

Factoring Trinomials of the form $Ax^2 + Bx + C$, where $A \neq 1$

Box Method

Steps to Factoring $Ax^2 + Bx + C$	Example Factor: $10x^2 - 23x + 12$													
1. Multiply $A \cdot C$	$A \cdot C = 10 \cdot 12 = 120$													
2. Find two factors of $A \cdot C$ that add to the middle term, B (the coefficient of x).	$\underline{120}$ $1 \cdot 120$ $2 \cdot 60$ $3 \cdot 40$ $4 \cdot 30$ $5 \cdot 24$ $6 \cdot 20$ $8 \cdot 15$ $-8 + (-15) = -23$ $10 \cdot 12$													
3. Create a 2×2 "grid box" and place the leading term in the upper left hand corner and the constant in the lower right hand corner of the grid.	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">$10x^2$</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">12</td> </tr> </table>	$10x^2$			12									
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	12													
4. Fill in the other boxes with the two new factors found in Step 2 (include the signs). Order is not important for the split terms, as either arrangement works.	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">$10x^2$</td> <td style="padding: 5px;">$-8x$</td> </tr> <tr> <td style="padding: 5px;">$-15x$</td> <td style="padding: 5px;">12</td> </tr> </table>	$10x^2$	$-8x$	$-15x$	12									
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5. Factor out the GCF in each ROW .	$2x$ <table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">$10x^2$</td> <td style="padding: 5px;">$-8x$</td> </tr> <tr> <td style="padding: 5px;">-3</td> <td style="padding: 5px;">12</td> </tr> </table>	$10x^2$	$-8x$	-3	12									
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6. Factor out the GCF in each COLUMN .	<table style="margin: auto;"> <tr> <td></td> <td style="text-align: center;">$5x$</td> <td style="text-align: center;">-4</td> </tr> <tr> <td style="padding-right: 10px;">$2x$</td> <td style="padding-right: 5px;"> <table border="1" style="display: inline-table;"> <tr> <td style="padding: 5px;">$10x^2$</td> <td style="padding: 5px;">$-8x$</td> </tr> <tr> <td style="padding: 5px;">$-15x$</td> <td style="padding: 5px;">12</td> </tr> </table> </td> <td></td> </tr> <tr> <td style="padding-right: 10px;">-3</td> <td></td> <td></td> </tr> </table>		$5x$	-4	$2x$	<table border="1" style="display: inline-table;"> <tr> <td style="padding: 5px;">$10x^2$</td> <td style="padding: 5px;">$-8x$</td> </tr> <tr> <td style="padding: 5px;">$-15x$</td> <td style="padding: 5px;">12</td> </tr> </table>	$10x^2$	$-8x$	$-15x$	12		-3		
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7. The final answer is now found on the outside of the grid box.	$(2x - 3)(5x - 4)$													

Here's Another Example...

Step	Factor: $8x^2 + 6x - 9$													
1.	$a \cdot c = -72$													
2.	$-6 \cdot 12 = -72$ AND $-6 + 12 = 6$													
3.	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">$8x^2$</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">-9</td> </tr> </table>	$8x^2$			-9									
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7.	$(2x + 3)(4x - 3)$													