CHAPTER 5

Section 5

HISTORYMAKERS # Archimedes
Genius of Legend, Genius in Fact

"Give me a place to stand on, and I can move the earth."—Archimedes explaining the use of levers and pulleys

Thinker and creative genius, the Greek mathematician Archimedes was famous in the ancient world for his inventions. He created devices used in peace and weapons used in war. He also did some important work that advanced mathematics. Many colorful legends arose about him—and many of them can be dismissed. Yet they cannot detract from his numerous accomplishments.

Archimedes's interest in science and mathematics should not be surprising. His father was an astronomer, which at the time was seen as a branch of mathematics. Archimedes was born around 287 B.C. in Syracuse, Sicily, a Greek colony. He studied for a while in Alexandria at the school founded by Euclid, another great Greek mathematician. Archimedes lived the rest of his life in Syracuse.

In mathematics Archimedes explored many different ideas. For example, he tried to find the volume or area of a variety of geometric shapes, such as circles, cones, spheres, and cylinders. In this work, he used ratios to find the area of these figures.

Archimedes often performed tasks on behalf of Hieron, the king of Syracuse. One story says that the king gave a goldsmith a quantity of gold and told him to make a crown. When it was finished, the king suspected that the goldsmith had placed silver inside, making the crown less valuable. The king asked Archimedes to find out if that were true. The mathematician used logic to discover the principle that explains the forces that keep a solid body afloat in water. With that knowledge, he could test the crown by comparing its weight in water against the weight of the correct quantity of gold. According to the story, Archimedes hit upon this idea one day as he rested in a bath. *"Eureka!"* (I have discovered it!), he yelled as he ran into the street—still naked from his bath.

While the details of this story are doubtful, there are several inventions of Archimedes that establish his brilliance. While in Egypt, he invented a device called the Archimedes screw. Because it could lift water to higher levels, the screw was useful for irrigating farmland. He also discovered the

lever and the pulley, which could be used to move heavy objects. This invention prompted his statement that he could move the world. Finally, he designed and built a planetarium that showed the movement of the sun, the moon, and the five known planets. According to one account, the machine worked so well that it showed eclipses of the sun and moon. Among his most spectacular inventions were machines used for war. An ancient historian described what happened when the Romans attacked Syracuse:

> Archimedes began to work his engines and hurled against the land forces all sorts of missiles and huge masses of stones, which . . . knocked down in heaps those who stood in the way and threw the ranks in disorder . . . [He also used machines against ships.] Often there was the fearful sight of a ship lifted out of the sea into mid-air and whirled about as it hung there, until the men had been thrown out. . . .

Nevertheless, the Romans eventually captured Syracuse. The Roman general ordered his men to spare the people of the city. For some reason, that order was ignored with Archimedes. Upon finding him, a Roman soldier told him that he was to go see the Roman general. However, Archimedes delayed until he could finish working on a mathematical problem. The soldier, angry at him for disobeying, killed him. While the details are obscured by legend, the result is undisputed. The general ". . . turned away from the slayer as from a polluted person, and sought out the relatives of Archimedes to do them honor."

Questions

1. **Distinguishing Fact from Opinion** How can historians examine sources to separate legend from fact?

2. **Drawing Conclusions** Which of Archimedes' inventions do you think was the most significant? Explain.

3. **Making Inferences** Why do you think the Roman general reacted as he did to Archimedes' death?