Unit 2: The Internet
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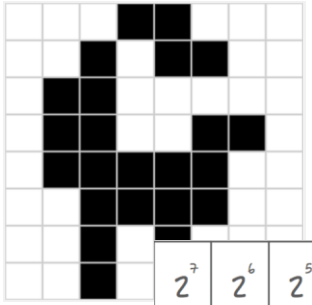
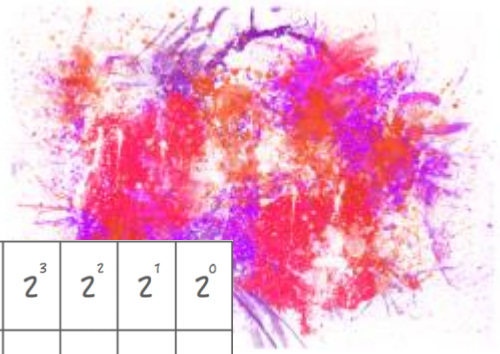
Unit 2 - Lesson 1
Welcome to the Internet

Warm Up





2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	64	32	16	8	4	2	1
0	1	0	0	0	0	1	1

Num.	Bits	Char.
64	01000000	@
65	01000001	A
66	01000010	B
67	01000011	C
68	01000100	D
69	01000101	E
70	01000110	F
71	01000111	G
72	01001000	H
73	01001001	I

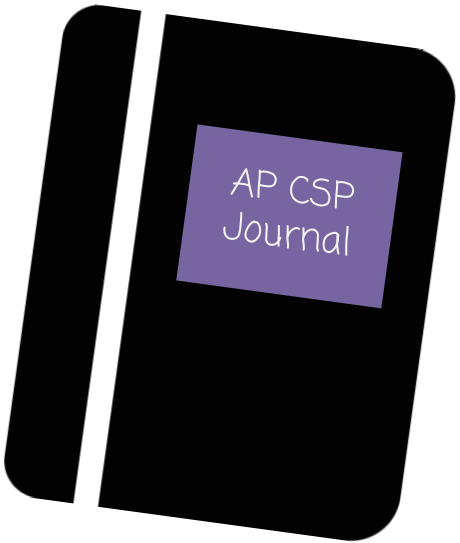
Prompt:

We've learned to represent images, text, and sound digitally - but we haven't discussed what we do with all this digital data. How do you see people sharing this kind of data in the real world? Who do they want to share it with and why?

Activity

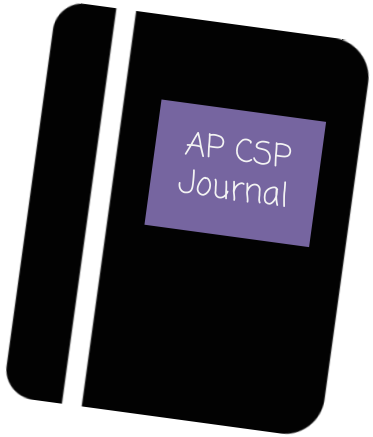
Prompt: Answer each of these questions your journal.

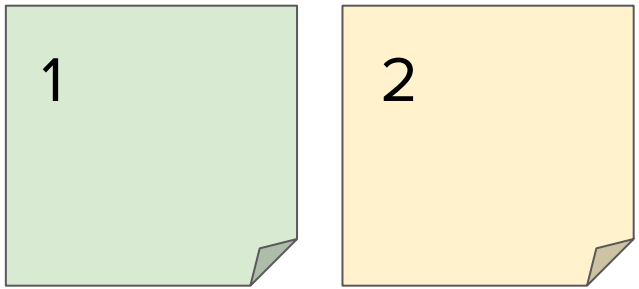
1. What is the Internet?
2. What questions do you have about how the Internet works?



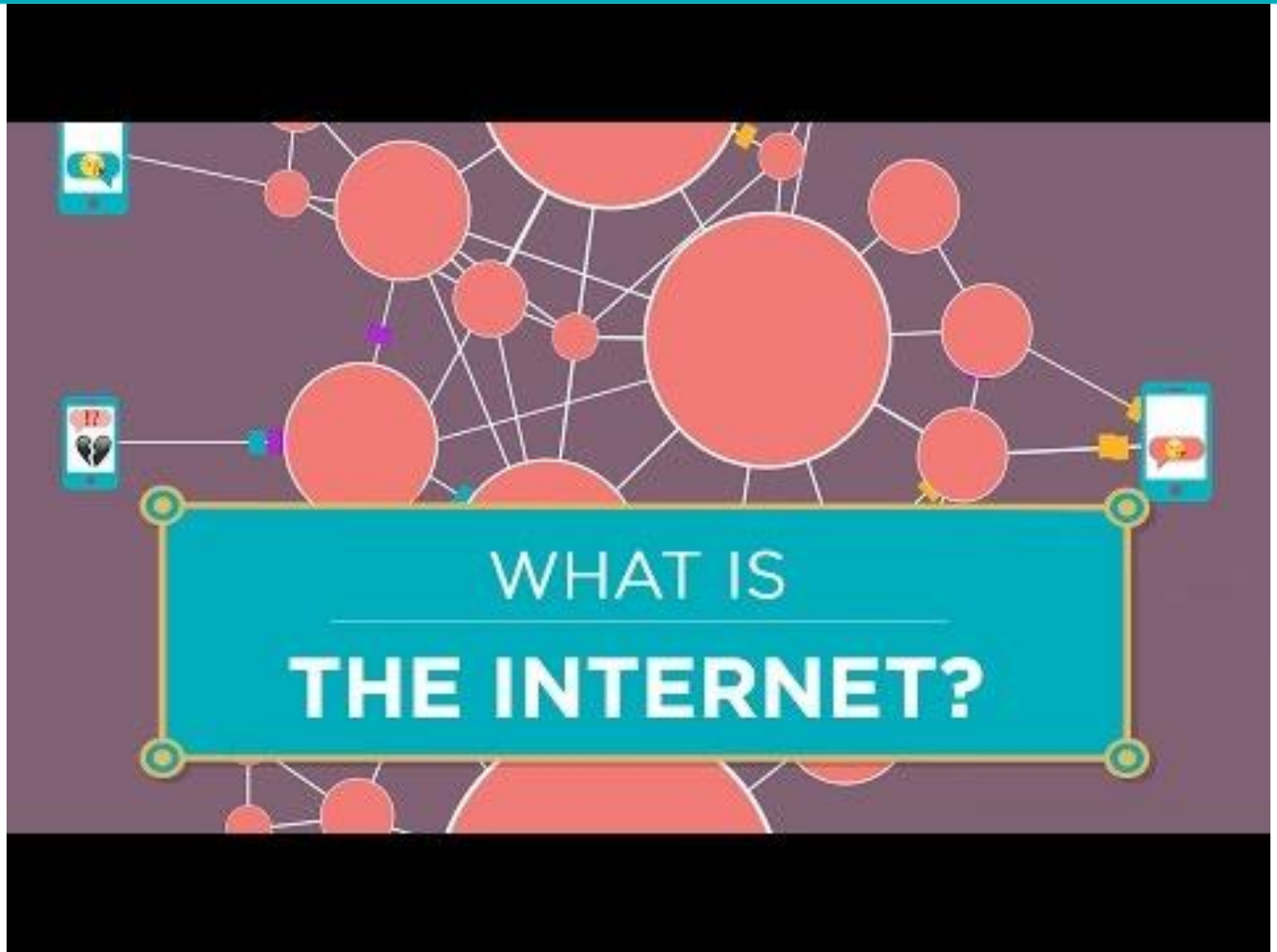
Do This: Choose one answer to each of these questions from your journal and write it on a sticky note.

1. What is the Internet?
2. What questions do you have about how the Internet works?



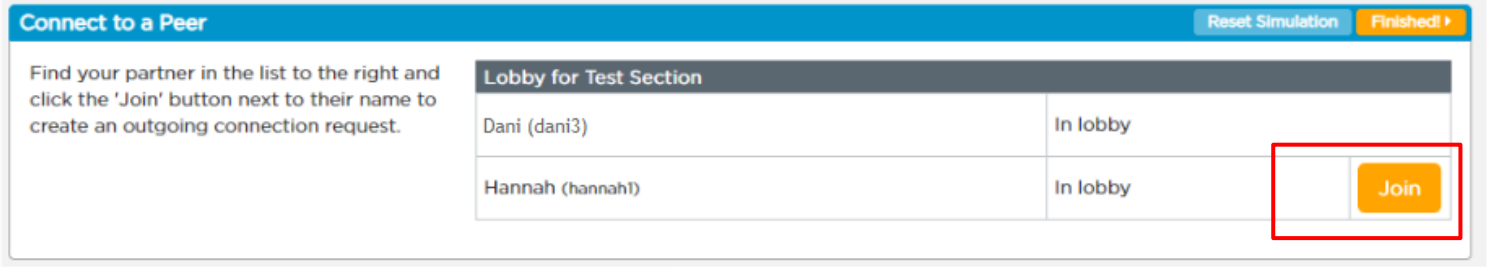


NOTE:
Stop at 1:30

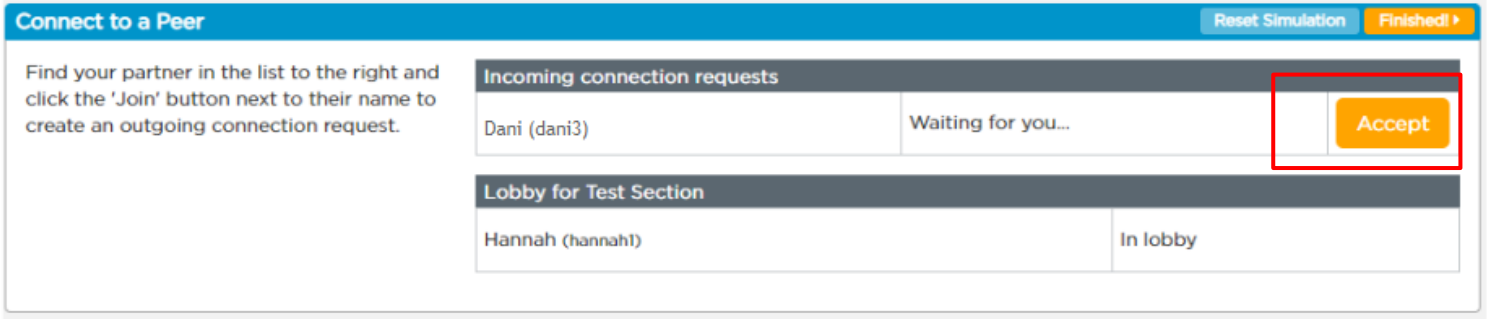


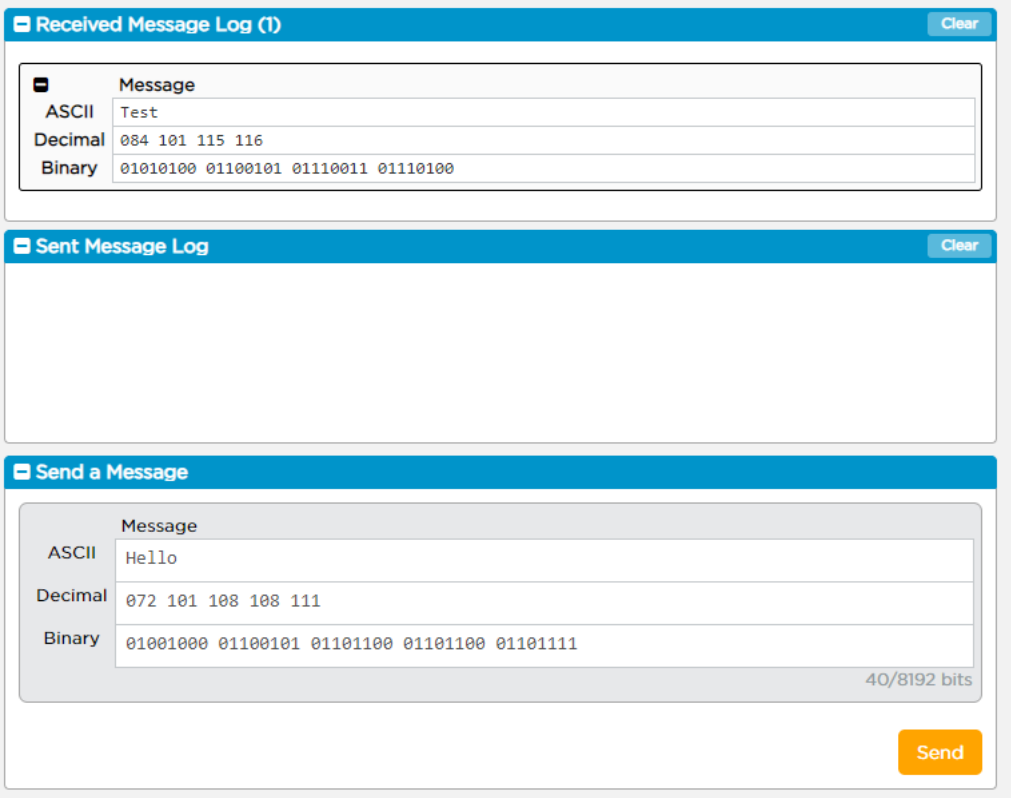
Do This: Join your partner in the Internet Simulator on Level 2

Partner #1 - (Dani)



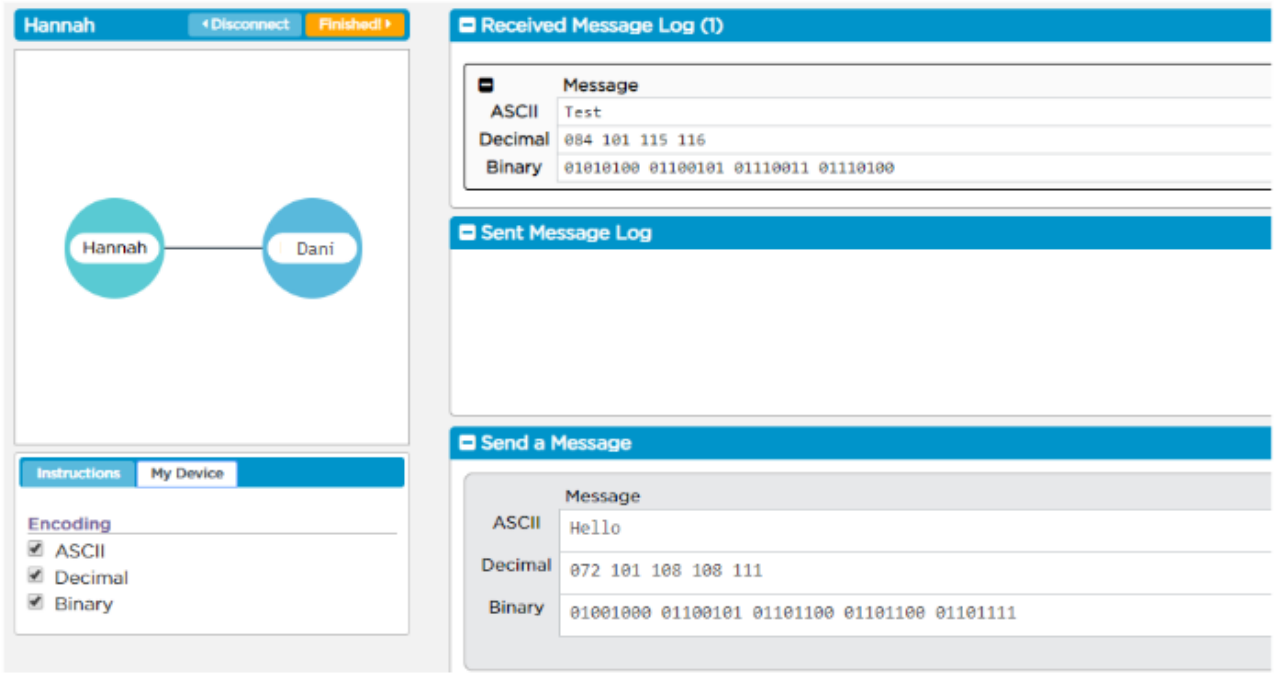
Partner #2 - (Hannah)





Do This:

Explore the Internet Simulator. How does it work? What can I do with it?



Teacher Demo

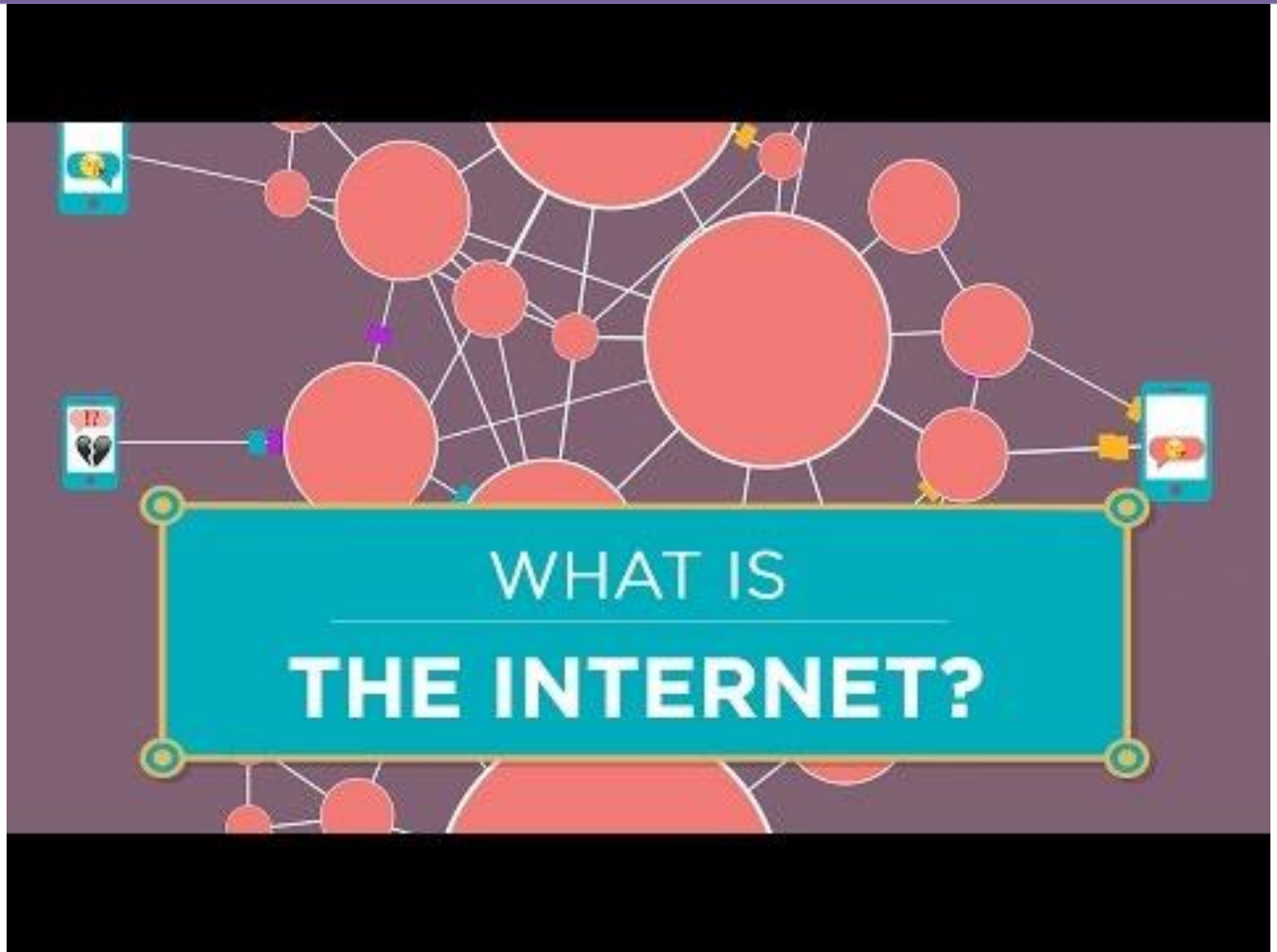
Prompt:

How is the Internet Simulator similar to the Internet?

How is it different?

Wrap Up

NOTE:
Start at 1:30



Unit 2 - Lesson 2
Building a Network

Warm Up

Prompt:

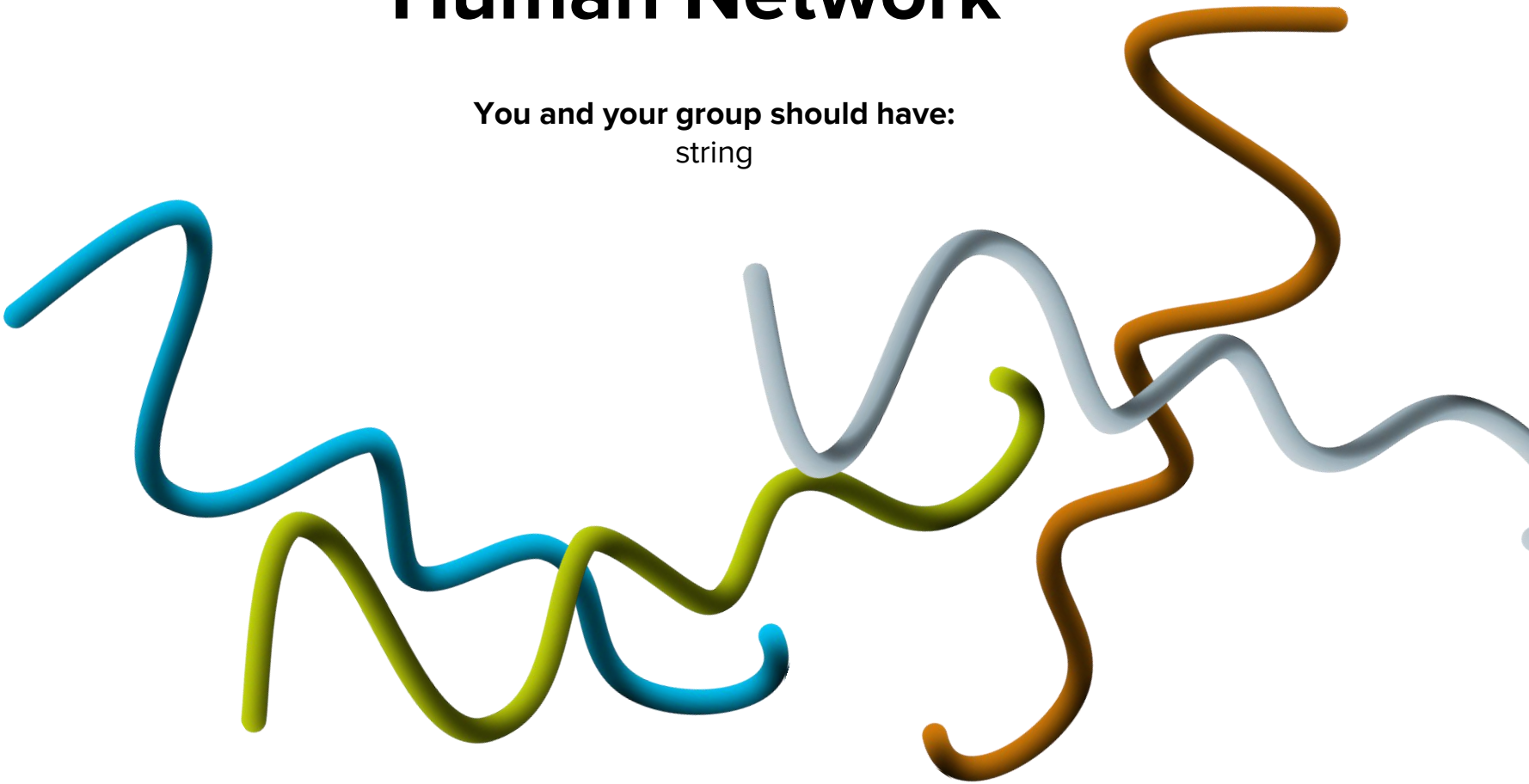
In the previous lesson, we explored the Internet Simulator, where each of you were connected to one other person by a single wire. What are the potential problems with this setup?

Activity

Human Network

You and your group should have:

string



Guidelines for all Challenges:

1. Only two people can be connected by a single string.
2. You can be connected to multiple people at the same time via multiple strings.

Challenge #1: As a group, create a network where everyone can speak directly to everyone else.

Guideline #1: Strings cost money, so try to use the least number of strings possible

Challenge #2: As a group, create a network that uses the least number of strings.

Guideline #1: Strings cost money, so try to use the least number of strings possible

Guideline #2: Strings can be cut, which might disconnect people from the network

Challenge #3: As a group, create a network that keeps everyone connected even if one of the lines is cut

Guideline #1: Strings cost money, so try to use the least number of strings possible

Guideline #2: Strings can be cut, which might disconnect people from the network

Guideline #3: Direct Connections are faster than long paths with indirect connections

Challenge #4: As a group, create a network that you feel balances all 3 guidelines.

Guideline #1: Strings cost money, so try to use the least number of strings possible

Guideline #2: Strings can be cut, which might disconnect people from the network

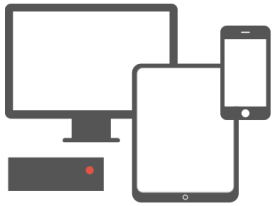
Guideline #3: Direct Connections are faster than long paths with indirect connections

Prompt:

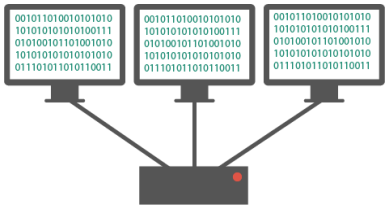
Thinking about our 3 guidelines, what is a strength of the network your group created?

What is a weakness for the network your group created?

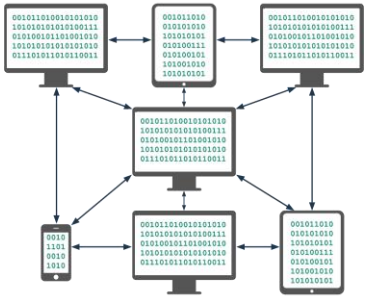
Wrap Up



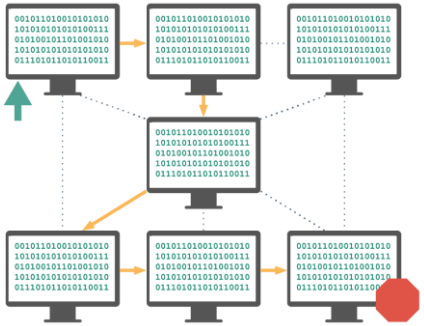
Computing Device: a machine that can run a program, including computers, tablets, servers, routers, and smart sensors



Computing System: a group of computing devices and programs working together for a common purpose



Computing Network: a group of interconnected computing devices capable of sending or receiving data.

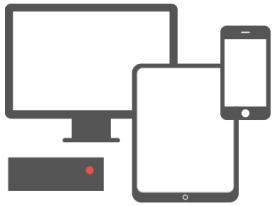


Path: the series of connections between computing devices on a network starting with a sender and ending with a receiver.

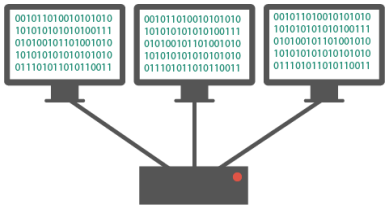
Bandwidth: the maximum amount of data that can be sent in a fixed amount of time, usually measured in bits per second.

Prompt: How would you use these words to describe today's activity?

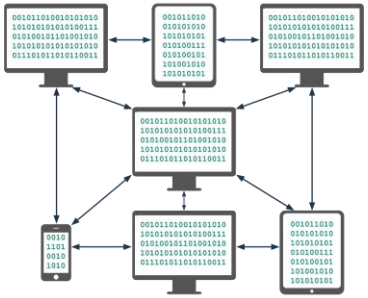
Computing Device
Computing System
Computing Network
Path
Bandwidth



Computing Device: a machine that can run a program, including computers, tablets, servers, routers, and smart sensors



Computing System: a group of computing devices and programs working together for a common purpose



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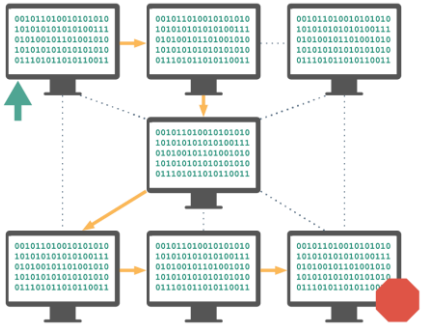


Path: the series of connections between computing devices on a network starting with a sender and ending with a receiver.

Bandwidth: the maximum amount of data that can be sent in a fixed amount of time, usually measured in bits per second.

Unit 2 - Lesson 3
The Need for Addressing

Warm Up

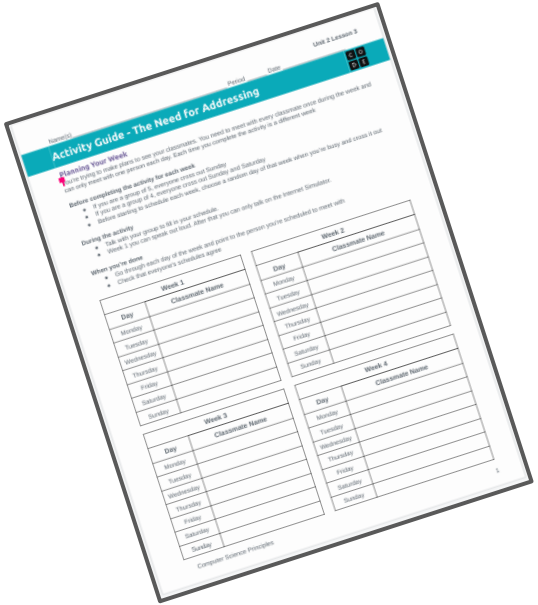
Prompt:

Imagine you were in a room with 5 other people, all with the same name as you.

What might happen when you start communicating?

Activity

The Need for Addressing


Name(s) Period Date Unit 2 Lessons 3

Activity Guide - The Need for Addressing

Planning Your Week

Before you begin to see your classmates. You need to meet with every classmate once during the week and can only meet with one person each day. Each time you complete the activity is a different week.

Before completing the activity for each week

- If you are a group of 5, everyone cross out Sunday and Saturday
- If you are a group of 4, everyone cross out Sunday
- Before starting to schedule each week, choose a random day of that week when you're busy and cross it out

During the activity

- Talk with your group to fill in your schedule.
- Week 1 you can speak out loud. After that you can only talk on the Internet Simulator.

When you're done

- Go through each day of the week and point to the person you're scheduled to meet with
- Check that everyone's schedules agree

Week 1	
Day	Classmate Name
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Week 2	
Day	Classmate Name
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Week 3	
Day	Classmate Name
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

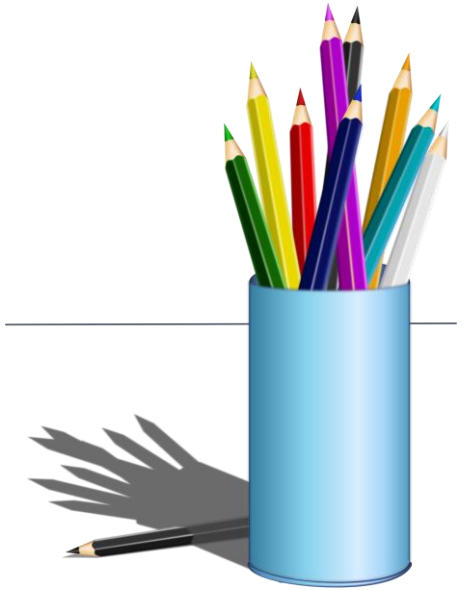
Week 4	
Day	Classmate Name
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Computer Science Principles 1

You should have:

Activity Guide

Pen or pencil



Do This: With your group follow the directions given in the box for Week 1

- If you are a group of 5, everyone cross out Sunday
- If you are a group of 4, everyone cross out Sunday and Saturday
- Before starting to schedule each week, choose a random day of that week when you're busy and cross it out

Week 1	
Day	**Classmate Name**
Monday	
Tuesday	XXXX BUSY XXXX
Wednesday	
Thursday	
Friday	
Saturday	XXXXXXXXXX
Sunday	XXXXXXXXXX

Once your group is ready, fill in your schedules.

Prompt: With your group check that everyone's schedules match. Then discuss what worked well, what made this tricky, if there's anything you want to try differently in Week 2.

Do This: With your group follow the same directions to set up Week 2

- If you are a group of 5, everyone cross out Sunday
- If you are a group of 4, everyone cross out Sunday and Saturday
- Cross out a new random day

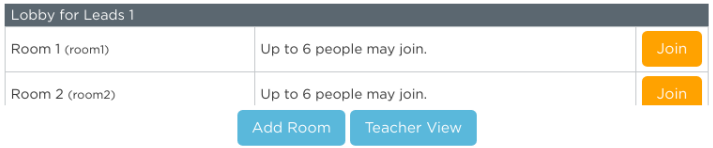
Week 2	
Day	**Classmate Name**
Monday	
Tuesday	
Wednesday	
Thursday	XXXX BUSY XXXX
Friday	
Saturday	XXXXXXXXXX
Sunday	XXXXXXXXXX

Complete Week 2!

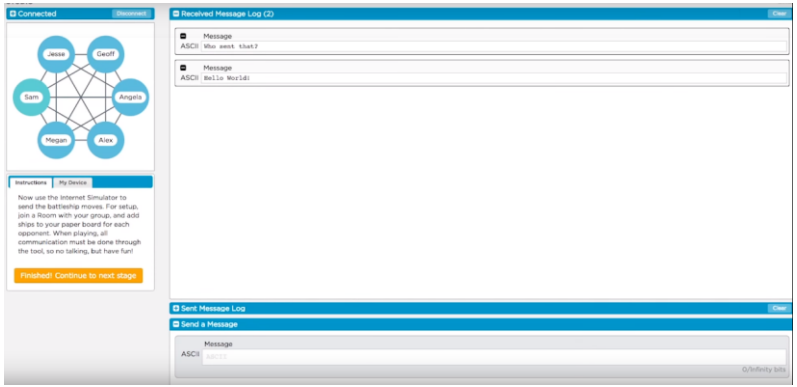
Do This:

- Go to Lesson 3 - Level 2

- Join a room with your group mates.



- Once everyone is in the room complete Week 2 on the simulator.



- **No talking!**

Prompt: Fill out the top on the back side of your sheet. What problems did you encounter? How do you want to fix them in Week 3?

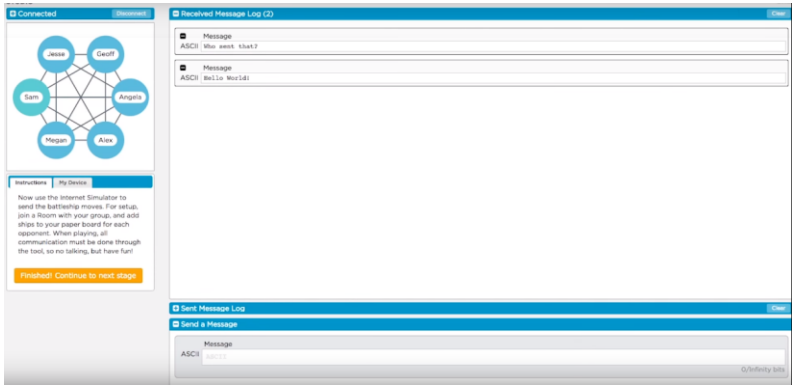
Communication Problems: As you use the simulator, record any problems you face and brainstorm solutions.

Problems Communicating	Potential Solutions

Complete Week 3!

Do This:

- Agree with your group on the set of rules you'd like to try this time around for how to communicate.
- Set up your boards for Week 3
- Complete Week 3, again **no talking!**



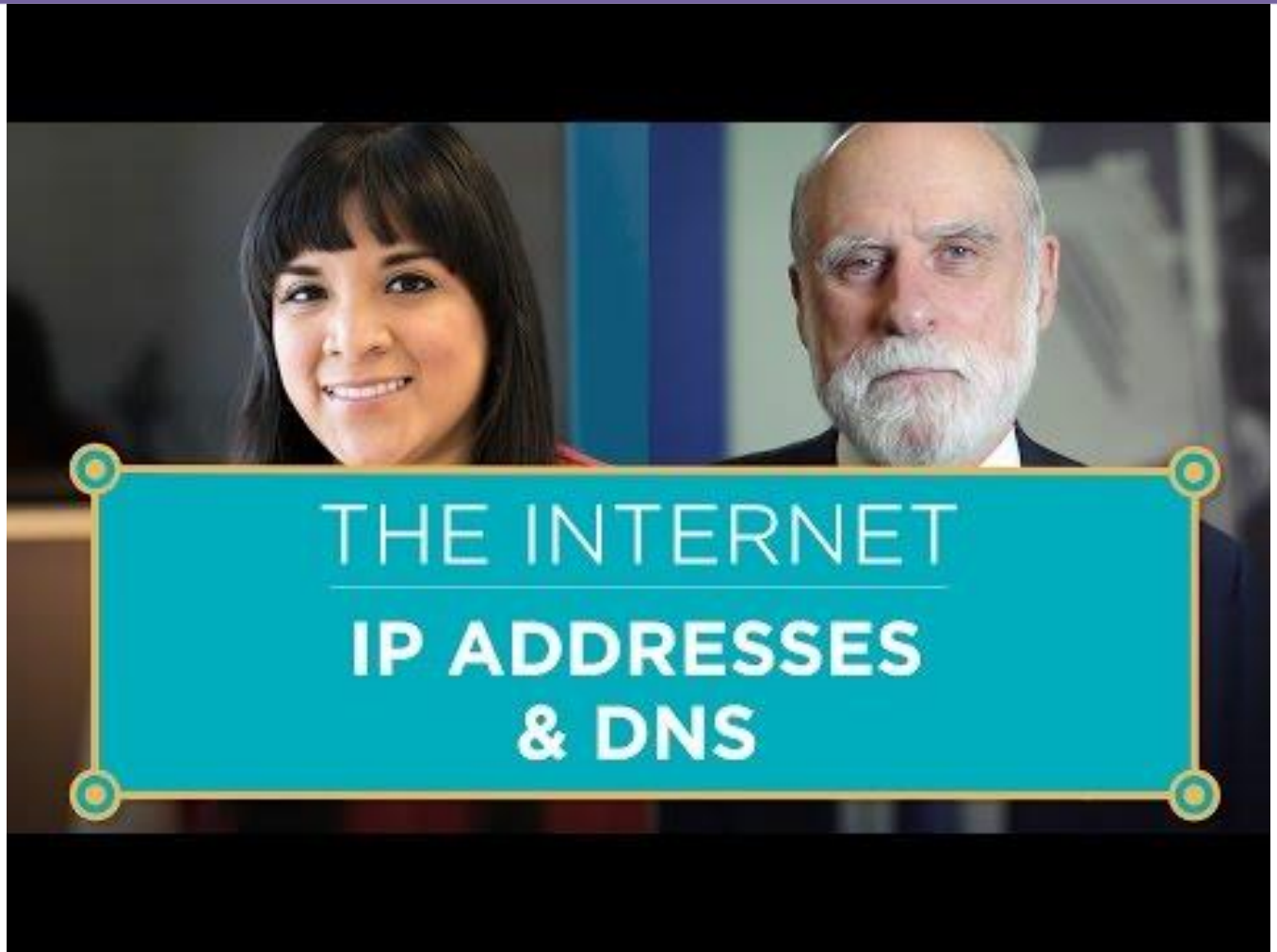
Do This: Based on your experience, take 5 minutes to write down in the rules section the collective rules you and your team would advise using going forward.

Be ready to share!

Group Rules: Make up a set of group rules your group think makes the most sense for communicating to complete this challenge. Include the ways messages should be formatted and some examples in the space below.

Explain your rules
Write some sample messages that follow your rules

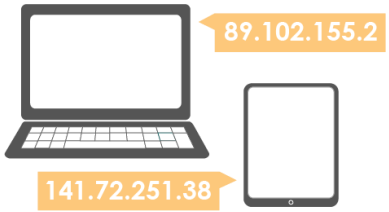
Wrap Up


THE INTERNET
IP ADDRESSES
& DNS

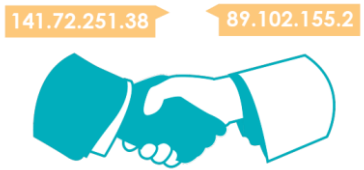
Prompt:

What are the similarities and differences between the Internet Protocol (IP) and the addressing rules our class made? Would rules like our or the IP work if they were secret?

Protocol: An agreed-upon set of rules that specify the behavior of some system



IP Address: The unique number assigned to each device on the Internet.



Internet Protocol (IP): a protocol for sending data across the Internet that assigns unique numbers (IP addresses) to each connected device

Unit 2 - Lesson 4
Routing & Redundancy

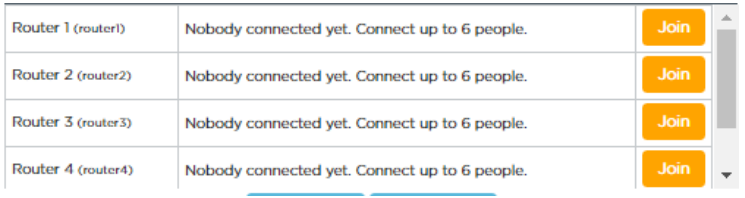
Warm Up

Prompt:

At the end of class yesterday, we saw that the Internet uses the Internet Protocol and IP Addresses to communicate across the shared Internet. How is this system similar to how we send letters in the mail? How is it different?

Activity

Updated Internet Simulator

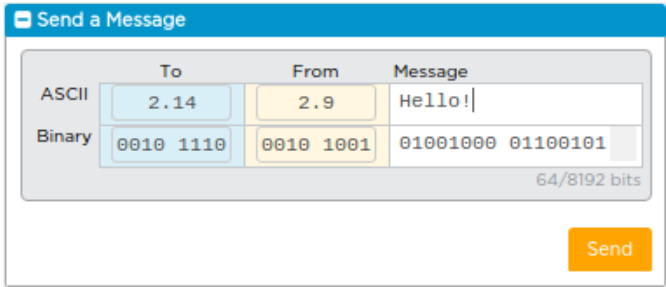


Step 1: Open the Internet Simulator

- Connect to the same router number as your group

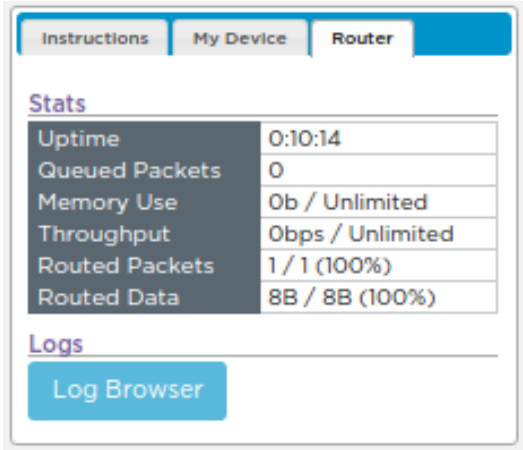
Step 2: Say Hello!

- Use the updated version of the Internet Simulator to send a message saying hello to everyone in your group.
- Everyone now has an IP Address! This will be important in today's simulation.

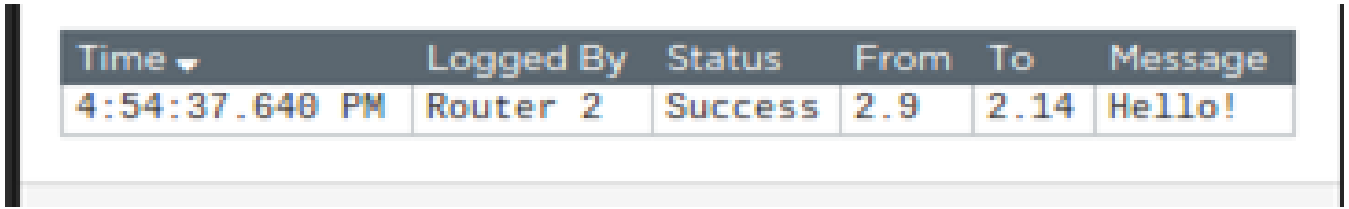


Open the Router Logs

Step 1: Open the Log Browser



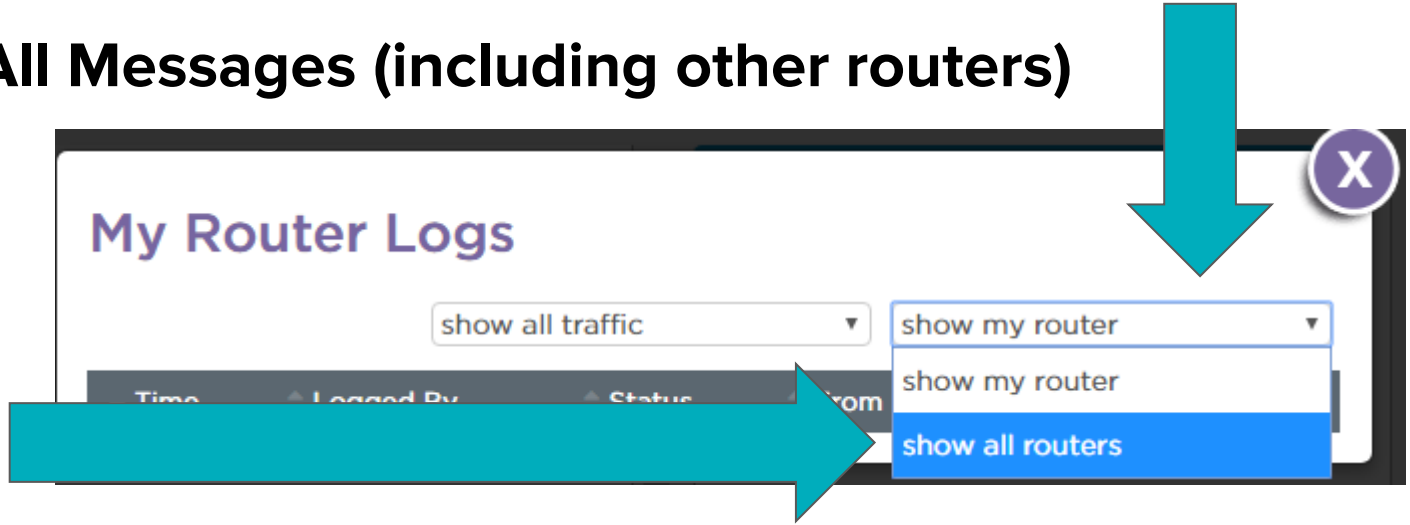
Step 2: Look at the Messages



Time	Logged By	Status	From	To	Message
4:54:37.640 PM	Router 2	Success	2.9	2.14	Hello!

Open the Router Logs

Step 3: View All Messages (including other routers)



Silly Class Survey

Use the Router Logs to choose an IP address from each of the other routers.

Send each person a message asking who they are and choose one of the following questions:

- What is your favorite food?
- What is your favorite type of animal?
- What is your favorite color?

Be sure to also respond to questions you get from people on other routers!

Open the Router Logs

Open the Router Logs Again. You should see a lot more messages now

All Router Logs

Time	Logged By	Status	From	To	Message
10:43:48.364 AM	Router 6	Success	5.5	6.12	first time was 6 - 8 - 5, second time was 6 - 13 - 8 - 5
10:43:48.133 AM	Router 8	Success	5.5	6.12	first time was 6 - 8 - 5, second time was 6 - 13 - 8 - 5
10:43:47.913 AM	Router 5	Success	5.5	6.12	first time was 6 - 8 - 5, second time was 6 - 13 - 8 - 5
10:43:39.114 AM	Router 6	Success	13.2	6.9	Hello Lillian, This is Vicky from Router 13.2
10:43:38.846 AM	Router 8	Success	13.2	6.9	Hello Lillian, This is Vicky from Router 13.2
10:43:38.579 AM	Router 7	Success	13.2	6.9	Hello Lillian, This is Vicky from Router 13.2
10:43:38.275 AM	Router 13	Success	13.2	6.9	Hello Lillian, This is Vicky from Router 13.2
10:43:27.347 AM	Router 5	Success	6.12	5.5	cool beans
10:43:27.155 AM	Router 8	Success	6.12	5.5	cool beans
10:43:26.957 AM	Router 13	Success	6.12	5.5	cool beans
10:43:26.740 AM	Router 6	Success	6.12	5.5	cool beans
10:43:24.677 AM	Router 5	Success	6.12	5.5	k
10:43:24.486 AM	Router 12	Success	6.12	5.5	k
10:43:24.273 AM	Router 6	Success	6.12	5.5	k
10:43:21.013 AM	Router 13	Dropped	13.13	14.12	Hey did you get my message? vcasas
10:43:20.324 AM	Router 12	Success	2.1	14.5	he's ignoring me...
10:43:20.002 AM	Router 2	Success	2.1	14.5	he's ignoring me...
10:43:11.974 AM	Router 6	Success	6.10	6.5	Why thank you!
10:43:11.947 AM	Router 2	Success	14.5	2.1	do you have a shorter route to my 14 router
10:43:11.385 AM	Router 8	Success	14.5	2.1	do you have a shorter route to my 14 router
10:43:10.678 AM	Router 6	Success	14.5	2.1	do you have a shorter route to my 14 router
10:43:10.115 AM	Router 14	Success	14.5	2.1	do you have a shorter route to my 14 router

Prompt:

Can you predict why some messages are appearing multiple times?

Do This:

1) Pick someone on a different router and send three separate messages with your top three favorite movies or TV shows.

2) After you send the messages, open the router logs and find these same messages in the logs. Notice how these messages traveled through the network. Did they always take the same path from your router to the other router?

3) Look at other messages that are being sent. Are there any patterns in the paths that they take?

Prompt: What did you notice about the messages you sent in the router logs?

Did they always take the same path from your router to the other router?

Wrap Up

Router: A type of computer that forwards data across a network

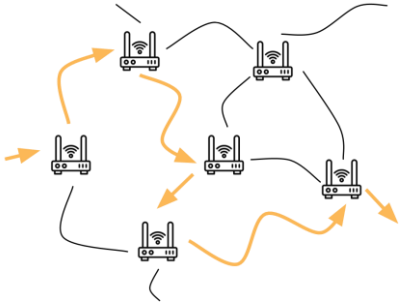
Redundancy: the inclusion of extra components so that a system can continue to work even if individual components fail, for example by having more than one path between any two connected devices in a network.

Fault Tolerant: Can continue to function even in the event of individual component failures. This is important because elements of complex systems like a computer network fail at unexpected times, often in groups.

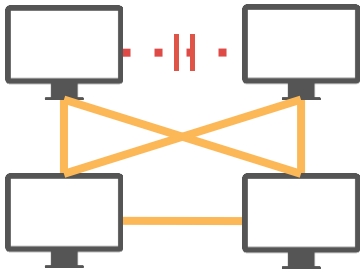
Prompt:

Thinking about these terms (*router*, *redundancy*, and *fault tolerant*), how can we describe what we've observed in the router logs at the end of this activity?

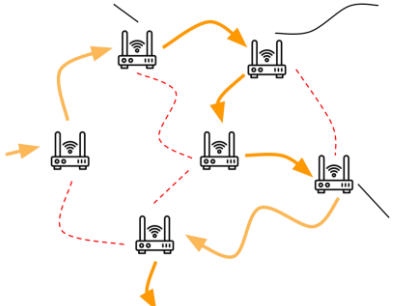
What are some practical reasons that you think messages might take different paths from one router to the other?



Router: A type of computer that forwards data across a network



Redundancy: the inclusion of extra components so that a system can continue to work even if individual components fail, for example by having more than one path between any two connected devices in a network.



Fault Tolerant: Can continue to function even in the event of individual component failures. This is important because elements of complex systems like a computer network fail at unexpected times, often in groups.

Unit 2 - Lesson 5
Packets

Warm Up

Prompt:

Suppose our school library is moving to a new building on campus and the librarian has asked for your help.

1. What approach would you take if you just needed to clear out the space by the end of the day?

1. How would your approach change if you had more time and wanted to check that every book made it safely and was on the same shelf it was on before the move?

Today we'll learn about two new protocols, one for when speed is most important, and one when accuracy is most important.

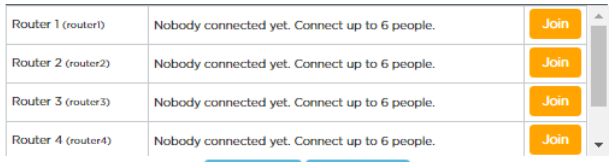
Activity

Do This:

- Navigate to Level 2

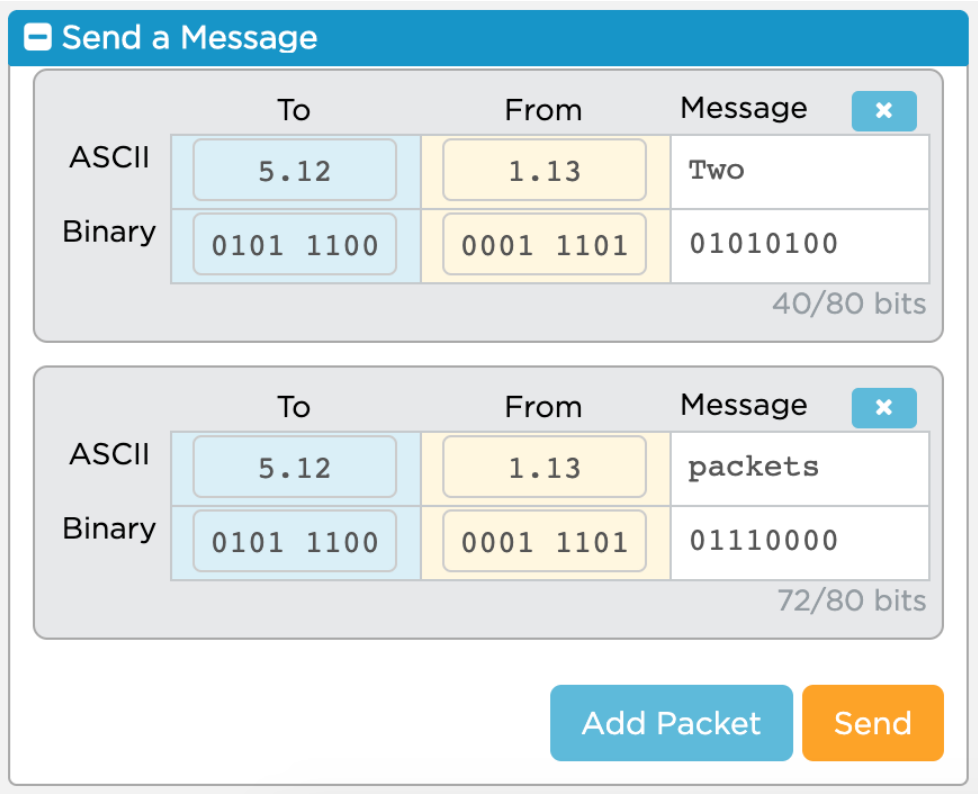
Updated Internet Simulator

Open the Internet Simulator



- Join a different router than your partner
- Ask your partner for their IP address.
- Using only the simulator, have a conversation about one of these topics:
  - Your favorite movie
  - Your favorite band/artist
  - The one superpower you wish you had
- Try to discover every way the simulator is different than last time.

What changed?



- A single message can be made up of many “packets” which you can add with the “Add Packet” button
- Packets can only be 80 bits long
  - 16 bits are already used for **packet metadata,** data added to help route the messages
  - You only have 64 bits, or 8 ASCII characters free for each of your messages

Packets


Unit 2 Lesson 04

Name(s) Period Date

Activity Guide - Packets

Why Packets?

When you send messages over the Internet there's always a chance for errors. If you're sending a huge file, and in the middle of the transmission you have a single error, you'd need to resend the entire file. The solution to this problem is to split the message into smaller chunks called packets. While errors could still occur, now they'll only affect the single packet, rather than the entire message. This of course introduces new challenges that we'll explore in this activity.

Send a Multi-packet Message

Write a single sentence and then break it up into multiple packets. For example the message "Hello this is a really long sentence that I'm sending to you." Your message should have at least 5 packets. Then send your multi-packet messages to each other.

Read the Traffic

Then click "Log Browser" **Set the Router logs to "show my traffic" and "show all routers" and then answer the following questions below.**

Question 1: Do all of the packets in your sent messages always follow the same path? If not, describe at least two different paths packets took.

Question 2: Did every packet arrive and arrive in the correct order? Describe what went wrong and whether your partner was able to read the message. If neither had an issue try sending another message.

Create an Error-Checking Protocol

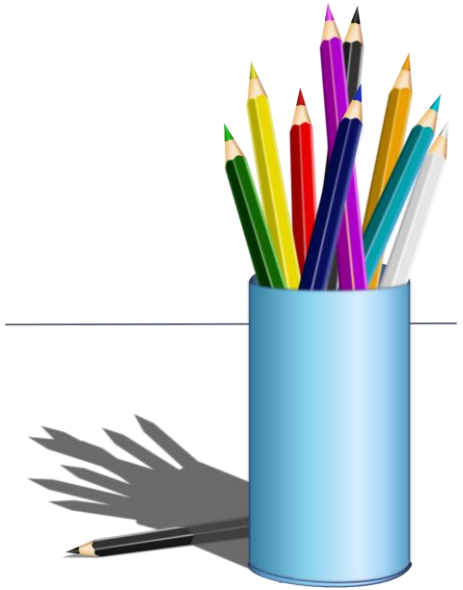
Create a protocol that will solve the problems you saw in the example above. The sender should be able to construct a single multi-packet message that is sent at once. Afterwards they can keep communicating to fix any errors in the transmission. Things to consider:

- How will the receiver know the order of the packets or if any are missing?
- How will the receiver request missing packets and what will the sender do in response?
- How will both sender and receiver know the full message arrived successfully?

Write the details of your protocol in the space below or the back of this sheet.

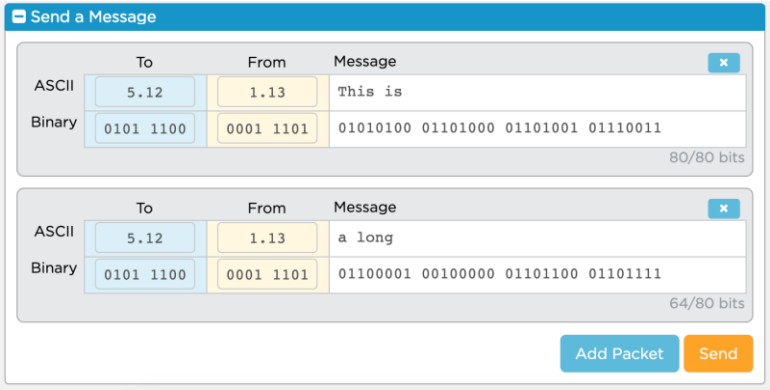
Computer Science Principles

You should have:
Activity Guide



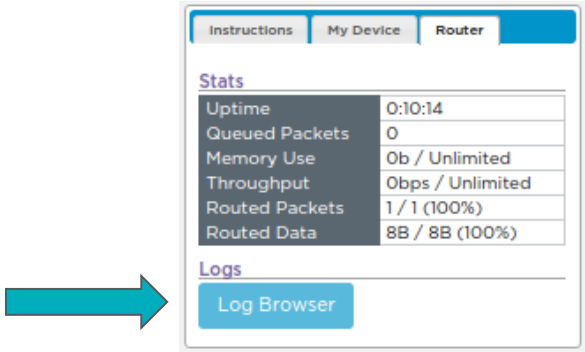
Protocol 1 - Just Send the Packets

Send a single message that includes 5 - 10 packets to your partner.



Read the Traffic

Step 1: Open the Log Browser



Step 2: Filter to your traffic on all routers

Step 3: Read the traffic and answer the questions in your activity guide.

Discuss: Responses to the Activity Guide questions

- Packets can take different paths or be dropped, just like messages in the previous lesson
- As a result, messages may arrive out of order or incomplete
- While a human might be able to understand the original message based on context, a computer would not, the message would simply be lost
- This protocol is simple and fast, but not very accurate

There's two protocols commonly used to send packets online, and depending on the situation websites will choose the one that makes sense.

	User Datagram Protocol (UDP)	
Main Idea	Like Protocol 1 or clearing out the library as fast as you can, the goal is to send information quickly without worrying about accuray.	
Basics of how it works	Send all the packets but don't check if they all get through or arrive in the right order.	
Use in real life	Useful when split seconds matter more than correcting errors, like video-conferencing, live streaming, online gaming	

Protocol 2 - Check for Errors

Protocol 2 - Check for Errors

Create a protocol that will solve the problems you saw with Protocol 1 by doing some error-checking. The sender should be able to construct a single multi-packet message that is sent at once. Afterwards they can keep communicating to fix any errors in the transmission. Things to consider:

- How will the receiver know the order of the packets or if any are missing?
- How will the receiver request missing packets and what will the sender do in response?
- How will both sender and receiver know the full message arrived successfully?

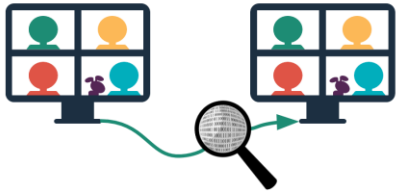
Write the details of your protocol in the space below or the back of this sheet.

There's two protocols commonly used to send packets online, and depending on the situation websites will choose the one that makes sense.

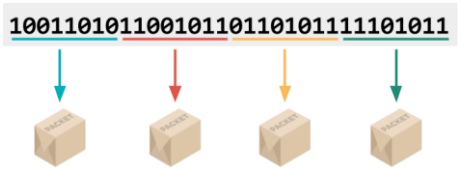
	User Datagram Protocol (UDP)	Transmission Control Protocol (TCP)
Main Idea	Like Protocol 1 or clearing out the library as fast as you can. The goal is to send information quickly without worrying about accuray.	Like Protocol 2 or numbering every book in the library. It's slower but more accurate.
Basics of how it works	Send all the packets but don't check if they all get through or arrive in the right order.	Number packets so they can be re-ordered, confirm all were received, resend any missing packets. Multiple back and forth confirmations between sender and receiver.
Use in real life	Useful when split seconds matter more than correcting errors, like video-conferencing, live streaming, online gaming	Useful when accuracy matters more than saving a split second, like sending emails, photos, or just browsing websites

Wrap Up


THE INTERNET
PACKETS, ROUTING
& RELIABILITY



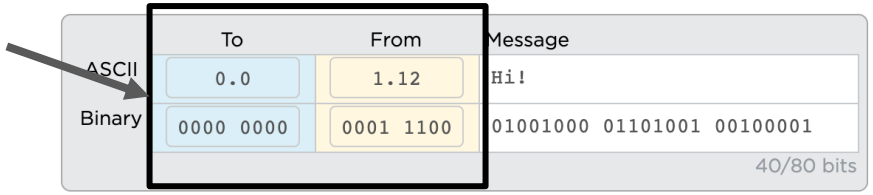
Datastream: Information passed through the internet in packets.

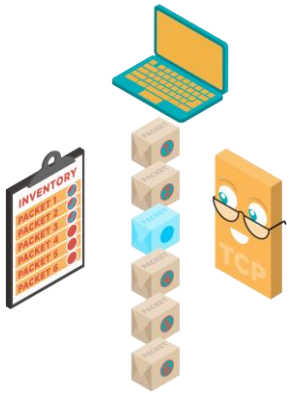


Packet: A chunk of data sent over a network. Larger messages are divided into packets that may arrive at the destination in order, out-of-order, or not at all.

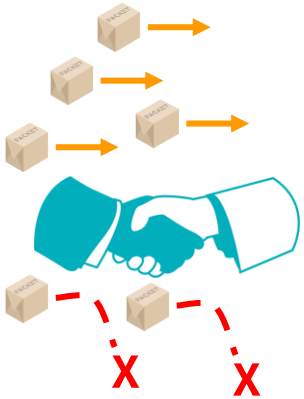
Packet Metadata: Data added to packets to help route them through the network and reassemble the original message.

The IP address of the sender and receiver helps route the message.





Transmission Control Protocol (TCP): A protocol for sending packets that does error-checking to ensure all packets are received and properly ordered



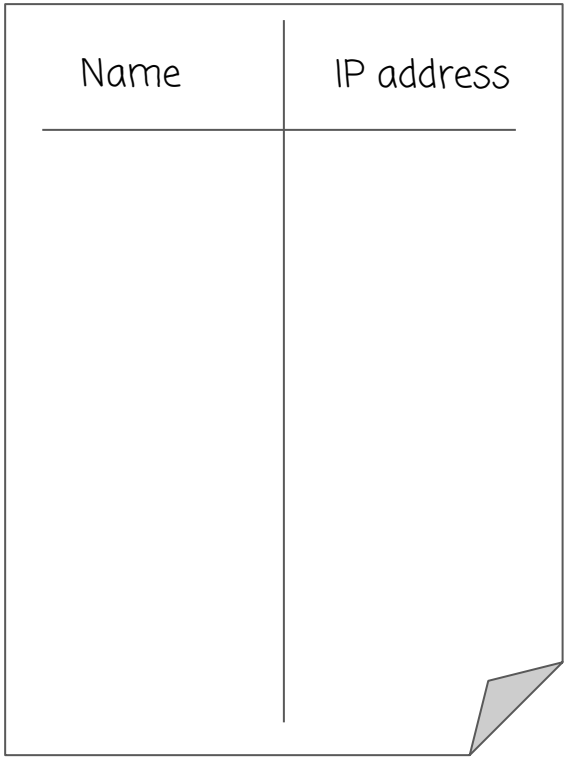
User Datagram Protocol (UDP): A protocol for sending packets quickly with minimal error-checking and no resending of dropped packets

Unit 2 - Lesson 6
HTTP and DNS

Warm Up

Do This: Create a list in your journal of every one of your classmates IP addresses. The only rules:

- You may walk around the room
- You may share information with classmates
- You may talk / share information with only ONE classmate at a time.



Prompt: Discuss with your classmates the following prompts

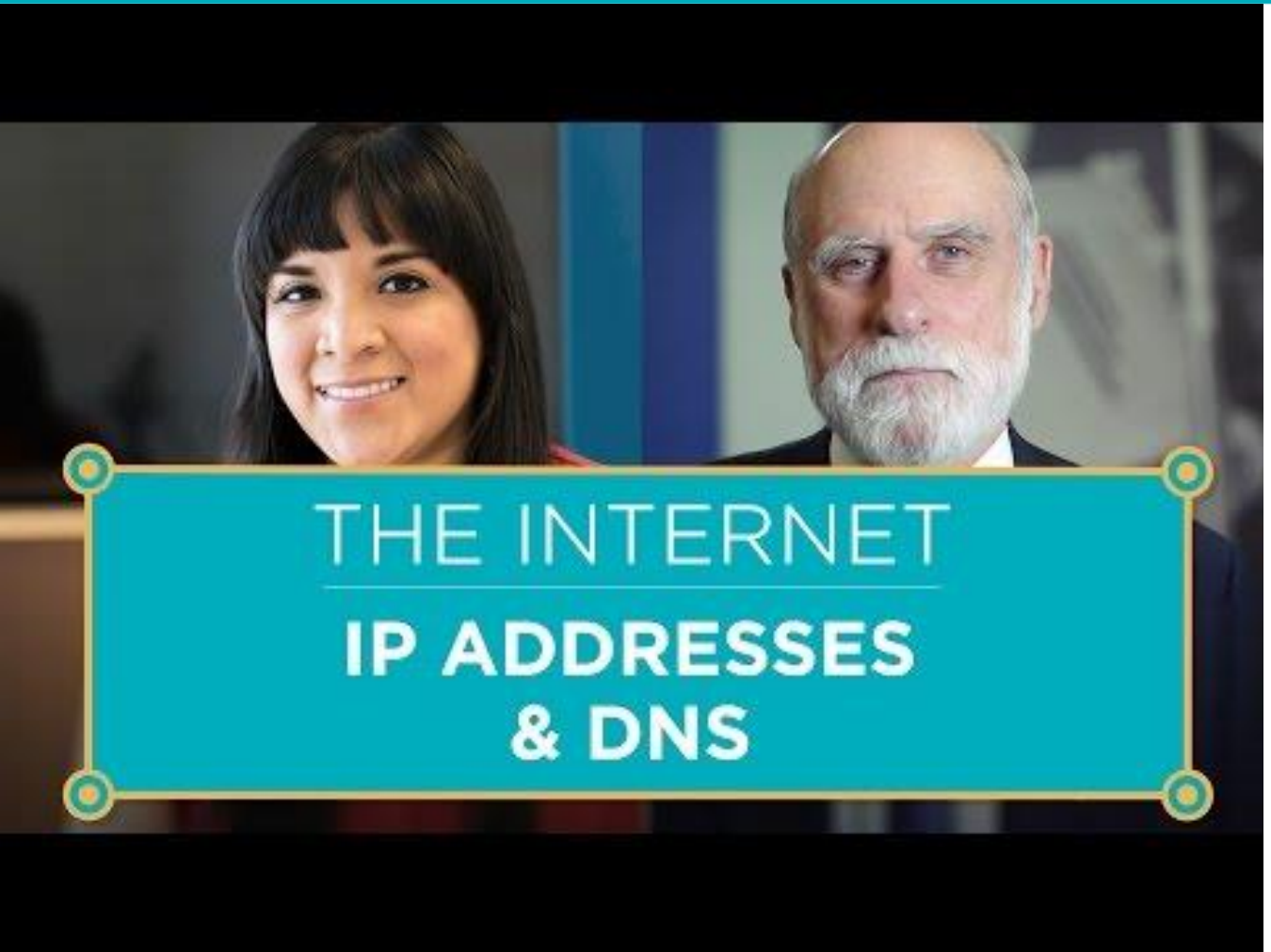
- Why do you think I was switching your classmates' IP addresses?
- If IP addresses can change, is there a better way for everyone to know everyone else's IP address?

If we want the Internet to scale up to billions of devices, then we need a better way to figure out one another's IP addresses!

Activity

Prompt: As we watch the following video take notes in your journal on:

- How does the DNS solve the problem of translating domain names like example.com into IP addresses?
- How does the DNS help the Internet scale?



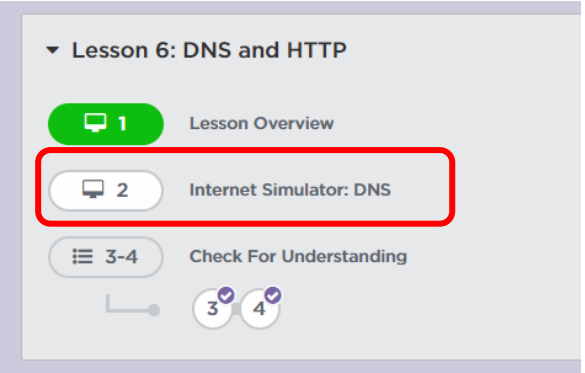
- How does the DNS solve the problem of translating domain names like example.com into IP addresses?
- How does the DNS help the Internet scale?

Prompt: Discuss the following prompts with a partner:

- How does the DNS solve the problem of translating domain names like example.com into IP addresses?
- How does the DNS help the Internet scale?

Let’s go use the final version of the Internet Simulator

This time we won’t cheat and ask out loud for one another’s IP addresses!

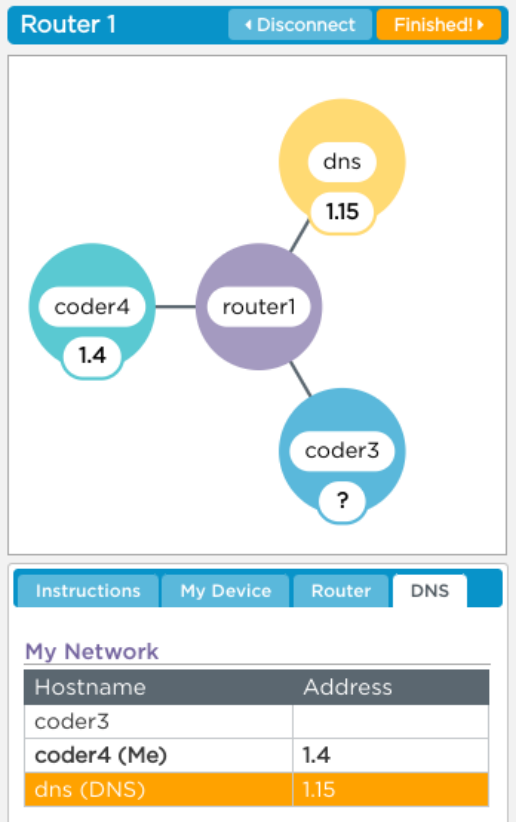


Do This:

Go to Level 2
on Code Studio

Do This:

- Log into this version of the Internet Simulator
- **No talking at all**, not even to get your partner's IP address
- Ask the DNS for the IP address of a user by sending `GET username`
- Use the IP address you get back to communicate with at least 2 friends. You can talk about
  - In your ideal world what time would school start?
  - What would you eat for your perfect meal?



Do This: As we watch this video take notes on the HTTP protocol.

- What problem is HTTP solving?
- What is a GET request and what are your requesting?
- How does HTTP rely on the other layers of the Internet?
- What problem is HTTP solving?
- What do certificate authorities do and why are they necessary?

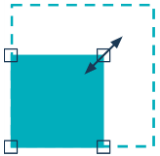
- What problem is HTTP solving?
- What is a GET request and what are your requesting?
- How does HTTP rely on the other layers of the Internet?
- Why are SSL, TLS, and HTTPS necessary?
- What do certificate authorities do and why are they necessary?

Prompt: Review these questions with a partner about HTTP

- What problem does it solve?
- How does it work?
- How does it rely on the other layers of the Internet?

Wrap Up

Key Takeaways:



Scalability: the capacity for the system to change in size and scale to meet new demands

The Domain Name System (DNS): the system responsible for translating domain names like example.com into IP addresses

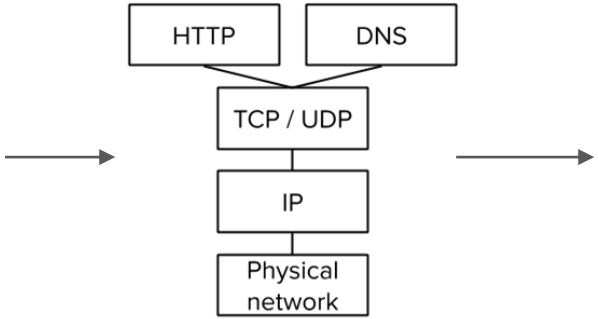
World Wide Web: a system of linked pages, programs, and files

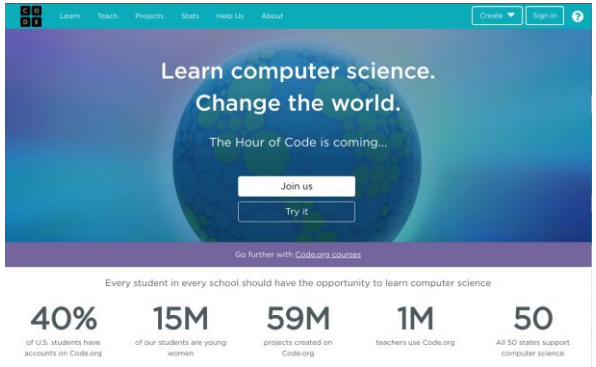
Hypertext Transfer Protocol (HTTP): a protocol for computers to request and share the pages that make up the world wide web on the Internet

- The World Wide Web is different from the Internet. The World Wide Web are files, web pages and media. The Internet is the network we use to access those files.
- The DNS is an important system in helping the Internet scale.

Prompt:

Using your Layers of the Internet activity guide to help you, explain how each of the different layers is involved when you go to a link like code.org?

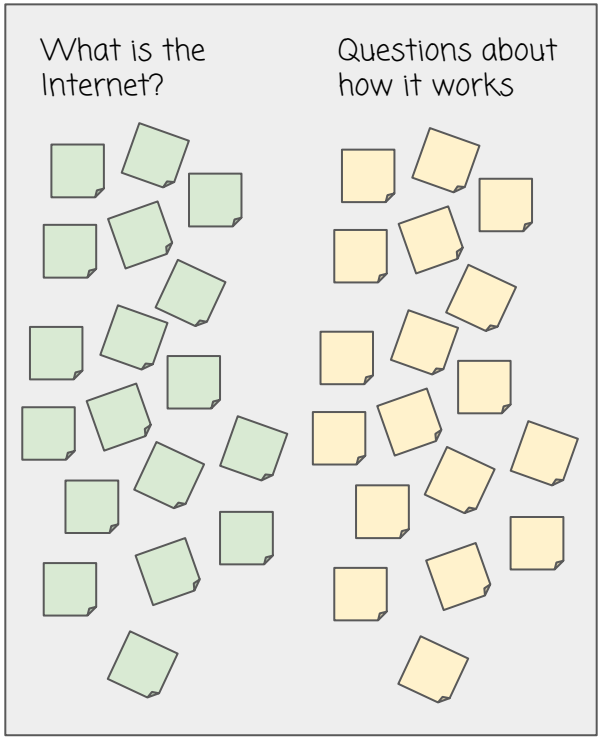




Unit 2 - Lesson 7
Project - Internet Dilemmas Part 1

Warm Up

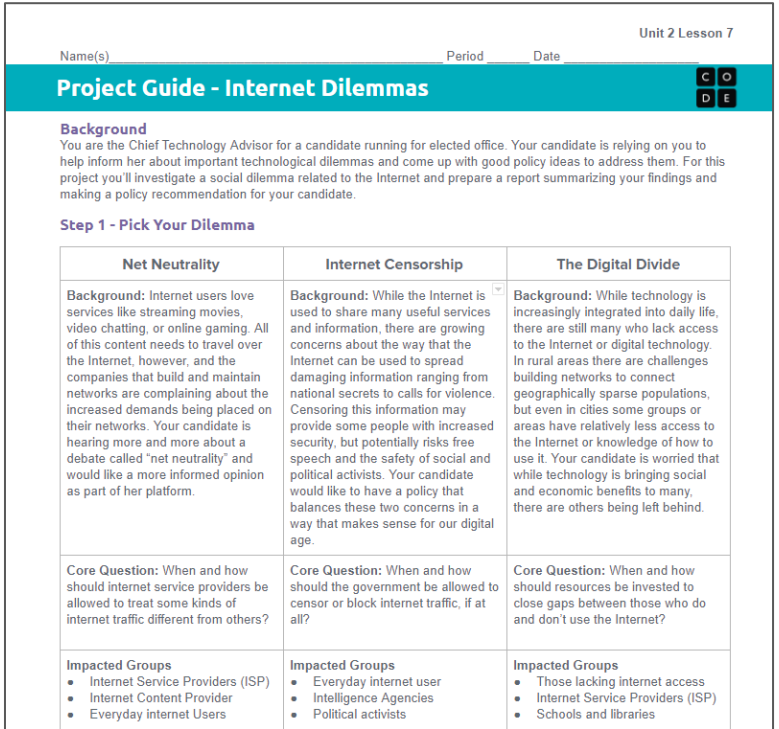
Review



Activity


Chief
Technology
Advisor

Project Guide:



Unit 2 Lesson 7

Name(s)_____ Period_____ Date_____

Project Guide - Internet Dilemmas

Background

You are the Chief Technology Advisor for a candidate running for elected office. Your candidate is relying on you to help inform her about important technological dilemmas and come up with good policy ideas to address them. For this project you'll investigate a social dilemma related to the Internet and prepare a report summarizing your findings and making a policy recommendation for your candidate.

Step 1 - Pick Your Dilemma

Net Neutrality	Internet Censorship	The Digital Divide
Background: Internet users love services like streaming movies, video chatting, or online gaming. All of this content needs to travel over the Internet, however, and the companies that build and maintain networks are complaining about the increased demands being placed on their networks. Your candidate is hearing more and more about a debate called "net neutrality" and would like a more informed opinion as part of her platform.	**Background:** While the Internet is used to share many useful services and information, there are growing concerns about the way that the Internet can be used to spread damaging information ranging from national secrets to calls for violence. Censoring this information may provide some people with increased security, but potentially risks free speech and the safety of social and political activists. Your candidate would like to have a policy that balances these two concerns in a way that makes sense for our digital age.	**Background:** While technology is increasingly integrated into daily life, there are still many who lack access to the Internet or digital technology. In rural areas there are challenges building networks to connect geographically sparse populations, but even in cities some groups or areas have relatively less access to the Internet or knowledge of how to use it. Your candidate is worried that while technology is bringing social and economic benefits to many, there are others being left behind.
Core Question: When and how should internet service providers be allowed to treat some kinds of internet traffic different from others?	**Core Question:** When and how should the government be allowed to censor or block internet traffic, if at all?	**Core Question:** When and how should resources be invested to close gaps between those who do and don't use the Internet?
Impacted Groups • Internet Service Providers (ISP) • Internet Content Provider • Everyday internet Users	**Impacted Groups** • Everyday internet user • Intelligence Agencies • Political activists	**Impacted Groups** • Those lacking internet access • Internet Service Providers (ISP) • Schools and libraries

Options:

Net Neutrality

Internet Censorship

The Digital Divide

Step 1: Choose!

Net Neutrality

Internet Censorship

The Digital Divide

Step 2: Review the One-Pager and Rubric

Unit 2 Lesson 7

Name(s)_____ Period_____ Date_____

Internet Dilemma Policy One Pager

To complete this one pager fill in each of the sections below. All text in italics is included to explain how to fill in the one pager and can be deleted before you submit.

Core Question

Copy this directly from your dilemma above

Impacted Groups

Fill in the table below with your Impacted Groups. You may optionally add new groups or split one of the ones assigned into smaller subgroups if it will help better explain who's involved in the dilemma.

Impacted Group and Description	Interests, Benefits, and Harms
Group 1: Write the name of the group and provide a brief description / examples of who they are *Can be bullets*	*Explain the interests of this group, as well as ways that they could benefit or be harmed because of the dilemma.* *Can be bullets*
Group 2: Write the name of the group and provide a brief description / examples of who they are *Can be bullets*	*Explain the interests of this group, as well as ways that they could benefit or be harmed because of the dilemma.* *Can be bullets*
Group 3: Write the name of the group and provide a brief description / examples of who they are *Can be bullets*	*Explain the interests of this group, as well as ways that they could benefit or be harmed because of the dilemma.* *Can be bullets*

Technical Background

Explain the technical background necessary to understand the problem. Include:

- *Background on layers / protocols / principles of the Internet necessary to understand the dilemma*
- *Use the concept bank on the first page to help brainstorm ideas to include. A strong description will reference several of these concepts*
- *Make sure your descriptions are approachable for your candidate, who does not have as strong of a background in the way the Internet works*
- *This can be completed in bullets*

Category	Extensive Evidence	Convincing Evidence	Limited Evidence	No Evidence
Completed research guide demonstrates use of multiple sources	Research guide indicates referencing three or more sources. provided are referenced	All three provided sources are referenced	Only one or two sources were referenced	No evidence that sources were used
Interests, benefits, and harms of all impacted groups are clearly explained	Interests, benefits, and harms for all groups, including possibly additional groups beyond the required three, are provided.	Interests, benefits, and harms of most groups are provided and accurate.	Interests, benefits, and harms are either limited, inaccurate, or incomplete.	No description of impacts on different groups
Technical details reflect an accurate and detailed understanding of the internet	Extensive technical details are provided demonstrating broad understanding of how the internet works	Many technical details are provided that accurately reflect how the internet works	Few technical details provided. Some may be inaccurate.	No technical details provided
Technical details are clear and described for a non-technical audience	All technical details are clear and easily read by a non-technical audience	Most of the technical details provided can be understood by a non-technical audience	Many of the technical details provided are confusing to a non-technical audience	No technical details provided
A clear policy recommendation is provided that is justifiable based on other information in the one-pager	Policy recommendation is justifiable and clear based on information in both other sections of one-pager	Policy recommendation is clear but some aspects may not build upon information elsewhere in the one-pager	Policy recommendation provided but is disconnected from other information in one-pager	No policy recommendation provided
Reasonable benefits and harms of the policy choice on different impacted groups are provided	Benefits and harms to all impacted groups are clearly explained	Benefits and harms to most impacted groups are clearly explained	Benefits and harms are limited or not tied to specific groups	No benefits and harms are provided

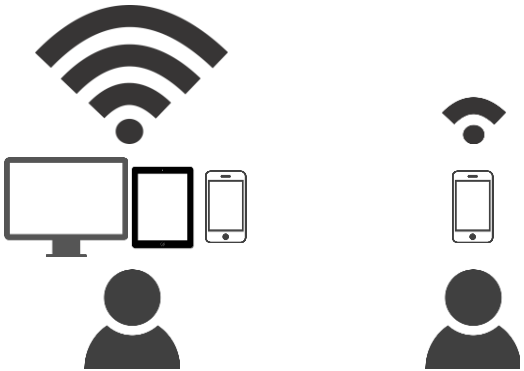
Step 3: Review the Concept Bank

Protocols / Layers Physical internet, IP, TCP, UDP, HTTP, DNS	**Networks** Fiber optic cable, copper wire, wifi, router, path, direct connection, bandwidth	**Packets and Routing** Packet metadata, IP addresses, dynamic routing,	**World Wide Web** Web pages, browsers, servers, domain, world wide web	**Internet Principles** Redundancy, fault tolerance, scalability, open protocols

Step 4: Review Your Sources

Source	Notes on Impacted Groups	Notes on Technical Details

Wrap Up



Digital Divide - differing access to computing devices and the Internet, based on socioeconomic, geographic, or demographic characteristics.

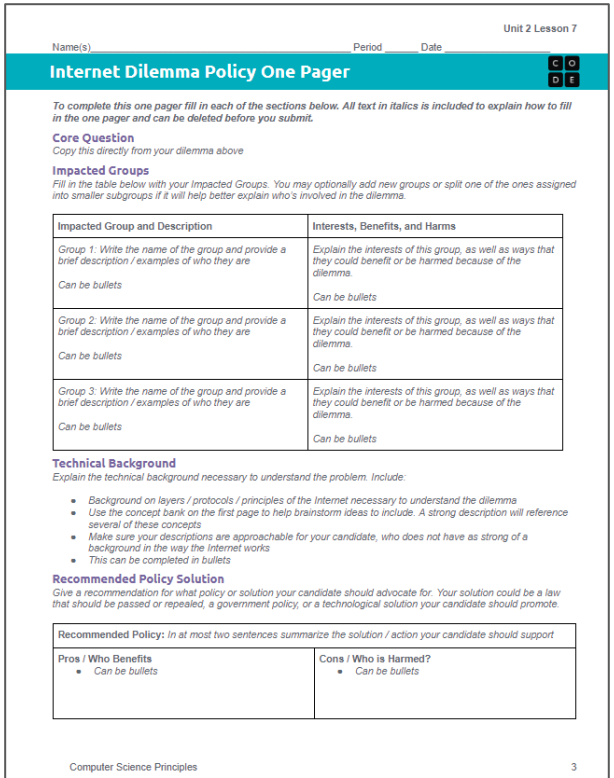
- Can affect both individual and groups.
- Raises ethical concerns of equity, access, and influence globally and locally.
- Affected by the actions of individuals, organizations, and governments.

Unit 2 - Lesson 8
Project - Internet Dilemmas Part 2

Warm Up

Activity

Internet Dilemma Policy One Pager



Unit 2 Lesson 7

Name(s)_____ Period_____ Date_____

Internet Dilemma Policy One Pager

To complete this one pager fill in each of the sections below. All text in italics is included to explain how to fill in the one pager and can be deleted before you submit.

Core Question

Copy this directly from your dilemma above

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Fill in the table below with your Impacted Groups. You may optionally add new groups or split one of the ones assigned into smaller subgroups if it will help better explain who's involved in the dilemma.

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Technical Background

Explain the technical background necessary to understand the problem. Include:

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- *Use the concept bank on the first page to help brainstorm ideas to include. A strong description will reference several of these concepts*
- *Make sure your descriptions are approachable for your candidate, who does not have as strong of a background in the way the Internet works*
- *This can be completed in bullets*

Recommended Policy Solution

Give a recommendation for what policy or solution your candidate should advocate for. Your solution could be a law that should be passed or repealed, a government policy, or a technological solution your candidate should promote.

Recommended Policy: *In at most two sentences summarize the solution / action your candidate should support*	
Pros / Who Benefits • *Can be bullets*	**Cons / Who is Harmed?** • *Can be bullets*

Computer Science Principles 3

Don't forget to check the rubric as you work!

Share Out

Net Neutrality

Share Out

Internet Censorship

Share Out

The Digital Divide

Wrap Up

Submit

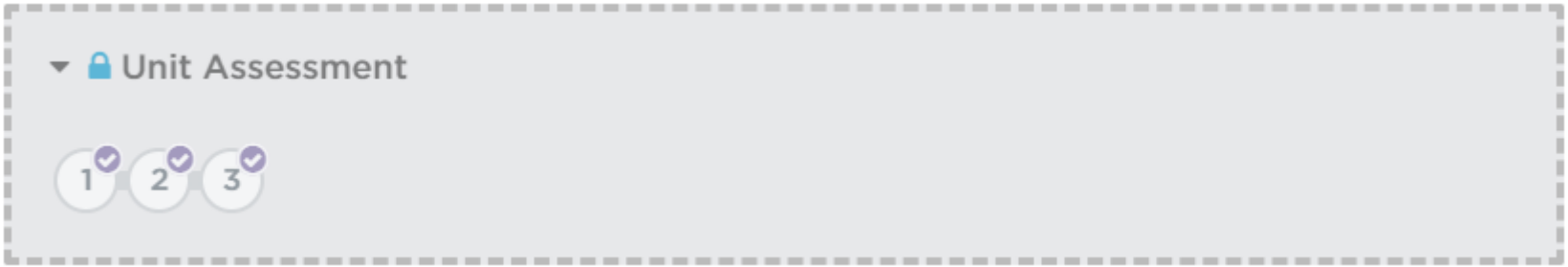
- Your Project Guide

Unit 2 - Lesson 9
Assessment Day

Warm Up

Activity

Unit Assessment



Wrap Up