Geometry Off the Geoboard

Discovering the Equation for Finding Area of Polygons

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Numerical Analysis - Required Reading

Ways a function rule can be obtained. Understand this section thoroughly before proceeding.

You have learned previously, a function involves two sets, the domain and the range. Usually there is a rule by which each member of the domain is mapped onto exactly one member of the range. The rule might be a statement such as "Pair each square with the number that is its area. " Often, however, the statement of the rule for a function involves variables. As an example, suppose you are given the following set of ordered pairs: {(-2, -6), (-1, -3), (0,0), (1,3), (2,6), (3,9)}.

If n represents the first component of each pair, then 3n represents the second component and each ordered pair is of the form (n, 3n). The set of ordered pairs is a function, and n -->3n (read "n" is paired with 3n") is a rule for the function.

Examples of the ways a function rule can be obtained are given below. In each case the resulting set of ordered pairs is a function, since each member of the domain is mapped onto exactly one member of the range.

1. The second component may be obtained by multiplying the first component by a number, as in n ---> 1/3n and n--->-5n.

2. The second component may be obtained by adding a number to or subtracting a number from the first component, as in n --->n+2 and n--->n-3.

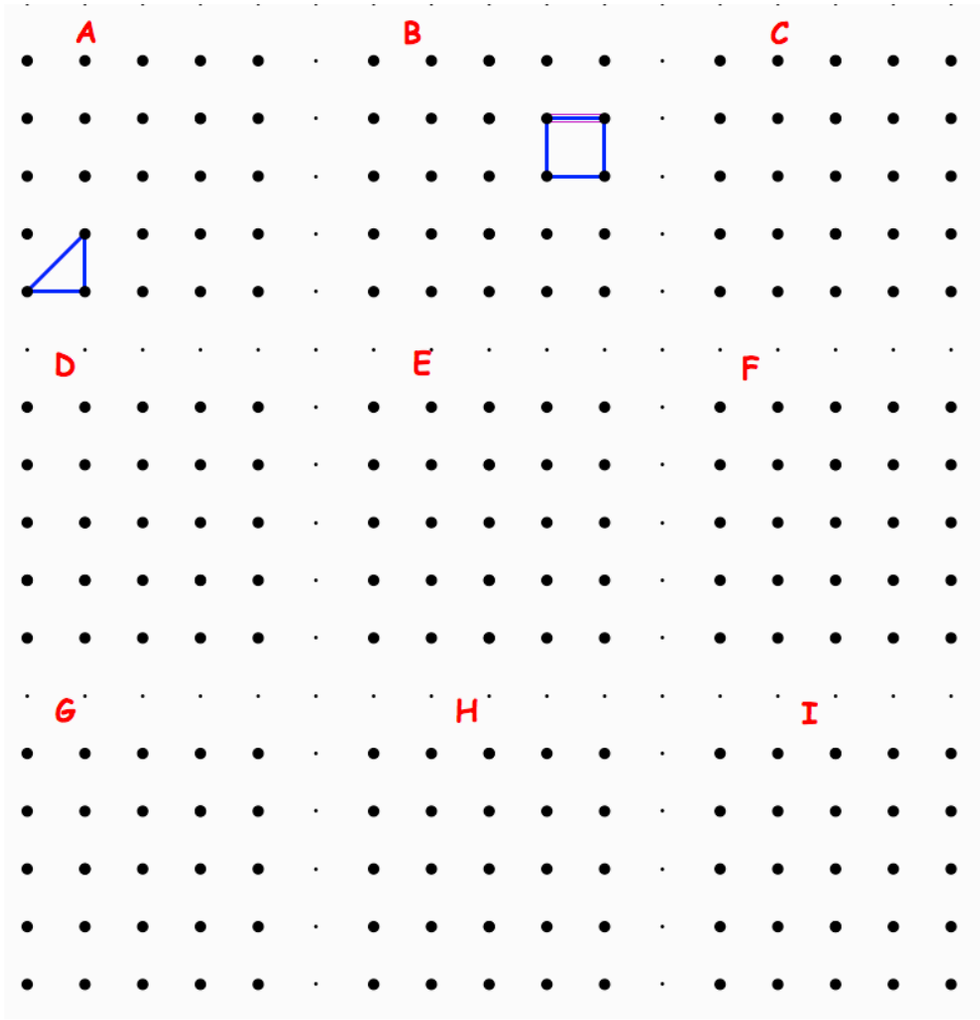
3. The third component may be obtained by multiplying the first component by a number and then adding (or subtracting) a number, as in n --> 2n+3 and n ---> 1/4n-4.
I do not include a rule involving division, such as n -->n / 3, because n -->n / 3 can be given as n ---> 1/3n.

Finding Formula for finding Area of shapes on a Geoboard

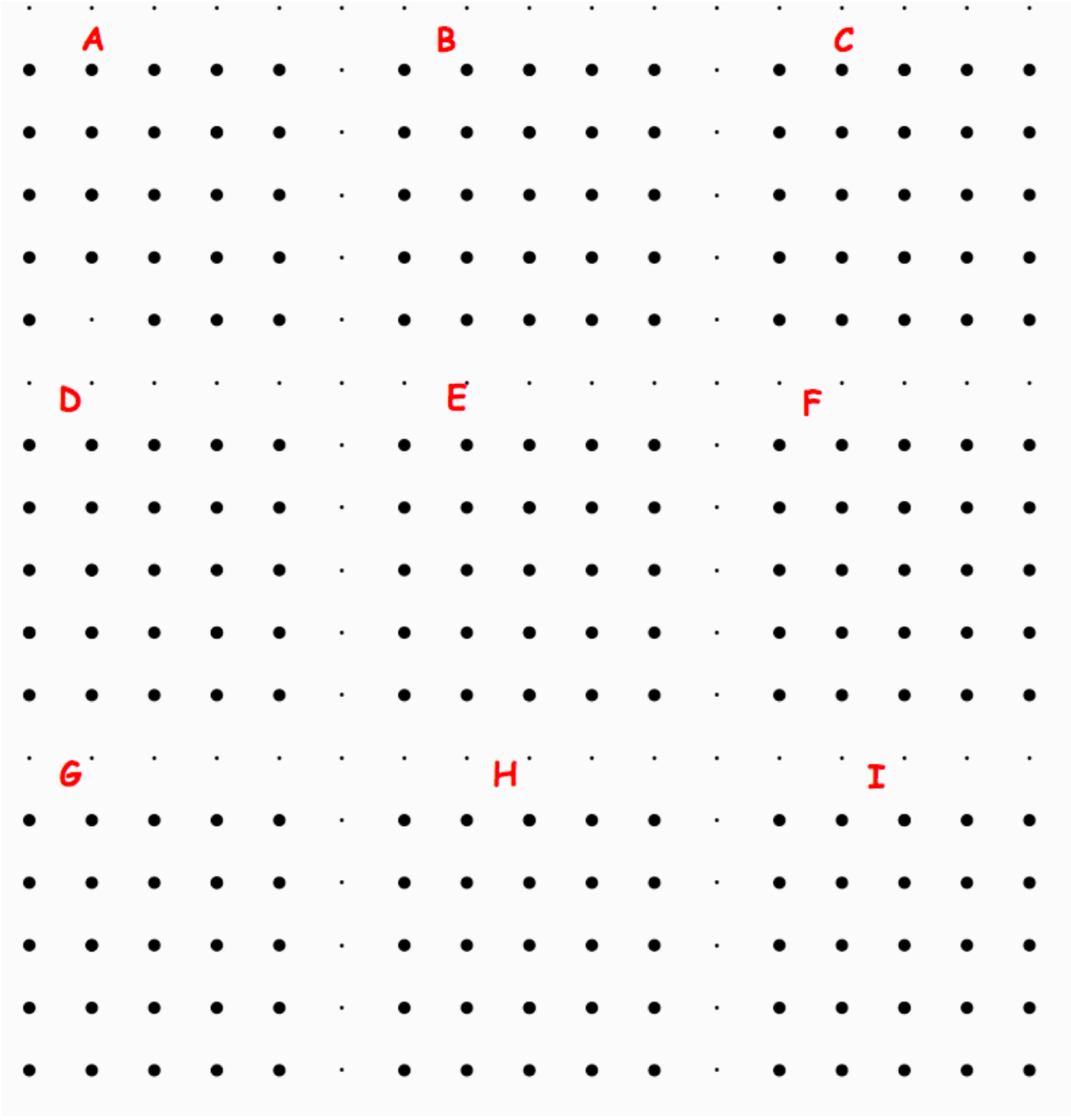
1. Make **five** figures that have **no nails inside**. Keep a record in your toolbox of the nails touching the figures and its area. Draw the figures. Write down the rule.

figure	nails touching	area
A	3	1/2
B	4	1
C	5	
D	6	
E	7	
F	8	
G	9	

Figures A and B are done for you. You need find solutions for figures C-F.



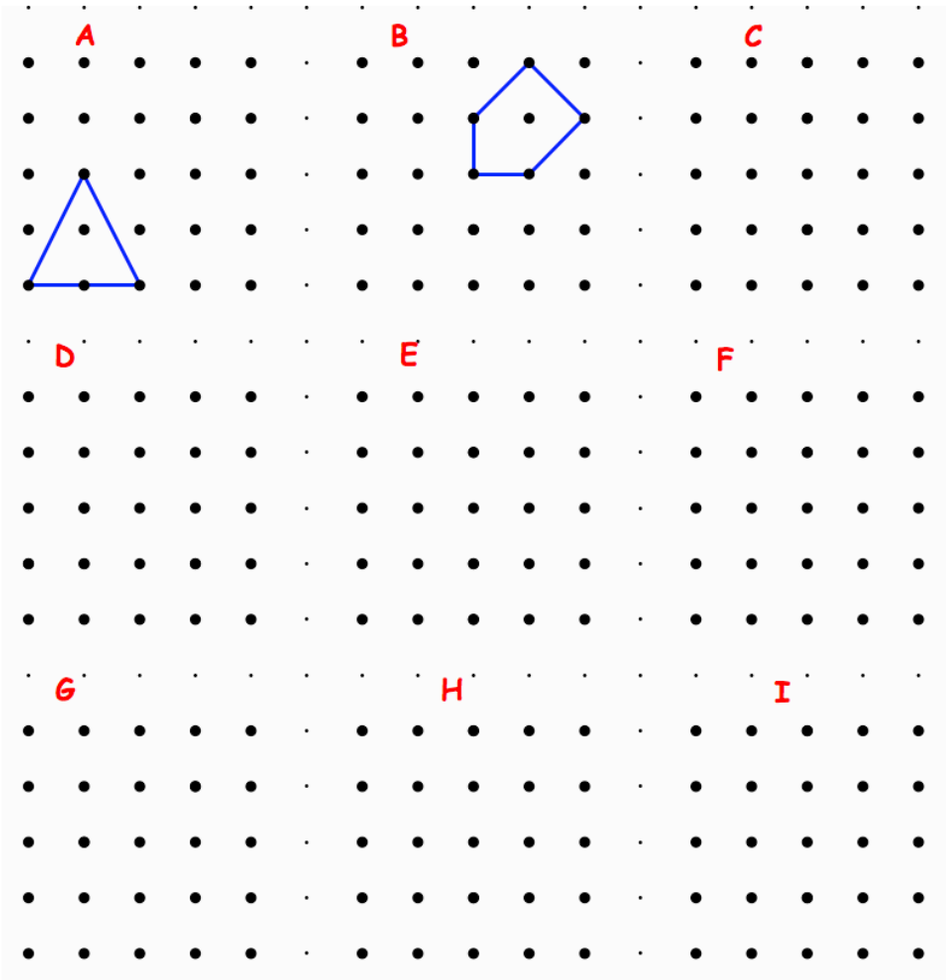
2. Make **five** figures that have **no nails inside** but have **3, 4, 5, 6, 7, 8, and 9 nails touching.**



3. Make **six** figures, such as A and B below, **with 1 nail inside, but have 6, 7, 8, 9, 10, and 11 nails touching the sides of the figure**. Keep a record of the nails touching and the area on your paper. Write down the rule.

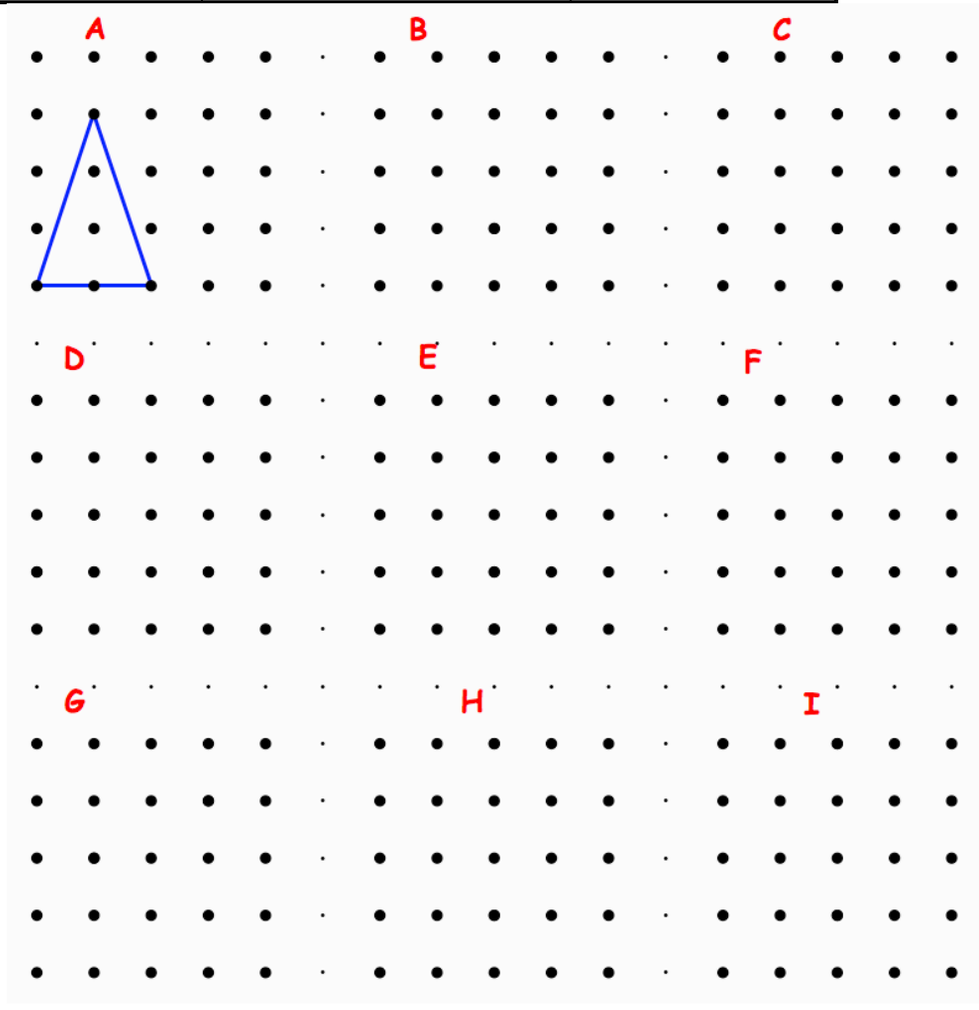
Figure	Nails touching	Area
A	4	2
B	5	2 1/2
C	6	
D	7	
E		
F		
G		
H		

4. Make some figures with 2 nails inside. Keep a record of the nails touching and the area on your paper.



5. **Make 7 figures with 2 nails inside, but 5, 6, 7, 8 ,9 10, and 11, nails touching the side of the figure.** Keep a record of the nails touching and the area on your paper.

figure	nails touching	area
A	4	3
B	5	
C	6	
D	7	
E	8	
F	9	
G		
H		



6. You should have 3 rules from the last 3 problems. Put these rules together in your toolbox.

   (1) For no nails, inside
   (2) For 1 nail, inside
   (3) For 2 nails, inside

Combine these rules to make 1 "super-rule" that will give the area for any figure by counting the nails inside and counting the nails that touch the figure.