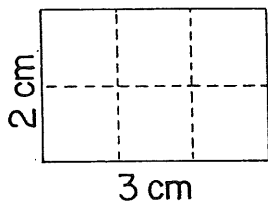


Heron: A Greek Jack-of-All-Trades

Today we call a person a jack-of-all-trades if that person can do many kinds of jobs. A long time ago there lived a Greek jack-of-all-trades. We know many things about the man, but there is much we do not know. We think he lived around A.D. 75, but it may have been much earlier or much later. We think his name was Heron, but it may have been Hero.

We do know that he lived in Alexandria, a big city in Egypt, where many people gathered to study, write, and talk about problems. He wrote a lot of things and made a lot of things.

Heron (let's call him that) wrote about how to get the area of certain figures. You probably know that the area of a figure is the number of square units in it. For example, the area of the figure at the left is six square centimeters, because there are six little squares inside the figure and the area of each little square is one square centimeter. Heron wrote about ways to find the area of figures like triangles and circles. You may not have learned how to do such problems yet.



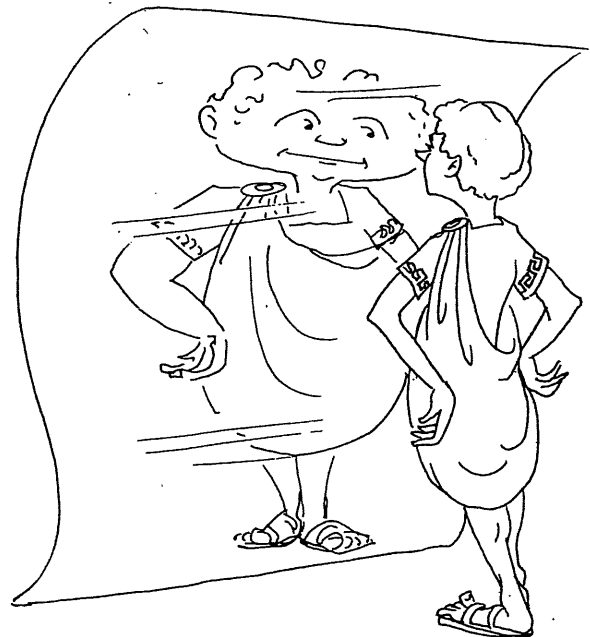
Another thing Heron wrote about was something like this: Find two numbers exactly alike that multiply together to give 9. You probably know that the answer is 3. But what if the numbers are to multiply to give 8? That is a much harder problem, and you may not have learned how to solve it yet. Heron wrote about some ways to get close to the right answer.

Most people could not understand Heron's problems, but they enjoyed the things he made. He must have liked children because he made many toys. One was a little fire engine much like those you can buy in stores today. Another was a small organ for children who liked to play music.

He must have liked jokes, too, because he made mirrors that showed a person upside down or very thin or very fat. He even made a mirror in which a person could see the back of his head.

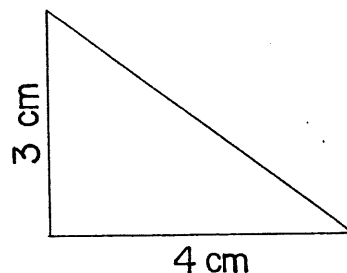
Today when you leave a supermarket, you usually go through a door that opens itself. This is no surprise to us, but Heron amazed the people of his day with a self-opening door for their temple. They must have thought Heron knew a lot about magic, but it was what he knew about mathematics that helped him make the door.

How do you suppose we have learned anything about this man, Heron, who lived so long ago? One way is through one of his books called *Metrica*, which means "measuring." This old writing was discovered in Constantinople in 1896 by a man named Schöe. Although what he found was only a copy of Heron's book, imagine how excited he must have been when he learned what he had found.



Activities about Heron and His Work

1. Heron lived in Alexandria, Egypt, sometime between 150 B.C. and A.D. 250. The city still exists. Find it on a modern map.
2. The old copy of Heron's writing, *Metrica*, was found in Constantinople in 1896. That city has another name today.
 - a) Find out what it is.
 - b) In what country is it located?
 - c) Find it on a modern map.
3.
 - a) Draw a rectangle that is 3 centimeters by 4 centimeters.
 - b) Find its area. (That is, find out how many little one-centimeter squares are inside.)



4. Heron showed how to find the area of a triangle. Can you find the area of the triangle shown at the right? (*Hint*: How big is this triangle compared to the rectangle you drew in number 3 above?)
5. Heron showed how to find two numbers exactly alike that multiply together to give a certain number, say 25. In this problem the answer is 5. Today we write this idea as $\sqrt{25} = 5$ and read this as "the square root of 25 is 5." This means that $5 \times 5 = 25$. In the same way, $\sqrt{16} = 4$, since $4 \times 4 = 16$, and $\sqrt{49} = 7$, since $7 \times 7 = 49$.
 - a) Find $\sqrt{81}$.
 - b) Find $\sqrt{1}$.
 - c) Find $\sqrt{121}$.
 - d) Find $\sqrt{64}$.
 - e) Show that $\sqrt{196} = 14$. To do this find 14×14 . What should this product be?
 - f) Show that $\sqrt{5329} = 73$.
6. Since $\sqrt{4} = 2$ and $\sqrt{9} = 3$, you should be able to see that $\sqrt{8}$ will be between 2 and 3. Heron showed that 8 is close to 2.8.
 - a) Show that 2.8×2.8 is close to 8. (This means that $\sqrt{8}$ is close to 2.8.)
 - b) Show that 2.83 is closer to $\sqrt{8}$ than 2.8 is.
 - c) Is 2.8 too large or too small?
 - d) Is 2.83 too large or too small?
 - e) If you answered (c) and (d) correctly, you should see that $\sqrt{8}$ must be between 2.8 and 2.83.
7. What do you think $\sqrt{106}$ is close to? Make a guess and see how good your guess is. (Heron wrote about a way to find square roots. When you get to this part of arithmetic, you will probably learn a way much like Heron's.)