2013 NCTM Annual Meeting and Exposition
April 17-20, 2013 Denver, Colorado

Reasoning and Proof: Is it true? Convince me!

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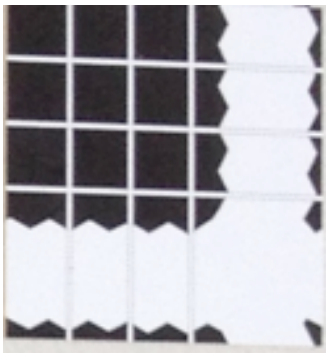
Connecting Geometry and Algebra through Reasoning and Proof

April 18, 2013 – 9:45 to 11:00

Hyatt Regency, Centennial Ballroom G/H

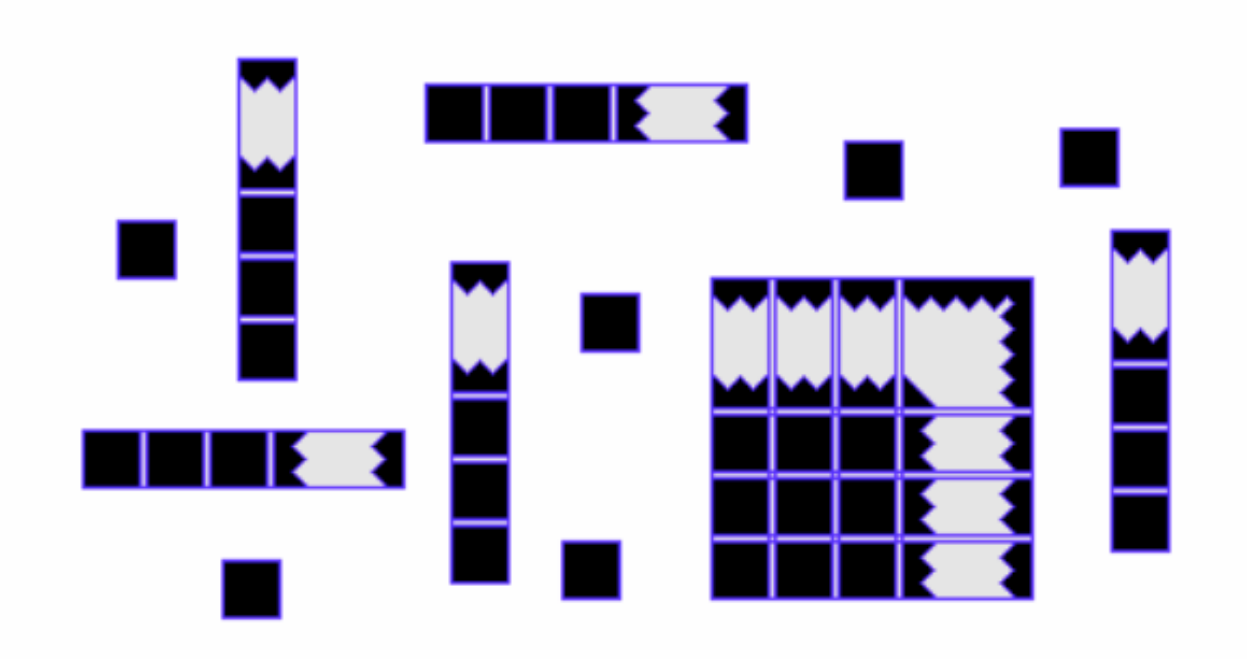
Algebra Pieces

n-square n-strips units



For right now, can we agree that black is positive and red is negative?

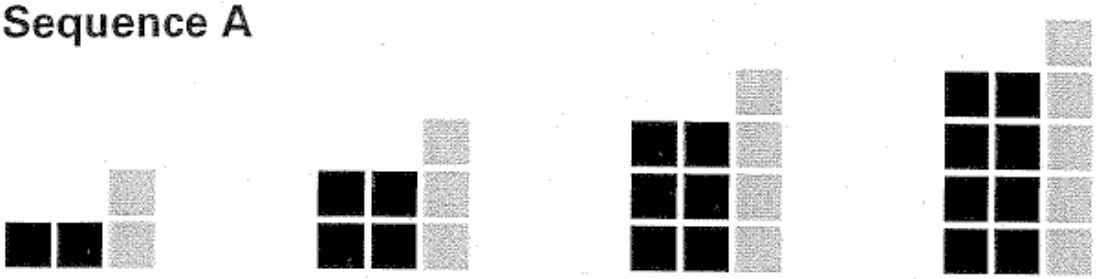
Use all of the pieces below to form one rectangle:



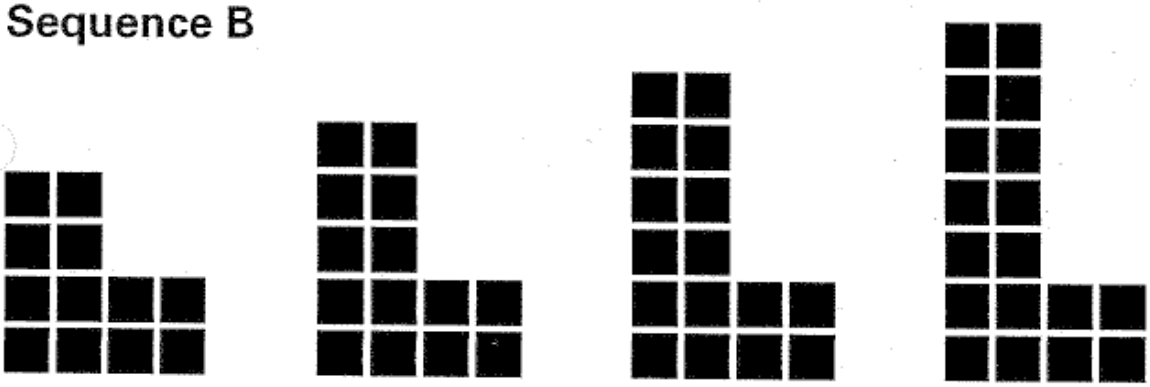
Now, record the area and dimensions of that rectangle. Ask students what they notice about this rectangle and its dimensions?

Use algebra pieces to model the "nth" arrangement of each these sequences:

Sequence A

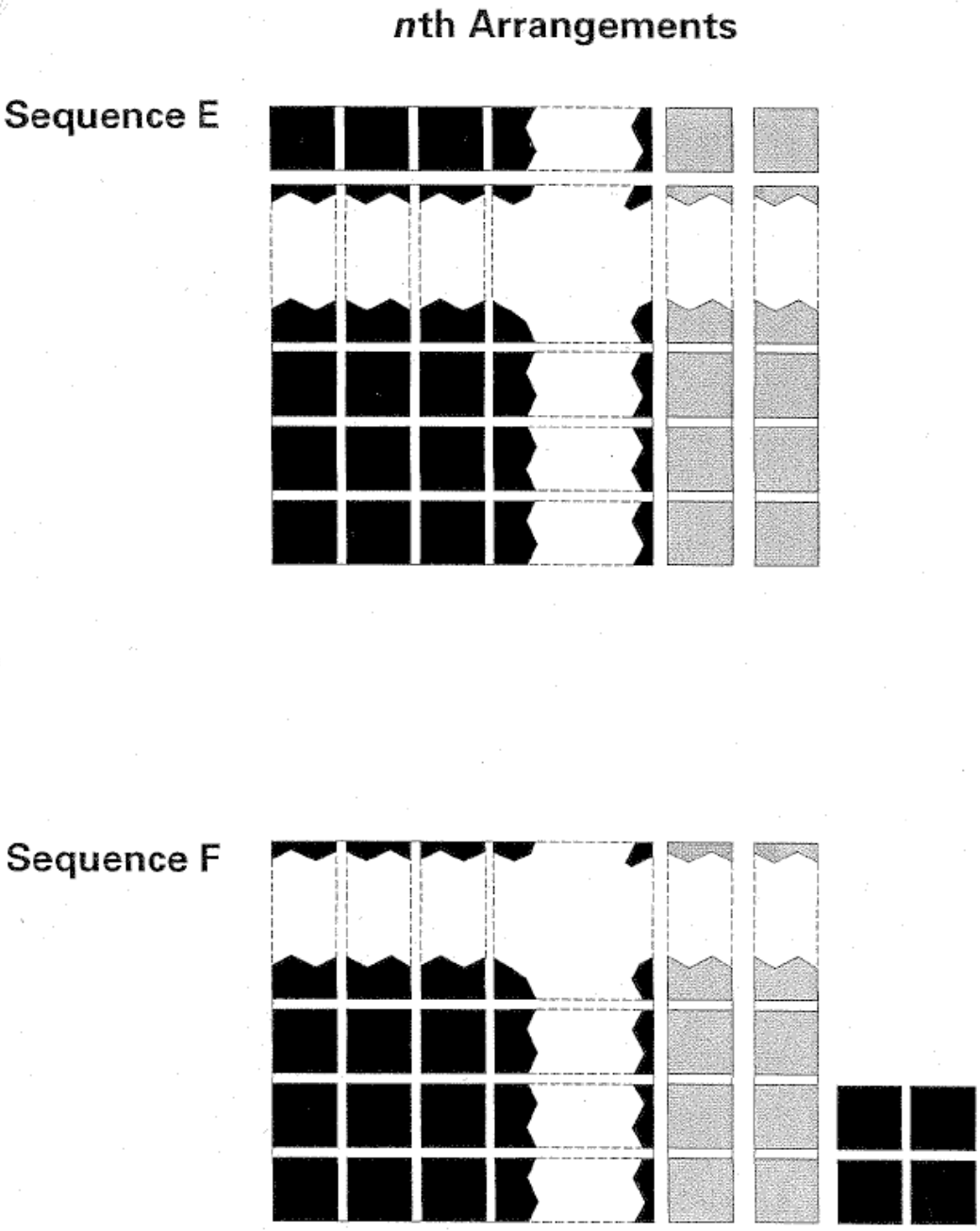


Sequence B



Determine for which arrangement these two sequences have the same value
Stated another way, what value of "n" causes these two sequences to be equal?

Determine for which arrangement these two sequences have the same value:



Now symbolically record the steps used in solving this equation with the algebra pieces:

$$n^2 + n - 2n - 2 = n^2 - 2n + 4$$

$$n^2 - n^2 + n - 2n - 2 = n^2 - n^2 - 2n + 4$$

So, $$n - 2n - 2 = -2n + 4$$

$$n - 2n - 2n - 2 = -2n - 2n + 4$$

So, $$n - 2 = 4$$

$$n - 2 + 2 = 4 + 2$$

So, $$n = 6$$

Use Algebra Pieces to explain and prove why the following number trick works:

Step 1: Pick a number.

Step 2: Triple your number.

Step 3: Subtract 3 from your answer in Step 2.

Step 4: Add 9 to your answer in Step 3.

Step 5: Divide your answer in Step 4 by 3.

Step 6: Add 2 less than your original number.

Ask students to share what they notice about the result.

Now devise your own number trick!

See also **free** Virtual Algebra Pieces app developed by Dr. Laurie Burton of Western Oregon University.

Click on "Virtual" above, the link below, or copy and paste the following in your browser:
http://www.wou.edu/~burtonl/flash/VirtualAlgebraPieces.html