Archimedes and the Golden Crown

1. According to legend, Archimedes—a famous mathematician and scientist who lived in ancient Greece—was given the task of determining if a goldsmith had embezzled gold from King Hiero. The king had supplied the goldsmith with pure gold so he could make a royal crown; however, the king suspected that the goldsmith had greedily stolen some of the gold to keep for himself and instead made the crown out of a less valuable metal. After all, it would have been easy to disguise a crown made out of another metal by topping it with a golden exterior. Archimedes had to figure out if the crown was really pure gold or if the goldsmith had been dishonest and used a cheaper metal to make the crown.

2. Archimedes knew that gold was a very heavy metal. It would be easy to find out if the crown was genuine by calculating its density, or mass per unit of volume. In order to do this, he’d have to melt the crown, mold it into a cube with a known volume, and measure its mass. Archimedes knew that the king would not approve of this method since the crown would be destroyed. He had to find another solution! How could he determine the density of the crown?

3. One day while taking a bath, the observant Archimedes noticed that the water level in the tub rose as he immersed his body in the water. When his body went under the surface of the water, it pushed the water out of the way and took up some of the space where the water had been. Archimedes realized that this same effect could be used with the golden crown. He could figure out the volume of the irregularly shaped crown by measuring the volume of the water that was pushed out of the way. Excited by his discovery, Archimedes jumped out of the tub and ran naked through the town shouting, "Eureka! Eureka!" (or “I’ve found it!”).

4. Archimedes conducted the test and was able to figure out how much space the crown took up—that is, its volume. Once he knew the crown’s volume, he compared the mass of the crown to the mass of a solid gold cube that had the same volume as the crown. Since the crown had less mass than the pure gold cube, Archimedes concluded that the sneaky goldsmith had indeed tried to trick the king by making the crown out of another metal. Archimedes’ discovery was very important in helping to determine the volume and density of oddly shaped objects. In fact, the principles of his method continue to be used by scientists today.
1. In paragraph 1 of this passage, what does the word goldsmith mean?

A. Someone that steals things

B. Someone that paints with gold paint

C. Someone that makes crowns

D. Someone that works with gold

2. Students of science have studied this story for more than 2,000 years. Which of these statements described the most important impact of his discovery?

A. He solved a problem for an ancient king.

B. He discovered a way to save time by working and taking a bath.

C. He gave scientists who came after him a way to measure the volume of oddly shaped objects.

D. It's a funny story, and people throughout history have enjoyed reading it.

3. What is the main point of this passage?

A. How a scientist solved a problem using the concept of density

B. How to cleverly steal gold from a king

C. Why people shouldn't steal things that belong to others

D. How to catch a thief
4. In paragraph 3 of this passage, what clues help you know the meaning of the word **immersed**?

   A. Got into his bath
   B. Under the water
   C. Figure out the volume
   D. Took up some of the space

5. The diagram above shows what happened when an irregular solid was immersed in water. This irregular solid has the same mass as a gold block, which is 2 cm wide by 2 cm high by 5 cm long. Using the method described in the passage, compare the density of the unknown with the density of gold.

   A. Equal to gold
   B. Less than gold
   C. Greater than gold
   D. Cannot be determined