



#### Unit 1: Getting Started with TI-Innovator™ Hub

#### Skill Builder 3: Request and SOUND

In this third lesson for Unit 1, you will learn another method to get user input into a program and how to control the SOUND on the TI-Innovator™ Hub.

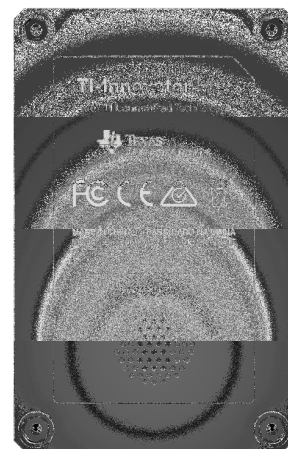
#### Objectives:

- Use the **Request** statement
- Control the frequency and timing of the speaker (SOUND)

The TI-Innovator Hub has a built-in speaker called SOUND.

You control the sound coming out of SOUND by sending it a frequency value.

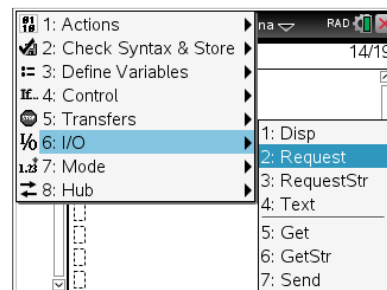
Sound frequencies are measured in Hertz (Hz), or 'cycles per second'.



The **Request** statement is found in the I/O menu. It is used to get input from the user and contains a feature that lets the programmer create a meaningful message to the user.

Statement Syntax: **Request** <String> , <Variable>

In this sound program, we'll use the **Request** statement.



**Teacher Tip:** The speaker has no amplifier, so it is not very loud. This helps control the noise level in a classroom full of TI-Innovator Hub units.

The syntax of the SET SOUND command is:

SET SOUND frequency duration

frequency can be from 1 to ???

duration is in seconds.

But the 'audible' range is more limited. An interesting frequency is 5. You will hear the speaker click 5 times in one second. This will help explain Hz (cycles per second). At higher frequencies, you will hear musical notes because this is the way our ears work. Pressure 'waves' through the air coming from a vibrating speaker cause our eardrums to vibrate and the brain interprets this vibration as sounds.



# 10 Minutes of Code

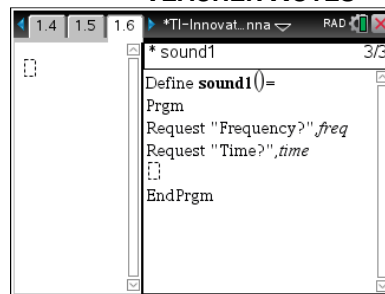
## TI-NSPIRE CX WITH THE TI-INNOVATOR™ HUB

### Setting up the SOUND program

1. Start a new program, and call it SOUND1.
2. Add the **Request** statement from the I/O menu.
3. Add the prompt "*Frequency?* " and a comma after the keyword Request.
4. Then type the variable that will represent the frequency, **freq**.
5. Add another **Request** statement to let the user enter the *time* for which the sound should play.

## UNIT 1: SKILL BUILDER 3

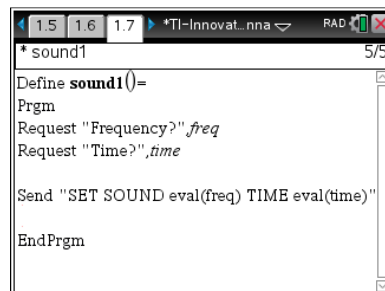
### TEACHER NOTES



As with the COLOR program in the previous skill builder, you need to use the **eval()** function to evaluate the variables **freq** and **time**.

### Finishing up the SOUND program

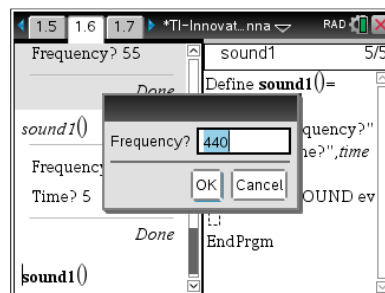
6. Select **Send "SET..."** and **SOUND** by pressing **menu > Hub > Send "SET..." > SOUND**.
7. Select **eval()** by pressing **menu > HUB > eval()**.
8. Add the variable **freq** inside the parentheses.
9. Type a space, and then add another **eval()** function for the variable **time**.
10. Press **ctrl-B** to store the program.



### Run the program

When you run this program, a dialog box appears as a result of the **Request** statement.

1. Enter the frequency 440 and time 5.
  - This will play the tone 440Hz for 5 seconds. This means that the speaker vibrates 440 times a second for 5 seconds.
  - In a noisy environment, you might have to hold the hub close to your ear to hear the tone.
2. Press enter to rerun the program with another frequency and time.
3. Experiment with other frequencies.



**Teacher Tip:** This is a good opportunity to investigate frequency and the 'audible' range. Low and high frequencies are out of the audible range, but the speaker will still respond with information that is useful for understanding frequency. If you enter a frequency of 5 and time 2, you will hear 10 clicks in 2 seconds. High frequencies do not sound very good, at least to most human ears. We leave it as an experiment to discover the 'useful' range of frequencies for this device; and, in a later lesson, we discuss the musical notes and their frequencies - an interesting geometric progression! For the musicians: 440 is the frequency of A4 (A in the 4<sup>th</sup> octave).