Lesson 2.3: All things connected

Objectives

In this lesson, students will be able to:

- Explain what is a network
- Explain how computers are connected together to create a network

Agenda

1. Introduction	5 mins
2. Make a String Phone	10 mins
3. Build your network	20 mins
4. Analyze networks	10 mins
5. Reflections and Wrap Up	5 mins

Preparation

- ❑ For the string phones (per student):
  - ❑ 2 paper cups
  - ❑ A sharp pencil or sewing needle to help poke holes
  - ❑ String (kite string and fishing lines work well)
  - ❑ 2 paper clips
- ❑ "Analyze networks" (1 per student)

Resources & Links

- ❑ https://www.sciencekids.co.nz/projects/stringphone.html

Credits:

Science Kids
Fun science & technology for kids!

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1. Introduction

How did people communicate in the past if they were far away from each other? Get some ideas from the students (letters, phone, telegram, lights)
What about today? What are the new things that exist to help us communicate? Emails, phone calls. Computing devices help us connect with one another. But they also help devices connect to other devices (for example a computer to a phone)

Explain to the students that today, the class is going to make their first **network connection** using a string phone. Each of the students will have one to many string phones to talk to their network neighbor(s).

A network is a group of people and things connected together

2. Make a String phone.

Watch the video: https://www.youtube.com/watch?v=4S7nG6S1isM

Instructions

1. Cut a long piece of string, you can experiment with different lengths but perhaps 10 metres (33 feet) is a good place to start.
2. Poke a small hole in the bottom of each cup.
3. Thread the string through each cup and tie knots at each end to stop it pulling through the cup
4. Alternatively you can use a paperclip to hold the string in place and capture the wave better.
5. Move into position with you and a friend holding the cups at a distance that makes the string tight (making sure the string isn't touching anything else).
6. One person talks into the cup while the other puts the cup to their ear and listens, can you hear each other?

3. Build your network

- Divide students in groups of 2, 3 and 4 and bring them in an open space

Make sure the students walk away from each other so that the string is a straight line. Students in pairs build network A, groups of 3 students create network B and groups of 4 students create network C.

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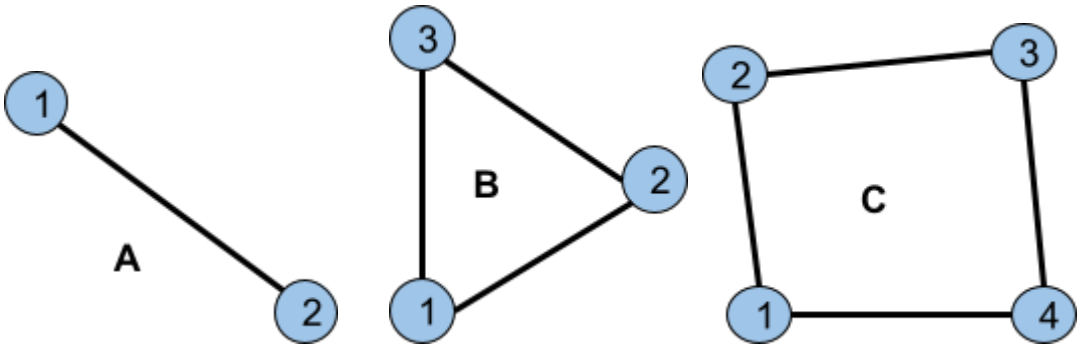
- Make sure students know what is their node number (1 to 4)



- Some students will hold only one cup if they are connected to only 1 student (like in network A), some will hold 2 cups
- In each network, have the student # 1 send a message (1 word) to student in # 2

Let's pass information through the network:

Rules:
if you are a 2 nodes network, the information will travel back and forth between student #1 and student #2
If you are a 3 nodes network, the information will travel from 1 to 2 to 3 back to 1 etc…
If you are a 4 nodes network, the information will travel form 1 to 2 to 3 to 4 back to 1 etc…

When you receive information, you need to remember it, and pass it on to the next node, adding a little bit of information. We will build a story sentence:
Example for a 4 nodes network:
Student #1 communicates to student #2: A black cat…
Student #2 communicates to student #3: A black cat crosses
Student #3 communicates to student #4: A black cat crosses the street
Student #4 communicates to student #1: A black cat crosses the street carefully.

Simplified version:
Distribute an animal flash card and students exchange which animal they are
Configurations B and C, the receiver adds his/her animal when communicating to the next node, so by the time Node 1 receives the information back, he/she knows all the animals in the network

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4. Analyze networks:

Explain: We had 3 different types of networks.
One way to spot the differences between networks is to count how many **nodes** and how many **connections** exist in each of them. The **nodes** are the "things" in the network that are connected (in our examples: the students). The **connections** are the number of strings that connect one student to another
For example, network A is made of 2 nodes and 1 connection

Distribute Activity "Analyze Networks to students" and ask them to fill up the numbers in the table

Solution:

Network Structure #	Network Nodes (computers)	Connections
A	2	1
B	3	3
C	4	4

5. Wrap Up and Reflections

Reflection Points:

- Exploring Networks in Computer Science: In the computer world, the different network points, where students were standing, are computers. Computers on a network can share information with each other. Like your network was linked using strings, computers on a network may be linked through cables, telephone lines or infrared light beams.
- In network structure C, how can nodes 1 and 3 communicate and share information? (via 2 or by adding a new connection)
- Can you spot some networks around you?
- What kind of information would you like to share in your network?

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- **Conclusion**

  When computers are connected, they form a network. A network cannot exist without computing devices or without connections. A connection can be a cable wire or a wireless connection. Each connection point represented by a computing device is called a node.

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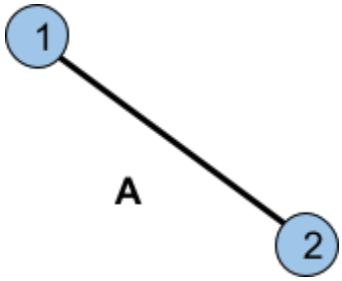
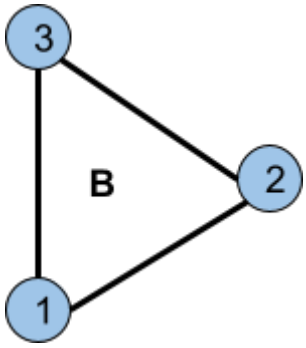
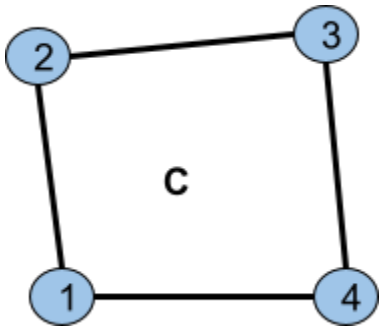
Analyze networks

Network	Number of Nodes	Number of Connections
	2	
		
		

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Standard Alignment (other than Computer Science)

CA Next Generation Science Standards:
1-PS4 Waves and Their Applications in Technologies for Information Transfer
1-PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [*Assessment Boundary: Assessment does not include technological details for how communication devices work.*]

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