Name: _____

Area Model Introduction

Learning Goals
1. Define area by using an "Area Model" by using multiplication of two factors.
2. Use factors of a number to construct functions.
3. Discover factors of a given number and depict those numbers using the area model.

Instructions:

In this activity, the above questions are investigated. Complete this document by filling in data tables and writing complete responses.

This investigation has three phases:
- Exploration
- Explanation
- Challenge

Procedure:

In this activity, we will further explore how to construct an area to represent a function. We will also define the area of functions when two factors are multiplied.

1. To access the simulation:
   a. Type this website in: **phet.colorado.edu**
   b. In the search bar type in: **Area Model Introduction**
   c. Click on the **play** button
   d. Select the **"Multiply"** tab
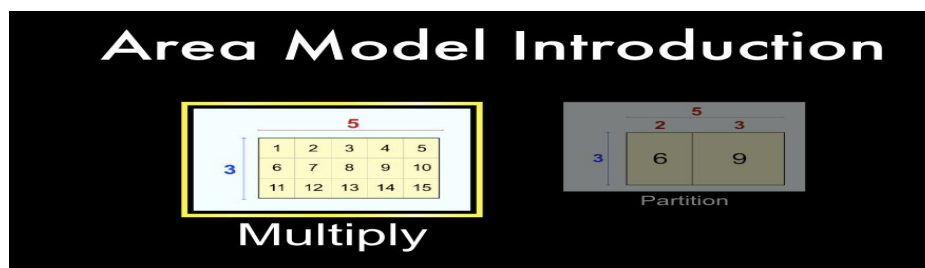
2. Your computer screen should now look like this. Take a minute to examine the different parts of the simulation before you explore.

Factors 1 × 1
Product Area = 1
10x10 12x12

Explore

3. Using the factors on the left, highlighted in blue and red, record the expression and its product.
    a. Factors = _____X_____
    b. Area = _____

4. Click each arrow, blue and red, once. Record your factors and their area in the table below for each trial.

Factor X Factor	Area

Describe your results for each trial. How does your picture change as the factors change?

_____

_____

5. Using the **blue arrow,** select "3".

Factors 3 × 1

6. Using the **red arrow,** select "2"
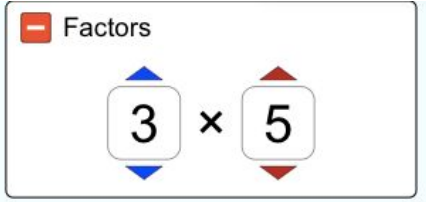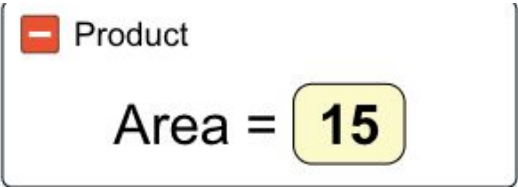
Factors 3 × 2

7. Given the factors below:
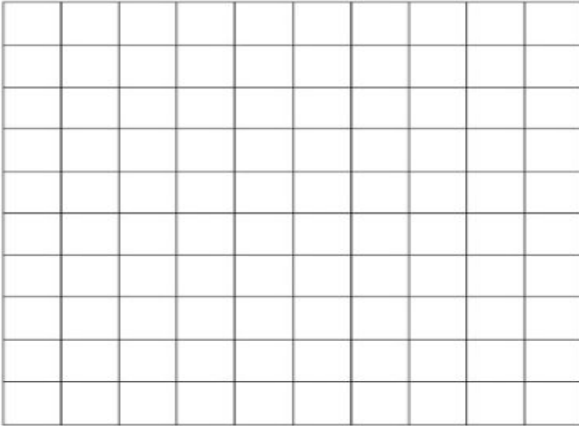   **Step 1: Construct the array model using the blue and red arrows.**
    Step 2: Draw the array model in the space provided.
    Step 3: Number the boxes in the figure to demonstrate the model.
    Step 4: Record the product (Area) of the array.

Factor X Factor	Area
Ex: 3 x 5 **Step 1** Factors 3 × 5 **Step 2** 5 1 2 3 4 5 3 6 7 8 9 10 11 12 13 14 15 **Step 3 (label the boxes with numbers)**	**Step 4** Product Area = 15
6 x 3	

4 x 2

Describe your results for each trial. How do the numbers you input to the machine compare the output numbers?
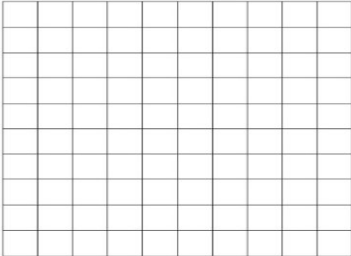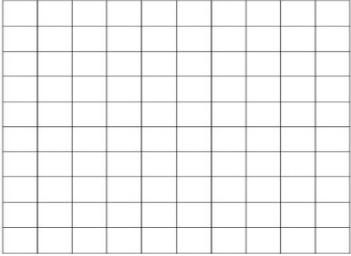
_____

_____

Explain: Part A
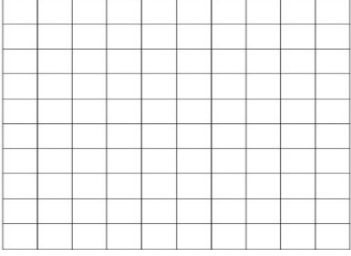
In multiplication factors are numbers we can multiply together to get another number.

An **area model** is a rectangular diagram or **model** used for multiplication and division problems, in which the factors or the quotient and divisor define the length and width of the rectangle.

Directions: For each question set, determine the area of the given models.

8. Determine the area of the models using the given factors and array model. Draw what you see.
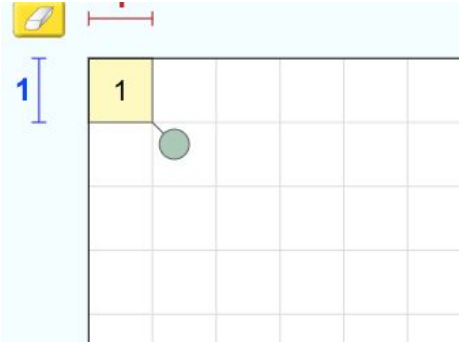
Factors	Array Model	Area/Product
6 X 8		
10 X 5		
4 X 7		

Explain: Part B

Now that you've been introduced to factors and have used them to find areas, come up with any product and use different arrays to model the factors. A **product**, also known as *area*, is the number you get when you have multiplied two factors together.

- Choose a product:
  - <mark>**Ex: 20**</mark>
- Think of how many factors can be multiplied together to give you your given product.
  - <mark>**Ex: 4 X 5 and 2 X 10.**</mark>
- Use the area model to match each set of factors.
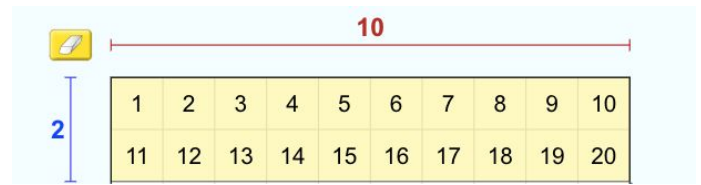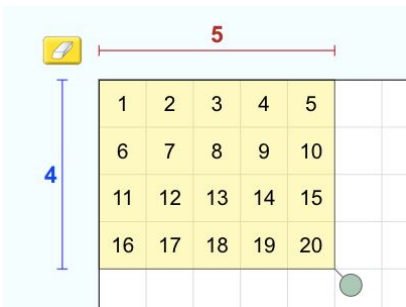
Notice that the product (area) both cover 20 squares in total. These are just two different ways to demonstrate this area.

9. Let's try working backward! List a product below (***less than 100***). Draw two different array models that can

Products	Factors	Array Model

Exit Ticket:

1. What is an area model?

   _____

   _____

2. Choose any two factors, each one less than 10, and represent it in the area model below.

   _____

   _____