



## TO THE STUDENT

**B**ENJAMIN FRANKLIN IS THE MASCOT for this unit on energy. We chose him not just for his famous experiments with electricity, but also because he always sought – through hard work and ingenuity – to understand the world around him and to make a positive impact on it.

### BENJAMIN FRANKLIN: 1706 - 1790

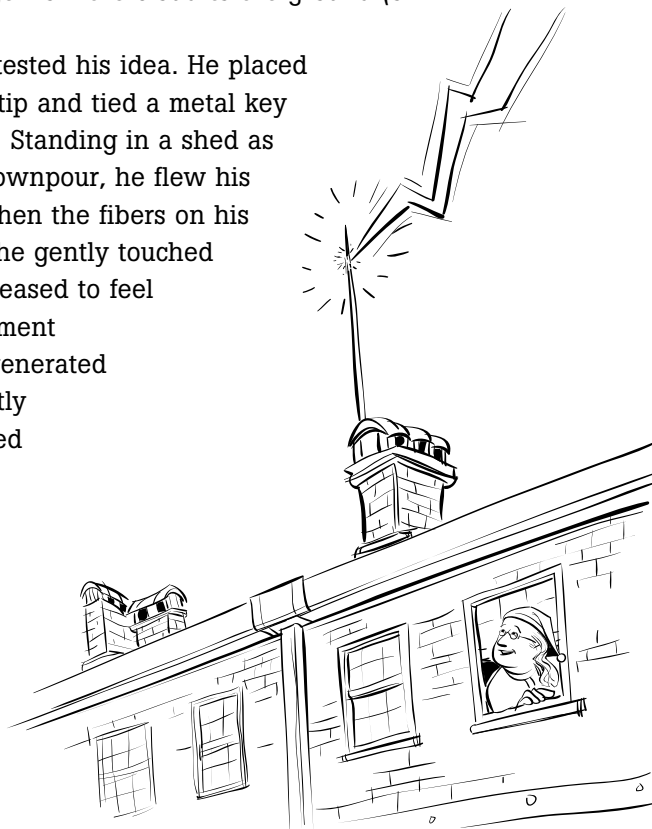
The best-known story about Ben Franklin is that he experimented with electricity by flying a kite in a raging lightning storm. In reality, he did not stand directly out in a storm, nor was he actually trying to have lightning strike his kite. One day in June of 1752, however, he did fly his kite while a storm was brewing, hoping to draw the “fire” (electrical charge) out of the clouds so that he could study it further.

By this time, Ben had already been studying electricity. He had correctly proposed that the sparks resulting from what we now call static electricity – an object of great fascination at that time – were due to excess electrical charges building up in an object and then leaping, or discharging, to an object of lesser charge. He speculated that thunderclouds also could build up excess electrical charges and that lightning was the discharge from the cloud to the ground (or other object, such as a house).

So on that stormy day Ben tested his idea. He placed a metal wire on a kite’s upper tip and tied a metal key to the bottom of the kite string. Standing in a shed as protection from the potential downpour, he flew his kite up into the dark clouds. When the fibers on his kite string began standing up, he gently touched the key and must have been pleased to feel an electrical charge. His experiment confirmed that thunderclouds generated static electricity. He also correctly concluded that lightning resulted from the build-up and discharge of excess electrical charges.

### NEVER A DULL MOMENT

**L**ife with Ben must have been pretty interesting. Imagine living with him while he was testing his new invention, the lightning rod. A metal rod on the roof attracted lightning, which traveled safely to the ground through a wire, sparing the house from fire. In one experiment, he threaded the wire right through the inside of his own house along the staircase banister. One stormy night the family awoke to the sound of bells clanging wildly. It turned out that Ben had attached metal bells to the wire along the banister, so that he would be alerted when electricity passed through to the ground.





Ben was not just an avidly curious scientist, but also a writer, a publisher, an inventor, a civic leader, and a statesman. He had his own print shop where he wrote and produced a newspaper and an annual almanac, among other publications. His many inventions include the lightning rod, the first bifocal glasses, the Franklin stove (a freestanding fireplace), and the odometer (which measures mileage). He began the nation's first lending library and the first fire department. He was Postmaster General of the American colonies. He contributed significantly to the writing of the Declaration of Independence and worked for the abolition of slavery. To top it off, his close diplomatic and scientific ties with Europe influenced France to support the colonial Americans during the Revolutionary War.

As you can see, Ben Franklin was a man who made many valuable contributions to science and society, contributions that we can appreciate to this day.

#### SAFETY PRECAUTIONS

- Always review all directions before beginning any project or scientific experiment.
- Use caution and take your time when cutting and assembling any project.
- Always work with or near other people. Report accidents or hazards to your teacher (or other adult) at once.
- If working with heat or open flames, long hair should be tied back and long sleeves rolled up. Wear safety goggles, if available. Learn the location of safety equipment and supplies. If a fire starts, react quickly but do not run, and do not panic.

Always get adult help. A small fire can often be extinguished with a fire extinguisher, baking soda, sand, or a fire blanket (or even a rug). If a piece of your clothing catches on fire, immediately drop and roll. If any fire cannot be extinguished immediately, the entire class should always exit the room.

