Understanding Digital Developments

Dig into digital convergence—technological innovations that bring interaction, communication, entertainment, and fun right to our fingertips.

OBJECTIVE

Students will engage in collaborative discussions building on the ideas of others, and solve problems by integrating visual information with information in print.

## TIME

80 minutes

MATERIALS

- Graphite pencils
- Sticky tape
- Spot the Technology! activity sheet
- Encrypt Your Fingerprint activity sheet

INSTRUCTIONS

1. Distribute the Spot the Technology! activity sheet to groups of three or four students. Have them cut out the cards.

2. Ask: *Which cards feature technology? Which cards do not?* It's a trick question: All the cards are technology. Technology is the application of knowledge toward a practical purpose.

3. Have students select the technology cards that can be used to listen to music and put them in order from least advanced to most advanced. (Answer: 1. LP; 2. cassette tape; 3. smartphone.) Have students explain the advantage of listening to music on smartphones. Answers may include: easy to take music on the go, stores more songs in a smaller object, easy to add or replace songs.

4. Leaving the music cards in place, have students select cards that can be used for photography. Students will need to "borrow" the phone from the music card set. Have students complete the same exercise for payment transactions. They'll need to "borrow" the phone card again.

5. Note that the smartphone is the most technologically advanced way to pay. Write the term "digital convergence" on the board. Explain that digital convergence is when digital technologies converge or come together in one place, like in a smartphone.

6. Ask students how they think technologies are able to converge in this one device. Explain that phones can translate different kinds of information (voice, video, music, text) into digits—or numbers. This code can be sent to other devices, such as tablets and computers, that speak the same digital language. This language uses only two digits—0 and 1—which is why it is called binary code.

7. Today, technology like a smartphone uses digital code to allow us to make purchases quickly and securely. Ask: *Can you think of any dangers in a phone having access to financial information?* Have students list ways we either identify ourselves or protect our personal information. Answers may include: presenting identification, entering PIN codes, providing a signature, answering security questions, or fingerprint- and facial-recognition technology.

8. Explain that fingerprint and facial recognition are examples of biometrics, when technology uses a person's unique biological characteristics to identify or authenticate them. Ask students what they think "biometric" might mean based on what they know about the roots "bio" and "metric." Tell them that biometric means applying statistical analysis to biological/human data. Then distribute the Encrypt Your Fingerprint activity sheet for students to complete.
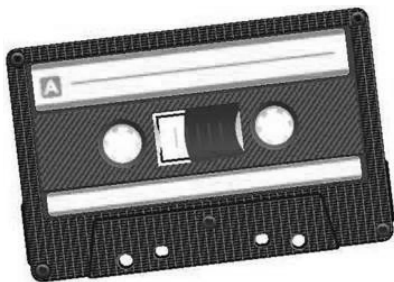
EXTENSION

Have students use what they learned in this unit to innovate a new digital security solution. Make sure they diagram, label, and explain their idea with a short description.
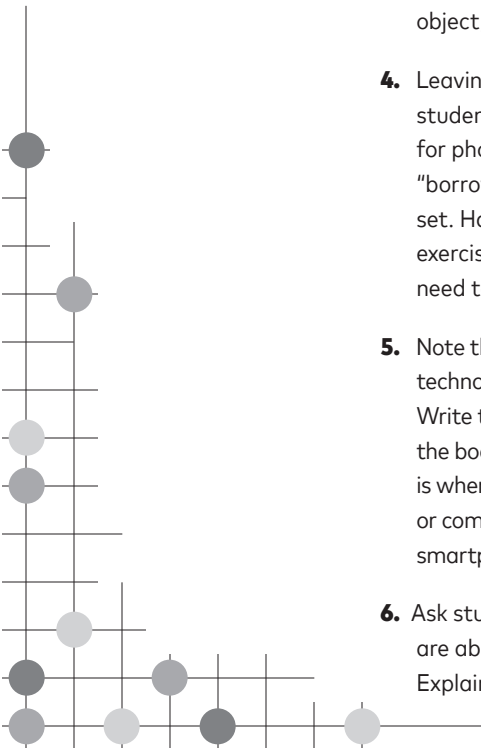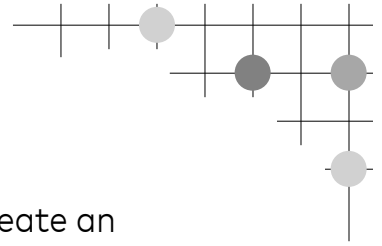
NAME

Spot the Technology!

Cut out the cards along the dotted lines and group them in three categories: technologies used for music, photography, and payment transactions.

NAME

Encrypt Your Fingerprint

Try biometrics! Using your own fingerprint and binary code, create an identifying code that is unique to you.

A	B

1. Use a graphite pencil to color in box A. Rub the pad of your thumb in the box until your thumbprint has an even coating of graphite.

2. Press your thumbprint onto the sticky side of a piece of clear tape. Place the tape sticky side down so your thumbprint appears inside box B.

3. Inspect your thumbprint for the features shown in the diagram on the right. If you spot one or more of the features, record its binary code(s) below.

DIVIDE
01000011
ridge that splits into two ridges

INDEPENDENT
01000101
a short ridge that isn't attached on either end

SPUR
01001001
a small ridge that branches from a longer one

ISLAND
01001000
a gap inside of a Split & Rejoin

SPLIT & REJOIN
01000111
a single ridge that splits into two and joins to become one ridge again

DELTA
01000001
Y-shaped meeting of ridges

CORE
01000010
U-turn in the ridge pattern

DEAD END
01000100
ridge that ends

My fingerprint encryption codes:

How a Print Can Unlock a Phone

When you first scan your fingerprint, the scanner creates a binary code that matches the ridges in your print (just like the exercise you did above). Those ridges in turn match the unique binary code that will stay stored in your phone. So even your identical twin can't get in!

110101010101
001010001110
101010101010
101010001111
010100101010