Fencing problems

1. Hannah has 50 feet of garden border fencing, made from 50 1-foot sections. If she wants to make a rectangular garden, what could the dimensions (length and width) of the garden be? List several possibilities. How many possibilities are there? Explain. (You may want to use a spreadsheet to help with this problem.)

2. Would some of these rectangular shapes provide more garden space than others, or do they all have the same space? Explain.

3. Is it possible to make a square garden with 50 feet of fencing? Explain.

4. Hannah decided to think about a triangular shaped garden. How long might the lengths of the three sides be? Can you find several possibilities? How many possibilities are there? Is it possible to build these triangles from any three segments whose sum is 50? Would some of these triangular shapes provide more garden space than others, or do they all have the same space? Explain. (*Note:* You might want to research Herron's Formula, which allows calculation of areas of triangles from the lengths of the sides.)

5. Can Hannah enclose more garden space with a triangle or a rectangle?

6. What other shapes could Hannah use to enclose her garden? Could the garden have more than four sides? Is there a shape that would give more garden space than the others? What is the maximum area that Hannah can enclose with her fence?

7. What if Hannah had 60 feet of fencing? How would that change your answers to these problems?

8. What if the fencing was available in 2 foot sections? 6 inch segments? How would that change the shapes that Hannah could make? Could she enclose a greater area with these options?

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Solutions for 50 ft. of fencing in one foot segments:

Rectangles: 24x1, 23x2, 22x3, 21x4,20x5, 19x6,18x7,17x8,16x9,15x10, 14x11,13x12.
Maximum area is 13 x 12 = 156.

Sample spreadsheets for triangles and regular polygons:

TRIANGLES:

side 1	side 2	side 3	perimeter	area
14	14	22	50	95.26
14	15	21	50	104.88
14	16	20	50	111.24
14	17	19	50	114.89
14	18	18	50	116.08
15	15	20	50	111.80
15	16	19	50	116.19
15	17	18	50	118.32
16	16	18	50	119.06
16	17	17	50	120

REGULAR POLYGONS:

perimeter	no. sides	length of side	area	gains	
50	3	16.667	120.28		
50	4	12.5	156.25	35.97	46.7%
50	5	10	172.05	15.80	20.1%
50	6	8.333	180.43	8.374	10.7%
50	7	7.143	185.40	4.981	6.33%
50	8	6.25	188.61	3.207	4.08%
50	9	5.556	190.80	2.187	2.78%