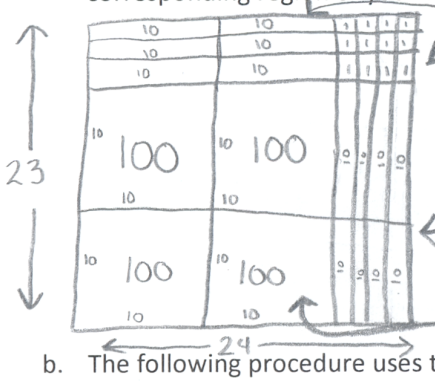
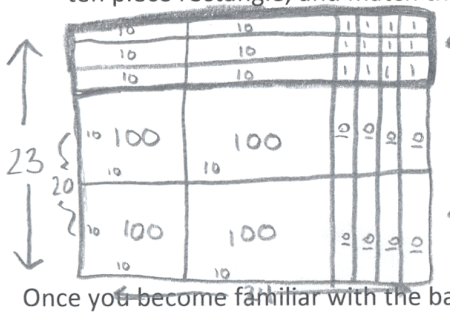
5. The rectangular model for multiplication corresponds very closely to the traditional paper-and-pencil algorithm for multiplication. Use your base-ten pieces to form the rectangle representing 23 X 24.
   a. Here is a paper-and-pencil procedure that uses four partial products for multiplication. Make a diagram of the base-ten pieces rectangle representing 23 X 24. Clearly match each partial product with the corresponding region of your diagram.



24		
X 23		
12	(3 X 4)	Partial products
60	(3 X 20)	
80	(20 X 4)	
400	(20 X 20)	
552		

   b. The following procedure uses two partial products for multiplication. Make another sketch of your base-ten piece rectangle, and match the parts of the rectangle with the corresponding partial products.



24		
X 23		
72	(3 X 24)	Partial products
480	(20 X 24)	
552		

6. Once you become familiar with the base-ten piece model, it is easy to sketch diagrams of rectangles in order to compute products. For example, to compute 33 X 41, you would outline the rectangle as in the first sketch below and fill it with flats, longs, and units as in the second sketch. The product is obtained by counting the base-ten pieces, 12 hundreds, 15 tens, and 3 units, and regrouping to obtain 1 thousand, 3 hundreds, 5 tens, and 3 units (1353).

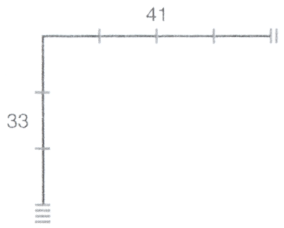


Figure 1

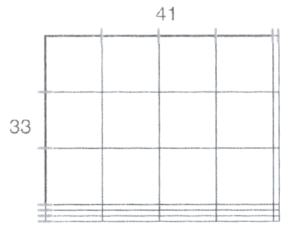
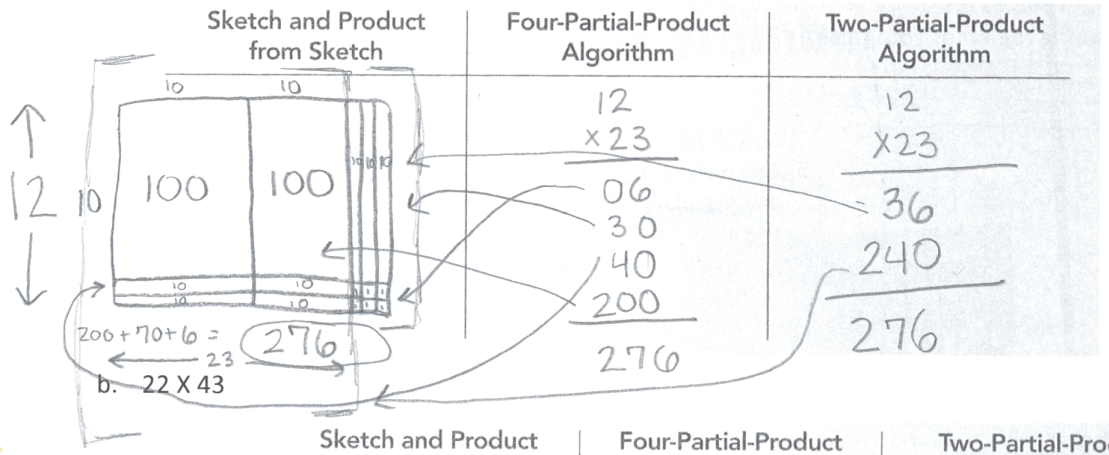


Figure 2

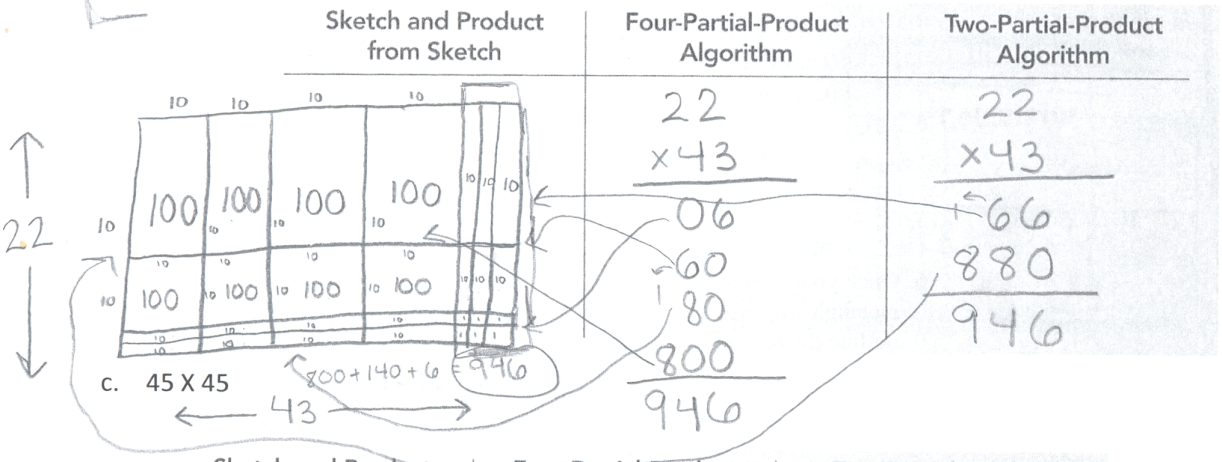
For each of the products on the following page,

(1) Draw a base-ten piece sketch, similar to Figure 2, in the first column.
(2) Determine the product from the sketch and record it below the sketch.
(3) In column 2, compute the product using the paper-and-pencil algorithm with *four* partial products and match the partial products to the corresponding parts of your sketch by marking the partial products on the sketch.
(4) In column 3 compute the product using the paper-and-pencil algorithm with *two* partial products and match the partial products to the corresponding parts of your sketch by marking the partial products on the sketch.

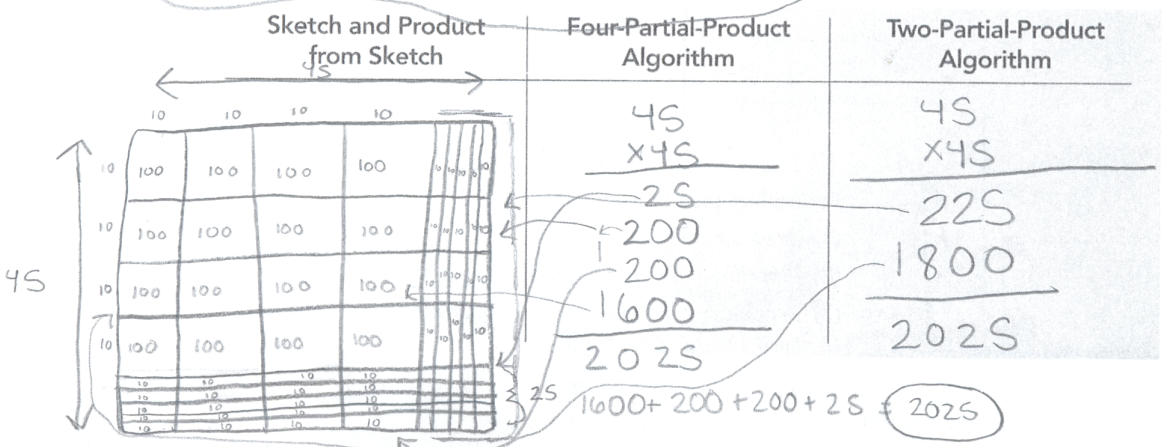
a. 12 X 23



b. 22 X 43



c. 45 X 45



7. Examine the relationship between the four-partial-product algorithm and the two-partial-product algorithm in activity 6 and explain how they are related.

The two product is the four sets simplified by adding the groups to form two sets ie 1 and 2 are added and 3 and 4 are added together.