

Your friend Alonzo has come to your team for help. His family owns a rug manufacturing company, which is famous for its creative and versatile designs. One of their most popular designs is shown at right. Each rug design has an “original” size as well as enlargements that are exactly the same shape.



Figure #1:
“The Original”

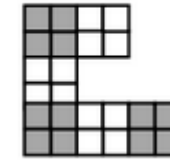


Figure #2

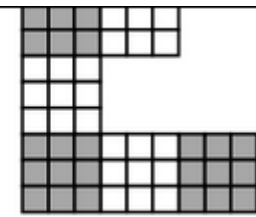


Figure #3

Alonzo is excited because his family has heard that the king of a far-away land is going to order an extremely large rug design for one of his immense banquet halls. Unfortunately, the king is fickle and will not decide which rug he will order until the very last minute. The day before the banquet, the king will tell Alonzo which rug he wants and how big it will need to be. The king’s palace is huge, so the rug will be VERY big!

Since the rugs are different sizes, and since each rug requires wool for the interior and fringe to wrap around the outside, Alonzo needs to quickly calculate the area and perimeter of each rug in order to obtain the correct quantities of wool and fringe.

Your Task: Investigate one of the rug designs. The “original” rug is shown in Figure 1, while Figures 2 and 3 are the next enlarged rugs of the series. With your team, create a table and a graph, and then write equations for both the area and perimeter of your enlarging rug design. Then decide which representation will best help Alonzo calculate the area and perimeter for *any* figure number. Be ready to share your analysis with the rest of the class. Your work must include the following:



a. **A**

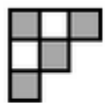


Figure 1

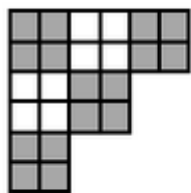


Figure 2

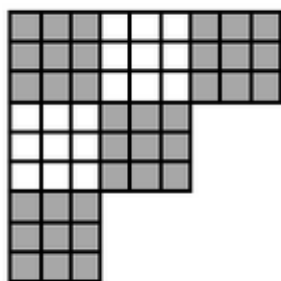


Figure 3

b. **B**

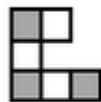


Figure 1

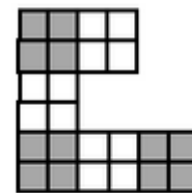


Figure 2

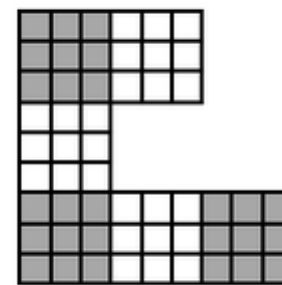


Figure 3

c, **G**

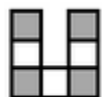


Figure 1

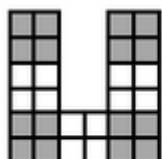


Figure 2

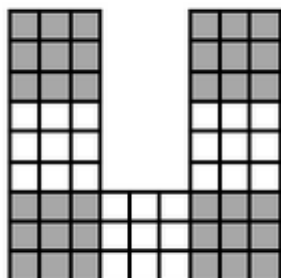


Figure 3

d. **D**

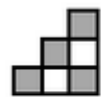


Figure 1

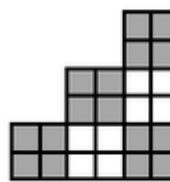


Figure 2

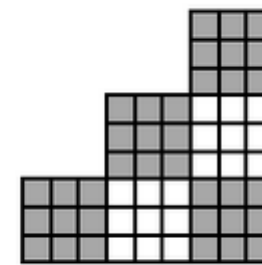


Figure 3

e, **H**

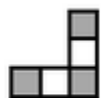


Figure 1

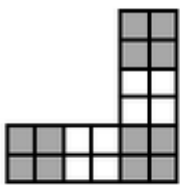


Figure 2

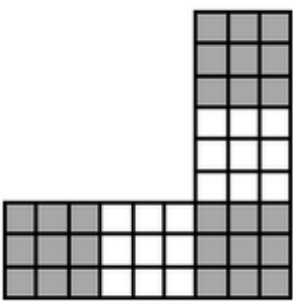


Figure 3

f. **F**

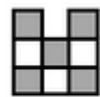


Figure 1

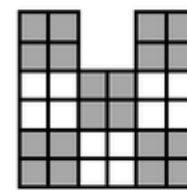


Figure 2

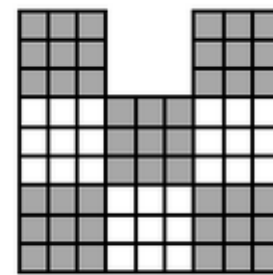


Figure 3

Further Guidance

1-31. To start problem 1-30, first analyze the rug design your team has been assigned, and draw diagrams of Figures 4 and 5 for your rug design on graph paper. Remember to shade Figures 4 and 5 the same way Figures 1 through 3 are shaded.

1-32. Describe Figure 20 of your design. Provide as much information as you can. What will it look like? How will the squares be arranged? How will it be shaded?

1-33. A table can help you learn more about how the perimeter changes as the rugs get bigger.

- a. Organize your perimeter data in a table like the one shown below.

Figure number	1	2	3	4	5	20
Perimeter (in units)						

- b. Graph the perimeter data for Figures 1 through 5. (You do not need to include Figure 20.) What is the shape of the graph?
- c. How does the perimeter grow? Examine your table and graph and describe how the perimeter changes as the rugs get larger.
- d. Generalize the patterns you have found by writing an equation that will calculate the perimeter of any size rug in your design. That is, what is the perimeter of Figure n ? Show how you got your answer.

Figure Number

a.

	1	2	3	4	5	20	100
perimeter	12	24	36	48	60	240	1200
area	6	24	54	96	150	2400	60,000

b.

perimeter	14	28	42	56	70	280	1400
area	6	24	54	96	150	2400	60,000

c.

perimeter	16	32	48	64	80	320	1600
area	7	28	63	112	175	2800	70,000

d.

perimeter	12	24	36	48	60	240	1200
area	6	24	54	96	150	2400	60,000

e.

perimeter	12	24	36	48	60	240	1200
area	5	20	45	80	125	2000	50,000

f.

perimeter	14	28	42	56	70	280	1400
area	8	32	72	128	200	3200	80,000



a.

12

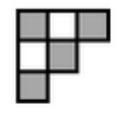


Figure 1

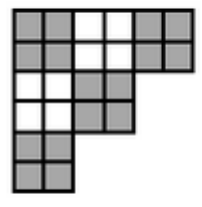


Figure 2

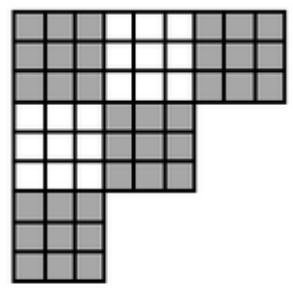


Figure 3

b.

14

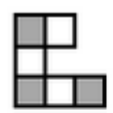


Figure 1

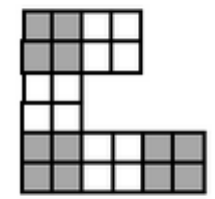


Figure 2

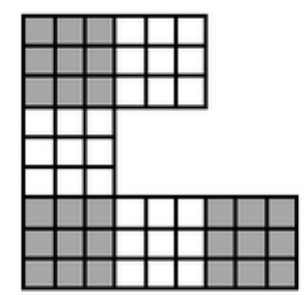


Figure 3

c.

16

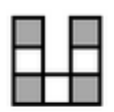


Figure 1

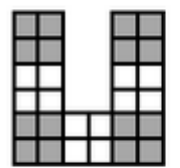


Figure 2

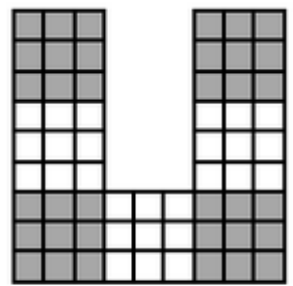


Figure 3

d.

12

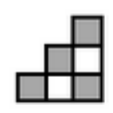


Figure 1

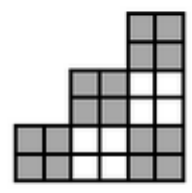


Figure 2

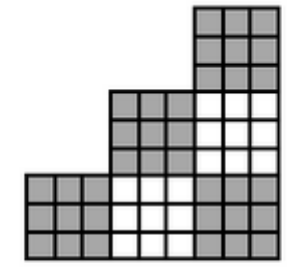


Figure 3

e.

12

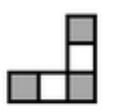


Figure 1

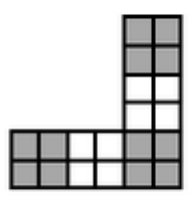


Figure 2

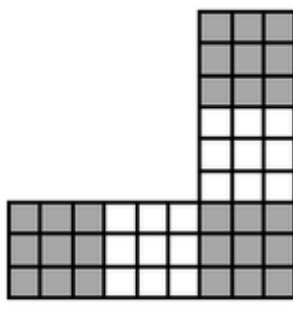


Figure 3

f.

14



Figure 1

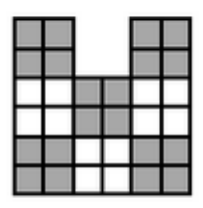


Figure 2

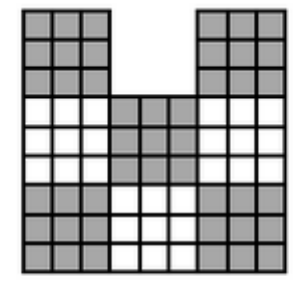


Figure 3

Figure Number

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perimeter	14	28	42	56	70	280	1400
area	8	32	72	128	200	3200	80,000

1-33:

14

