Part 1: Discovering an Area Model

💬 = turn and talk. Stop and share your responses with your partner. Notice when you have different answers.

1. What does the *area of a rectangle* have to do with *multiplication*? 💬

2. Play with Area Model Algebra for 5 minutes. Write down two things you notice or have questions about, and one thing a neighbor noticed that is interesting to you.
    a.

    b.

    c.

Part 2: Understanding an Area Model

Use the Explore Screen to answer the following questions.

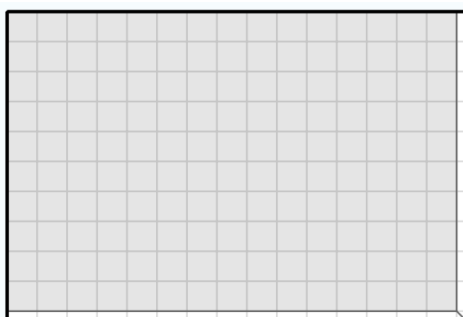
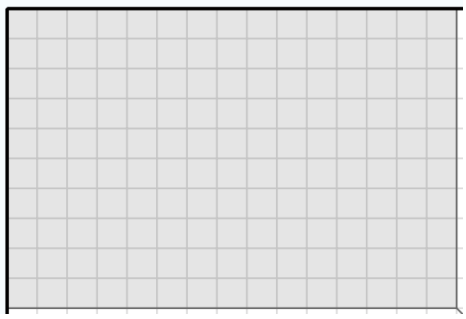
1. Explain what the red and blue sliders do to the *outside* of the rectangle.

2. Explain what the red and blue sliders do to the *inside* of the rectangle.

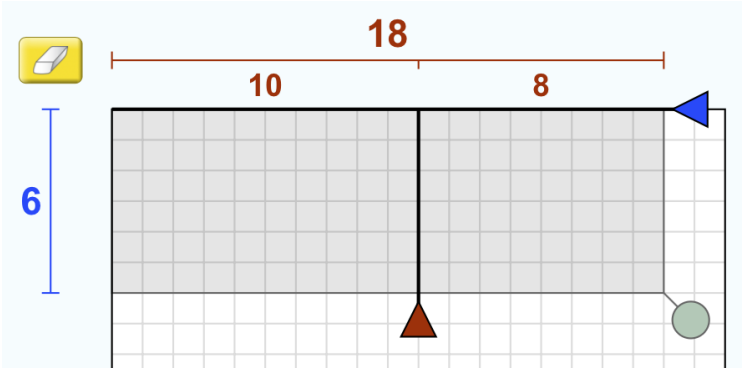
3. Describe what changes and what doesn't change when the red and blue sliders are moved. 💬

What changes	What doesn't change

4. Multiply 10×15 using an area model. Find two different ways to partition the 10x15 rectangle. Use the sim to support you in filling out this table. 💬

Problem	Labeled Area Model with partial products	List partial products and write as a sum	Total area of rectangle
10×15			
10×15			

5. Use the sim to model 6×18.



What is the total area of this rectangle? Represent the total area in multiple ways.

SUMMARY

6. In an area model, how do the partial products (interior numbers) get calculated?

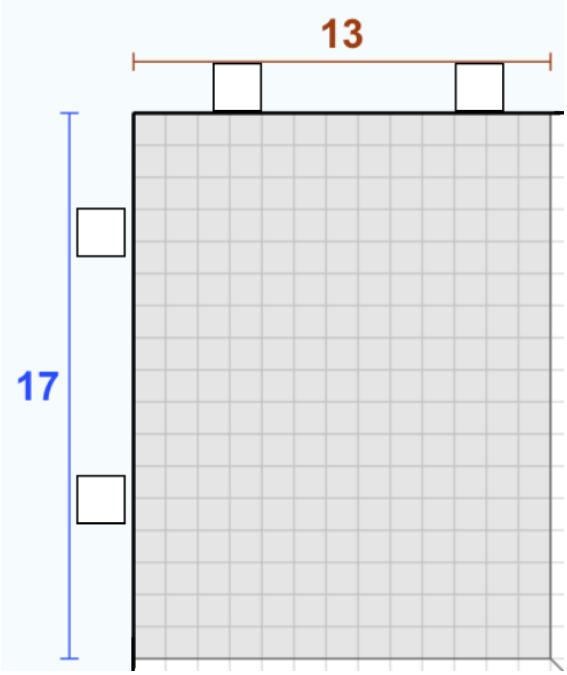
7. In an area model, what are *two different ways* the total area could get calculated?

8. How do the partial products relate to the total area of the area model?

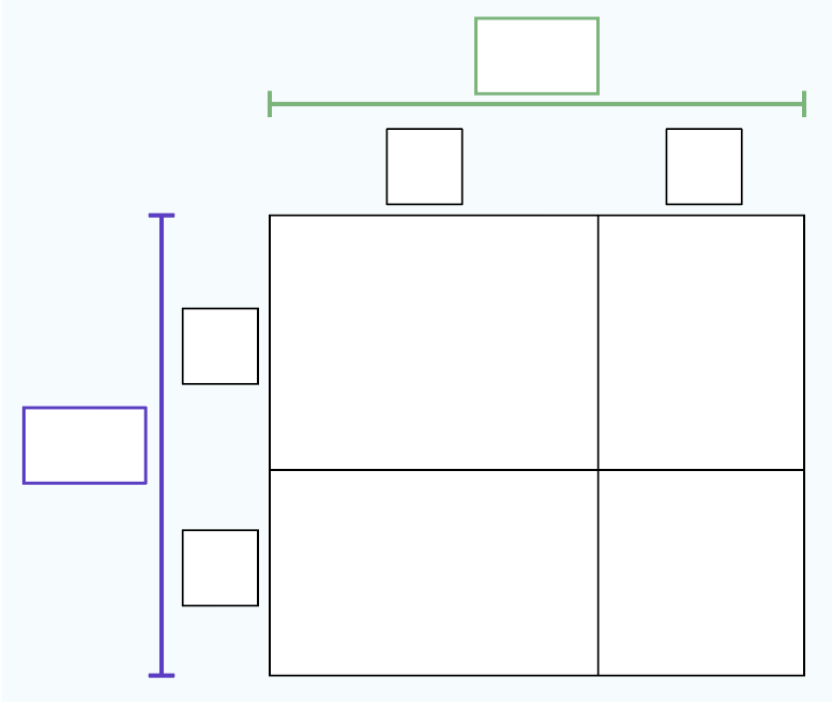
Part 3: Using an Area Model

Use the Explore Screen and Generic Screen to answer the following questions.

1. Suppose we want to find the product of 17 and 13 using an area model.
    a. Draw and label your partitions on the scaled area model below.



    b. Draw and label your partitions on the generic model below.



c. 💬 Discuss with your group: How does your area model compare to those in your group? What is the same? What is different?

d. Justify how you know your model represents 17x13. Does your area model represent 17✕13? How do you know? 💬

2. Challenge yourself to work through levels 1-2 of the Area Model Numbers Game!

SUMMARY

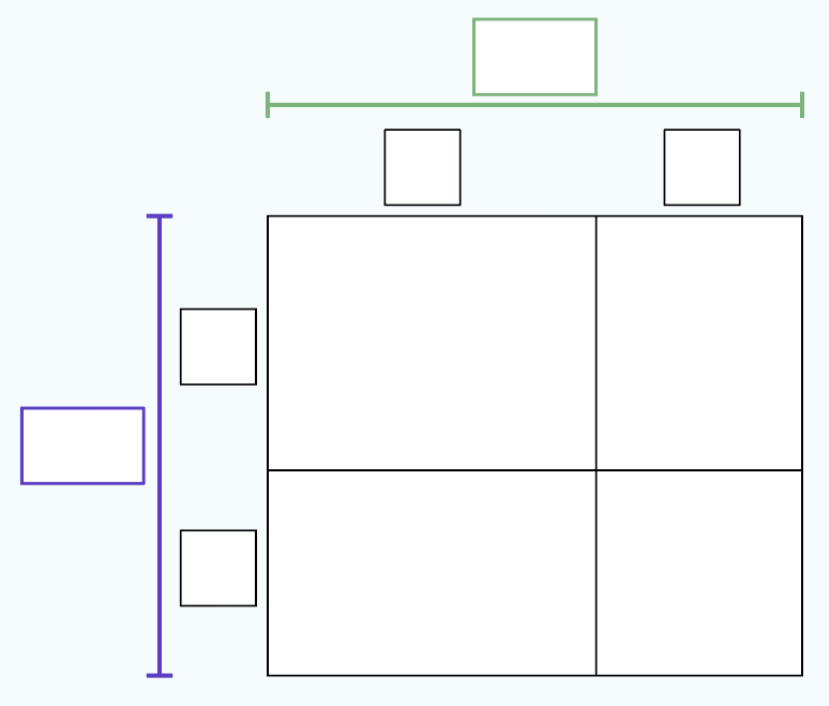
3. What are three different ways you could partition 17?

a. $\square + \square = 17$

b. $\square + \square = 17$

c. $\square + \square = 17$

4. Write your own 2-digit times 2-digit multiplication problem that uses an area model, and find the total area.



5. What is a convenient way to break up a multiplication problem into an area model, and why is it convenient for you?

Part 4: Applying an Area Model

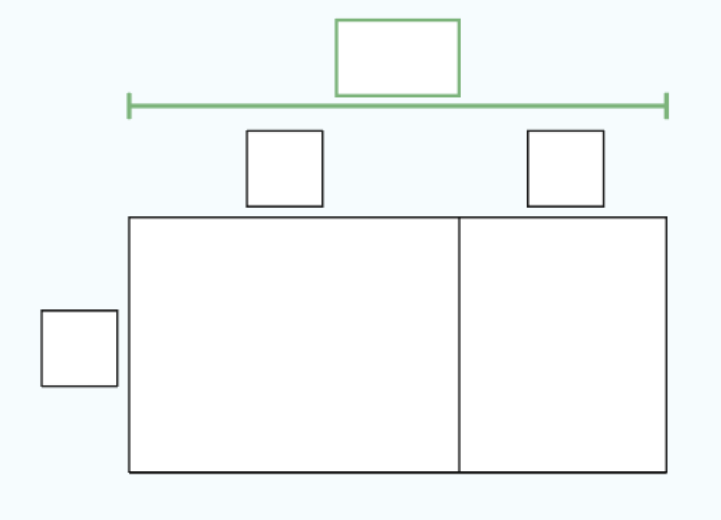
Use the Variables Screen to answer the following questions.

1. Play around with entering your own variable expressions, then answer the following.
    a. In an area model, how do the partial products (interior numbers) get calculated?

    b. In an area model, how does the total area get calculated?

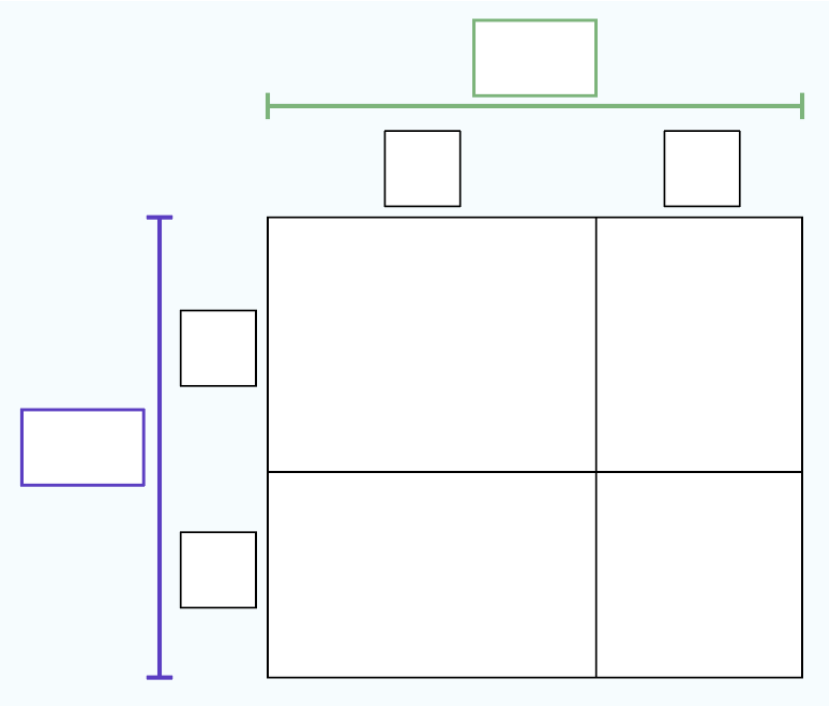
    c. How do the partial products relate to the total area of the area model?

2. Use the sim to model $6(x+8)$.



What is the total area of this rectangle? Represent the total area in multiple ways.💬

3. Use the sim to model $(x + 3)(x - 5)$.



What is the total area of this rectangle? Represent the total area in multiple ways.💬

4. Challenge yourself to work through levels 1-4 of the Area Model Algebra Game!

SUMMARY

5. How is multiplying *variable expressions* using an area model similar to multiplying *numbers* using an area model?

EXTENSION

The Area Model sim is playing tricks on you! It gives you the partial products, but not the side lengths. What numbers and/or variables must be on the outside of this rectangle?