UNIT 7

Patterns of Technology

In this unit, you will

- read about bar codes and how they are used.
- learn about how bar codes could be used in the future.
- review time signals.
- increase your understanding of target vocabulary words.

READING SKILL Identifying Steps in a Sequence

Self-Assessment

Think about how well you know each target word, and check (✓) the appropriate column. I have...

TARGET WORDS	never seen the word before	seen the word but am not sure what it means	seen the word and understand what it means	used the word, but am not sure if correctly	used the word confidently in *either* speaking *or* writing	used the word confidently in *both* speaking *and* writing
automatic						
AWL consist						
AWL identify						
invent						
item						
pattern						
produce						
purchase						
technology						
unique						

Outside the Reading What do you know about bar codes? Watch the video on the student website to find out more.

AWL Academic Word List
Oxford 3000™ keywords

Before You Read

In small groups or with the whole class, discuss the following questions.

1. When you go to a market or other kind of store, how does the clerk know how much to charge you for your purchase?
2. Have you ever noticed bar codes on items that you buy? What is their purpose?
3. Imagine you wanted to make a list of all of the food items in your kitchen. Why would this be hard?

Read

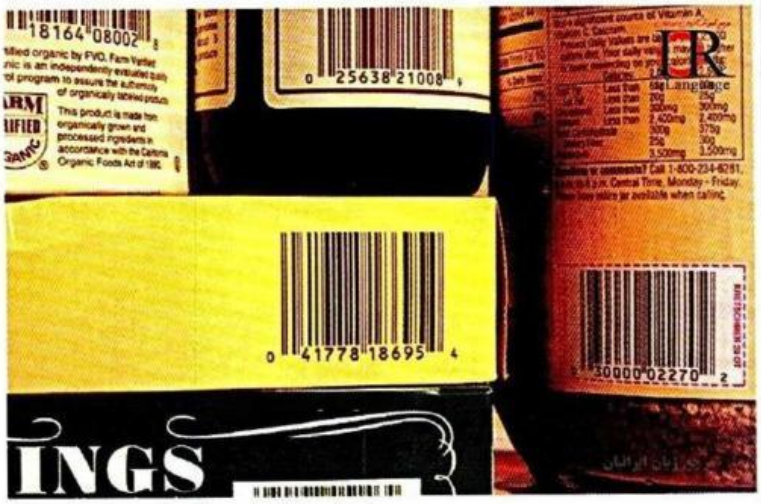
Information in this article is from a popular book on inventions.

Bar Codes

Look at the **items** you have **purchased** recently. Do any of them have a bar code on the package? A bar code is a printed **pattern** of black and white lines. The **pattern** contains important information. Bar codes are becoming common all over the world. The **technology** is especially useful in supermarkets.

NEED FOR BAR CODES

Before bar codes were **invented**, supermarket customers waited in long lines. They waited for a clerk to add up the cost of their **purchases**. First the clerk picked up an **item**. Then she searched for a price sticker and read the amount. Finally, she entered the price on a cash register. Sometimes the clerk did not read the price accurately. The checkout process was slow. Bar codes were **invented** to help grocery stores speed up the checkout process. Now a clerk picks up an **item** and passes it over a scanner. The scanner reads the bar code. The store computer searches its memory. It finds the matching



Bar codes on food product packages.

bar code. Then it **automatically** enters the correct price into the cash register.

HOW BAR CODES WORK

A supermarket computer system has in its memory the bar code for each **item** in the store. The computer also has in its memory the price of each **item**. If a store has a sale on canned fruit, for instance, the store manager does not have to change the prices on the cans. Instead, he changes the price in the computer memory. When a sale **item** is scanned, the computer reads the bar code. It enters the new price into the cash register. Bar codes also help stores count what they have sold. As **items** are scanned, the computer **automatically** counts them. At the end of each day, the store manager knows what the store has sold. For example, he knows that he still has enough canned fruit, but that he must order more coffee.

HOW BAR CODES DEVELOPED

Bar code **technology** became available in 1974. Since then, several bar code systems have been designed. Each system is based on creating a **unique identification** number for every manufacturer. One system uses 12-digit **identification** numbers. Each printed bar code **consists** of a **unique pattern** of black and white lines that represent numbers from 0 to 9. The first six digits **identify** the manufacturer. The next five digits **identify** a certain **product**. The last digit is called a *check digit*. It tells if the number scanned correctly. For example, the Campbell Soup Company **produces** canned foods. The first six digits of all Campbell **products** are the same. The next five digits are different for each Campbell **product**, such as chicken soup, tomato soup, and so on. As a result, the bar code for each **product** in a store is **unique**.

Each bar code consists of a unique pattern.

HOW BAR CODES HELP

Many kinds of businesses use bar codes. However, a bar code system is especially useful in supermarkets. One reason is that most customers **purchase** a large number of **items**. Bar codes make the checkout process fast and easy. Also, supermarkets sell a wide variety of **items**. Most of these **items** sell quickly. Using bar codes allows stores to easily track what has sold and what needs to be ordered. Using the **technology** of bar codes makes supermarkets more efficient. ■

Reading Comprehension

Mark each statement *T* (True) or *F* (False) according to Reading 1.

___ 1. A bar code is a pattern of black and white lines.
___ 2. A bar code might be printed on an item that you bought recently.
___ 3. Bar code technology is not used in supermarkets.
___ 4. Supermarket clerks count the number of purchases that a customer makes.
___ 5. Bar codes were invented to help customers save money.
___ 6. Computers automatically tell a customer the price of an item.
___ 7. The bar code for each product is unique.
___ 8. Bar code readers can identify customers by what they purchase.
___ 9. A bar code number consists of 12 digits.

READING SKILL Identifying Steps in a Sequence

LEARN

Articles often describe the steps necessary to complete an action. Sometimes these steps describe how a famous person was able to do something special. Sometimes these steps tell you how to build something. Sometimes these steps relate the progress of a historical event.

Often the order of the steps begins with words like *first, the first thing,* or *to begin with.* Sometimes the next steps are identified with words like *second, next, then,* or *after that.* The last step often begins with words like *finally* or *at last.* Sometimes the separate steps are not labeled.

APPLY

Work with a partner. Answer the questions below. Then follow the directions given.

1. In Paragraph 2 there is a description of the steps that checkout clerks had to take before bar codes were used. How many steps were there? ___

2. Paragraph 2 also describes the steps to check out customers after bar codes were used. How many steps are there? ___ How many of these steps are done by the checkout clerk? ___

3. Follow the directions to create a sample bar code digit.

   First, draw a square on a piece of paper. Make the square about one inch wide and one inch high. Next, draw six vertical lines inside the square. The lines should divide the square into seven equal spaces. Now you are ready to create a digital 9. After that, use a pencil to blacken in the first three spaces on the left. Then leave the fourth space white. Next, blacken in the fifth space. Finally, leave the last two spaces white. You have just created a digital 9.

   Number the six steps that are included in the directions.

REVIEW A SKILL Identifying Time Signals (See p. 84)

Work with a partner. Find the sentences below in Reading 1. Then answer the questions in your notebook.

1. *Look at the items you have purchased recently.*
   Which word tells you that the sentence is about the past?
2. *Before bar codes were invented, supermarket customers waited in long lines.*
   Which words tell you that the sentence is about the past?
3. *Now a clerk picks up an item and passes it over a scanner.*
   Which word tells you that the sentence is about present time?

Vocabulary Activities STEP I: Word Level

Technology refers to the equipment or scientific knowledge that is used in a particular industry.

Canning contributed to the growth of food ***technology****.*

Computer ***technology*** *has changed our lives.*

(See Oxford American Dictionary for learners of English, p. 750)

CORPUS

A. **Work with a partner. Write the name of each invention or event under the appropriate technology. Then take turns making sentences with the information.**

Space ***technology*** *made satellites orbiting Earth possible.*

brain surgery	laptop computers	~~satellites orbiting Earth~~
cell phones	moon landings	studies of the sun
heart transplants	preventing some diseases	the Internet

Space Technology	Medical Technology	Information Technology
satellites orbiting Earth		

Something is *unique* when it is the only one of its kind. A person is *unique* if he or she is not like anyone else. It can also mean "very unusual."

*Antarctica is **unique**. It is the only continent permanently covered with ice.*

*My family is **unique**. All five of my sisters are doctors.*

Unique can also mean that someone or something is connected with a single time or place.

*The kangaroo is **unique** to Australia.*

(See Oxford American Dictionary for learners of English, p. 795)

CORPUS

B. **Work with a partner. In each group below, decide which item is *unique*. Tell why it is unique. Take turns making sentences with the information.**

1. piano violin (radio) guitar trumpet drum

   *Why? Radio is **unique** because it is not a musical instrument.*

2. elephant zebra cow horse chicken sheep

   Why? _____

3. Brazil Italy Spain France Denmark Portugal

   Why? _____

4. Earth Jupiter Mars Sun Neptune Mercury

   Why? _____

5. beef bananas berries beans cheese bread

   Why? _____

To consist of something means "to be made up of two or more parts, substances, etc."

*The United States **consists of** 50 states.*

*Pasta **consists of** a mixture of flour and water.*

(See Oxford American Dictionary for learners of English, p. 154)

CORPUS

C. **Work with a partner. Match the item on the left with what it *consists of*. Then take turns making sentences with the information.**

1. a soccer team ___ a. shops, restaurants, and other businesses
2. water ___ b. a crust, tomato sauce, and cheese
3. South America ___ c. two hydrogen atoms and one oxygen atom
4. the English alphabet ___ d. 12 independent nations
5. a shopping mall ___ e. 11 players
6. pizza ___ f. 26 letters

Vocabulary Activities STEP II: Sentence Level

The adjective *automatic* refers to a machine that can operate without human help. The adverb form is *automatically.*

*I stopped by the **automatic** teller machine at the bank to get some money.*

*The machine **automatically** counts out the amount you request.*

Automatic also means "to do something without thinking about it."

*Whenever the phone rings, my **automatic** reaction is to answer it.*

*I **automatically** answer the phone whenever it rings.*

Automatic also refers to a certain outcome as a result of an action.

*There is an **automatic** penalty if you hit another player.*

*You are **automatically** penalized if you hit another player.*

(See Oxford American Dictionary for learners of English, p. 45)

D. Read the paragraph below. Then rewrite each of the eight underlined sentences in your notebook with *automatic* or *automatically*. Take turns reading all the sentences with a partner. The first one has been done for you.

I went to a modern supermarket to buy food for my family. (1) As I approached the door, it opened for me. A young woman inside the market gave me a leaflet. (2) It said, "You will get a 10% discount if you spend over $100." (3) I took a leaflet without thinking about it. Then the manager greeted me with, "How are you today?" (4) Without thinking, I answered, "Fine, thanks." As I finished my shopping, I passed by a new kind of frozen food cabinet. (5) A light inside turned on whenever someone passed by. I got to the checkout counter. (6) The clerk said, "Please put your items on the scanning disc. It will turn without help." (7) As the disc went around, a scanner read the prices. The clerk said, "Your total is $100.01." (8) I got a 10% discount.

*1. As I approached the door, it **automatically** opened for me.*

To invent something means "to think of an idea or to make something for the first time." The noun form is *invention*.

*Thomas Edison **invented** the first practical electric light bulb.*

*This **invention** made Edison rich.*

Often this verb is used in the passive, especially when the inventor is unknown.

*The zipper **was invented** in 1893.*

*Writing **was invented** thousands of years ago.*

(See Oxford American Dictionary for learners of English, p. 387)

CORPUS

E. Use the information in the chart below to write a sentence about each invention.

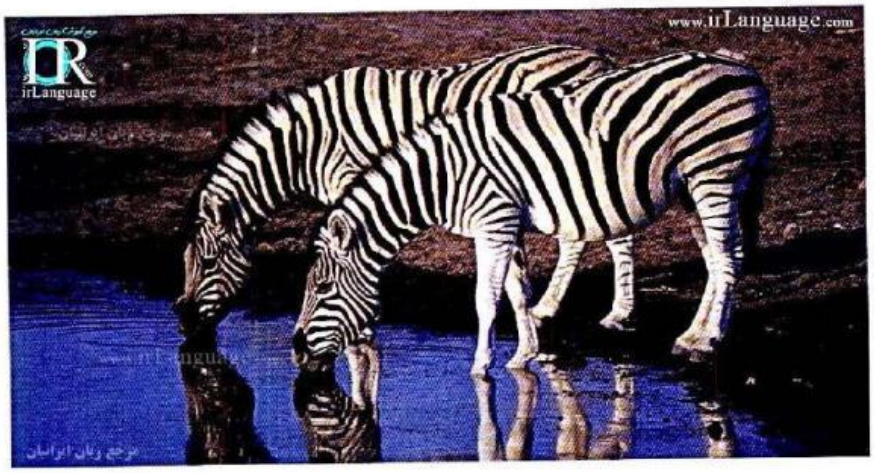
Inventor	Invention	Date of Invention
1. Alexander Bell	telephone	
2. Ransom Olds	gasoline-powered car	1896
3. The Chinese	magnetic compass	2,000 years ago
4.	nylon	1935
5.	the Internet	1969

1. *Alexander Bell **invented** the telephone.*
2. _____
3. _____
4. _____
5. _____

F. Use the following words to complete this paragraph.

automatically	identify	items	produces	technology
consists of	invented	pattern	purchase	unique

Bar codes help supermarkets count the (1) _____ that customers (2) _____. Now animal scientists are using bar code (3) _____ in a new way. They are using it to help (4) _____ and count the zebras that live in the grasslands of Africa. The scientists know that the hair of zebras grows in a (5) _____ that 6) _____ black and white stripes. They also know that each zebra has a (7) _____ pattern of stripes. Scientists saw that these stripes look like bar codes. They (8) _____ a program called Stripe Spotter to read the zebras' stripes. The program uses photos of zebras. It changes the stripes electronically and (9) _____ a bar code for each zebra. These bar codes are (10) _____ stored in a computer. Scientists can follow the movements of wild zebras by comparing their stripes to the bar codes stored in the computer. This helps them study how zebras live.



READING 2

Before You Read

In small groups or with the whole class, discuss the following questions.

1. Bar codes are very useful for businesses such as supermarkets. Can you think of any ways that bar codes could help people in their personal lives?
2. Why are bar codes printed only in black and white? Why aren't bar codes printed in other colors?
3. Have you ever used a smartphone? What are some of the things a smartphone can do?

Read

The information in this article is from a technology website.

2-D BAR CODES

In 1974, the first bar code was scanned. It was printed on a pack of chewing gum. It was a significant event. Almost immediately, UPC bar codes began to appear on hundreds of other **products**. Supermarkets and other large stores quickly installed machines to scan these bar codes. These machines were called *scanners*. They were linked to store computer systems.

UPC and other bar code formats are one-dimensional. That is, the information coded in the black and white **pattern** of lines can be read in only one direction. There is a beginning to the **pattern** and an end to the **pattern**. The information in the **pattern identifies** only the **product** and its manufacturer. After a while, companies wanted to find a way to include more information in the bar code.

A NEW KIND OF BAR CODE

This led to the **invention** of 2-D, or two-dimensional, bar codes in Japan. They were first used in the 1990s to track the **production** of automobiles. A 2-D bar code **consists** of shapes in both a vertical and a horizontal **pattern**. Like 1-D bar codes, 2-D bar codes are black and white. Each shape or combination of shapes provides information. This allows a 2-D bar code to hold over a hundred times more information than a 1-D bar code. Like 1-D bar codes, each 2-D bar code is **unique**. However, the complex **pattern** requires a powerful scanner to read and analyze the information. Modern smartphones and tablet computers can scan the bar codes and download the information.

A 2-D bar code

Companies have found this **technology** very useful for advertising and selling their products. For example, a sportswear company might place an advertisement in a popular magazine. The advertisement shows a picture of happy people skiing down a mountain. There is a 2-D bar code under the picture. A young man is looking through the magazine. First the picture catches his eye. Then he notices the 2-D bar code. He scans it with his smartphone. A short video **automatically** appears on the screen of the phone. The video shows people skiing. Then it shows many styles of ski clothes. He decides he needs a new ski jacket. He clicks a button on the phone and it links him to the company's website. Within minutes, he **purchases** a ski jacket online.

1-D bar codes	2-D barcodes
appeared in 1974	appeared in 1990
horizontal pattern	horizontal and vertical patterns
unique pattern	unique pattern
identifies a product	provides product information
printed on products	printed almost anywhere
read by scanning machines	read by smartphones/ computer tablets

USES FOR 2-D BAR CODES

Most 2-D bar codes appear in magazine or newspaper advertisements. When scanned, most provide information about **items** in the advertisement. However, 2-D bar codes can be put almost anywhere, and they can be used for more than advertising. Giant bar codes on highway billboards give directions to rest stops. Smaller ones on the backs of stadium seats can show a team's schedule of games. A hardware store might attach a 2-D bar code to the tools it sells. Customers who buy a tool can watch a video on their smartphone screens to learn how to use the tool. A 2-D bar code might appear on a FOR RENT sign placed in the window of an empty apartment. Scanning the bar code will give people information about the apartment, such as the monthly rental fee. Modern **technology** has provided us with an amazing tool. ■

Scanning a 2-D bar code with a cell phone

READING COMPREHENSION

Mark each statement *T* (True) or *F* (False) according to Reading 2.

___ 1. A 2-D bar code consists of two digits.

___ 2. A 2-D bar code can provide information about a product you purchase.

___ 3. Each 2-D bar code consists of a unique pattern of black and white shapes.

___ 4. 2-D bar codes were invented in Japan to identify automobiles.

___ 5. Each item in a supermarket has a 2-D bar code printed on it.

___ 6. 2-D technology enables smartphone users to automatically access many kinds of information.

READING SKILL Identifying Steps in a Sequence

APPLY

1. Re-read paragraph 4. The paragraph describes how 2-D technology is useful in advertising and selling products. Number the steps that the young man takes to purchase a ski jacket in your notebook.
2. The last paragraph in Reading 2 tells that people advertise apartment rentals using 2-D bar codes. Imagine that a young man is looking for an apartment to rent. In your notebook, write the steps he might take to rent the apartment.

REVIEW A SKILL **Identifying Time Signals** (See p. 84)

The sentences below are taken from Reading 2. Answer the questions.

1. They were first used in the 1990s to track the production of automobiles.
   What part of the sentence tells you that this happened in the past?

   _____

2. Modern technology has provided us with an amazing tool.
   What word tells you that this is about the present time?

   _____

Vocabulary Activities STEP I: Word Level

To purchase something means "to buy something." It is a more formal word than *buy*.

*The company plans to **purchase** a new office building downtown.*

The noun form is also *purchase*. It can refer to the act of buying something. It can also refer to the item or items that you buy.

*The **purchase** of a new house takes time and money.*

*I put my **purchases** in my car and drove home from the market.*

(See Oxford American Dictionary for learners of English, p. 567)

CORPUS

A. **Work with a partner. You have just been shopping. Match each item with the store where you *purchased* it. Take turns making sentences with the information.**

1. a pair of slippers — 1 a. a shoe store

   *I **purchased** a pair of slippers at a shoe store.*

2. a cake — ___ b. a pharmacy
3. a wrist watch — ___ c. a bakery
4. lunch — ___ d. a bookstore
5. some cough medicine — ___ e. a jewelry store
6. a dictionary — ___ f. a sidewalk café

With your partner, answer these questions about the purchases.

1. Which purchase was the most expensive?
2. Which purchase took the longest?
3. Which purchases were something to eat or drink?

An *item* is one thing in a group or list of things.

*The first **item** of business for this meeting is to welcome our new vice president.*

*I wrapped all of the breakable **items** in newspaper before packing them.*

An *item* also refers to a story in a newspaper.

*Did you read the **item** in today's paper about oil production?*

(See Oxford American Dictionary for learners of English, p. 390)

CORPUS

B. **Work with a partner. Take turns asking and answering questions about the *items* on the lists below. Follow the example.**

1. Shopping list	2. Hawaii vacation	3. Menu
5 pounds of beef	sun hat	glass of water
1 can of beans	airline ticket	fried chicken sandwich
1 apple	snow shoes	bread
4. Newspaper stories	**5. Homework**	**6. Jobs to do**
No Change in Weather	clean off desk	paint kitchen walls
Animals Found on Mars	choose topic for final report	sweep floor
No Soccer Games Today	study for tomorrow's test	wash dishes

1. Which item on the shopping list will be the most expensive?

   A: Five pounds of beef.

2. Which item on the vacation list should you leave at home?
3. Which item on the menu would you like to order for lunch?
4. Which item in the newspaper sounds the most interesting?
5. Which item on the homework list should you do first?
6. Which item on the jobs list will take the longest?

A *pattern* is a repeated arrangement of sounds, colors, or shapes.

The walls were covered with a beautiful ***pattern*** *of red, gray, and black bricks.*

A *pattern* can also refer to the regular customary way something is done.

Each language has a specific set of sentence ***patterns.***

By the age of 50, Jan had fallen into a ***pattern*** *of bad habits.*

The police noticed a ***pattern*** *to the bank robberies.*

A *pattern* is also a shape or design for making something.

Sheila followed a ***pattern*** *to cut material for a blouse she was sewing.*

(See Oxford American Dictionary for learners of English, p. 512)

CORPUS

C. **Work with a partner. Take turns reading the four numbered patterns below. Put the number of the pattern by the best description below.**

1. left foot, right foot,
   left foot, right foot

2. green stripe, white stripe,
   green stripe, white stripe

3. Twinkle, twinkle little star,
   How I wonder what you are.
   Up above the world so high,
   Like a diamond in the sky.

4. get up, eat breakfast, brush teeth,
   take a shower, get dressed,
   drive to work, come home,
   eat dinner, watch TV, go to bed.

___ a street pattern

___ a daily pattern

___ a walking pattern

___ a color pattern

___ a musical pattern

___ a rhyming pattern

Vocabulary Activities STEP II: Sentence Level

To identify someone or something means "to be able to tell what or who something or someone is."

My friend ***identified*** *the insect in my kitchen. He said it was a cricket.*

The police ***identified*** *the robber from his fingerprints.*

The noun form is *identification*. It refers to the process of showing or seeing who someone is or what something is.

All workers had to have an ***identification*** *photo.*

Each year our club helps with the ***identification*** *of wild birds as they fly south.*

(See Oxford American Dictionary for learners of English, p. 359)

CORPUS

D. Complete the paragraph below with *identify* or *identification*.

When you travel by plane, be sure you can (1) _____ your suitcases. Before leaving home, attach an (2) _____ tag to each suitcase. It should show your name, address, and phone number. If a suitcase gets lost, the tag will (3) _____ you as the owner. The tag will also help you (4) _____ your luggage at your destination. Sometimes these tags fall off, so also put (5) _____ information *inside* each suitcase. Then the airline can contact you if a suitcase *and* its tag get lost. When you arrive at the check-in counter the agent will ask to see a photo (6) _____. A passport or driver's license can be used to (7) _____ yourself.

The verb *to produce* something means "to make something or grow something." The noun form is *production*.

*Brazil **produces** over one-third of the world's coffee.*

*Brazil is known for its **production** of coffee.*

To produce something also means "to show something to another person, or to cause something to happen."

*I had **to produce** my passport to prove who I was.*

The noun *product* refers to something that is made or occurs in nature.

*The company's best-selling **product** is its chocolate candy.*

(See Oxford American Dictionary for learners of English, p. 557)

CORPUS

E. Complete this paragraph by using a form of *produce* in each blank space.

Coffee is the most popular drink in the world. About seven million metric tons of coffee is (1) _____ in the world each year. After petroleum, coffee is the most common (2) _____ in international trade. Brazil (3) _____ about one-third of the world's coffee. The (4) _____ of coffee begins with small bushes that (5) _____ coffee berries. Inside is a small coffee bean. The beans are roasted. They are sold to different coffee companies. Then these coffee (6) _____ are shipped to markets. Customers buy the coffee and make it at home. The finished coffee will (7) _____ a wonderful smell and a delicious drink.