## Lesson 8: Equivalent Quadratic Expressions

* Let’s use diagrams to help us rewrite quadratic expressions.

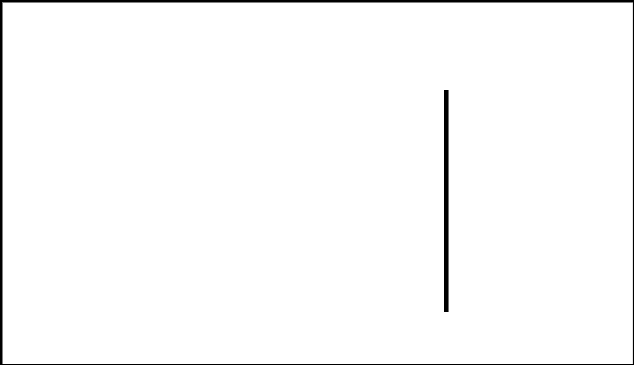
### 8.1: Diagrams of Products



1. Explain why the diagram shows that .
2. Draw a diagram to show that .

### 8.2: Drawing Diagrams to Represent More Products

Applying the distributive property to multiply out the factors of, or expand, gives us , so we know the two expressions are equivalent. We can use a rectangle with side lengths and 4 to illustrate the multiplication.

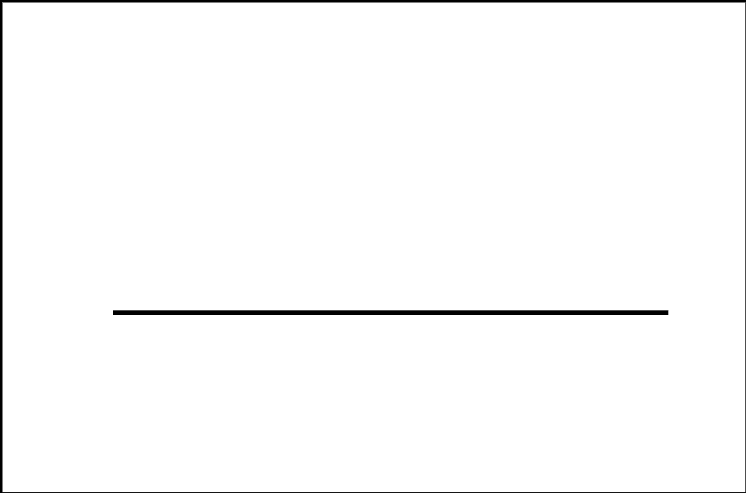


1. Draw a diagram to show that and are equivalent expressions.
2. For each expression, use the distributive property to write an equivalent expression. If you get stuck, consider drawing a diagram.

* a.
* b.
* c.
* d.

### 8.3: Using Diagrams to Find Equivalent Quadratic Expressions

1. Here is a diagram of a rectangle with side lengths and . Use this diagram to show that and are equivalent expressions.

* 

1. Draw diagrams to help you write an equivalent expression for each of the following:
2. Write an equivalent expression for each expression without drawing a diagram:

#### Are you ready for more?



1. Is it possible to arrange an by square, five by 1 rectangles and six 1 by 1 squares into a single large rectangle?  Explain or show your reasoning.
2. What does this tell you about an equivalent expression for ?
3. Is there a different non-zero number of 1 by 1 squares that we could have used instead that would allow us to arrange the combined figures into a single large rectangle?

### Lesson 8 Summary

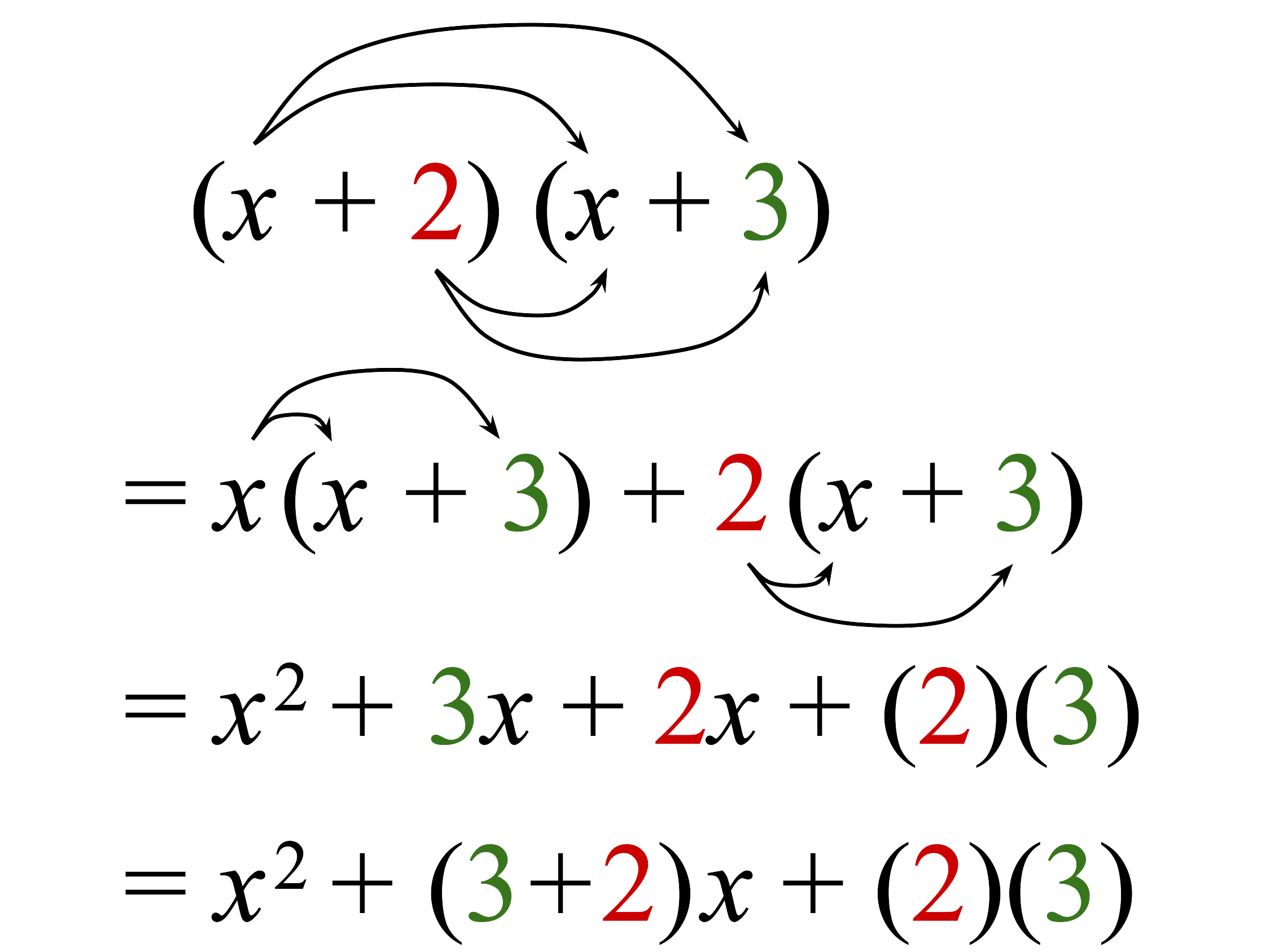
A quadratic function can often be defined by many different but equivalent expressions. For example, we saw earlier that the predicted revenue, in thousands of dollars, from selling a downloadable movie at dollars can be expressed with , which can also be written as . The former is a product of and , and the latter is a difference of and , but both expressions represent the same function.

Sometimes a quadratic expression is a product of two factors that are each a linear expression, for example . We can write an equivalent expression by thinking about each factor, the and , as the side lengths of a rectangle, and each side length decomposed into a variable expression and a number.



Multiplying and gives the area of the rectangle. Adding the areas of the four sub-rectangles also gives the area of the rectangle. This means that is equivalent to , or to .

Notice that the diagram illustrates the distributive property being applied. Each term of one factor (say, the and the 2 in ) is multiplied by every term in the other factor (the and the 3 in ).



In general, when a quadratic expression is written in the form of , we can apply the distributive property to rewrite it as or .



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