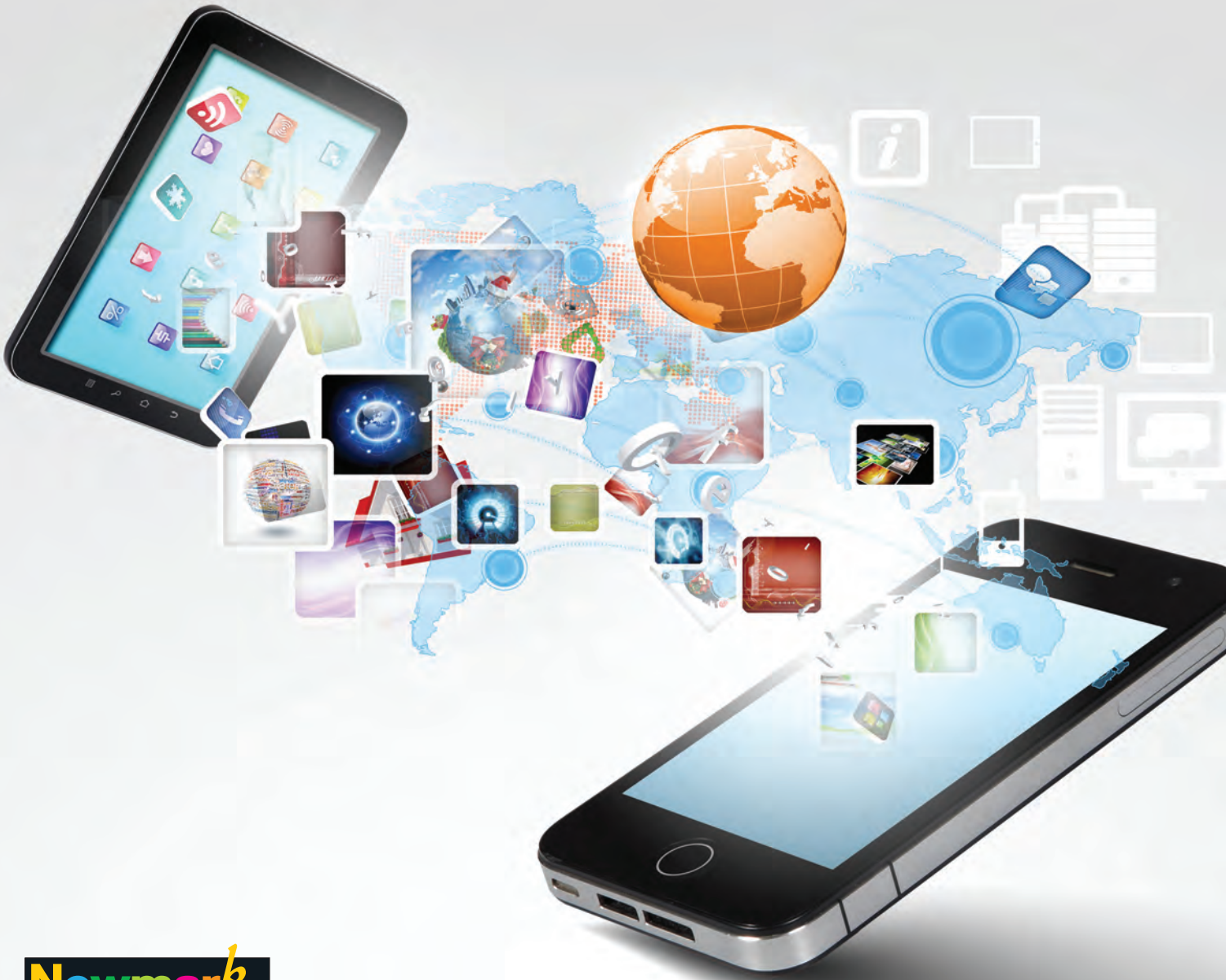
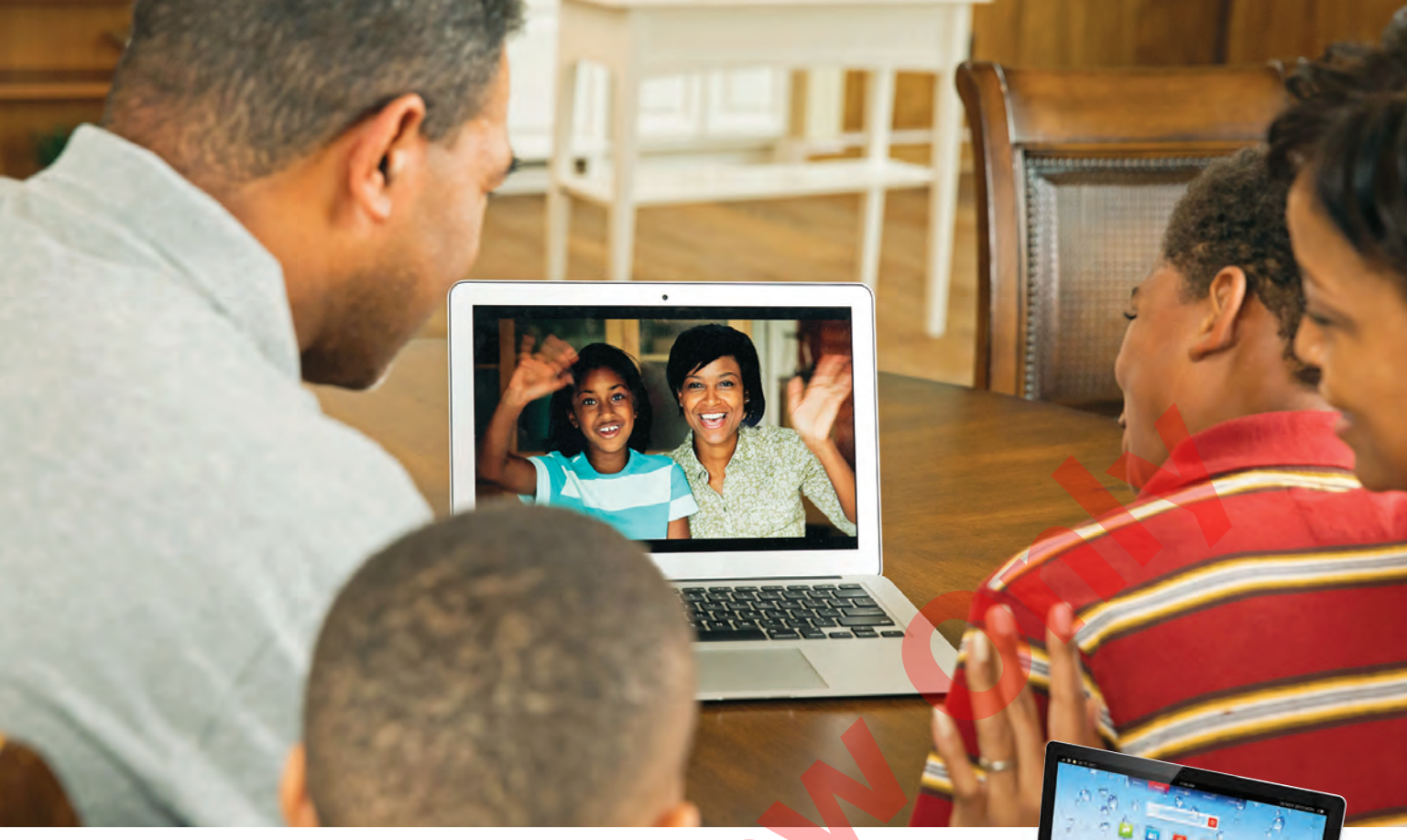
THE SCIENCE OF MODERN TECHNOLOGY

by Ranida McKneally

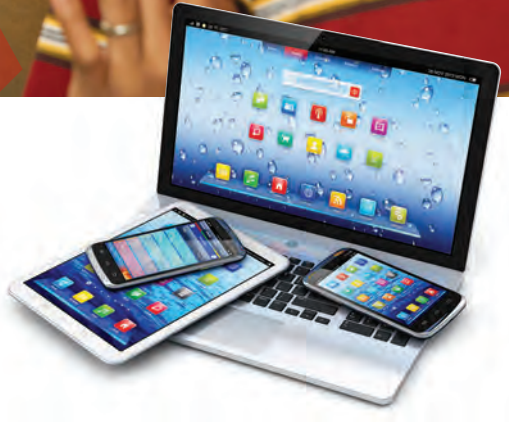


Newmark LEARNING

TABLE OF CONTENTS



THE ELEMENTS OF COMMUNICATION



Using a smartphone or computer to video chat with someone may be pretty routine today. However, just 50 years ago, this technology didn't exist. Of course, 100 years before that, telephones weren't even invented yet. The thought of talking with someone on the other side of the world would have been beyond imagination.

The word *technology* means using science to invent useful things or solve problems. All technology, new or old, depends on materials originally found in the earth. These materials are changed and molded to create things like smartphones and computers.

New technology is constantly changing the way people communicate. Scientists apply their knowledge of the world to develop technology. In turn, these technologies help scientists make new discoveries and advance science even further.

▲ **Technology has changed how people communicate.**

Technology and Chemistry

Matter makes up everything in the universe. It makes up rocks, trees, air, water, shoes, food, smells—literally everything. The study of matter and how it can be combined and changed is called chemistry. When it comes to developing communication technologies, understanding the chemistry of matter is key. Communication devices like smartphones work because of the materials, or matter, they are made from. This includes the metal casing, the strong glass screen, and all the parts in between that store, send, and display information.

Everything in this garden is made of matter—even the air.

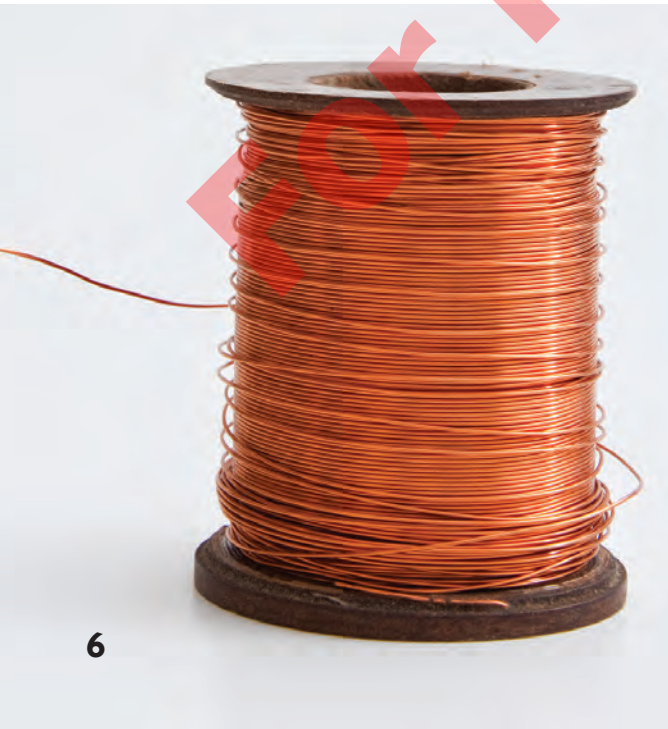
Elements and Compounds

At a very basic level, matter consists of elements and compounds. An element is the simplest form of matter. There are over 100 known elements found on Earth. Copper and silicon are important elements used in communication technologies.

Each element has its own unique set of characteristics, or properties. An element's properties include its color, texture, the temperature at which it melts or boils, and how hard or soft it is. Another property is how well electricity or heat can pass through a particular element. This property is called conductivity, and it is very important to communication technologies.

▲ Gold is a metal element. Because metals can be easily flattened, stretched, and shaped, they are prized by both technology engineers and jewelers.

Copper is an element that is very important in communications technology.

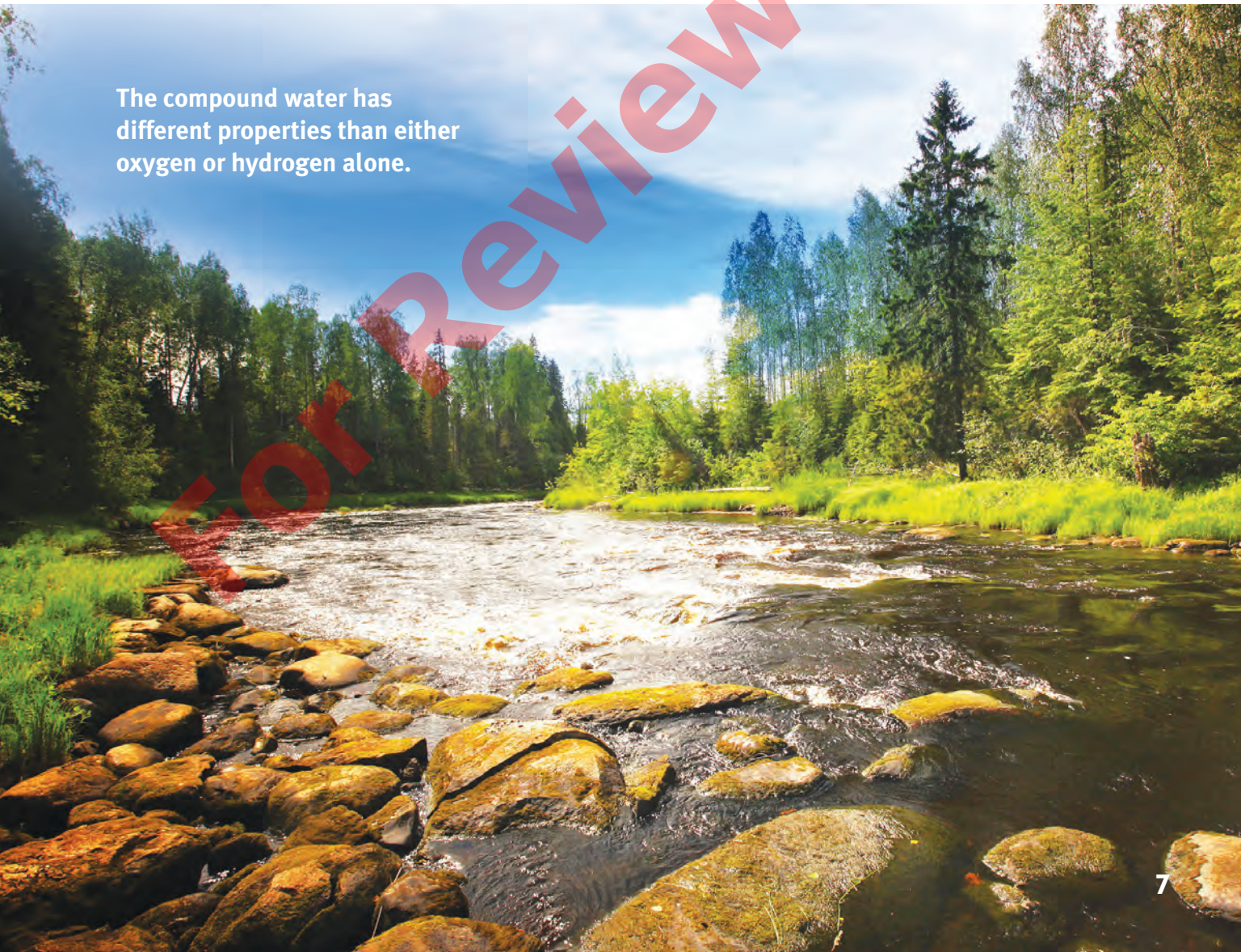


There are different types of elements, but the majority are metals. Pure metals share many of the same properties, such as a shiny appearance. Two other common properties make metals especially important for communication technologies. They conduct heat and electricity well, and they are both soft and dense. This means that they can be hammered into thin sheets and pulled into wires without breaking. Gold, silver, and copper are metals.

When two or more elements combine, a compound is formed. Compounds account for most of the matter that makes up our world. Rocks, for example, are mostly made up of compounds. Salt, water, and plastics are other examples. Most compounds on Earth occur naturally, although some are human-made.

Compounds have unique properties based on the elements that make them up. In water, the elements hydrogen and oxygen combine to create a completely different substance.

▲ **Salt is a compound formed from the elements sodium and chloride.**



The compound water has different properties than either oxygen or hydrogen alone.

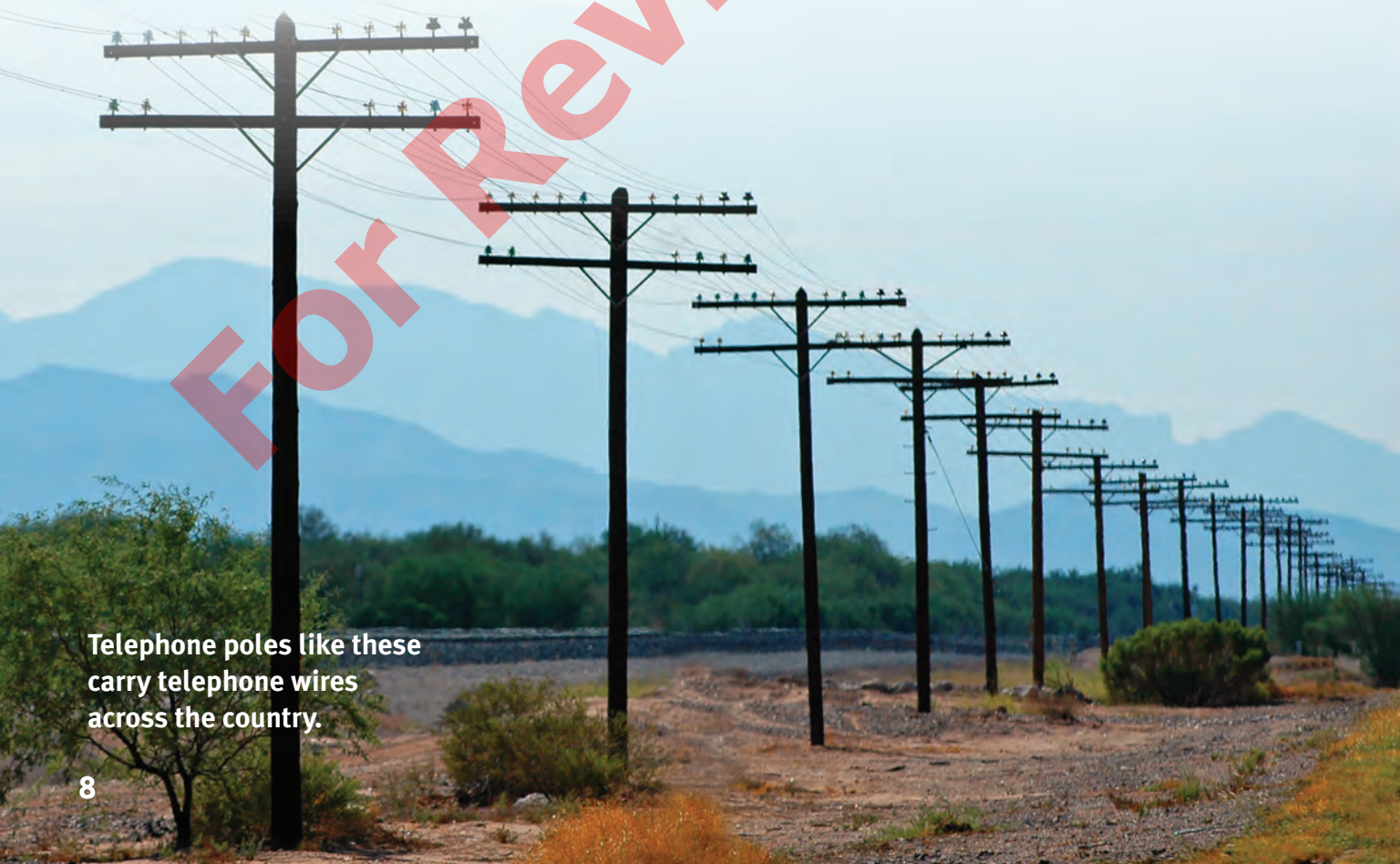
Telephone Chemistry

Electric telephones first appeared in the 1880s. They marked a turning point in communication. For the first time, people could talk to one another across long distances.

This world-changing technology only became possible because inventors had identified and studied the properties of different elements. They knew that metals were good conductors of electricity.

Electric telephones relied on electricity and metal to work. Unlike today's cell phones, early telephones used metal wires. The earliest telephone wires were made of iron or steel. But these metals rusted and did not send sound very clearly. Soon, copper, a much better conductor of electricity, became the metal of choice for telephone wires.

▲ Today's cell phones—also called wireless or mobile phones—allow people to communicate over long distances without telephone wires.



Telephone poles like these carry telephone wires across the country.

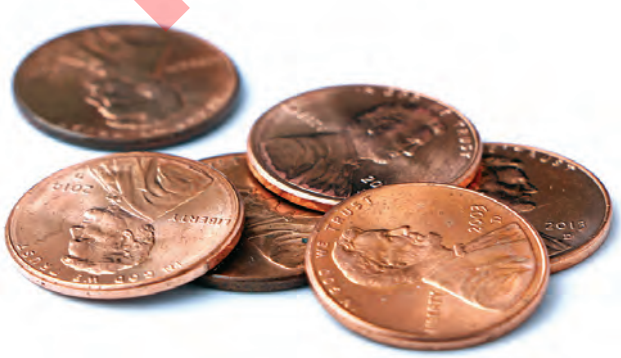
>> FROM THE SOURCE

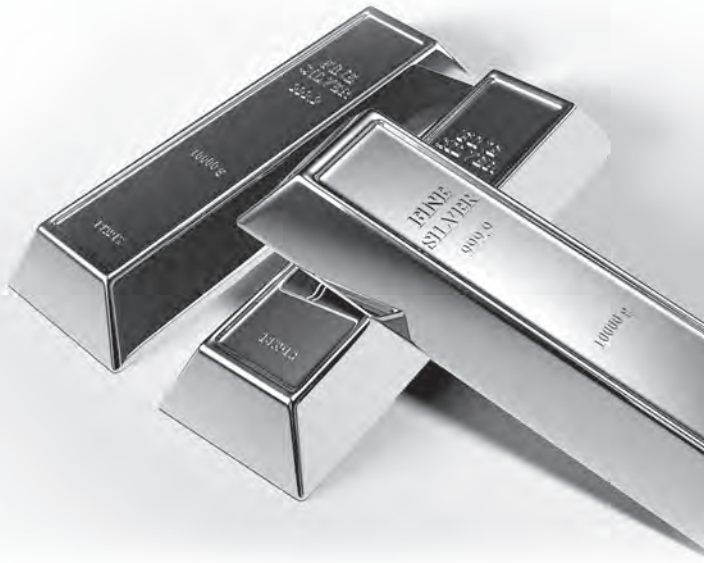
Here's what Sir William Crookes, a noted English chemist and physicist, had to say in 1903 about the invention of the telephone.

"If you had come to me a hundred years ago, do you think I should have dreamed of foretelling the telephone? Why, even now I cannot understand it! I use it every day, I transact half my correspondence by means of it—but I don't understand it. Think of that little stretched disc of iron at the end of a wire repeating in your ear not only sounds, but words—not only words, but all the most delicate and elusive inflections and nuances of tone which separate one human voice from another! Is not that something of a miracle?"

Sir William Crookes

Today, copper is used in all sorts of wiring systems, particularly those involved in communication. A humble reddish-brown element usually associated with pennies, copper has been central in revolutionizing the way we communicate.





▲ Silver is actually the best conductor of all metals, but it's very expensive. Copper is cheaper.