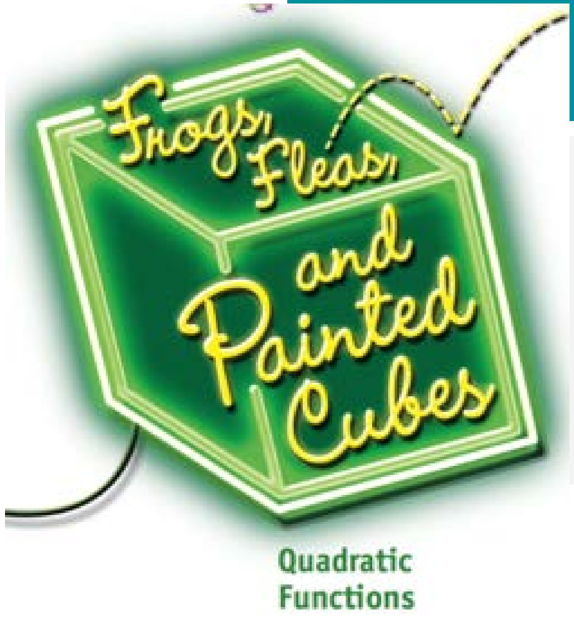
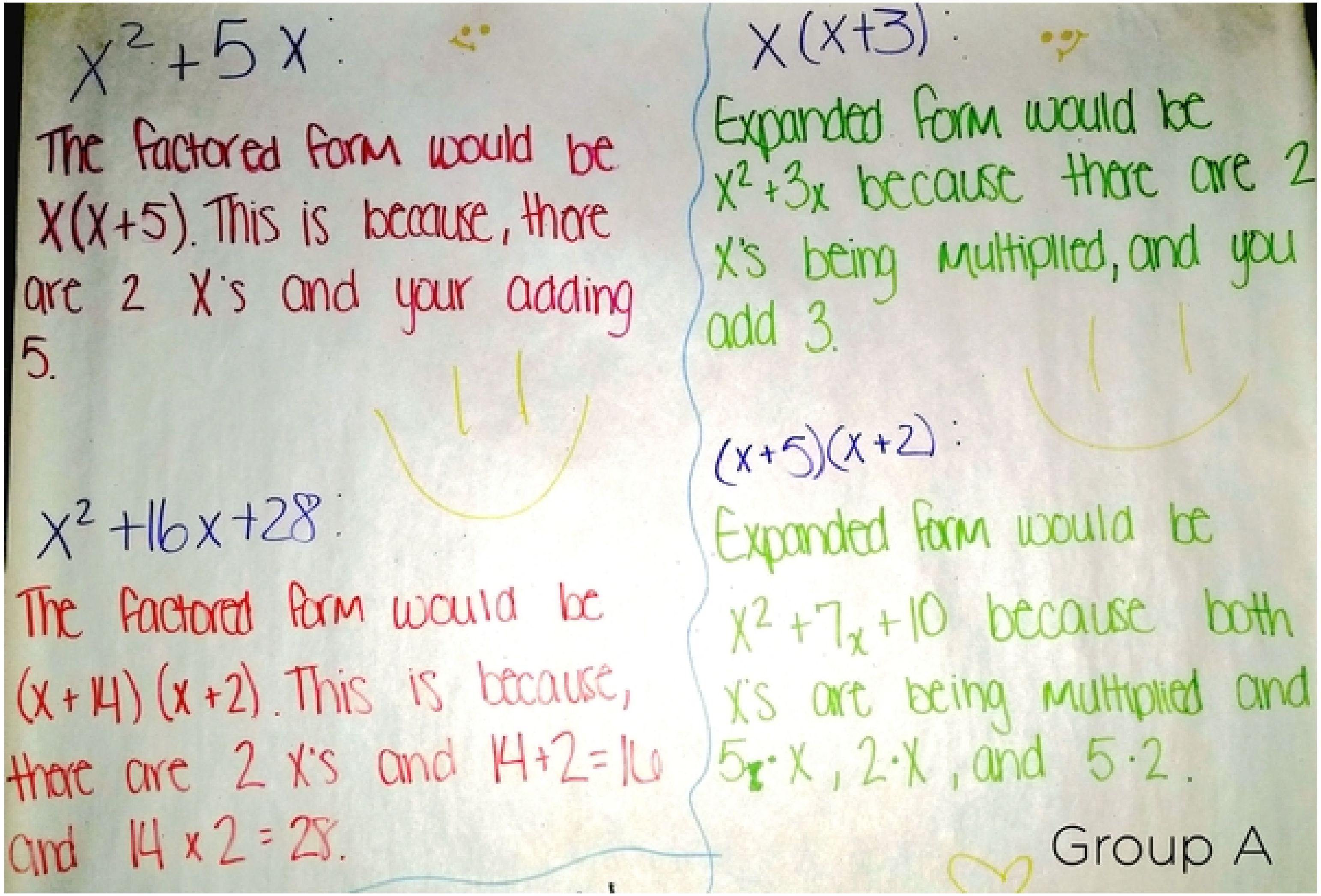
Grade 8
Student Work



Frogs, Fleas, and Painted Cubes Check Up

This document provides a summary of seven pieces of student work. Students prepared posters to show their thinking about using the distributive property to write equivalent forms of quadratic expressions. The students used the posters to share and discuss their ideas as a way to summarize Frogs, Fleas, and Painted Cubes: Investigation 2 and prepare for Check Up 2.

To streamline the communication in the classroom, students chose to use the same set of expressions on their posters. x2 + 5 x, x2 + 16x + 28, x(x +3), and (x+5)(x + 2)



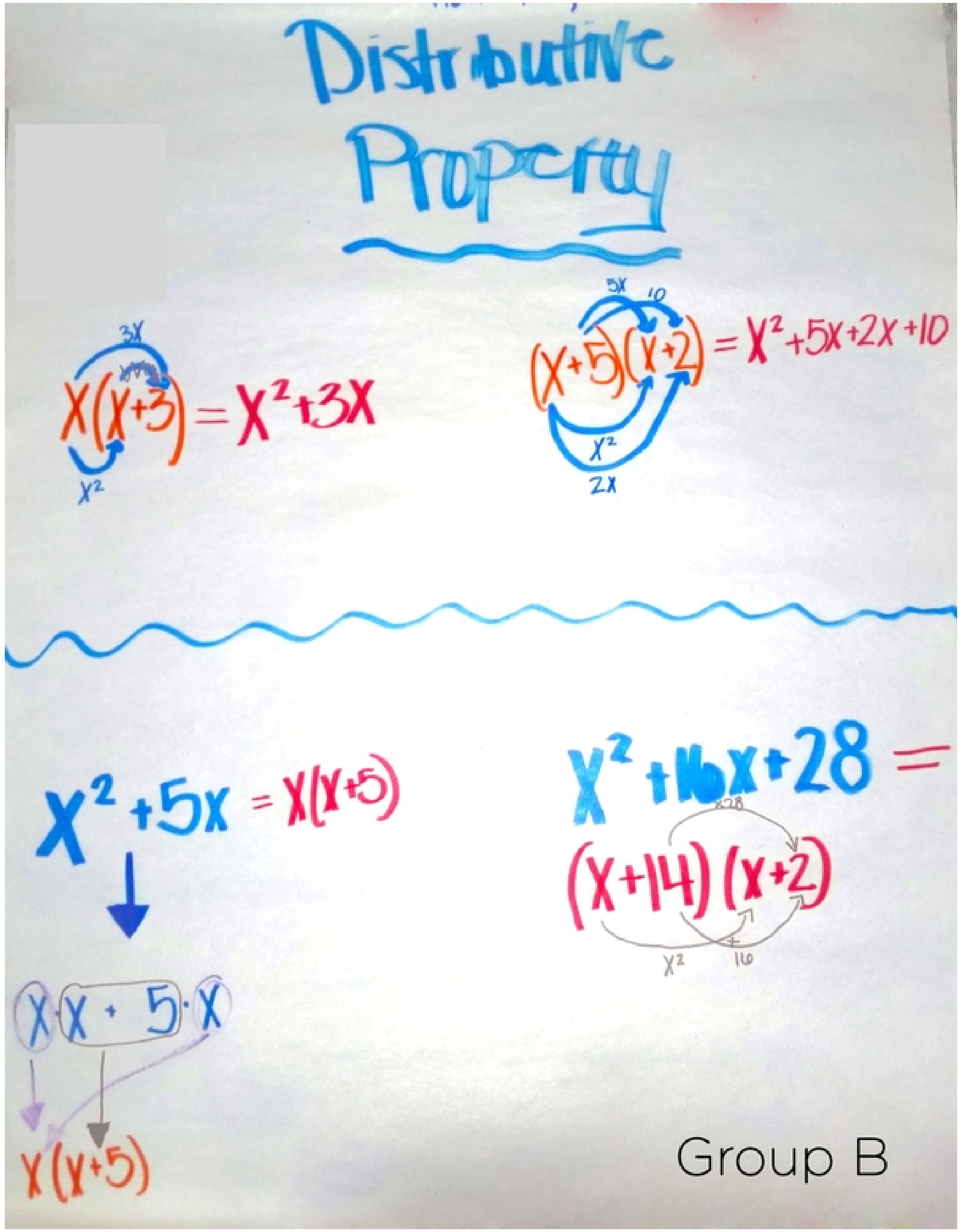
Quadratic Functions

Group A

Students have some explanation of how they would find factored form. The students are accurate with their factoring. However, the descriptions are not clear. A reader would have to have a clear understanding of factoring to make sense of what the students are saying.

On the right side of the chart, students inaccurately explain expanding the monomial X binomial. When expanding the binomial X binomial, students show all of the multiplication that needs to be done.

Question(s) to the Group might be: "Can you explain a little more about how you found the expanded from of x(x + 3) to be x2 + 3x?"



Quadratic Functions

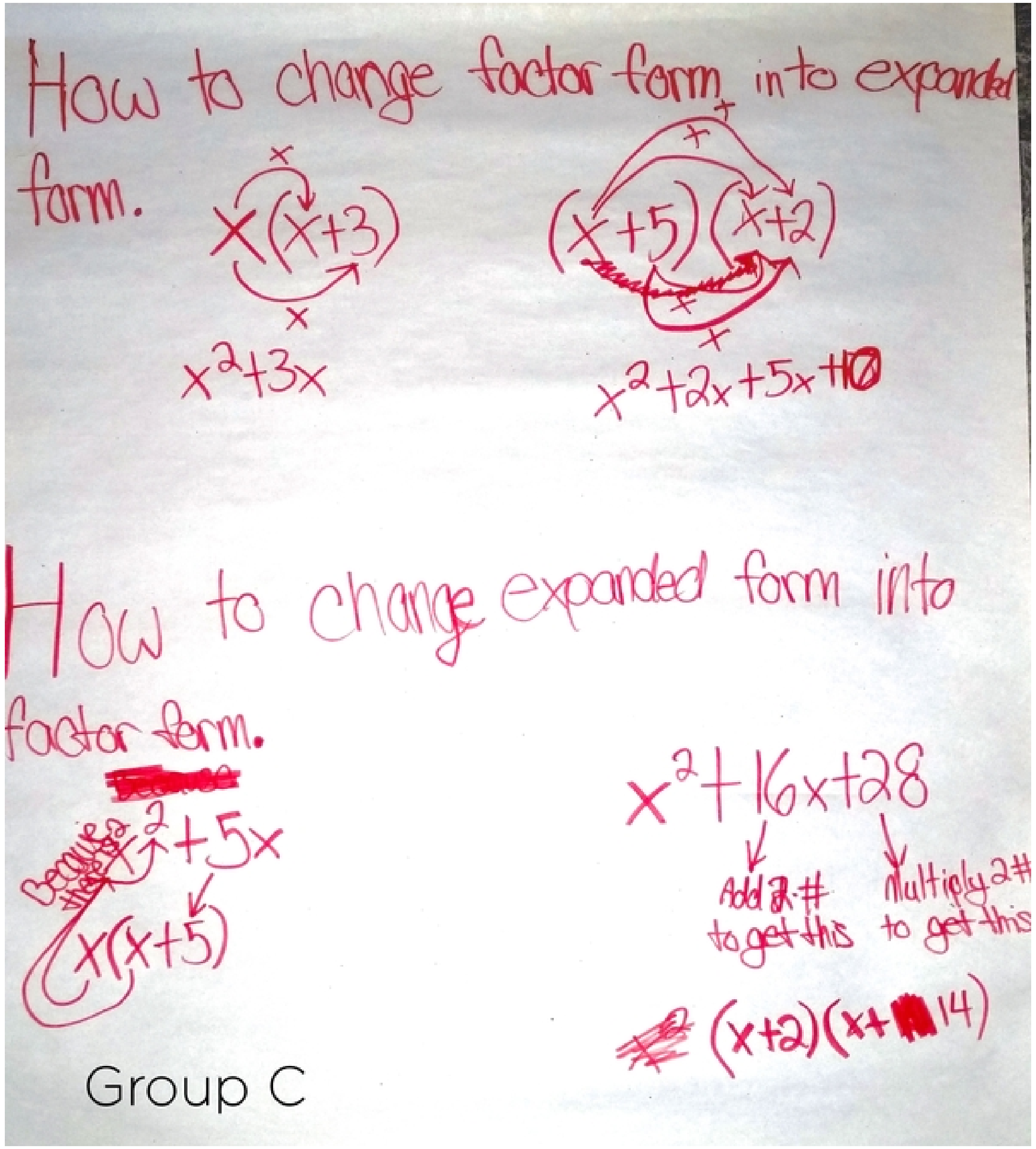
Group B

On the top of the chart, students use arrows as a way to explain the multiplication when changing the expression from factored form to an equivalent expanded form.

On the bottom of the chart, students attempt to show how to factor. Students expand the binomial to show the common factor of x in each term. In this part of the poster, the arrows seem to carry a different meaning.

The diagram showing the factoring of the trinomial is less clear. Students show that the factored form of the trinomial is accurate. However, it is not clear how they found the two linear factors.

Question(s) to the Group might be: “What do the arrows on your chart mean? Do the arrows always mean the some thing?”



Quadratic Functions

Group C

On the top of the chart, students use arrows as a way to explain the multiplication when changing the expression from factored form to an equivalent expanded form. Note that the action of the arrow is shown with at multiplication sign.

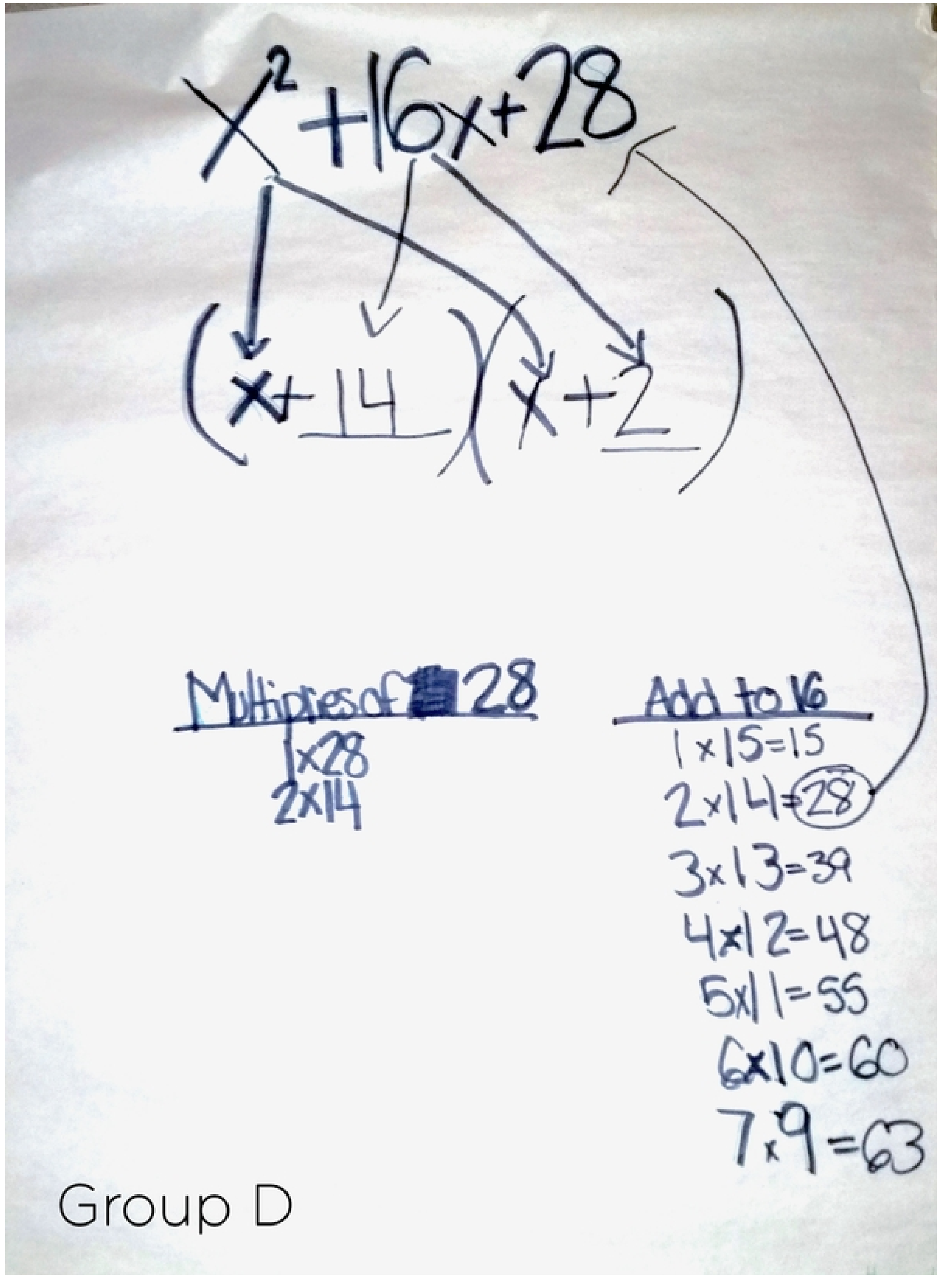
It is not clear that the students know how to simplify x2 + 2x + 5x + 10. They may have left the expression in this form to “explain” the parts of the multiplication.

On the bottom of the chart, students attempt to show how to factor.

Expanding the binomial seems to be difficult to explain. It is not clear if the students understand why the variable in the term 5x is no longer notated in the expression (x+ 5).

Question(s) to the Group might be: “Why does 5x -> 5? What happened to x? Why is this accurate?”

The diagram with the factorization of the trinomial shows that these students know a process for factoring the expression.


x² + 16x + 28
(x + 14)(x + 2)
Multiples of 28
1x28
2x14
Add to 16
1x15=15
2x14=28
3x13=39
4x12=48
5x11=55
6x10=60
7x9=63

Group D

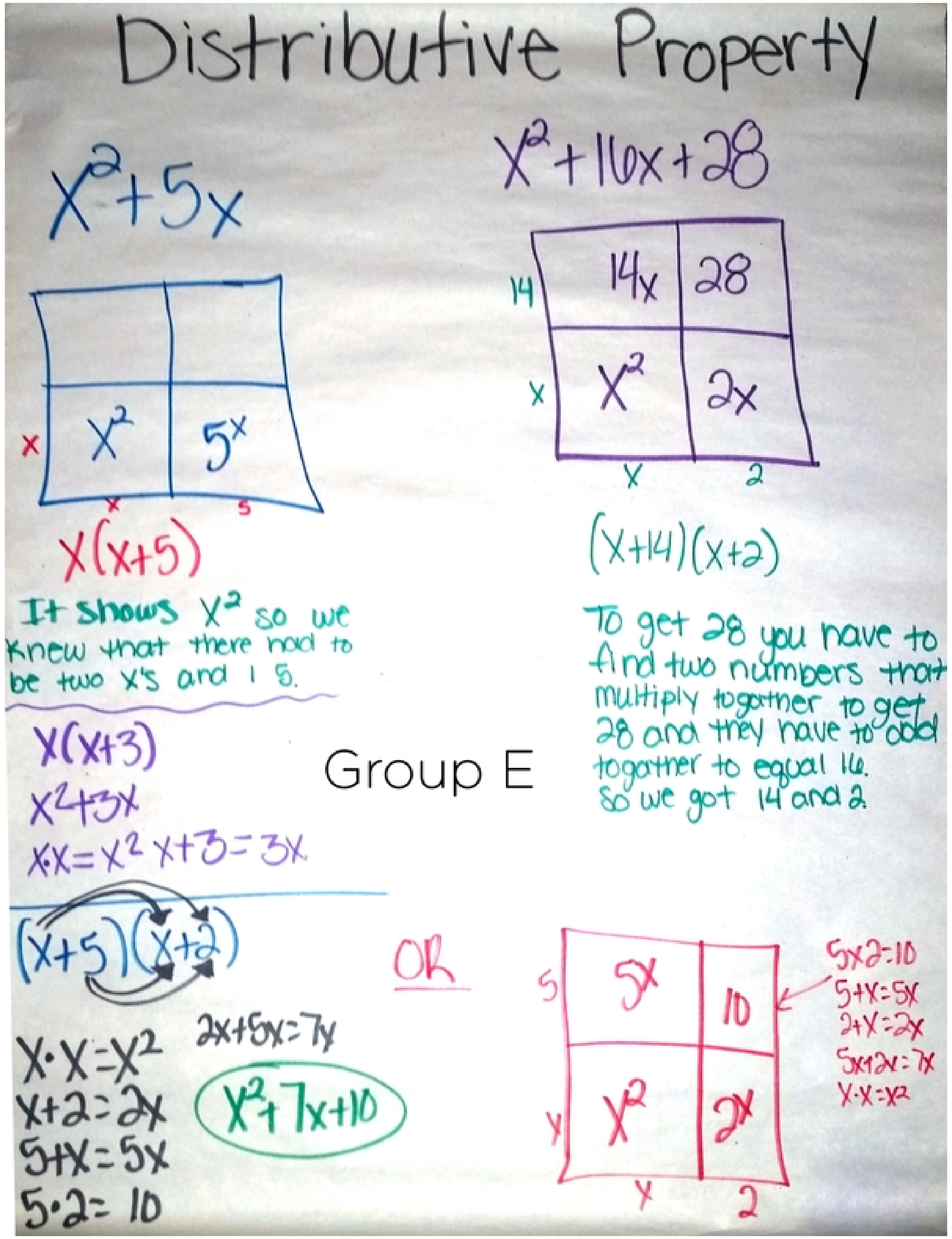
Group D

Students provide some detail about how they think about factoring a quadratic trinomial into two linear factors.

The students do not show all of the factors of 28. (That they have mislabeled as multiples.) It is not clear if students do not know all of the factors, or if they stopped finding factors because 2 and 14 satisfied their search.

This poster shows how to factor a quadratic trinomial. We have no evidence that these students can factor a quadratic binomial. Or, if they can expand quadratic expressions.

Question(s) to the Group might be: “How does this process change if we need to factor the binomial expression x2 + 16x?



Group E

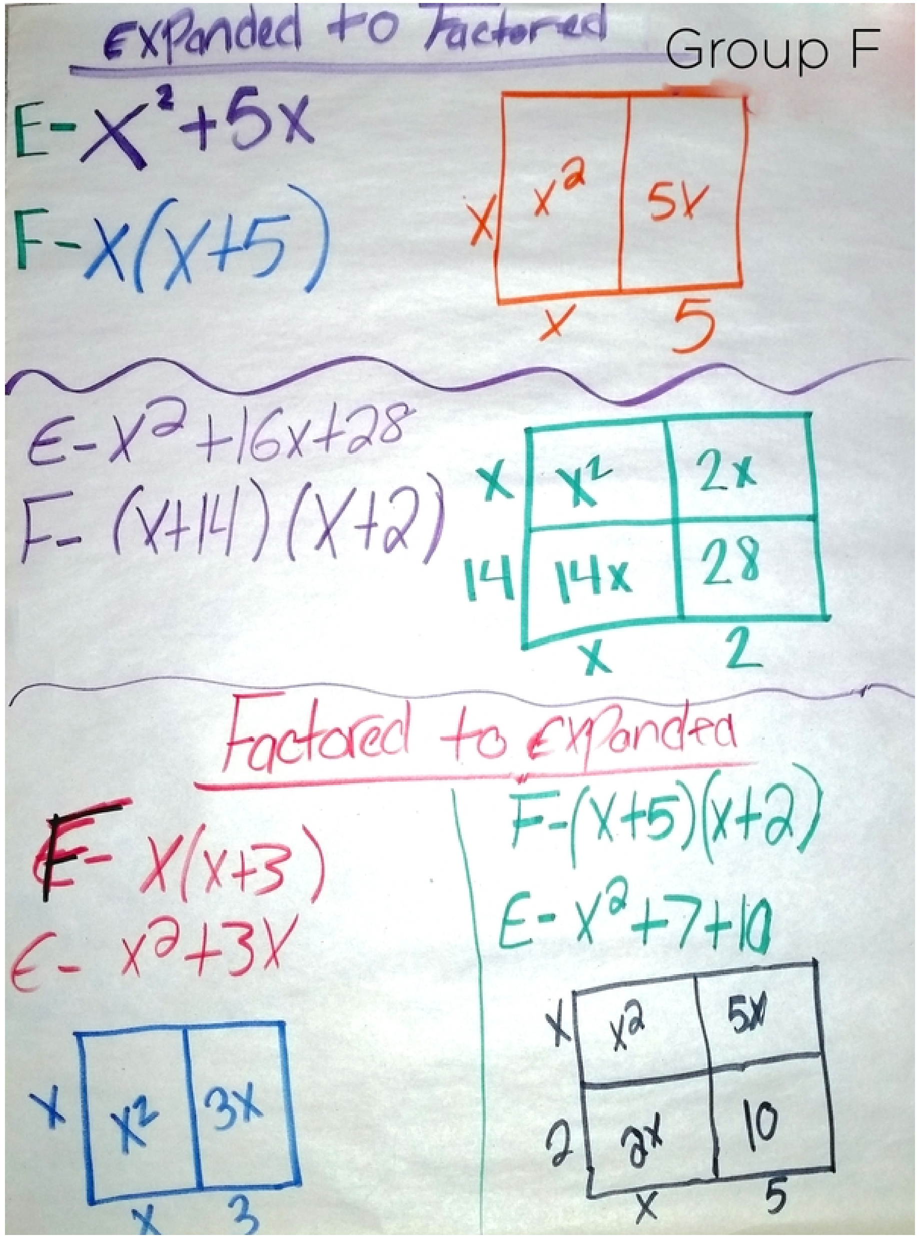
Quadratic Functions

Group E

On the top of the chart, students use an area model to help explain how to factor quadratic expressions. The writing below each picture explains some of the students' thinking to finding the dimensions of the rectangles, which helps them find the linear factors of the quadratic expression.

To expand the expressions, students in this group write-out the multiplication, use arrows to show the multiplication, and draw an area model to help explain the multiplication. This group chose to show multiple representations to explain to the expanding of the expressions.

Question(s) to the Group might be: "Why did you choose to show the factoring using the area model, but when expanding you selected more than one way to think about it?"



Quadratic Functions

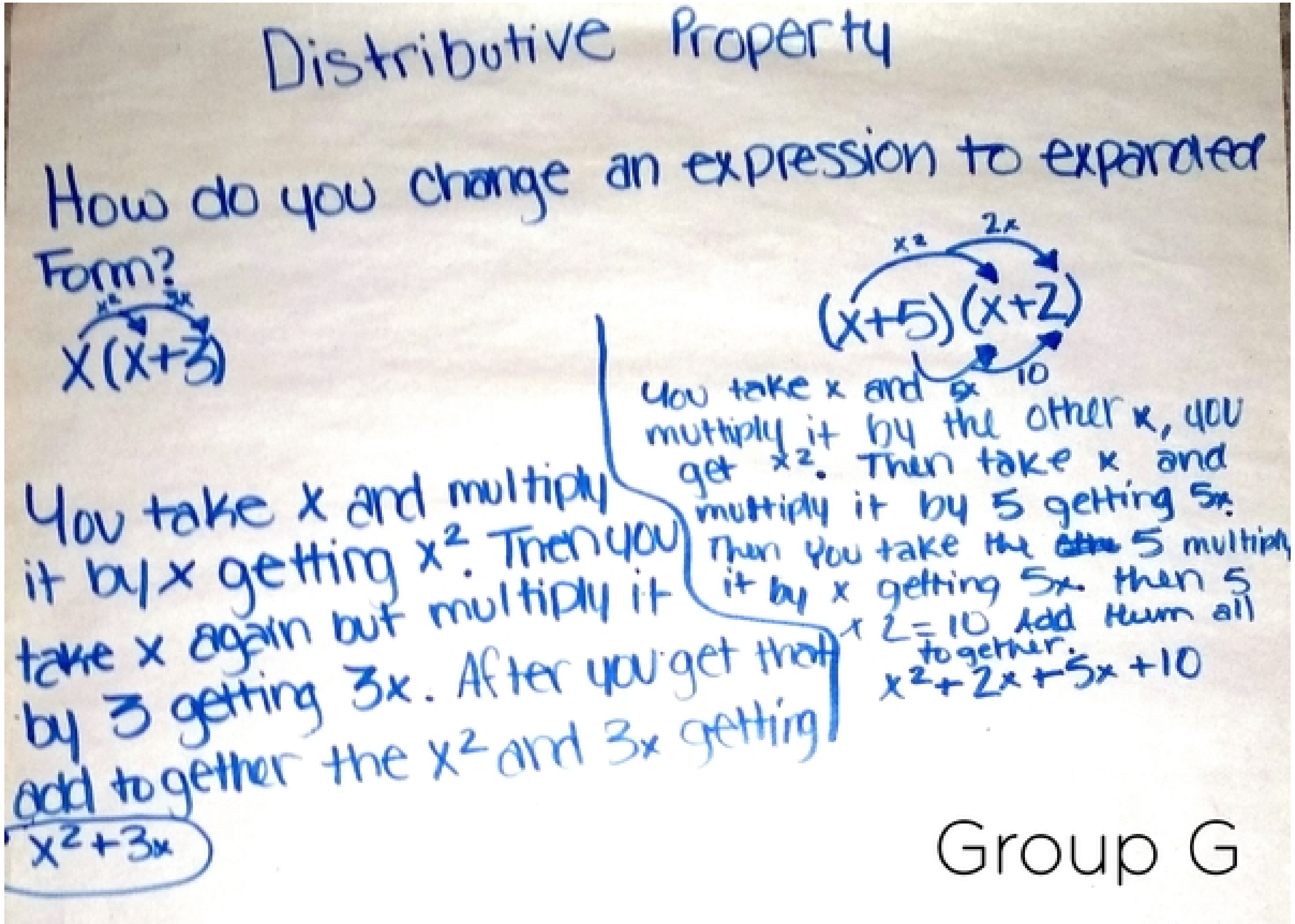
Group F

Students show the use of the area model to accurately express both expanded and factored forms of the quadratic expressions.

There is one error in the last expression. Students write x2 + 7 + 10. The middle term should be 7x. Since 2x and 5x are shown in the area sections of the rectangle, one might assume that this was just a writing error, not truly a mathematical misunderstanding.

Question(s) to the Group might be: “How did you use the area model, to help you think about and write equivalent expressions?”

Frogs, Fleas and Painted Cubes
Quadratic Functions


Distributive Property
How do you change an expression to expanded Form?
X(X+3)
You take x and multiply it by x getting x². Then you take x again but multiply it by 3 getting 3x. After you get that add together the x² and 3x getting
x²+3x
(x+5)(x+2)
You take x and multiply it by the other x, you get x². Then take x and multiply it by 5 getting 5x. Then you take the 5 multiply it by x getting 5x. then 5 × 2 = 10 Add them all together.
x²+2x+5x+10
Group G

Group G

Students in this group use arrows and explain how to expand the quadratic expressions.

When explaining the distribution of a binomial over a binomial (binomial X binomial), students make an error of saying that they get 5x twice. However, the arrow notation and their expression show the correct terms: 5x and 2x.

Note that their use of arrows is different from some groups. The notation with the arrow shows the result of the multiplication.

Question(s) to the Group might be: “How does explaining how to expand an expression, help you think about how you might factor a quadratic expression? How might you start at the end and work backward?”