

## The Box Method for Factoring

Case 1  $Ax^2 + Bx + C$  where  $A > 0$  and  $B > 0$  and  $C > 0$ .

<ol style="list-style-type: none"><li>1. Box A.</li><li>2. Multiply A times C. Drop the box number A and replace C with A x C. List all the factor pairs of the product.</li><li>2. Look for a pair of factors that add to the coefficient of the middle term, B.</li><li>3. Factor the new expression using the pairs of factors found in step (2).</li><li>4. Divide each factor by the boxed number A.</li><li>5. Reduce the fractions if possible.</li><li>6. Write any remaining denominators in front of x.</li></ol>	<ol style="list-style-type: none"><li>1. <math>\boxed{6}x^2 + 23x + 20</math></li><li>2. <math>6 \times 20 = 120</math> <math>X^2 + 23x + 120</math> Factor Pairs 1, 120 2, 60 3, 40 4, 30 5, 24 6, 20 8, 15 10, 12</li><li>2. <math>8 + 15 = 23</math></li><li>3. <math>X^2 + 23x + 120 = (x + 8)(x + 15)</math></li><li>4. <math>\left(x + \frac{8}{6}\right)\left(x + \frac{15}{6}\right)</math></li><li>5. <math>\left(x + \frac{4}{3}\right)\left(x + \frac{5}{2}\right)</math></li><li>6. <math>(3x + 4)(2x + 5)</math></li></ol>
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Case 2  $Ax^2 + Bx + C$  where  $A > 0$  and  $C > 0$ , but  $B < 0$ .

The pair found in step 2 of the process will both be negative factors.

Case 3  $Ax^2 + Bx + C$  where  $A > 0$  and  $B > 0$  and  $C < 0$ .

The larger factor will be positive and the smaller factor will be negative in step (2).

Case 4  $Ax^2 + Bx + C$  where  $A > 0$  and  $C < 0$  and  $B < 0$ .

The smaller factor will be positive and the larger factor will be negative in step (2).

Case 5:  $Ax^2 + Bx + C$  where  $A < 0$

Factor out a  $-1$ , then apply one of the previous cases to the trinomial.