

Computing Systems  
Module 5 Lessons 5.8

Context of the Lesson	
<p><b>The Big Idea:</b> Students will learn common problems in hardware and software. Additionally, students will also learn the terminology and strategies used by experts to solve them.</p>	
<p><b>Prerequisite Knowledge and Skills:</b></p> <ul style="list-style-type: none"> <li>• Knowledge of computing devices</li> <li>• Using computing devices for everyday tasks</li> <li>• Basic understanding of computing networks</li> <li>• Basic understanding of how use computing devices</li> <li>• Basic understanding of what not to do using computing devices</li> </ul>	<p><b>Connections to SOLs:</b></p> <ul style="list-style-type: none"> <li>• Computer Science 5.8</li> </ul>
Objectives of the Lesson	Formative Assessment
<p><b>Learning Targets (I can...):</b></p> <ul style="list-style-type: none"> <li>• I can use problem solving skills to troubleshoot computers</li> <li>• I can check my devices for power</li> <li>• I can check my devices for networking access</li> </ul>	<ul style="list-style-type: none"> <li>• Verbal testing</li> <li>• Group and individual activities</li> <li>• Instructional aids</li> <li>• Written testing</li> </ul>
Materials	
<ul style="list-style-type: none"> <li>• Visual Aid for instructor to write on (e.g., chalkboard, projector, dry erase board, easel)</li> <li>• Handouts for students (optional)</li> <li>• Computer (optional)</li> </ul>	
Lesson Structure and Activities	
<p><b>Warm Up [5-10min]</b> , answers to be written out by instructor on visual aid</p> <p>Ask: What are some problems computers, mobile phones, and tablets often have?</p> <ul style="list-style-type: none"> <li>• Responses will vary. (Stops responding, won't turn on, too slow, can't go on the internet)</li> </ul> <p>Ask: How often have you fixed one of these problems?</p> <ul style="list-style-type: none"> <li>• Responses will vary.</li> </ul> <p>Explain to students that they will be learning how to work on some common computer problems today.</p>	
<p><b>Launch (Engage) [5-15min] :Teacher Directed Instruction:</b></p> <p>Vocabulary:</p> <ul style="list-style-type: none"> <li>• Rebooting – Powering a system down and then powering it back on. To turn on a system is to ‘boot’ it.</li> <li>• Restarting – Closing or exiting a program or system then opening it/turning it back on. When restarting a computer, one reboots it.</li> <li>• Software – <i>Digital</i> programs such as web browsers, operating systems, text editors, music players, and video players.</li> <li>• Hardware – <i>Physical</i> computer parts like mice, monitors, phone screens, motherboards, and chargers.</li> <li>• Computing System – A desktop, laptop, phone, or tablet computer.</li> </ul> <p>Computing systems have lots of common issues. They often experience slow down, freezing, network dropping, and lack of power.</p> <p>Slow down occur when a system becomes less responsive than usual, but is still operable. The device may take several seconds to produce any form of output from a user's actions. Programs may halt and enter a “not responding” state, but return to normal function when slow down ceases.</p>	

Freezing is when a program or device comes to a complete standstill, usually marked by no function at all for a period of time. A program may freeze up during a slowdown, but if the entire device is frozen, it is practically unusable.

A network drop is when due to the device's configuration, hardware, or another device on the network, the device's internet connection fails suddenly. Similar to a "dropped call" on a cellular device, a network drop usually interrupts any service provided.

A computer's lack of power could be the result of its own hardware failing as much as it could be the weather. A common cause for power loss is a particular electrical outlet is damaged or malfunctioning and the computer, nor any electronic device attached to it, cannot function.

There are many things you can try when experiencing computer issues to get on the right track to fixing the problem.

- If a program or software is not responding or is slow when it shouldn't be:

Save your data if necessary, then try "restarting" the program, or closing the application and opening it again. This will clear out the working memory of the program.

- If a device or hardware is not responding or slow:

Try "rebooting", or powering the computing system on and off.

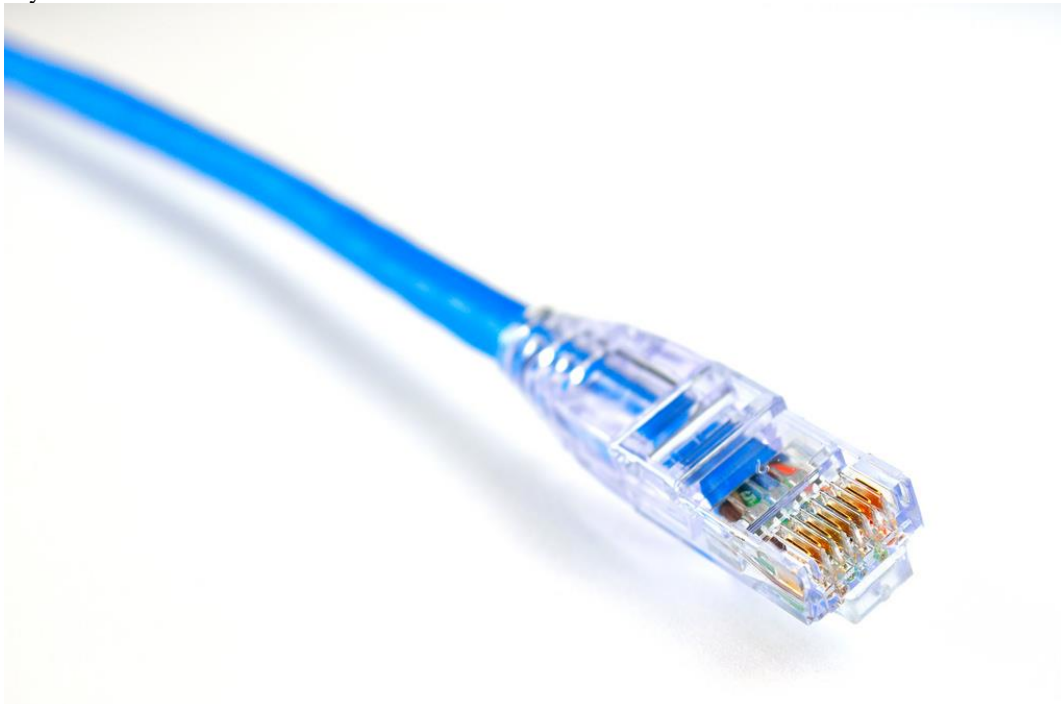
- If a device does not respond when you try to turn it on:

It may be out of power. Make sure a power cable or charger is attached properly and try again.

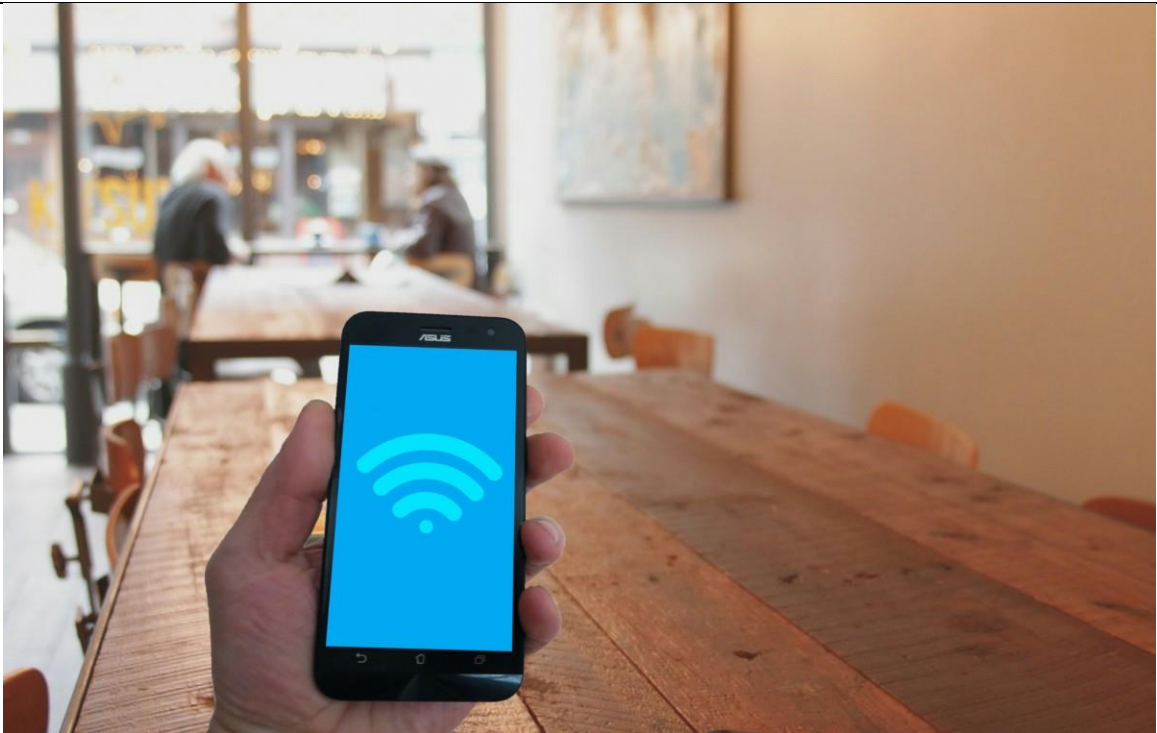
- If a website does not seem to function:

Check a common, trusted, and popular website. Your connection may be disrupted to that website or it may be experiencing difficulties. Your internet connection could also be interrupted.


- If you cannot use the internet at all:




Ethernet cables (the technology that allows them to surf the web), also called LAN cables (since they are used commonly to connect Local Area Networks), RJ-45 cables (due to the connector), Internet cables (there are other Internet enabling cables but these are by far the most common outside of specialized fields), CAT 5, CAT 5e, and CAT6 cables (the name for the actual physical cable itself). There is no "official name", but 'Ethernet cables' is very common technical jargon found in many places describing wired connections with these cables.



Wireless connections rely on antenna that can capture internet data sent through the air similar to radio antenna or cell phone towers. Wireless connections can often be interrupted more easily than wired connections due to a reliance on invisible data being sent through the air, rather than through a connected, sometimes shielded cable. They are incapable of penetrating some materials, so sometimes particular walls, ceilings, floors, or devices can cause irregular or unusable service.

Ensure that a network cable is connected if you are using a wired Local Area Network (LAN)  connection. (Symbol may differ.) The cable could be damaged in rare cases, or the LAN cable port on either end of the cable in even rarer cases.

If you are using a Wi-Fi wireless  connection (Symbol may differ.) for a Wireless LAN (WLAN), be sure you are on the correct network and you have a good signal. Make sure you are avoiding interference: some types of walls, materials such as aluminum foil, and microwave ovens can block the waves sent off by wireless devices.

Next, explain that some issues can be both hardware and software related.

Ask: What is a problem that could be caused by hardware and/or software and why?

Ask: Name a problem that could only be caused by hardware or software and not the other.

- In actuality, almost every single problem one could experience on a computer could be caused by hardware or software. Hardware can cause similar problems as the kind software could cause. Example: You can't connect to the internet if your router is broken, your computer has networking disabled, or the network hardware is broken.
- Many pieces of hardware use software inside and outside the operating system to function properly.
- Generally speaking, most problems hardware cause can also cause software problems and there can be multiple causes for the same problem happening at the same time.

Explain an example such as:

- A muted phone, broken headphones, or a muted program all causing there to be no sound.
- A broken screen, a frozen tablet, a turned off monitor, or no battery all being a cause for not being able to see anything.

Explore [10-25min] :Joint/Guided Practice | Student Practice:

Note: The below are all strictly optional ways of teaching this material. If the teacher feels uncomfortable with a live demonstration on what could be school equipment, it is better to search online for a video demonstration or an image than risk damage.

- Give classwork or assign homework on troubleshooting computing systems and networks as needed.
- Demonstrate how to close a program on a desktop/laptop and a phone/tablet.
- Demonstrate how to turn a desktop/laptop and a phone/tablet on and off safely.
- Demonstrate how to disconnect and reconnect LAN cables or disable and re-enable Wi-Fi.

Summarize [5-10min] :Debrief :

- Ask: What is a problem you could have on a computer and how would you try to solve it?
- Ask: What is a problem you could have on a phone or tablet and how would you try to solve it differently than a computer?

*Extensions:*

Credits:

Wi-Fi Icon made by [Freepik](https://www.freepik.com) from [www.flaticon.com](http://www.flaticon.com)