

## Factoring Trinomials

The table model is one of many different ways to factor the trinomial. By using the table model, it will give you a clear idea on visualizing the factoring process. This kind of factoring is used a lot in calculus and higher up math to get critical points and other interesting stuff.

**Ex)**  $2x^2 + 14x + 24$

### Step 1

**Factor table:** First, we will multiply the first coefficient by the third coefficient together to obtain a number; then, we can list all possible combination of that number. Now we are only interested in finding one of the combinations from the list, which will add up to the second coefficient.

|   |  |
|---|--|
| <i>Factors of <math>2 \times 24 = 48</math></i>             | <i>Sum of factor must equal 14</i>                           |
| $1 \times 48$ or $-1 \times -48$                            | $1 + 48 = 49$ or $-1 + -48 = -49$                            |
| $2 \times 24$ or $-2 \times -24$                            | $2 + 24 = 26$ or $-2 + 24 = 22$                              |
| $3 \times 16$ or $-3 \times -16$                            | $3 + 16 = 19$ or $-3 + -16 = -19$                            |
| $4 \times 12$ or $-4 \times -12$                            | $4 + 12 = 16$ or $-4 + -12 = -16$                            |
| <b><math>6 \times 8</math> or <math>-6 \times -8</math></b> | <b><math>6 + 8 = 14</math> or <math>-6 + -8 = -14</math></b> |

### Step 2

**Table Model:** Just like a multiplication table, this table works the same way, except with variables.

|   |                                      |                       |
|---|--------------------------------------|-----------------------|
|   | ?                                    | ?                     |
| ? | <i>First term: <math>2x^2</math></i> | $+8x$                 |
| ? | $+6x$                                | <i>Third term: 24</i> |

We can ignore the first row and the first column of the table for now. Focusing on the inside four boxes, we already have enough information to fill in each of the boxes.



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|       |        |       |
|-------|--------|-------|
|       | $2x$   | $+8$  |
| $x$   | $2x^2$ | $+8x$ |
| $+3x$ | $+6x$  | $24$  |

In this table, we can now fill in the first row and first column.

### Step 3

$$(2x + 8)(x + 3) = 2x^2 + 6x + 8x + 24 = 2x^2 + 14x + 24$$

You try: Using Table model

$42x^2 + 43x - 7$

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You try: Using Table model

**$9x^2 - 27x + 18$**

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(510) 885-3674  
[www.csueastbay.edu/scaa](http://www.csueastbay.edu/scaa)  
[scaa@csueastbay.edu](mailto:scaa@csueastbay.edu)