</td><td style="border: 1px solid black; padding: 2px;">-36</td> <td style="border: 1px solid black; padding: 2px;">-2</td><td style="border: 1px solid black; padding: 2px;">36</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">3</td><td style="border: 1px solid black; padding: 2px;">-24</td> <td style="border: 1px solid black; padding: 2px;">-3</td><td style="border: 1px solid black; padding: 2px;">24</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">4</td><td style="border: 1px solid black; padding: 2px;">-18</td> <td style="border: 1px solid black; padding: 2px;">-4</td><td style="border: 1px solid black; padding: 2px;">18</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">6</td><td style="border: 1px solid black; padding: 2px;">-12</td> <td style="border: 1px solid black; padding: 2px;">-6</td><td style="border: 1px solid black; padding: 2px;">12</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">8</td><td style="border: 1px solid black; padding: 2px;">-9</td> <td style="border: 1px solid black; padding: 2px;">-8</td><td style="border: 1px solid black; padding: 2px;">9</td> </tr> </table>	1	-72	-1	72	2	-36	-2	36	3	-24	-3	24	4	-18	-4	18	6	-12	-6	12	8	-9	-8	9	<p><b>Step 3:</b> Add the numbers together to find the pair that adds to equal the bottom number.</p> <p style="margin-left: 20px;"><math>1 + (-72) = -71</math></p> <p style="margin-left: 20px;"><math>2 + (-36) = -34</math></p> <div style="border: 1px solid black; border-radius: 50%; width: fit-content; margin-left: 20px; padding: 2px;"> <math>3 + (-24) = -21</math> </div>	<p><b>Step 4:</b> Write the numbers in the empty spaces.</p> <div style="text-align: center;"> <math display="block">\begin{array}{c} -72 \\ \times \\ 3 \quad -24 \\ \hline -21 \end{array}</math> </div> <p><b>Step 5:</b> Use them to rewrite the quadratic expression in intercept form.</p> <div style="border: 1px solid black; border-radius: 15px; width: fit-content; margin-left: auto; margin-right: auto; padding: 2px;"> <math>y = (x + 3)(x - 24)</math> </div>
1	-72	-1	72																								
2	-36	-2	36																								
3	-24	-3	24																								
4	-18	-4	18																								
6	-12	-6	12																								
8	-9	-8	9																								
<p>You can then use both forms of the parabola to find key features of the graph.</p> <p style="text-align: center;"><math>y = x^2 - 21x - 72</math> and <math>y = (x + 3)(x - 24)</math> are the same parabola.</p> <p style="text-align: center;">So the y-intercept is <math>(0, -72)</math>. And the x-intercepts are <math>(-3, 0)</math> and <math>(24, 0)</math>.</p>																											

Factor to rewrite the quadratic in intercept form and label the coordinates of the points on the graph.

<p>1. <math>y = x^2 - 6x + 9</math></p> <div style="text-align: center;"> <math display="block">\begin{array}{c} 9 \\ \times \\ -6 \end{array}</math> </div> <p>Intercept form:</p> <p>Label graph:</p> 	<p>2. <math>y = x^2 + 8x + 7</math></p> <div style="text-align: center;"> <math display="block">\begin{array}{c} 7 \\ \times \\ 8 \end{array}</math> </div> <p>Intercept form:</p> <p>Label graph:</p> 	<p>3. <math>y = x^2 + 5x - 6</math></p> <div style="text-align: center;"> <math display="block">\begin{array}{c} -6 \\ \times \\ 5 \end{array}</math> </div> <p>Intercept form:</p> <p>Label graph:</p> 	<p>4. <math>y = x^2 - x - 12</math></p> <div style="text-align: center;"> <math display="block">\begin{array}{c} -12 \\ \times \\ -1 \end{array}</math> </div> <p>Intercept form:</p> <p>Label graph:</p> 
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Factor to rewrite the quadratic in intercept form and find the characteristics of the graph.

<p>5. <math>y = x^2 + 5x - 84</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} -84 \\ \times \\ 5 \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>	<p>6. <math>y = x^2 + 20x + 51</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} 51 \\ \times \\ 20 \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>	<p>7. <math>y = x^2 - 14x - 15</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} -15 \\ \times \\ -14 \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>	<p>8. <math>y = x^2 - 16x + 48</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} 48 \\ \times \\ -16 \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>
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Use the given information to write the quadratic in standard form, then factor to rewrite in intercept form.

<p>9.</p> <p style="text-align: center;"><del><math>\begin{array}{c} 16 \\ \times \\ -8 \end{array}</math></del></p> <p>Standard form:</p> <p>Intercept form:</p>	<p>10.</p> <p style="text-align: center;"><del><math>\begin{array}{c} -24 \\ \times \\ -5 \end{array}</math></del></p> <p>Standard form:</p> <p>Intercept form:</p>	<p>11.</p> <p style="text-align: center;"><del><math>\begin{array}{c} 49 \\ \times \\ 14 \end{array}</math></del></p> <p>Standard form:</p> <p>Intercept form:</p>	<p>12.</p> <p style="text-align: center;"><del><math>\begin{array}{c} -75 \\ \times \\ -10 \end{array}</math></del></p> <p>Standard form:</p> <p>Intercept form:</p>
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Factor to rewrite the quadratic in intercept form and find the characteristics of the graph.

<p>13. <math>y = x^2 - 4x - 21</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} \times \\ \times \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>	<p>14. <math>y = x^2 + 10x + 25</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} \times \\ \times \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>	<p>15. <math>y = x^2 - 36x - 16</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} \times \\ \times \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>	<p>16. <math>y = x^2 + 2x - 35</math></p> <p style="text-align: center;"><del><math>\begin{array}{c} \times \\ \times \end{array}</math></del></p> <p>Intercept form:</p> <p>y-int: (0,___)</p> <p>x-int: (____,0) and (____,0)</p>
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