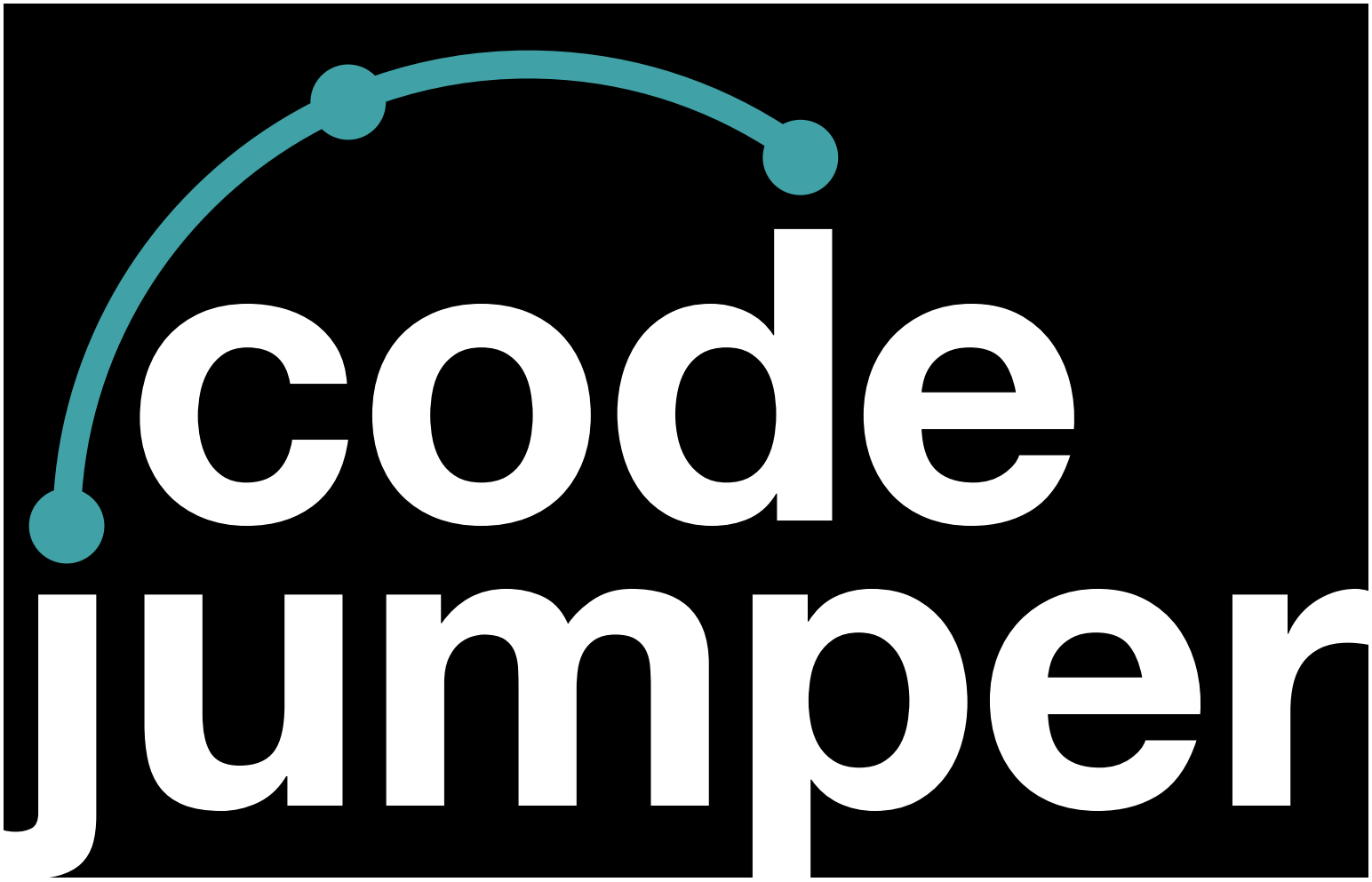

Lesson 17

Protocols

Code Jumper Curriculum: Lessons

Lesson 17
Protocols

American Printing House for the Blind

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1839 Frankfort Avenue, Louisville, KY 40206
www.aph.org | info@aph.org

Overview

Lesson Objectives

After this lesson, students will understand the importance and purpose of protocols.

Expected Outcomes

Students will:

- All students: Be able to state that a protocol is a set of rules for communication
- Most students: Be able to explain why protocols are important
- Some students: Be able to give examples of what a good protocol should include

Lesson Plan Structure

- Lesson Objectives
- Introductory Lesson Activity
- Lesson Extension Activity
- Standards and Check for Understanding

Key Vocabulary

- **Protocol**: A set of rules that tells devices on a network how to communicate

Introductory Lesson Activity

Objective

After this lesson, students will understand the importance and purpose of protocols.

Overview

In this lesson, students will participate in a communication activity to demonstrate the importance of protocols.

Materials

- String
- Morse code
- Morse Code Video
- Computer Science Journal

Getting started

1. Review with students that in previous lesson activities, they have transmitted different types of data (letters) over networks.
2. Explain that computers don't understand letters. Computers use electricity to turn a signal either on or off and, thereby, transmit information. In order for computers to understand what these electrical signals mean, they need a protocol, or a set of rules that tells devices how to communicate over a network.
3. Tell students that Morse Code, developed in 1851, is an example of a system of communication for transmitting information or text. Play the 1 minute video of the letters of the alphabet in Morse Code. Say each letter's name before it is played.
4. Explain that this type of communication uses different combinations of dots and short dashes for all letters, and show them the large print copy and a braille copy, if appropriate.
5. Divide students into groups of two and provide each pair with a long piece of string and the Morse code table.
6. Tell students that each person in the pair needs to think of

a simple three- to four-letter word to communicate to their partner in Morse code.

7. Instruct students to identify the correct dots and dashes needed to create their word and then choose which student in the partner group will go first.
8. Explain that each student will hold the end of the string and stand far enough apart to make the string tight.
9. Tell the first student to use Morse code to send the word across the string by plucking the string for the dots and using a quick tug on the string for the dashes to represent each letter of their word. Tell their partner to try to guess what word they are spelling by using the Morse code table.
10. Remind each pair of students that they will have to make sure to go slowly and give their partner time to process the actions in between each letter. Students should write down the dots and dashes in their Computer Science Journal after each letter is sent with Morse code across the string.
    Tip: For students using Braille, ask them to record the dots and dashes by using the period for a dot and a dash for the dash. This can be done on a computer, a Braillewriter, or slate and stylus.
11. Instruct students to switch after the first word is communicated so that their partner can take a turn using Morse code.

Closure

When all the partner groups are finished with the activity, ask the class to brainstorm the different rules or protocols that were involved in the activity. (Examples: Use dots and dashes from Morse code to create letters, hold the string tightly between partners so the taps can be felt and interpreted, use three to four letters to create the words for the Morse code.)

- Ask students to brainstorm some types of protocols they think computer networks use today. (Expected response:

protocols regarding how fast or slow information is delivered, are devices are wired or wireless, how to communicate messages, how to start and end messages, how to format a message, how to end a connection, what to communicate if there is an error.)

Lesson Extension Activity:

Objective

After this lesson, students will understand the importance and purpose of protocols.

Materials

- Protocol cards
- Computer Science Journals

Instruction

1. Review with students that Morse code has a protocol of using a series of dots and dashes to communicate letters that make words.
2. Brainstorm as a class a type of protocol they could come up with to communicate the letters of the alphabet. (If students are stuck for ideas, suggest they use the positions of the letters in the alphabet. For example, A is 1, B is 2. Instead of using string for the signals, they could clap their hands. If they were spelling the word BED, the clapping sequence would be 2 claps + 5 claps + 4 claps.) If needed, demonstrate one or both of these examples and have students try to guess the word.
3. Explain that students will be getting into partner groups and each group will get a protocol card with a word on it. Partner #1 will use the clapping signals to communicate the word. Partner #2 will try to guess the word.

4. Instruct students to get into partner groups and face each other. Give one protocol card to each group and give the students a few minutes to clap and guess the words. Students can write the signals down in their Computer Science Journal to help decode the word.
5. Have student partner groups pass their card to the next group. Give the students a few minutes with the new word where partner #2 claps the word and partner #1 tries to guess the word.
6. After each set of partners has had the opportunity to communicate a word using the clapping protocol, discuss as a class how their protocol could be improved. For example, they could pause between each letter before they started clapping the next letter, in order to signal that the letter is finished being transmitted.
7. Give students five minutes to work with their partner and come up with additional ways to further improve their protocol.
8. As before, regroup to discuss how things went and how the protocols could be further improved.

Closure

- Ask students why protocols are important. (Expected response: Without protocols, computers won't understand what the signals they receive mean.)
- Ask students what things a good protocol should include. (Expected response: How to send a message, how to know when the message starts and finishes, how to deal with errors, etc.)

Standards and Check for Understanding

CSTA K-12 Computer Science Standards *

- 1A-AP-09: Model the way programs store and manipulate data by using numbers or other symbols to represent information.

National Curriculum of England**

Key Stage 1:

- Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- Create and debug simple programs
- Use logical reasoning to predict the behavior of simple programs
- Use technology purposefully to create, organize, store, manipulate and retrieve digital content
- Recognize common uses of information technology beyond school
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

Key Stage 2:

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output

- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.
- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.
- Use technology safely, respectfully and responsibly; recognize acceptable/unacceptable behavior; identify a range of ways to report concerns about content and contact.

Closing Activities and Check for Understanding

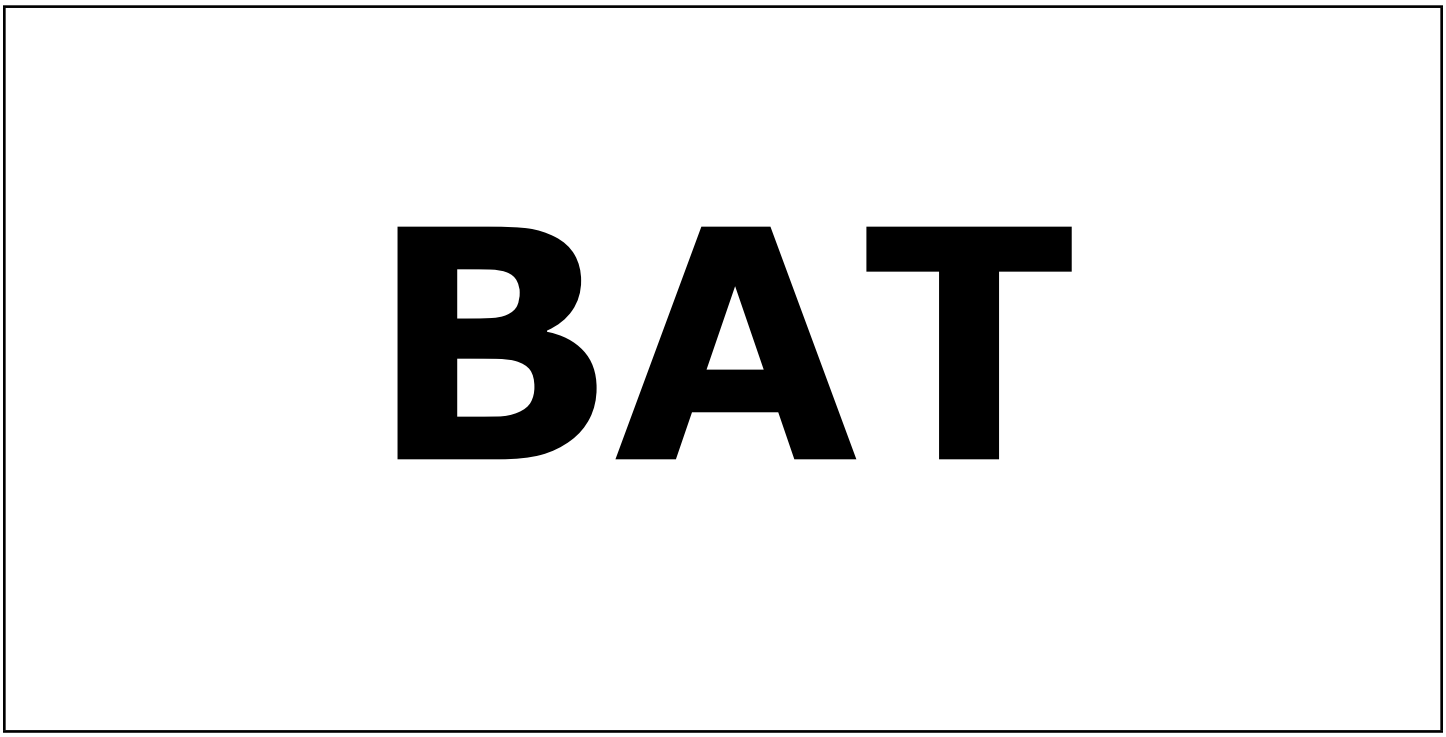
- Ask students to think of a protocol that could be used to send messages using a button connected to a buzzer.

Check for Understanding	**Completed**
Students can reflect in their Computer Science Journal of what a protocol is and why are they important.	Yes / No

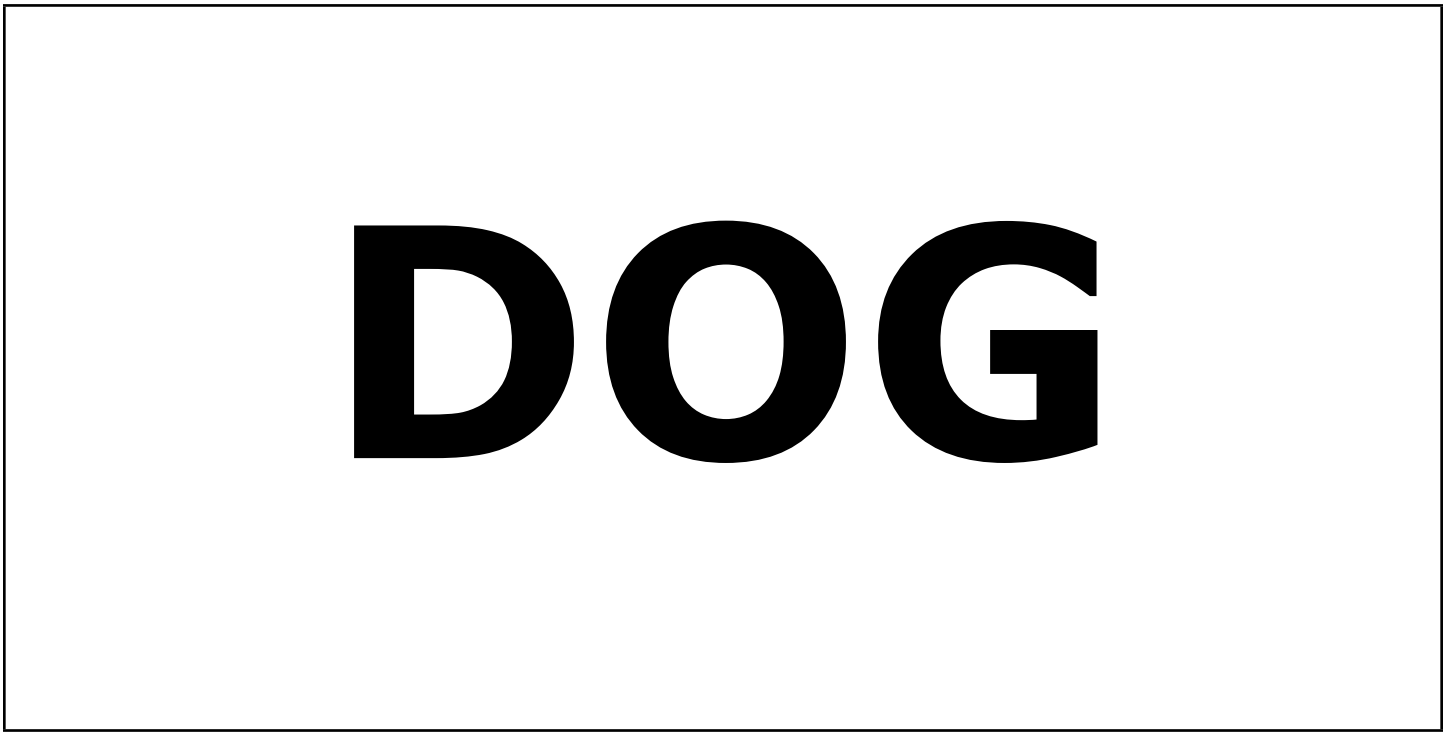
*Computer Science Teachers Association (2017). CSTA K-12 Computer Science Standards, Revised 2017. Retrieved from http://www.csteachers.org/standards

**Education, Department for. "National Curriculum in England: Computing Programmes of Study." GOV.UK, 11 Sept. 2013, www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study

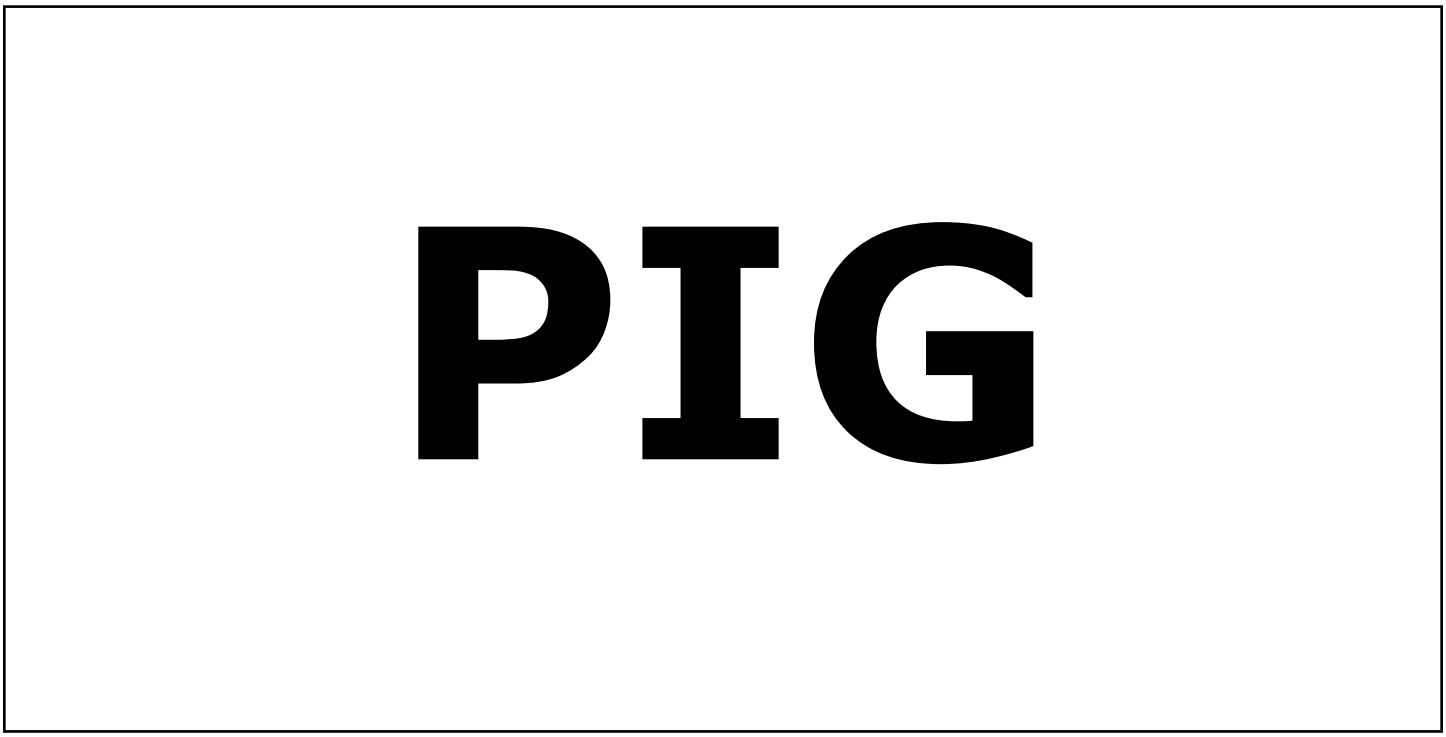
Protocol Card #1:



Protocol Card #2:

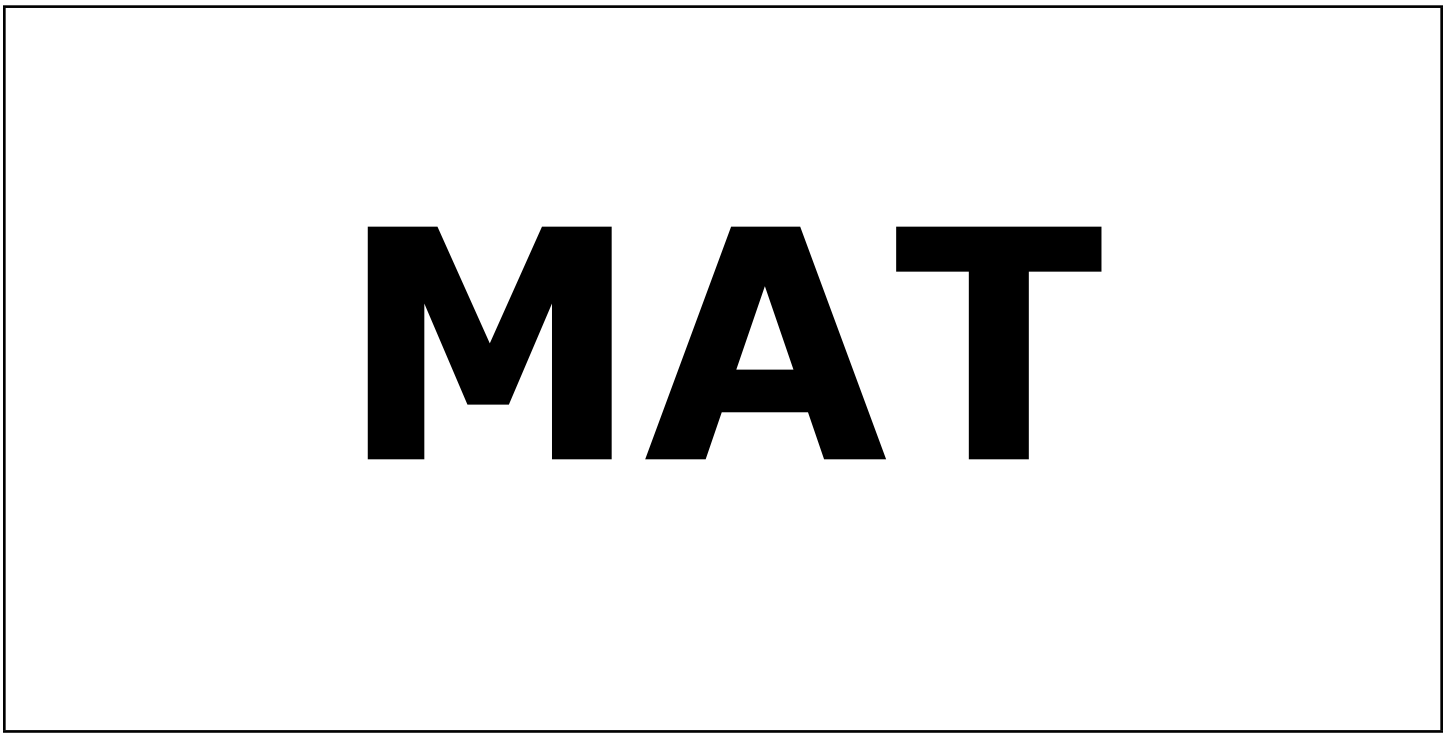


Protocol Card #3:

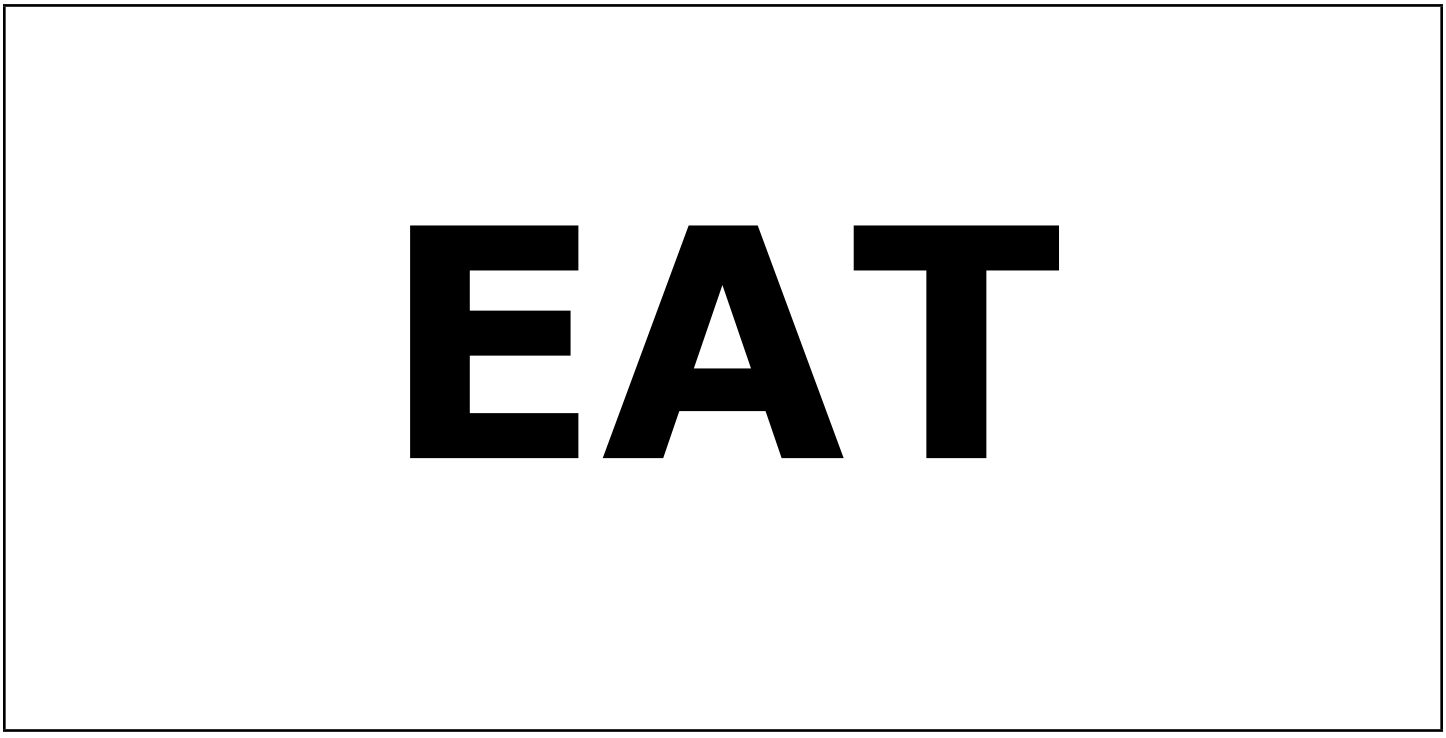


Protocol Card #4:

Protocol Card #5:



Protocol Card #6:



Protocol Card #7:

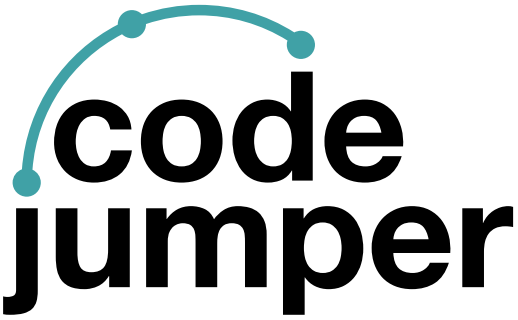
POP

Protocol Card #8:

RUN

Morse Code Table

A	.-	
B	-...	
C	-.-.	
D	-..	
E	.	
F	..-.	
G	--.	
H	....	
I	..	
J	.---	
K	-.-	
L	.-..	
M	--	
N	-.	
O	---	
P	.--.	
Q	--.-	
R	.-.	
S	...	
T	-	
U	..-	
V	...-	
W	.--	
X	-..-	
Y	-.--	
Z	--..	



For more resources, visit codejumper.com

1839 Frankfort Avenue
Louisville, Kentucky 40206
502-895-2405 • 800-223-1839
www.aph.org • info@aph.org