

CHAPTER

7

SCIENCE & TECHNOLOGY

Science Helps Create the Metric System

Section 2

Though one of the French Revolution's most famous inventions, the guillotine, was designed for executions, another technological development from this period made a great contribution to the future of science.

In 1790, the drive to reform French society moved the newly formed National Assembly to change the way measurements were made. The French Academy of Sciences was asked to develop a standard system of measurement. Up to this point, every country possessed its own procedure for measuring, which often grew out of local customs. At one time in England, for example, an inch was defined as the length of “three barleycorns, round and dry.” The problem was that the size of an inch was different with every handful of barley.

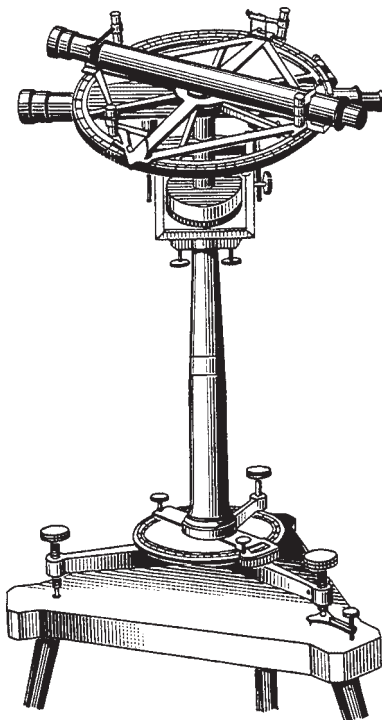
The mathematicians and astronomers in the Academy of Sciences wanted to devise a measuring system that would be used in all countries. Therefore, the scientists needed to create a uniform unit of length. They decided to use a certain fraction of the distance around the earth. The

meter—its name taken from the Greek word *metron*, meaning “measure”—was established as one 10-millionth of the distance from the North Pole to the equator along the meridian passing through Paris.

Determining the length of this meridian required surveying the distance from Dunkirk, France, to Barcelona, Spain, which is over 600 miles. Measurements needed to be precise, and the best instruments available were used. The measuring rods were 12 feet long, made of platinum, and equipped with devices to record expansion and contraction due to changes in temperature. An instrument with rotating telescopic sights, developed by Étienne Lenoir in 1784, enabled the teams of surveyors to make highly accurate angle measurements.

The National Convention officially adopted the metric system in 1795. On June 22, 1799, a meter-long platinum rod and a platinum cylinder weighing one kilogram were deposited in the French National Archives as official standards. The government then established a period of transition to the new system, which lasted until 1840, when using the new standards became a requirement.

Over the years, the original measurement standards have been updated to be more precise, and other units have been added. Today, the metric system is the basic system of measurement in almost all the countries of the world.



Complex angle measurements were made on Lenoir's instrument, shown above. The rotating telescopic sights are located on top of the device.

Questions

1. **Clarifying** What was the length of the meter as established by the French Academy of Sciences?
2. **Making Inferences** Why do you think the scientists in the Academy of Sciences wanted their new system of measurement to be used in all countries?
3. **Drawing Conclusions** Why was the distance from the North Pole to the equator a good distance on which to base a uniform unit of length?