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Science Shorts -8

Archimedes' Crowning Moment

Archimedes, one of the most famous mathematicians and scientists of ancient Greece, had a problem. The king had a new crown. It looked like pure gold. But the king was suspicious. How could he be sure that the jeweler hadn't cheated him by adding another less valuable metal to the melted gold? The king asked Archimedes to find out whether the crown was made from pure gold.

Archimedes knew his reputation was on the line. He could have taken the problem down to the public marketplace, where he often went to discuss scientific questions with other scholars. But instead, he decided to relax in a bath. The tub was filled to the very top. Still concentrating on his problem, Archimedes got into the tub.

Splash! Water spilled over the sides of the tub and on to the floor. He had made a real mess. But that mess triggered an idea—an idea that would help solve the king's problem.

"When I got into the tub," Archimedes reasoned, "my body displaced (pushed out) a lot of water. Now, there must be a relationship between my volume and the volume of water that my body displaced — because if I weren't so big, less water would have spilled on my floor.

This observation brought Archimedes back to the problem of the golden crown. What if he put it into water? How much water would it displace? And could he apply this observation to prove that the crown was made of pure gold?

Archimedes found a piece of gold and a piece of silver exactly the same mass. He dropped the gold into a bowl filled to the top with water and measured the volume of water that spilled out. Then he did the same thing with the piece of silver.

Although both metals had the same mass, the silver had a larger volume; therefore, it displaced more water than the gold did. That's because silver was less dense than the gold.

Now it was time to check out the crown. Archimedes found a piece of pure gold that had the same mass as the crown. He placed the pure gold chunk and the crown in the water, one at a time. The crown displaced more water than the piece of gold. Therefore, its density was less than pure gold! The king had been cheated! Although this was one of Archimedes' many contributions to science, there's no doubt that it was his "crowning moment"!

Show that you understand density and what Archimedes did by drawing a series of cartoons illustrating the story of Archimedes and the King's Crown.