Title: Factoring Trinomials Using the Trial-and-Error Method

Class: Math 100

Author: Sharareh Masooman

Instructions to tutor: Read instructions under "Activity" and follow all steps for each problem exactly as given.

Keywords/Tags: Factor, factoring trinomials, trial-and-error method, guess-and-check method, unFOIL, deFOIL.

Objective: Factoring trinomials using the trial and error method.

Activity: You should already know how to multiply polynomials. In particular you know that when we multiply a binomial (two terms) by another binomial we can follow a process called FOIL, which refers to an order in which we multiply the terms. Now we are going to go in the other direction, i.e. start with a trinomial (three terms) and figure out what two binomials could have led to this when multiplied. You can think of this as unFOILing the trinomial. In the examples below, follow the steps to factor each trinomial.

Example 1. Factor the trinomial $2t^2 - 13t + 15$ using the trial-and-error (guess-and-check) method.

Follow these steps:
(As always) Check for GCF first.
      Do all the terms have something in common? If so factor it out.

Make your "double-bubble" (Leave them blank for now.)
        (   )(   )
      Goal: To put the correct terms in each "bubble" so that when you FOIL you get the trinomial you were trying to factor.

Write the <u>first term</u> of the trinomial here: _____
What two things can you multiply to get this term?
    (These will be your choices to try in the <u>first</u> spot in each "bubble".)
List all possible pairs:

Write the <u>last term</u> of the trinomial here:_____
What two things can you multiply to get this term?
    (These will be your choices to try in the <u>second</u> spot in each "bubble".)
List all possible pairs (consider the signs):

Guess

Try possible combinations of your choices in the last two steps until you get the one that gives you the correct "OI".

(   )(   ) → **O+I =**   (Did it work?)

(   )(   ) → **O+I =**   (Did it work?)

Check

(   )(   ) → **O+I =**   (Did it work?)

⋮

You can stop once you have the correct "bubbles". Write your final factored form:

                                  _____

Check with a tutor to make sure you did this correctly before you proceed.

Example 2. Factor the trinomial $3x^2 - x - 10$ using the trial-and-error method.

Follow these steps:
(As always) Check for GCF first.
        Do all the terms have something in common? If so factor it out.

Make your "double-bubble" (Leave them blank for now.)
        (   )(   )
        Goal: To put the correct terms in each "bubble" so that when you FOIL you get the trinomial you were trying to factor.

Write the <u>first term</u> of the trinomial here: _____
What two things can you multiply to get this term?
      (These will be your choices to try in the <u>first</u> spot in each "bubble".)
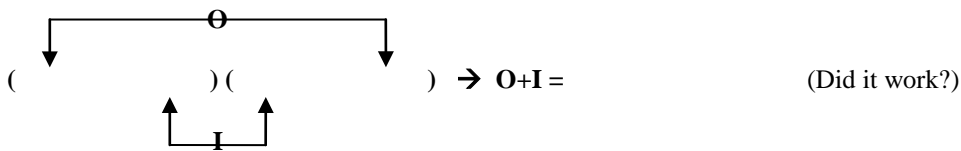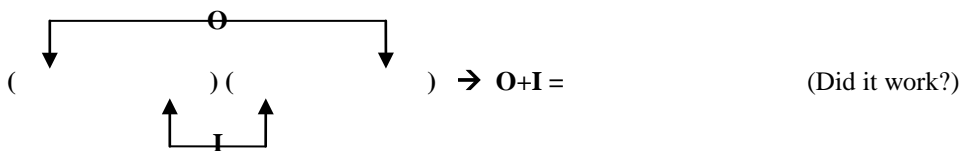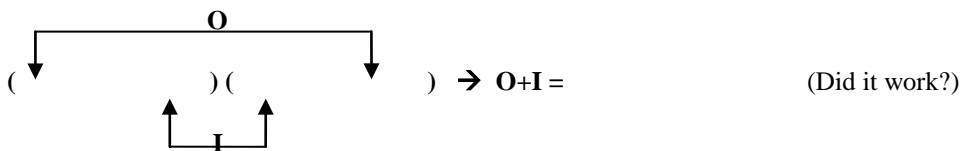**List all possible pairs:**

Write the <u>last term</u> of the trinomial here:_____
What two things can you multiply to get this term?
      (These will be your choices to try in the <u>second</u> spot in each "bubble".)
List all possible pairs (consider the signs):

Try possible combinations of your choices in the last two steps until you get the one that gives you the correct "OI".

O

(   )(   )   → **O+I =**   (Did it work?)
I

O

(   )(   )   → **O+I =**   (Did it work?)
I

O

(   )(   )   → **O+I =**   (Did it work?)
I

⋮

You can stop once you have the correct "bubbles". Write your final factored form:

                                      _____

Example 3. Factor the trinomial $6x^2 + 13x + 6$ using the trial-and-error method.

Follow these steps:
(As always) Check for GCF first.
      Do all the terms have something in common? If so factor it out.

Make your "double-bubble" (Leave them blank for now.)
      (**)(**   **)**
      Goal: To put the correct terms in each "bubble" so that when you FOIL you get the trinomial you were trying to factor.

Write the <u>first term</u> of the trinomial here: _____
What two things can you multiply to get this term?
      (These will be your choices to try in the <u>first</u> spot in each "bubble".)
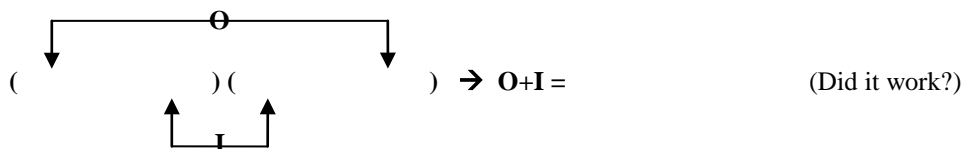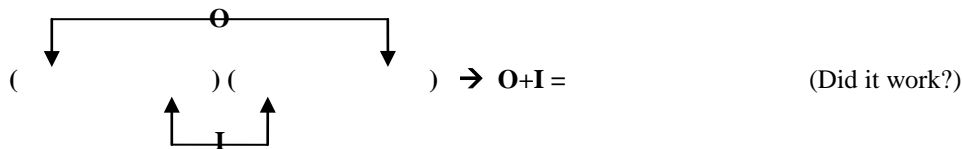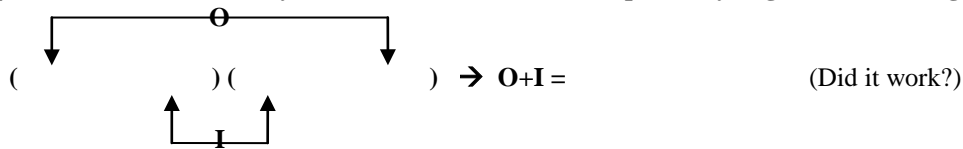**List all possible pairs:**

Write the <u>last term</u> of the trinomial here:_____
What two things can you multiply to get this term?
      (These will be your choices to try in the <u>second</u> spot in each "bubble".)
List all possible pairs (consider the signs):

Try possible combinations of your choices in the last two steps until you get the one that gives you the correct "OI".

      O
(**) (**   **)** → **O+I =**   (Did it work?)
      I

      O
(**) (**   **)** → **O+I =**   (Did it work?)
      I

      O
(**) (**   **)** → **O+I =**   (Did it work?)
      I

You can stop once you have the correct "bubbles". Write your final factored form:

                                          _____

After you go over the previous problems with a tutor, try the following, then check with a tutor to make sure you did them correctly.

Factor each trinomial using the trial-and-error method.

1. $x^2 + 11x + 30$

2. $5x^2 + 7x + 2$

3. $x^2 - 11x + 30$

4. $3x^2 - 8x + 4$

5. $x^2 - x - 20$

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

7. $x^2 + x - 12$

8. $6x^2 + x - 2$

9. $x^2 - 2x - 15$

10. $3x^2 - 2x - 5$