

Dividing Polynomials Using Algebra Tiles

Strand:	Expressions and Operations
Topic:	Dividing Polynomials
Primary SOL:	A.2 The student will perform operations on polynomials, including b) adding, subtracting, multiplying, and dividing polynomials.
Related SOL:	A.2a

Materials

- Algebra tiles
- Teacher Resource for Dividing Polynomials (attached)
- Dividing Polynomials Using Algebra Tiles activity sheet (attached)

Vocabulary

dividend, divisor (earlier grades)

base, binomial, coefficient, degree, exponent, monomial, polynomial, term, trinomial (A.2)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Demonstrate dividing polynomials using algebra tiles and the Teacher Resource for Dividing Polynomials.
2. Distribute algebra tiles and the Dividing Polynomials Using Algebra Tiles activity sheet. Instruct students to model each expression with the tiles, draw the model, simplify the expression, and write the simplified answer.

Assessment

- **Questions**
 - Draw a model of the division of a trinomial with a binomial. Simplify your expression. Did your expression simplify easily? Did you need to make changes? What changes did you need to make to your original expression?
 - How can you explain why $x^2 \div x = x$?
 - How are the properties of real numbers related to polynomials?
- **Journal/writing prompts**
 - One of your classmates was absent when we practiced dividing polynomials using algebra tiles. Write a paragraph explaining this procedure.
 - Describe how to divide polynomials without using algebra tiles.
- **Other Assessments**
 - Have students create their own set of problems for dividing polynomials. How can they use properties of real numbers to know when the divisor is a factor of the dividend?
 - When is it appropriate to use algebra tiles or algebraic methods to divide polynomials?

Extensions and Connections (for all students)

- We know that the area of a rectangle is length of the rectangle times its width. What if the width was $(x + 4)$ units and the area was $(x^2 + 6x + 8)$ units squared? How could we determine the length of the rectangle?

Strategies for Differentiation

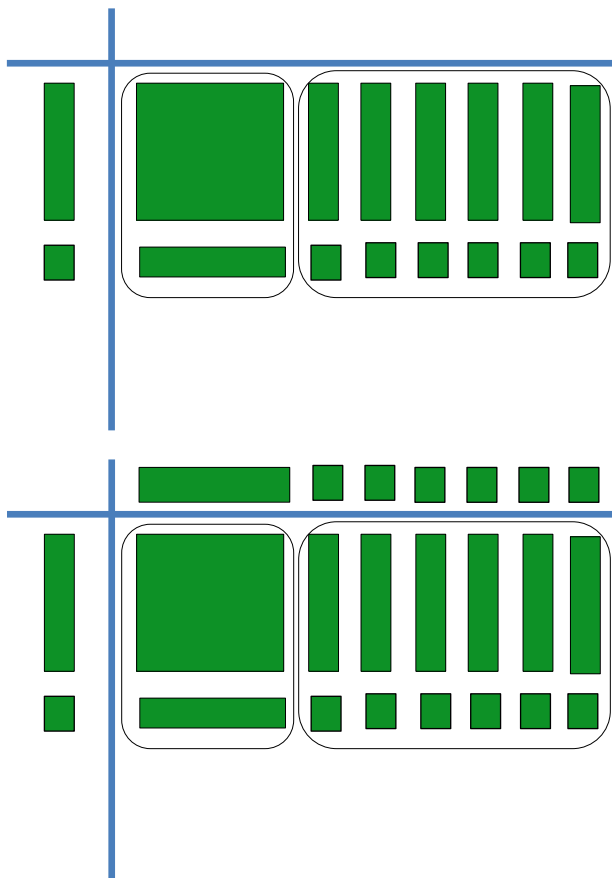
- Review vocabulary, as needed.
- Encourage the use of algebra tiles, drawings, and mathematical notation simultaneously to reinforce the concepts in this lesson.
- Have students use colored pencils for drawing algebra tile models.
- Have students use interactive whiteboards or dry-erase boards on which to create expressions.
- Provide scaffolding for No. 1 (fill in the dividend) and No. 2 (fill in the divisor) by filling in part of the frame.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Teacher Resource for Dividing Polynomials

- Fill the inside of the frame with the dividend and the left side of the frame with the divisor.
- When filling in the dividend, the “1” squares must remain together and form a rectangle. They may not be adjacent to the “ x^2 ” tile.
- Be prepared to use zero pairs in the dividend.

Example:
$$\frac{x^2 + 7x + 6}{x + 1}$$



1. Pairing x^2 with x and $6x$ with 6 , we have

$$\frac{x^2 + x + 6x + 6}{x + 1}$$

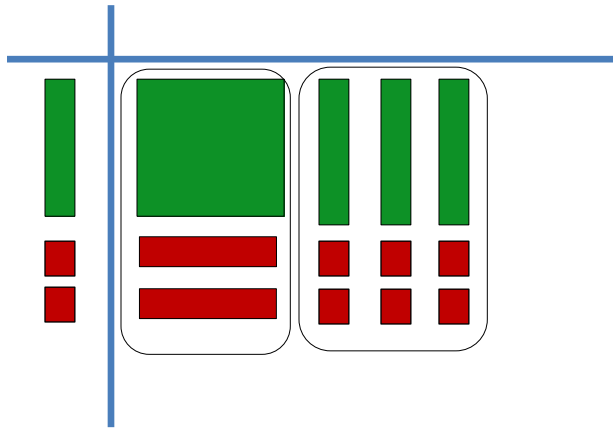
2. To find the quotient, fill the top of the frame to fit the side lengths adjacent to it. With this, x is divided out of the group “ $x^2 + x$ ” and 6 is divided out of “ $6x + 6$ ”.

$$\frac{x(x + 1) + 6(x + 1)}{x + 1}$$

3. $\frac{(x+1)(x+6)}{x+1} = x + 6$

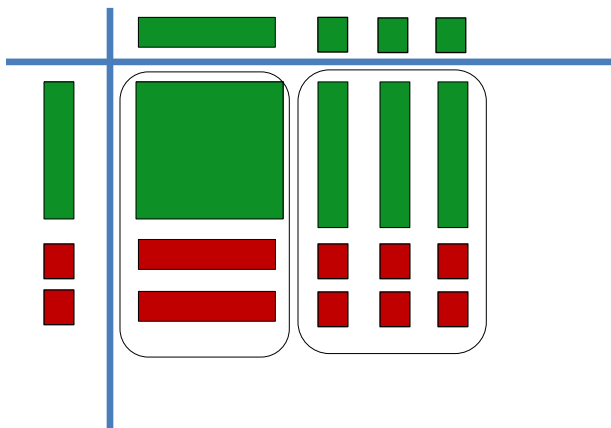
Example 2:

$$\frac{x^2 + x - 6}{x - 2}$$



1. For this one, the only way to fill the inside of the array as a rectangle is to bring in zero pairs. Pairing x^2 with $-2x$ and $3x$ with -6 we have

$$\frac{x^2 - 2x + 3x - 6}{x - 2}$$



2. To find the quotient, fill the top of the frame to fit the side lengths adjacent to it. With this, x is divided out of the group " $x^2 - 2x$ " and 3 is divided out of " $3x - 6$."

$$\frac{x(x - 2) + 3(x - 2)}{x - 2}$$

$$3. \frac{(x-2)(x+3)}{x-2} = x + 3$$

Dividing Polynomials Using Algebra Tiles

Name _____ Date _____

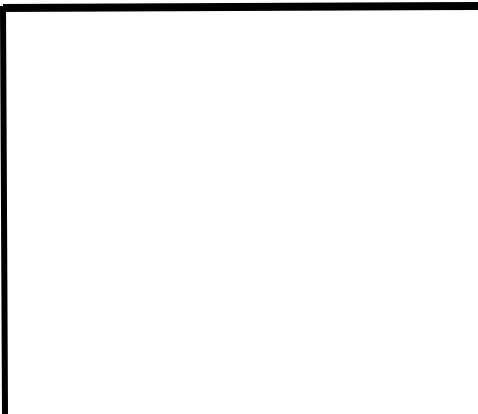
Use algebra tiles to model each division problem and find the quotient. Draw your model in the frame. Write your simplified answer in the space provided and show your work alongside the algebraic tile model.

1.
$$\frac{x^2 + 7x - 3}{x + 3}$$



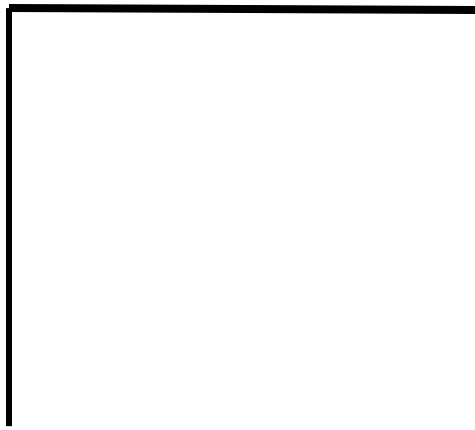
Answer: _____

2.
$$\frac{2x^2 + 5x - 3}{x + 3}$$



Answer: _____

3.
$$\frac{x^2 - x - 2}{x - 2}$$



4. $\frac{x^2+x-6}{3+x}$

Answer: _____



Answer: _____

For 5 and 6, find the quotient for each without the use of algebra tiles.

5. $\frac{x^2-4x-77}{x+7}$

6. $\frac{3x^2-35x-12}{x-12}$