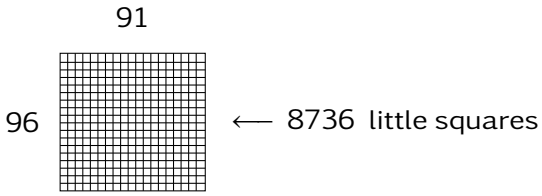
Algebra vs. Geometry

Math in the Real World, Fall 2016

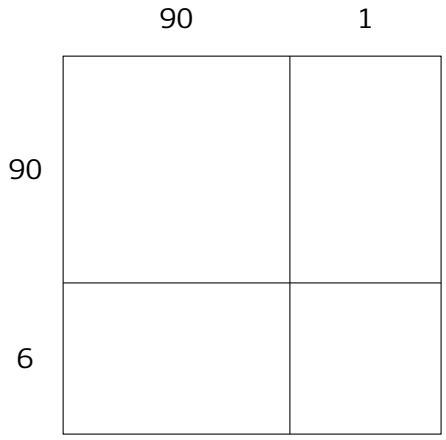
For some inspiration, watch the video below:

https://www.youtube.com/watch?v=90YK_NlZ7n4

1. Multiply by hand: 94×97
2. Explain your process in (1). Why did it work?
3. Multiply a bunch of pairs of 90s numbers (e.g. 91×99). You may use a calculator here. What observations can you make about the products you are finding?
4. If you take two 90s numbers you haven't multiplied yet, can you predict anything about the product?
5. One way of understanding multiplication is to visualize the area of a rectangle:

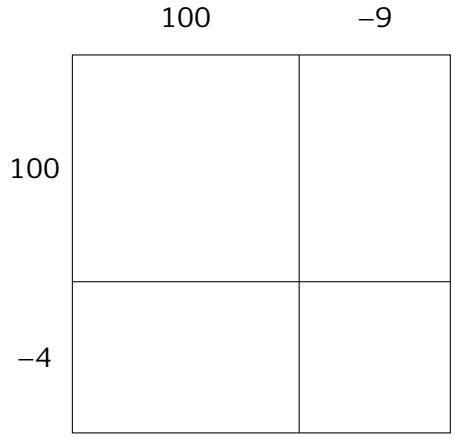


We can subdivide the rectangle into smaller rectangles whose areas are easier to compute. Use multiplication to compute areas of the four blank rectangles below:



6. Confirm that the four areas you computed above add to 8736.

7. Fill in the areas of the blank rectangles below and explain how the total area relates to problem (5).



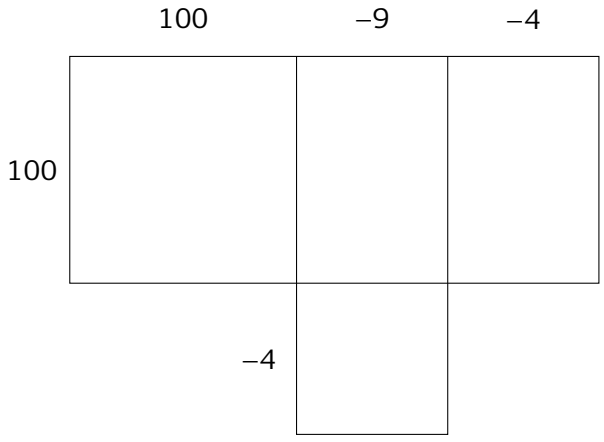
8. The **distributive property** says that for any numbers, say a, b and c,

$$a(b+c) = ab + ac.$$

Use the rectangle from problem (7) to explain why

$$100 \cdot (100-9) = (100 \cdot 100) + (100 \cdot -9) \quad \text{and} \quad -4 \cdot (100-9) = (-4 \cdot 100) + (-4 \cdot -9).$$

9. Explain why the figure below has area equal to the rectangle in problem (7).



10. Explain why $96 \times 91 = 100 \cdot (100-9-4) + (4 \cdot 9)$.

11. Explain why $96 \times 91 = 100 \cdot (80+1+6) + (4 \cdot 9)$.
Is the expression on the right side of the equals sign easy to compute? Why?

12. Can you come up with a formula that gives the product of any two numbers in the 90s that is easy to compute?