LAUNCH: Work alone or in pairs p.338
To turn in in 10 - 15 minutes

In-Class Experiment

Draw a rectangle. Scale it by the factor 2.

1. How do the dimensions of the original rectangle compare with the dimensions of the scaled rectangle?
2. How many copies of the original rectangle fit into the scaled rectangle?
3. How does the area of the scaled rectangle compare to the area of the original rectangle?

Draw a rectangle. Scale it by the factor $\frac{1}{3}$.

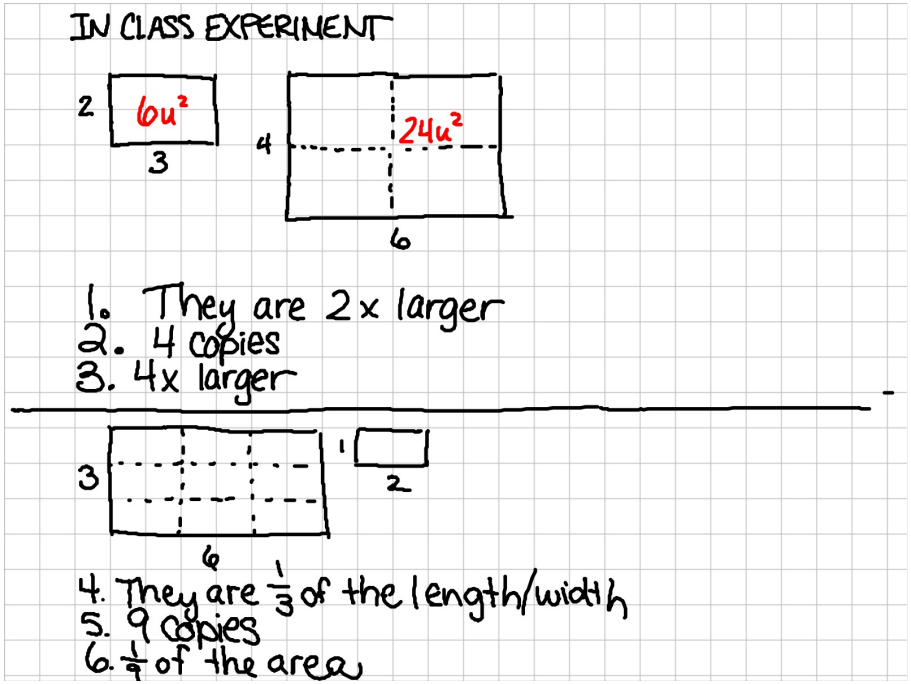
4. How do the dimensions of the two rectangles compare?
5. How many copies of the scaled rectangle fit into the original rectangle?
6. How do the areas of the two rectangles compare?

If two triangles are similar and the scale factor is r, you know that the ratio of the lengths of two corresponding sides is r. Show that the following statements are true.

7. The ratio of their perimeters is r.
8. The ratio of the lengths of two corresponding altitudes is also r.
9. The ratio of their areas is r^2.

4.16 Areas of Similar Polygons

Objective: Students will understand that the ratio between the area of a polygon and the area of a copy of that polygon scaled by the factor r will be r^2



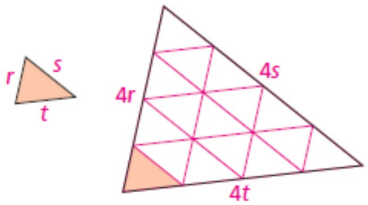
Minds in Action episode 14

Hannah and Derman complete the In-Class Experiment.

Hannah: According to the In-Class Experiment, if you scale a triangle by 4, then 16 copies of it should fit inside the scaled copy.

Derman: That sounds like a lot of triangles. Let's try to draw it out.

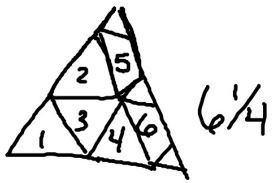
Hannah: It's easy! Look, here's a small triangle. And here's a picture showing 16 copies of the small triangle inside the triangle that has been scaled by 4.



Derman: Okay, that works. But what if you scale a triangle by $2\frac{1}{2}$? Then there should by $6\frac{1}{4}$ copies of the original triangle inside the scaled one. What would that look like?

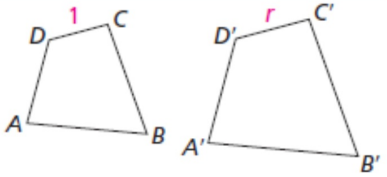
For Discussion

10. Draw a figure that answers Derman's question. Show that if you scale a triangle by the factor $2\frac{1}{2}$, then you can fit $6\frac{1}{4}$ copies of the original triangle inside the scaled one.



Theorem 4.6

If you scale a polygon by some positive number *r*, then the ratio of the area of the scaled copy to the area of the original polygon is r^2.



Scale factor	New area factor
2	4
3	9
4	16
$\frac{1}{2}$	$\frac{1}{4}$

Check Your Understanding

1. One side of a triangle has length 10. The altitude to that side has length 12. If you make a new triangle for which all the sides of the original triangle are tripled, what is the area of the new triangle?

2. Jerry wants to plant two cornfields. One measures 400 ft by 600 ft. The other measures 200 ft by 300 ft. Becky, the owner of the seed-and-grain store, says, "The big field will take eight bags of seed. The small field has sides half as big, so you'll need four more bags for that. Will that be cash or charge?" A few days later, Jerry returns to the store very upset. Explain.

1.

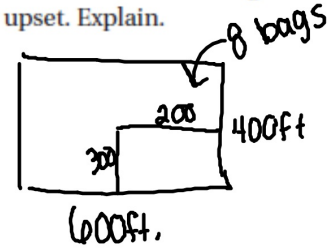
$A = \frac{1}{2}bh$

$A = \frac{1}{2}(10)(12)$

$A = 60u^2$

$A = 60 \cdot 9 =$ $540u^2$

2.



On Your Own

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5. You scale a rectangle by the factor $\frac{1}{4}$. Compare the area of the scaled rectangle to the area of the original rectangle.

6. You scale a triangle by the factor 5. Compare the area of the scaled triangle to the area of the original triangle.

7. The area of a polygon is 17 square inches. You scale the polygon by the factor 2. What is the area of the new polygon?