

Arduino STEM Challenge

Welcome to the Arduino STEM Challenge! For this challenge, you will be modifying a program written for an Arduino. An Arduino is used to create simple and more advanced circuits. Programs can be written to do all sorts of things, like play a song. For this challenge, you will be provided a circuit and a base program that will play a recognizable tune. Your mission, should you choose to accept it, is to make small changes in the code that will result in specific changes to the song. The desired change to the song will be listed, but you must figure out how to change the code. After you make your edits to the code, press the verify button to see if the program is valid. Then, upload it and see how the song changes. Some guess and check might be required. Unless specified, return the song to its original form after making a change. Good luck!

Modification	Completion
1. Double the length of the final note in the tune.	
2. Double the length of the rest in the song.	
3. Lower the whole song by two octaves	
4. Raise the whole song by 4 octaves	
5. Slow song down to half its original speed.	
6. Decrease the interval between the notes by half.	
7. Make the song repeat, playing two times back to back	
8. Keeping the change from 7, add a rest between the repeat.	
9 10 . Change the song to the intro of happy birthday, including rests and note lengths.	
10 9 . Change the song to twinkle twinkle little star, including rests and note lengths.	

Intro to Happy Birthday: G, G, A, G, C, B

Twinkle Twinkle: D, D, A, A, B, B, A, G, G, Fsharp, Fsharp, E, E, D,

Arduino STEM Challenge

Name _____

School _____

After completing the basic arduino tone melody circuit, here are some challenges:

1. Delete a note
2. Add a note
3. Make the song twice as slow.
4. Make the song twice as fast.
5. Repeat the same tone
6. Play a C-scale (use the notes C, D, E, F, G, A, B, C)
7. Change the duration of the notes during the C-scale. Make them increase in duration as the tone increases, then decrease in duration as the tone decreases for the second half.
8. Play the tune "Hot Crossed Buns" (new durations: 4,4,2,4,4,2,8,8,8,8,8,8,8,8,4,4,2 and use the notes CS5, B4, A4)
9. Play the "Jaws" theme song (new durations: 1,4,1,4,2,6,2,6,4,8,8,10,8,10,8,1,1 and use the notes A3, B3 and the last note is CS5)
10. Play the tune "Happy Birthday" (use notes G,E,B,FS,D,A and make the durations 4,8,4,4,5,2,4,8,4,4,5,2,3,3,2,2,3,3,3,4,4,4,3,2,1)

Name _____

School _____

Grade _____

After completing the basic tone melody arduino circuit, there are some challenges to complete. Make sure to have a teacher or helper initial next to the number when a challenge is completed. Here are the challenges:

1. Raise the melody one octave (ex: raising NOTE_C4 an octave would make it NOTE_C5)
2. Lower the melody by 2 octaves
3. Double the speed of the melody
4. Slow the melody to half of its initial speed
5. Increase the length of the pause within the melody
6. Change the melody to Twinkle Twinkle Little Star. Use the notes NOTE_C4, NOTE_C4, NOTE_G4, NOTE_G4, NOTE_G4, NOTE_A4, NOTE_A4, NOTE_G4
7. Make the above phrase of notes repeat after the first time in the code
8. Play the melody for Twinkle Twinkle Little Star backwards
9. Add the next part of the tune for Twinkle Twinkle Little Star
10. Create the melody for the Star Wars theme using the below notes, and make sure that you change the note durations.

Four NOTE_C4, one NOTE_D4, one NOTE_E4, one NOTE_F4, one NOTE_G4, and one NOTE_G5

Instruction sheet made by Olivia, Meghan, Jay, Connor, Avel

Name _____

Grade _____

School _____

After you have set up the arduino and upload the code, there are some things you can do to modify the circuit. By changing parts of the code, you are able to change the sounds output by the breadboard.

1. Make the song go twice as fast
2. Make the song go twice as slow
3. Have the circuit play the same note in the pattern of the original tune
4. Have the arduino play a scale using the notes C4, D4, E4, F4, G4, A5, B5, C5
5. Add to the last challenge by making the scale go up and then come back down (same as above then add B5, A5, G4, F4, E4, D4, C4 to the end of it)
6. Play the tune to happy birthday (notes are D, D, E, D, G, F, D, D, E, D, A, D, D, D, D, B, D, F, E, C, C, B, G, A, G)
7. Change the happy birthday tune so that it is an octave higher (for example, make all C4's C5 etc)
8. Play hot cross buns with the arduino (B, A, G, B, A, G, G, G, G, G, A, A, A, A, B, A, G)
9. Have the arduino play Mary Had A Little Lamb (starting tune is B, A, G, A, B, B, B)
10. Have the arduino play Long Brldge is Falling Down (A, B, A, G, A, G, A, E, F, G, F, G, A, A, B, A, G, F, G, A, E, A, F, D)