Problem-Solving and Computers

Homework

Fun

Communication

Schoolwork

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Problem-Solving and Computers

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Table of Contents

How Do Systems Help Solve Problems?

Many objects we use each day are made of multiple parts. The doorknob Lin uses to open a door has many parts. The computer he uses to play a game or type a report has a lot of pieces. Even the pen Lin uses to write a thank-you card is made of many pieces. What other objects can you think of that are made of many pieces and parts?

A **system** is a set of parts that work together to complete a task. A doorknob, a computer, and a pen are all systems. Systems can have internal parts that are not seen from the outside. External parts are on the outside and can be seen. The doorknob system that Lin uses to open the classroom door has internal parts. The knob itself is an external part of the doorknob system. And even the doorknob system is part of a bigger system that includes the door, the door's hinges, and the doorframe.

Look at the external and internal parts of the doorknob system. Which parts of the doorknob system do you see when you use it to open the door (the external parts)? Which parts do you not see (the internal parts)?

Some systems are more simple than others. A computer and a car are systems that are more complex than a stepladder. But if one part of a system is not working, it does not matter if a system is simple or complex. The system cannot work if all the parts do not work as planned. When a system doesn't work, someone needs to **troubleshoot** the problem. *Troubleshoot* means to figure out and then correct a problem in a system.

When a system stops working, we look for the reason or the *cause* of the problem. For example, if a computer can't reach a website, the cause might be a failed internet connection. Every cause has an *effect*, something that happens (or doesn't happen) because there is a problem. In this case, the effect of a failed internet connection might be an error message, such as "page not found."

Vocabulary

system, n. a set of parts that work together to complete a task

troubleshoot, v. to identify and correct the problem in a system

When Lin gets home from school, he hangs his coat on the doorknob and gets out the can opener to open a can of food for his dog, Click. Since the can opener system is not broken, Lin is able to open the can and feed Click his food.

The can opener is a system of parts that work together for one purpose—opening metal cans.

The can opener is a system of parts that work together for one purpose—opening metal cans. Some systems have more than one purpose. Or the purpose can change depending on why you are using the system.

The doorknob is now also functioning in a different way from its original design—as a holder for Lin's coat! How is Click's collar also a system?

After feeding Click, Lin is ready to play a game on his computer. Lin's computer is also a system that has many purposes. What purposes can you think of that a computer has? Is one purpose more important than another purpose?

How Does Communicating Solve Problems?

Click and Lin **communicate** throughout the day. Humans and dogs are different types of creatures. Lin and his mom communicate differently from how Lin communicates with Click. But Click and Lin still communicate throughout the day.

> **Vocabulary**
>
> **communicate, v.** to share information

Lin and Click have actions that help them communicate with each other. Lin has even taught Click to use some items around the house to tell Lin if he wants or needs something. If Click wants to go outside, he rings the bell on the back door. If Click wants to play ball, he brings his ball over to Lin. When Click is hungry, he goes and sits by his food dish.

Lin communicates with Click too. When it is time to stop playing ball, Lin puts the ball in the basket. When Lin wants Click to sit and wait, he makes a hand motion and says, "Sit." And when Lin wants Click to come, he calls his name, "Click."

Even though they are not the same type of creature, Lin and Click communicate in their own way.

Like Lin and Click, computers have their own language to communicate. The information that computers share is made up of symbols and signals. Computers can communicate with each other by sending signals back and forth. The computers must be connected in a **network** to communicate. The internet is a network of computers located all over the world.

Vocabulary

network, n. group of computer devices that communicate with each other

Lin's parents run an online bakery. They need computer devices to communicate with other computer devices in order to sell their products. But not all the information in their computer should be **public**. Public information is information that anyone can see. Some of the bakery information should be kept **private**. The items being sold and their prices are public information on the bakery website. The passwords Lin's parents use are private. Think of other public information that should be shared and other private information that should not be shared.

How Does Collecting Data Solve Problems?

Chapter 3

Lin and his classmates are learning about how they can collect **data**. Collected facts and information are data. Surveys are one way data can be collected. Tools can also be used to collect data.

> **Vocabulary**
>
> **data, n.** details of information collected by observation or measurement

Mr. Vasco, Lin's teacher, asks, "What tools do we use to collect data?" Lin and his classmates start responding with names of tools they use. They think of computer devices, thermometers, scales, cameras, recording devices, and so on. Think about tools you have used to collect data.
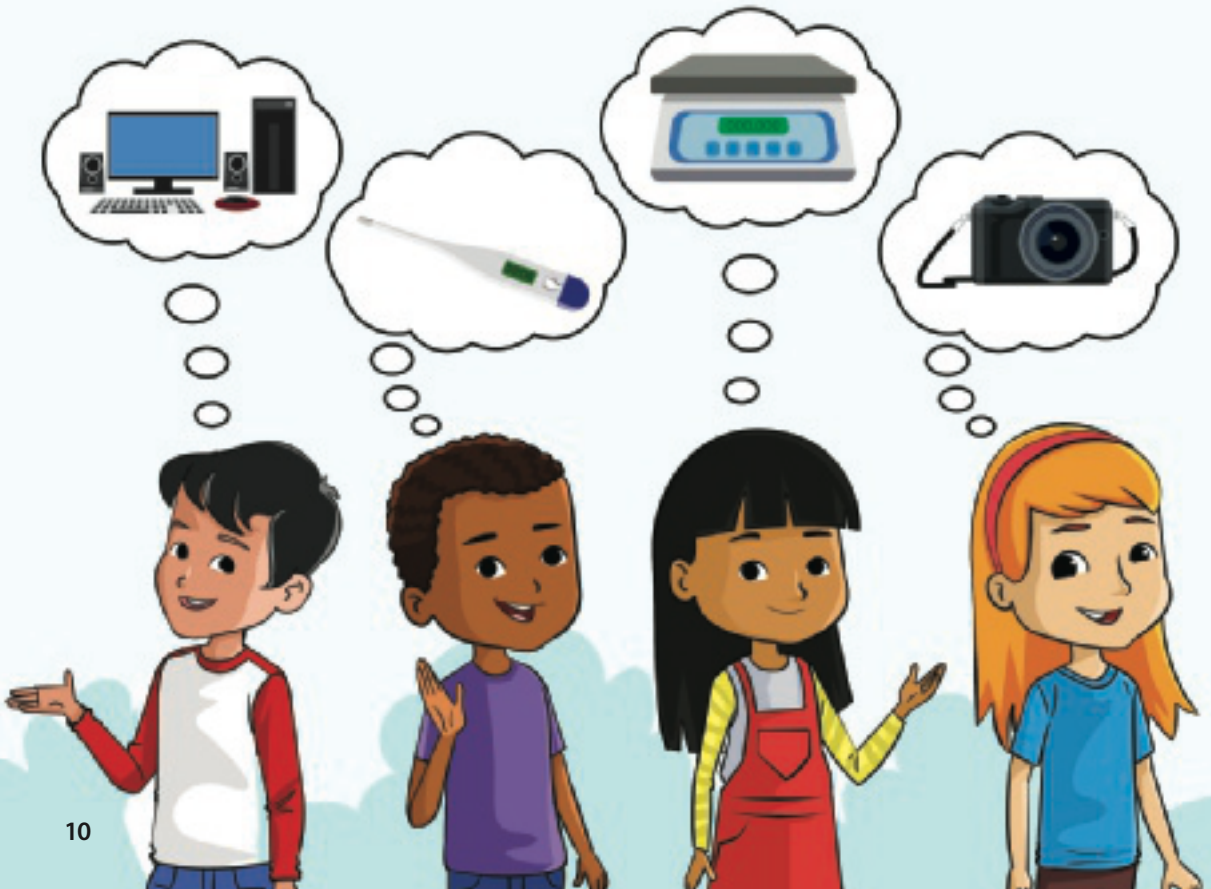
Mr. Vasco tells the class that information can be based on a fact or an opinion. A fact is known to be true or proven. An opinion is a view or a judgement about something. Mr. Vasco explains that the outside temperature of 68°F is a fact. Saying the temperature outside is too warm to wear a jacket is an opinion. Some times data collection uses facts, and some times it uses opinions.

Think about something you saw outside today. What is a fact about it, and what is an opinion? Suppose you saw a blue jay outside. A fact about the blue jay is that it is a bird. The blue jay will not change from being a bird. So, the fact of it being a bird will always be true. An opinion about the blue jay is that it is the best type of bird. Some people might think other birds are better for different reasons.

What facts about the blue jay can you observe by looking at the photo?

When Lin comes home from school, he starts his data assignment. The first part of the assignment is to make a claim. A claim is a statement you think is true. Then Lin will collect data to see if his claim is correct.

Lin claims that ice shaped as a cube will melt faster than ice shaped as a sphere. He measures the same amounts of water and into two containers—one shaped as a cube and the other shaped as a sphere. Once the water freezes into ice, he starts collecting data.

Lin knows that sometimes data will show a pattern that is unexpected. The evidence from the data he collects might not support his claim.

Lin takes pictures every ten minutes to record what the ice shapes look like. He stores the pictures on his computer. He observes how much water has melted from each ice shape. He records his observations into a data table, which is also on his computer. The table keeps Lin's data organized. It makes it easier for Lin to look for patterns. By collecting data carefully, Lin will be ready to explain whether or not the data he collected support his claim.

Words to Know

A *data table* is a grid of lines for organizing information. The lines make rows and columns of boxes called *cells*. Each cell in a data table contains one datum—a single piece of data.

	Amount of Water Melted from Cube	Amount of Water Melted from Sphere
10 minutes		
20 minutes		
30 minutes		

Solving Problems with Planning and Teamwork

Lin's family helps animals by selling some of their bakery treats. Lin's parents participate in a local fundraiser called Bakeries for Barks. Bakeries come together to sell baked goods to help raise money for the local animal center.

Lin's mom says, "The first thing we need to do is have a plan of what we will bake for the fundraiser." They all start naming bakery items. Lin's mom records the ideas on her tablet. Click is close by in case they need a dog taste-tester! The teamwork has already begun. *Teamwork* means working together as a group.

Lin's mom looks at the list of baking ideas. "We have over twenty items," she says. "As a team, let's choose the top five. Those are the ones we will bake for the fundraiser."

Lin's top choice is coconut bites. Lin's dad chooses blueberry bagels. Mom votes for almond cookies. They collaborate, or work together as a team, and decide on two more items to bake for Bakeries for Barks.

Lin and his parents move on to the next steps in their plan. They determine the timing so that all the bakery items will be ready and packaged the day before the fundraiser.

They make a list of ingredients called for by their recipes. Then they buy everything they need.

Now it is time to start making the treats. Lin chops the pineapple for the tropical coconut bites. Dad measures flour to make dough for the bagels. Mom gets pans ready for the cookies.

After all five treats are ready, Lin's family works as a team packaging them to bring to the event.

Lin and his parents are ready for Bakeries for Barks. Collaborating as a team made it possible for them to provide treats for the fundraiser. Now all the town's bakeries collaborate to sell their treats in order to raise money for the animal center.

Lin learns how to sell his family's treats. Ringing up each sale on the tablet records data about the money they are collecting to donate. Click shows his support too. He greets everyone who comes to purchase bakery treats at the tent!

Data, Programmers, and Problem-Solving

After Lin and Click take a walk, they stop by the bakery Lin's parents own. When they walk in the door, they see Lin's dad mixing ingredients in a big bowl. Dad says, "Hi, Lin! Hi, Click! Lin, will you please read the recipe and tell me how long I need to mix the dough after adding the dried blueberries?"

Lin walks to the stand where his dad has the recipe displayed on his tablet. He scrolls down through the steps of the recipe to find the step after adding blueberries. Lin tells his dad, "The recipe says to mix the dough for five minutes."

Word to Know

Scroll means to move words or pictures on a screen by sliding the contents up or down. A *scroll* is also a roll of paper for writing or drawing on.

Lin asks, "Dad, what would happen if you did not mix the dough for the right amount of time, or if you didn't mix the dough at all?"

His dad answers, "The recipe has steps to follow that will result in a certain food. If I don't follow the steps in the recipe, then the food won't turn out the way it should. It might be too chewy. It might be too dry. I follow the recipe instructions because I want the food to turn out just right. But I can modify the ingredients at times. If I want to make cherry bagels instead of blueberry bagels, then I would substitute cherries for blueberries. However, that would not change the steps in the recipe. I would still follow the same recipe instructions."

A recipe gives you a list of ingredients and tells you how much of each ingredient you will need. It also gives you the steps to take when you combine those ingredients. The steps have to happen in a particular order.

The next day at school, Lin and his classmates learn about computer programmers. Their teacher, Mr. Vasco, explains that programmers design sets of instructions for computer devices to follow. Programmers use **if/then statements**: if something is done or not done, then something else will happen or not happen.

Lin remembers his dad making blueberry bagels. The recipe his dad used was a set of instructions too. If the recipe steps were not followed, then the food wouldn't turn out right.

The sets of instructions that computers follow are called **algorithms**. Different algorithms perform different tasks, much like different recipes result in different foods. If the steps of an algorithm are incomplete or in the wrong order, then a computer device won't do what it is supposed to do.

After school, Lin's dad is making another batch of blueberry bagels. He clicks a button in the recipe program displayed on his tablet. The click adds a little bagel picture to a row of bagel icons at the top of the recipe. This way Dad records how many times he has made a batch of blueberry bagels.

Lin learned something about this when Mr. Vasco was teaching about computer programs earlier! The number of times Lin's dad makes the bagels is a **variable** in the recipe program. A variable is a piece of data that isn't exactly the same every time a computer runs a program.

When Lin logs in later to play a video game, his score saved from the previous game is another example of a variable. A computer device can store many variables, but a computer programmer must give each variable a different name.

Word to Know

An *icon* is a small picture used to represent something in a way that takes up less space than words.

Solving Problems with Codes

Lin's cousin Yoshi is in a marching band. Yoshi plays the trumpet at high school football games. Lin and his family go to watch the band perform. As the band members play instruments, they also march in **sequence**.

Band members make pictures on the field while playing their instruments. Lin thinks it is awesome! First, their positions make the group look like a tiger. Some band members step back and forth to make the tiger's fur move! Then they march to new spots on the field. They spell the high school's initials, APHS.
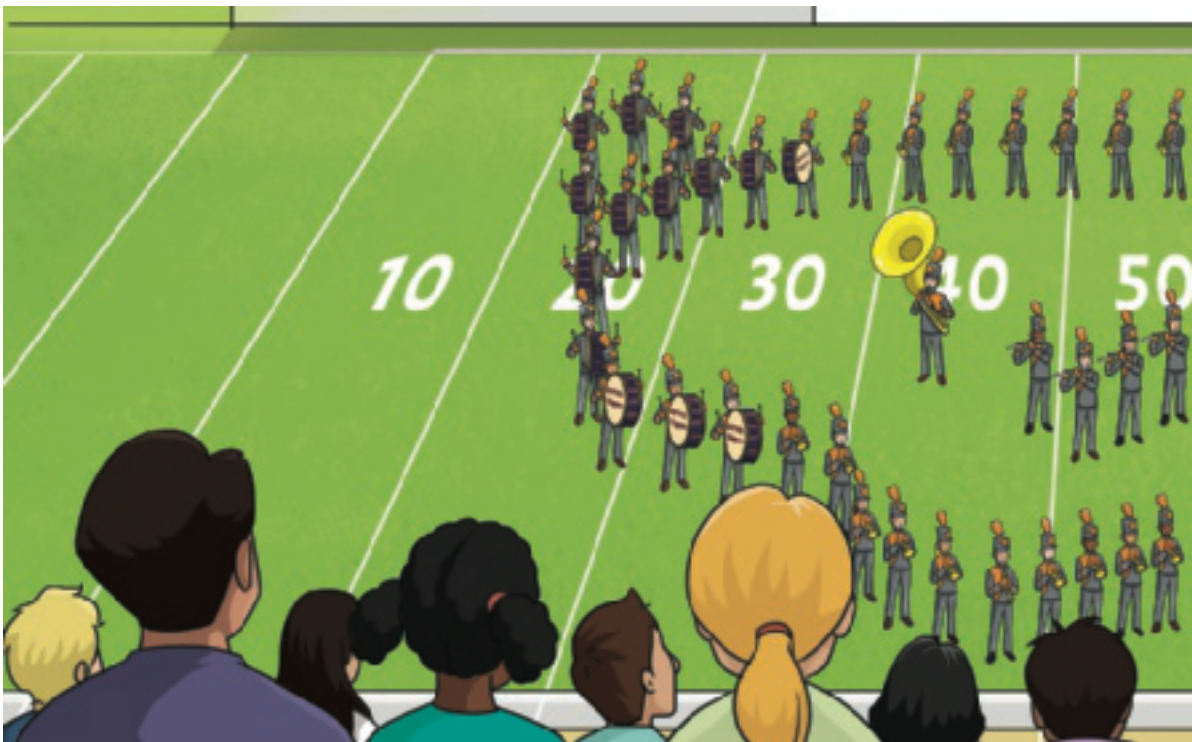
The next day, Lin and Yoshi hang out to play video games. Lin asks, "How did you know where to move to make the tiger and then where to move again to make the letters?"

Yoshi explains, "The whole program is a sequence of many steps. It's broken down, or decomposed, into smaller **events**. The events mark where we start, march, and stop. Some of the steps **loop**, or keep repeating."

Yoshi continues, "We get our steps on a sheet of paper. Or we can also see them digitally on a smartphone. Each member in the band is grouped by the instrument they play. I only need to learn the trumpet events. When all the events are composed back together, you see the tiger and the school's initials."

Vocabulary

event, n. part of a program that runs in response to certain actions

loop, n. instructions that repeat
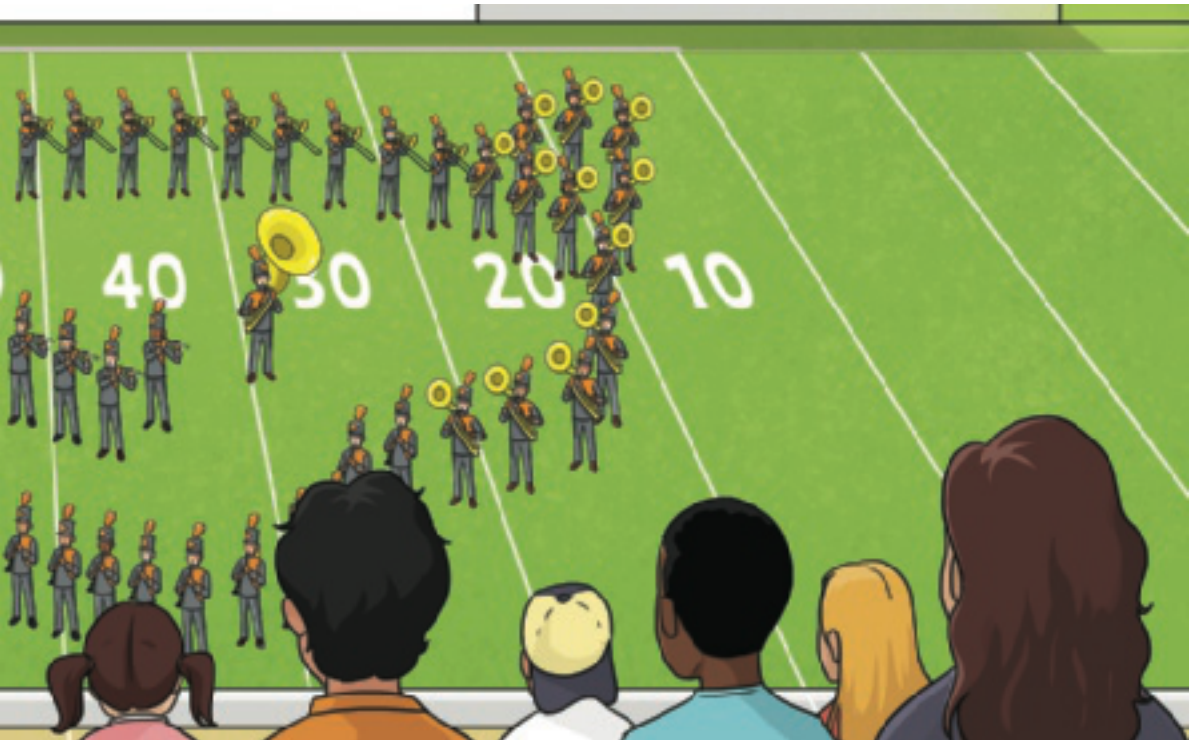
At school, Lin and his classmates learn how computer programmers tell computer devices what to do. Programmers use **code** to give computers instructions. The code provides the events, sequences, and loops for the computer to complete.

Mr. Vasco gives the students their next computer science assignment: give a presentation to describe something in real life that uses sequences that can be decomposed into events and loops.

Thanks to Yoshi's marching band, Lin knows exactly what he will use for his assignment! Lin starts working on his presentation when he gets home.

With Yoshi's help, Lin compares a marching band to computer programming.

- The order of the marching steps is similar to the sequences in a code.
- The instructions for just the trumpet players are like the decomposed events in a code.
- When band members repeat marching steps to make it look like the fur on the tiger is moving, that is like a loop in a code.
- When all the events in the marching band program work together, the task is complete.
- The same thing happens with computer code. When all the events in a code work, the task is complete.

Lin presents his assignment to his classmates. He even shows the videos he took on his tablet with the music from the halftime show!

Testing Programs

"FINALLY!" Lin exclaims.

"What are you so excited about, Lin?" asks his dad.

Lin replies, "I have been waiting for this new video game to come out for almost a year. I just saw a commercial on TV that it will be on store shelves next week."

Lin asks, "Why did it take so long? FavoGames started advertising this game last year."

Lin's dad explains, "It's a long process to make a video game. It starts with an idea. But then computer programmers must code all the parts of the story, the pictures, the sounds, and the rules. The program must be tested. Problems have to be fixed, or debugged. Then more testing happens."

Lin asks, "Can't they just put the video game out and fix the problems later?"

Lin's dad asks, "How would you feel, after waiting for a video game, if the character you are playing had a bug in the loop and kept moving to the right through the whole game? No matter what controls you would use, the character would only move one way."

"That would stink!" Lin replies. "I guess it's worth the wait for the game to be tested so that it works correctly."

Dad continues, "When Mom and I decide to offer a new item at the bakery, it takes us a while, too, before we can sell it. First, we discuss what ingredients should go in the recipe. Then we make a small batch to try the recipe. We test it to make sure we have the right ingredients and amounts. Usually we need to make some changes. Then we make another small batch with those changes. Testing happens again. When we're sure the recipe is right, we put a description and pictures on the website so people get excited. Then we start making the item to sell."

Lin's dad asks, "Do you remember the oatmeal cranberry cookies you tested last month?"

Lin responds, "Yes, those are fantastic!"

Dad replies, "That recipe took Mom and me over a year to make perfect. Now those cookies are the favorite bakery item sold on our website."

The day the video game is released, Lin and his dad go to the store to buy it. They try it out together. Lin says, "You are right, Dad. I'm glad the game was tested and any bugs were fixed. It was worth waiting for this game. I'm also happy you and Mom did not rush on the oatmeal cranberry cookies. They make the best game-time snack!"

Making Programs Usable

Using his document camera on the whiteboard, Mr. Vasco shows Lin's class the same words in different ways. Mr. Vasco says, "Look at the words in the three different styles of letters. Letter styles are called fonts. Rank the fonts based on how easy they are to read. The easiest to read will be number 1. The most difficult to read will be number 3."

Mr. Vasco displays a different set of words. This time students rank the words based on color. Next they rank sets of words of different sizes. Once all the students have finished their rankings, Lin's teacher leads a discussion. Mr. Vasco explains that choices like font, color, and size of text affect how usable a computer program is.

After school, Lin sees his mom busily packaging online orders. Lin asks, "Mom, did you know there are things that make computers and programs more usable or less usable? Today we learned how fonts, colors, and sizes make a difference."

Lin's mom answers, "Yes, I did know that. When Dad and I started online sales for our bakery, we worked with someone to make sure that our website would be accessible."

She continues, "Part of that process was making sure the descriptions on the website would be readable. We also added a way for the website to read the descriptions out loud so that people can listen to the the them. That makes our website more accessible, which means that the information on our website will be available to the greatest number of people."

After Lin talks with his mom, he goes to the kitchen to get Click a dog treat. Lin starts thinking that maybe Click would like some

homemade treats. He starts looking up some recipes on the internet for how to make dog treats.

Lin asks his mom, "Could we make some dog treats for Click? Maybe if he likes them, we could sell them on the bakery website. I found a recipe online that only has four ingredients."

"I think that is a great idea, Lin," replies his mom. "But we will need to come up with our own recipe if we are going to sell them, or we should give credit to the original author of the recipe."

Lin wonders, "Mom, why can't we just use the recipe I found? It seems like a lot of work to make a new recipe. Dad said it took the two of you over a year to make the oatmeal cranberry cookies perfect."

His mom answers, "It wouldn't be ethical, which means the correct thing to do. If we use someone else's recipe to make a bakery item that we would sell to make money, we should get their permission and give that person credit for the recipe."

Lin says, "I think maybe the best thing to do is to give the recipe author credit for the dog treats I will make for Click. Then we can work on a recipe of our own to sell. Click can be the tester."

Lin's mom laughs and says, "I know Click will enjoy that."

Computer Technology over Time

Mr. Vasco has given Lin's computer science class an assignment. Each student must do a presentation that compares an old tool with a newer tool that does the same task. Each of them also needs to explain how the newer tools make a task easier or faster. Lin isn't sure what this has to do with computers, but he has a good idea for his presentation. On the presentation day, Lin brings in three different tools that all do the same task—mix ingredients.

The first tool is a metal whisk. It does not have an electrical cord or batteries. Lin explains that the tool is helpful but that it takes a long time to mix the ingredients and the person's hand might get tired from mixing.

The next tool is a handheld mixer. It has two metal whisks attached to the main part. It plugs into an electrical outlet, and it mixes the ingredients quickly. However, if there are a lot of ingredients to mix or if the mixture is very thick, the person's hand might get tired from holding the mixer for a long period of time.

The last tool Lin shows the class is one of his parents' counter mixers. This tool has a metal whisk attached at the top of the mixer. The top moves up and down in a large bowl. This tool is very strong, and it does not require anyone to do the mixing. It mixes the ingredients quickly.

After the student presentations, Mr. Vasco explains why he has had students sharing tools like ingredient mixers in a computer class. He asks students to name the things they use computers for inside and outside of class. Then he shows how producing a document printed on paper has changed over time.

Mr. Vasco projects different pictures on the whiteboard. The first picture is a manual typewriter. The next photo is an electric typewriter. Then he shows a picture of an older desktop tower computer. Last, he shows the laptop he uses every day.

Mr. Vasco wheels out a very heavy-looking, black typewriter. "My grandmother's first job out of high school was as a typist," he says. "She would type letters, envelopes, and announcements. This was her typewriter. Pushing a key on this typewriter puts one letter directly on a sheet of paper. If Grandma needed to keep a copy of a letter in her files, she would use carbon paper. That way she did not have to type the letter twice. However, if she made a mistake, she might have to start all over!"

"When my dad was in high school, he took typing classes and used an electronic typewriter. He didn't have to push the typewriter keys as hard as Grandma did. If he made a mistake, he could type over the mistake using correction tape to cover it and then type the correct letter or word over top of the mistake."

Mr. Vasco adds, "When my dad was in college, he would go to a computer lab to use a word processor. The word processor let him type all his words, make sure they were correct, and change any of them if needed before he printed anything."
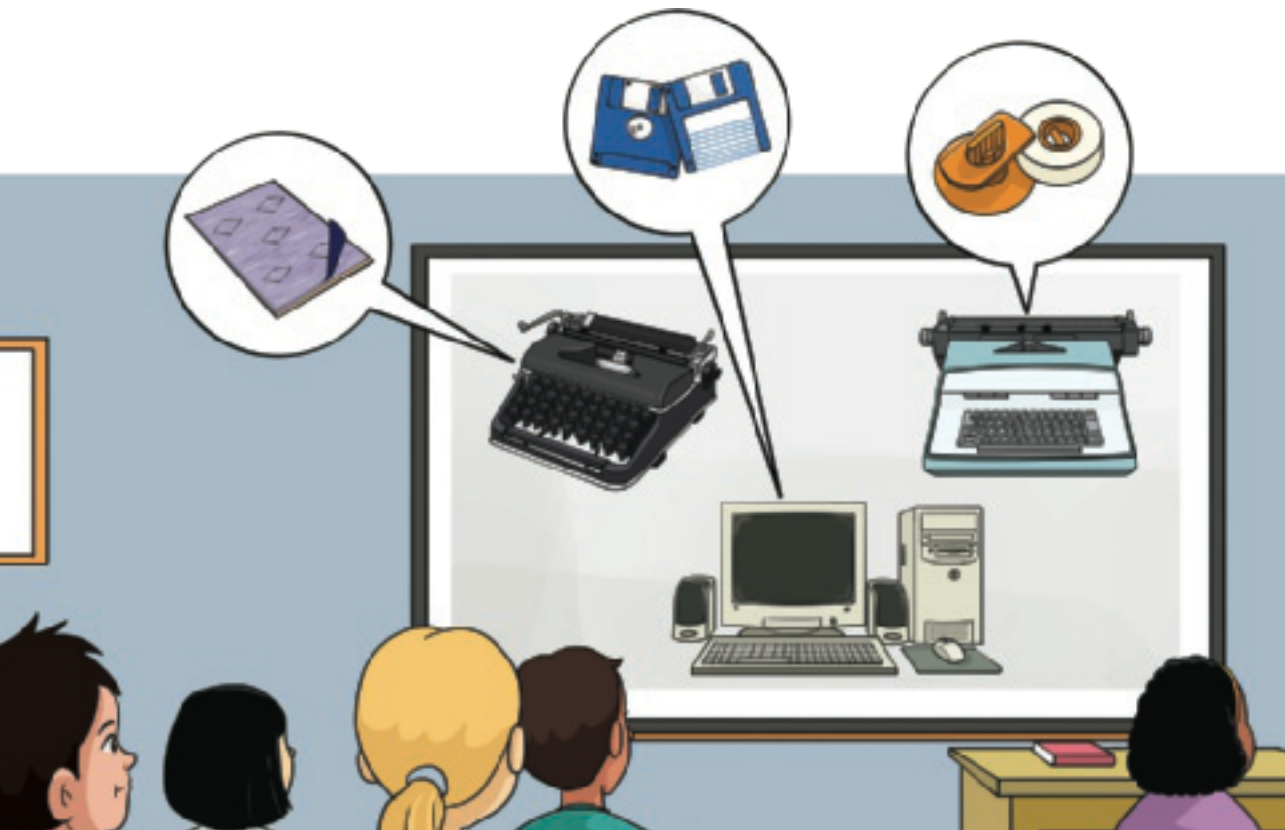
"Later when Dad started his first job," Mr. Vasco continues, "he used a big, clunky, desktop tower computer. He would save the documents he typed on a floppy disk. Saving the document on the disk meant he could take the document with him and use it on another computer. If he needed to print the document, he would plug a printer into the computer. Then he could print the document. If he needed more than one copy, he would have to print the document as many times as necessary, one copy at a time.

Mr. Vasco tells the class how he prints a document now. "If I need to print a document, I first type it on my laptop. Then I can send the file to a printer without plugged-in wires. With the right apps, I can even make documents and print them from my smartphone!"

Computer Technology Solves Problems

Lin is excited about school today. The local university is putting on a technology fair at the playground outside Lin's school. Lin and his classmates will get to visit several booths with fun exhibits.

The first exhibit is about a big technology change that has often helped the world—the internet! Using the internet, people all over the world can share and find information for school, fun, and work. The internet provides a way to communicate almost immediately with others, even if they are far away.

Lin thinks of ways he uses the internet. One of his favorite uses is playing video games online with his cousin Yoshi. What are some other ways people use the internet?

The next exhibit area is about video conferencing and streaming. The university students running the video conference booth demonstrate how people can work together on a video conference call. The participants can see and talk with each other. At the same time, they can share images and files. They don't have to be in the same building or even in the same city to work together. Lin thinks about how much he enjoys video calls with his grandpa in Japan. Grandpa gets to see how much Lin has grown. It's funny to Lin when Grandpa's cat gets in front of Grandpa's laptop camera!

The video streaming exhibit shows how watching shows and listening to music have changed from before the internet existed. Streaming can happen on the go. Some shows and music can be downloaded to computer devices, too, so people can enjoy them when they don't have access to the internet. Lin and his cousin Yoshi like to make and share playlists. Lin really likes the marching band playlists Yoshi sends him.

The next exhibit booth shows wireless technology and voice assistants. Before wireless capability, computer devices needed to be connected with wires or cables. The university students at the booth are demonstrating listening to music on the go before Bluetooth and streaming were developed. A device could only play the music on one compact disc at a time, and headphones required wires.

The wireless voice assistant display has all sorts of appliances and devices. The students say short and simple commands like, "Beni, turn on the light." Then the light bulb in the lamp turns on. The voice assistant device can also give information. If you want to know the temperature outside, you can ask, "Beni, what is the temperature?" The device answers, "The temperature is 75 degrees."

Lin thinks of ways Bluetooth and voice assistants are used at his parents' bakery. What are some other ways people use Bluetooth and voice assistants?

In the next-to-last exhibit booth at the technology fair, Lin and his classmates learn about drones. Lin has seen small drones that seem like fun toys. But here he learns that drones have other uses. For example, a drone can fly into an area that people cannot easily reach to take pictures, such as a disaster zone after a hurricane. Drones can also deliver needed items to hard-to-reach areas.

The last booth displays a 3D printer and many items that it made. With instructions from a computer program, the machine can deposit soft plastic into almost any shape. Then the plastic hardens into a useful object. The university students at the booth explain that one important use of 3D printers is in health care. One student shows his prosthetic arm that was made by a 3D printer. The printer made the body part to fit him perfectly.

When Lin and his classmates come back to their classroom, Mr. Vasco leads a discussion about all the technology they saw at the fair. He challenges the students to defend which computer technology they think is most important for the world. Which computer technology would you choose?

Glossary

A

accessible, adj. how easy something is to understand or use

action, n. a movement or thing to do

algorithm, n. steps or rules to follow to complete a specific task or to solve a problem

app, n. abbreviation for *application*; a program that enables a computing device to do certain tasks

attribute, v. to give credit to the maker of a product

C

categorize, v. to organize things into groups that have something in common

cause, n. the reason that something happens

code, n. instructions for a computer device to complete a task

collaboration, n. working together as a team

communicate, v. to share information

compare, v. to note the similarities of two things

component, n. a part of a greater whole

conditional, adj. dependent on a certain factors

control, v. to command or manage

copyright, n. legal protection for the creator of original content

credit, n. showing in writing that someone has created a work

cube, n. a solid shape with all square sides

D

data, n. details of information collected by observation or measurement

data table, n. a diagram that displays data in rows and columns

datum, n. a single piece of data

debug, v. to fix something that is not functioning properly in a computer program

decompose, v. to break down into smaller tasks

design, v. to plan out

development, n. the act of making or improving something

E

effect, n. the result of a cause

ethics, n. a set of values for guiding people to differentiate between right and wrong actions

external, adj. outside of

event, n. part of a program that runs in response to certain actions

evidence, n. information that helps prove something

explanation, n. a description of the reasons for an outcome or condition

F

font, n. the style of text

fundraiser, n. a set of activities that people do to collect money to support something helpful

I

icon, n. a small picture used to represent something in a way that takes up less space than words

identity, n. who a person is; includes their characteristics and how they describe themselves

if/then statements, n. conditional statements that explain if something is done, then something else will happen

information, n. collected knowledge

internal, adj. inside of

internet, n. the network of connected computers all over the world

L

loop, n. instructions that repeat

M

modify, v. to change or update

N

network, n. a group of computer devices that communicate with each other

O

online, adj. connected to the internet

organize, v. to arrange in an orderly way

P

personal information, n. details that can be used to identify and find an individual

planning, v. determining the steps and requirements of a task, design, or solution

present, v. to display information to others and tell them about it

private, adj. not public; information only known by some people

program, n. a set of instructions that tell a computer what to do

Q

questionnaire, n. a list of questions used to gather information from people participating in a survey

R

represent, v. to stand for

reset, v. to begin again from an original starting point

revise, v. to change in order to improve

role, n. a part a person plays in a given situation; a job

S

scroll, v. to move words or pictures on a screen by sliding the contents up or down

sequence, n. an order of actions

sphere, n. a solid in the shape of a ball

strategy, n. a plan for solving a problem

survey, n. a planned collection of information from a target population

system, n. a set of parts that work together to complete a task

T

task, n. a job that needs to be completed

text, n. written or typed words and numbers that are read visually

technology, n. the use of science to solve problems

teamwork, n. working together as a group

testing, n. the process of trying out a design to determine whether it works as intended

trial and error, n. the process of trying different possible solutions to a problem to eliminate the ones that don't work

troubleshoot, v. to identify and correct the problem in a system

U

unique, adj. different from all others

usability, n. the quality of how easy something is to use

V

value, n. a numerical amount

variable, n. a value that can change depending on conditions or input

visual, adj. related to the sense of sight

visualize, v. to form a mental picture

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A comprehensive program in science, integrating topics from
Earth and Space, Life, and Physical Sciences
with concepts specified in the *Core Knowledge Sequence*
(content and skill guidelines for Grades K–8).

Core Knowledge SCIENCE™
units at this level include:

Energy Transfer and Transformation
Investigating Waves
Structures and Functions of Living Things
Processes That Shape Earth
Using Natural Resources for Energy
Human Respiration and Circulation
Problem-Solving and Computers

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