Area – "FOILed" Again!

ID: 12433

Time required
20 minutes

Activity Overview

In this activity, students will practice finding rectangular areas with algebraic expressions for the lengths of the sides.

Topic: Polynomial Multiplication

- *Distribution Property*
- *FOIL method*
- *Adding together rectangular areas to find the total area of the figure*

Teacher Preparation and Notes

- *Students will practice finding areas of rectangular figures by using either the Distributive property or FOIL. Some instruction on these methods is assumed.*
- *It is likely that students will need more "paper and pencil" practice after this activity, since the embedded assessment questions are self check, and the interactive pieces of the document allow students to obtain answers without necessarily doing the work themselves.*
- *Since the problems are presented as dimensions of rectangles, most of the numbers used (as coefficients and constants) are positive. This may make more sense to students than using negative numbers as part of those expressions. Emphasize, however, that those expressions simply represent the relationship between the two numbers that are the length and width of the given rectangle. For example, if a rectangle has sides of length 7 and 12, the two could be described algebraically as 4x – 5 and 6x – 6. The negative numbers in those expressions do NOT mean the rectangle has any negative lengths!*
- ***To download the student TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter "12433" in the quick search box.***

Associated Materials

- *Alg1Week22_FOILed_worksheet_TINspire.doc*
- *Alg1Week22_FOILed.tns*

Suggested Related Activities

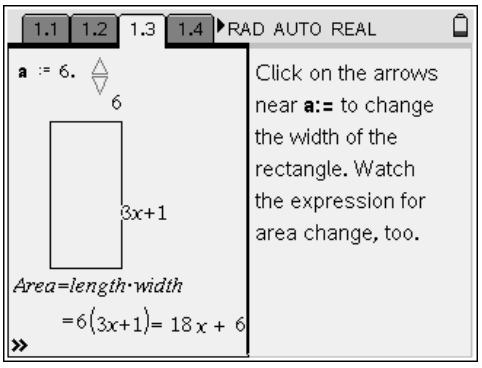
To download any activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *Multiplying Polynomials (TI-Nspire technology) — 9682*
- *Multiplying Binomials (TI-84 Plus family) — 7592*
- *FOIL Review (TI-84 Plus family) — 8081*

Problem 1 – Introduction to area of a rectangle

On page 1.3, the students will interact with the width of the rectangle, and will observe the changes in the calculation for area. Several problems are provided on the student worksheet.

Students should see that when one of the sides of a rectangle is a number or a monomial, the **distributive property** can be used to simplify the expression for the area.

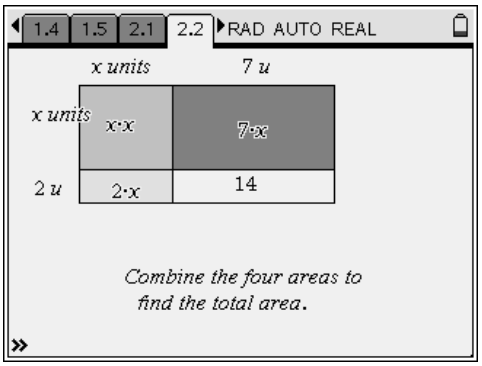


Problem 2 – Areas of small rectangles

On page 2.1, the rectangle is shaded so that the students will see the four different pieces that must be added together to find the total area. The sides of the entire rectangle are of length $x + 7$ and $x + 2$.

The visual is adapted on the next page to show the four area calculations of the small rectangles. Students are asked to add the parts together.

Page 2.3 has a self check multiple choice question concerning the total area.

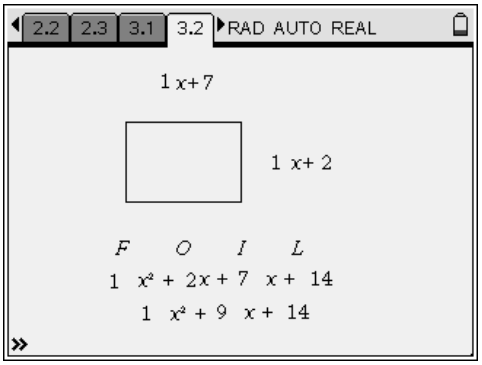


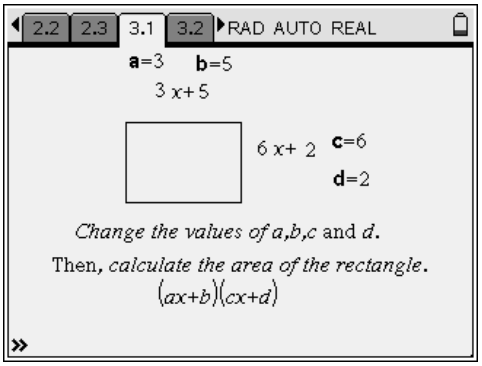
Problem 3 – FOIL method

Students should notice that the rectangle on page 3.1 has the same dimensions as the rectangle in Problem 2. Have them make the connection between the 4 terms shown underneath the letters FOIL on page 3.2 and the areas of the 4 smaller rectangles in Problem 2.

Page 3.1 has a rectangle with changeable sides of length $ax + b$ and $cx + d$. Students may double click to change any part of the dimensions, and then calculate the area themselves. Discourage students from entering in decimals or extremely large or small number values. Suggest whole numbers to begin with (integers will also be acceptable if students feel comfortable multiplying negative numbers).

Page 3.2 uses the mnemonic word FOIL, and shows the calculation of all four parts, as well as the total with like terms combined. (see also Mr. Foil on the title page of the activity!) Students should change the values of **a**, **b**, **c**, and **d** in order to practice several problems given on the worksheet.



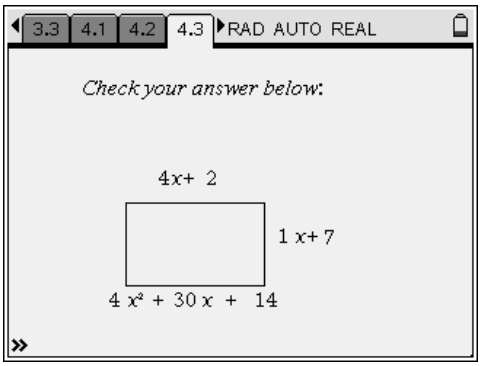


Homework/Extensions

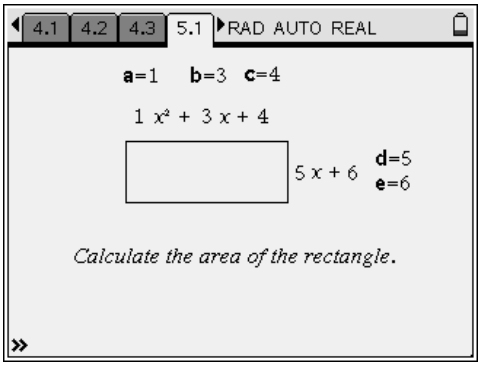
Page 4.1 presents an area problem for students to do. $(4x + 2)(x + 7)$

Page 4.2 provides the solution, without the intermediate steps shown. Students may be encouraged to show that step if necessary.

The numbers on page 4.1 are interactive, and can be changed by double clicking again for the homework questions provided.



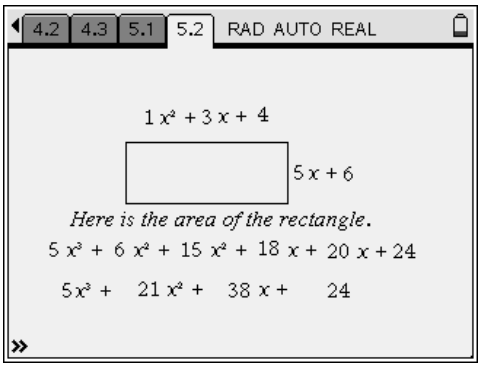
On page 5.1, a rectangle is shown with a trinomial as the length of one side, and a binomial for the other side. The area is calculated on the next page with steps shown, as well as the total area with like terms combined. Again, the numbers are interactive and can be double clicked to change for practice problems. You may wish to have students use the Mr. FOIL model of showing their distributive steps. Underlining like terms is also a good idea.



Students are to determine the formula used to find the 6 terms of the expression for area before like terms are combined. The formula or pattern is:

$(ax^2 + bx + c)(dx + e) =$

$$(a \cdot d)x^3 + (a \cdot e)x^2 + (b \cdot d)x^2 + (b \cdot e)x + (c \cdot d)x + (c \cdot e)$$



This formula invokes the use of the distributive property.

Other Possible Extension Ideas:

A rectangular prism could be introduced with algebraic expressions for length, width and height. Other geometric figures could also be created with various algebraic expressions as dimensions.