

Shannon
(answers)

MTH-4106-1 Factoring Trinomials of the Form: $ax^2 + bx + c$

Problem #1 Factor the following trinomial:

$$2x^2 + 7x + 6$$

Steps:

1. Multiply $a \times c$.

$$2 \times 6 = 12$$

2. Find two numbers (N_1 and N_2) whose product is $(a \times c)$ and whose sum is b .

$$3, 4$$

3. Rewrite the original trinomial, but when writing the middle term, replace bx with $N_1x + N_2x$.

$$2x^2 + 3x + 4x + 6$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (2x^2 + 3x) + (4x + 6) \\ & + (2x + 3) + 2(2x + 3) \\ & \boxed{(x+2)(2x+3)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

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Problem #2 Factor the following trinomial:

$$6x^2 - 11x - 10$$

Steps:

1. Multiply $a \times c$.

$$6 \times (-10) = -60$$

2. Find two numbers (N_1 and N_2) whose product is ($a \times c$) and whose sum is b .

$$-15, +4$$

3. Rewrite the original trinomial, but when writing the middle term, replace bx with $N_1x + N_2x$.

$$6x^2 - 15x + 4x - 10$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (6x^2 - 15x) + (4x - 10) \\ & 3x(2x - 5) + 2(2x - 5) \\ & \boxed{(3x + 2)(2x - 5)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

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Problem #3 Factor the following trinomial:

$$3x^2 - 13x - 10$$

Steps:

1. Multiply $a \times c$.

$$3 \times (-10) = -30$$

2. Find two numbers (N_1 and N_2) whose product is ($a \times c$) and whose sum is b .

$$-15, +2$$

3. Rewrite the original trinomial, but when writing the middle term, replace bx with $N_1x + N_2x$.

$$3x^2 - 15x + 2x - 10$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (3x^2 - 15x) + (2x - 10) \\ & 3x(x - 5) + 2(x - 5) \\ & \boxed{(3x + 2)(x - 5)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

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Problem #4 Factor the following trinomial:

$$4d^2 - 12d + 9$$

Steps:

1. Multiply $a \times c$.

$$4 \times 9 = 36$$

2. Find two numbers (N_1 and N_2) whose product is ($a \times c$) and whose sum is b .

$$-6, -6$$

3. Rewrite the original trinomial, but when writing the middle term, replace bd with $N_1d + N_2d$.

$$4d^2 - 6d - 6d + 9$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (4d^2 - 6d) + (-6d + 9) \\ & 2d(2d - 3) - 3(2d - 3) \\ & \boxed{(2d - 3)(2d - 3)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

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Problem #5 Factor the following trinomial:

$$-t^2 - t + 12$$

Steps:

1. Multiply $a \times c$.

$$(-1) \times (12) = -12$$

2. Find two numbers (N_1 and N_2) whose product is ($a \times c$) and whose sum is b .

$$-4, +3$$

3. Rewrite the original trinomial, but when writing the middle term, replace bt with $N_1t + N_2t$.

$$-t^2 - 4t + 3t + 12$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (-t^2 - 4t) + (3t + 12) \\ & -t(t + 4) + 3(t + 4) \\ & \boxed{(-t + 3)(t + 4)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

MTH-4106-1 Factoring Trinomials of the Form: $ax^2 + bxy + cy^2$

Problem #6 Factor the following trinomial:

$$5x^2 + 6xy + y^2$$

Steps:

1. Multiply $a \times c$.

$$5 \times 1 = 5$$

2. Find two numbers (N_1 and N_2) whose product is $(a \times c)$ and whose sum is b .

$$5, 1$$

3. Rewrite the original trinomial, but when writing the middle term, replace bxy with $N_1xy + N_2xy$.

$$5x^2 + 1xy + 5xy + y^2$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (5x^2 + 1xy) + (5xy + y^2) \\ & x(5x + y) + y(5x + y) \\ & \boxed{(x+y)(5x+y)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

MTH-4106-1 Factoring Trinomials of the Form: $ax^2 + bxy + cy^2$

Problem #7 Factor the following trinomial:

$$3m^2 - 13mn + 14n^2$$

Steps:

1. Multiply $a \times c$.

$$3 \times 14 = 42$$

2. Find two numbers (N_1 and N_2) whose product is $(a \times c)$ and whose sum is b .

$$-6, -7$$

3. Rewrite the original trinomial, but when writing the middle term, replace bmn with $N_1mn + N_2mn$.

$$3m^2 - 6mn - 7mn + 14n^2$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (3m^2 - 6mn) + (-7mn + 14n^2) \\ & 3m(m - 2n) - 7n(m - 2n) \\ & \boxed{(3m - 7n)(m - 2n)} \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

MTH-4106-1 Factoring Trinomials of the Form: $ax^2 + bxy + cy^2$

Problem #8 Factor the following trinomial:

$$-2x^2 + 5xy - 2y^2$$

Steps:

1. Multiply $a \times c$.

$$(-2)(-2) = +4$$

2. Find two numbers (N_1 and N_2) whose product is $(a \times c)$ and whose sum is b .

$$4, 1$$

3. Rewrite the original trinomial, but when writing the middle term, replace bxy with $N_1xy + N_2xy$.

$$-2x^2 + 4xy + 1xy - 2y^2$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (-2x^2 + 4xy) + (xy - 2y^2) \\ & -2x(x - 2y) + y(x - 2y) \end{aligned}$$

$$\boxed{(-2x + y)(x - 2y)}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.

MTH-4106-1 Factoring Trinomials of the Form: $ax^2 + bx + c$

Problem #9 Factor the following trinomial:

$$x^2 - 6x - 27$$

Steps:

1. Multiply $a \times c$.

$$1 \times -27 = -27$$

2. Find two numbers (N_1 and N_2) whose product is $(a \times c)$ and whose sum is b .

$$-9, +3$$

3. Rewrite the original trinomial, but when writing the middle term, replace bx with $N_1x + N_2x$.

$$x^2 - 9x + 3x - 27$$

4. Factor by grouping (grouping the first two and the last two always works here).

$$\begin{aligned} & (x^2 - 9x) + (3x - 27) \\ & x(x - 9) + 3(x - 9) \\ & (x + 3)(x - 9) \end{aligned}$$

5. Don't forget to check your answer! The factors (your answer), when multiplied together, must give you the original trinomial.