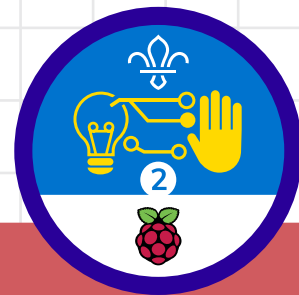


# micro:bit campfire music

1



## Overview

This activity fulfills **Stage 2, Requirement 3** of the **Digital Maker Staged Activity Badge** ('Make a simple digital creation that uses code to interact with the wider world through inputs (such as buttons or typing on a keyboard) and outputs (such as a computer screen, sound, or lights)'). Young people will create a campfire music player using the micro:bit that will play the tune of Campfire's Burning.

## You will need:



- Laptops or desktop computers; tablets or other mobile devices may potentially work as well.
- Activity handouts (at least one per group).
- micro:bit MakeCode editor.
- Per group:
  - One micro:bit
  - One USB A to micro USB B cable
  - Two cables with crocodile clips (can be purchased from websites such as Amazon, ebay, or CPC)
  - One pair of headphones or a portable speaker



### If your meeting place has WiFi

Run the micro:bit MakeCode editor in a web browser using this link: [rpf.io/makecode](https://rpf.io/makecode).

### If your meeting place doesn't have WiFi

Download the micro:bit code editor software beforehand; refer to the micro:bit guide [rpf.io/scouts-microbit](https://rpf.io/scouts-microbit) for instructions.



45 minutes



Flexible (ideally two young people per computer)



If you're running this activity without access to WiFi, you will need to download the software ahead of time. You may also wish to print handouts.



Wherever you have access to computers

## Key messages

- Sound/music is just one output of a computing device (others examples are light, movement, and storing data).
- Music is a sequence of notes played in order, just like computer code is a sequence of instructions performed in order.
- Often in musical tunes, some sequences of notes repeat themselves. Because a computer program can loop, we don't have to write out the whole tune in code when we want a computer to play it. Instead, we can tell the program to loop these repeated sequences.
- MakeCode is a simple drag-and-drop programming language that you can use to make a computer carry out instructions.

## Leader instructions



- 1 Discuss how computers can be programmed to make sounds and musical notes.
- 2 Explain that the Scouts' challenge is to program a micro:bit to play the tune Campfire's Burning.
- 3 If they have not used them before, introduce the young people to the micro:bit. Explain that micro:bits not only have two buttons (for input) and a small LED display (for output), but they are also able to output an analogue signal. When heard through headphones or a speaker, this signal will sound like musical notes!
- 4 Explain that the Scouts will use cables and crocodile clips to connect the micro:bit to headphones or a speaker.
- 5 Demonstrate how to open the micro:bit MakeCode editor.
- 6 Organise the young people into groups, with one computer per group, and give each group at least one copy of the printout.

## Community and sharing



Young people should have the opportunity to explain their code, or to explain how they found or fixed a bug, to the rest of their team.

## Alternatives



- If you don't have micro:bits, it's possible to only use the micro:bit code editor to complete the coding section of the activity to create the tune.

## Safety



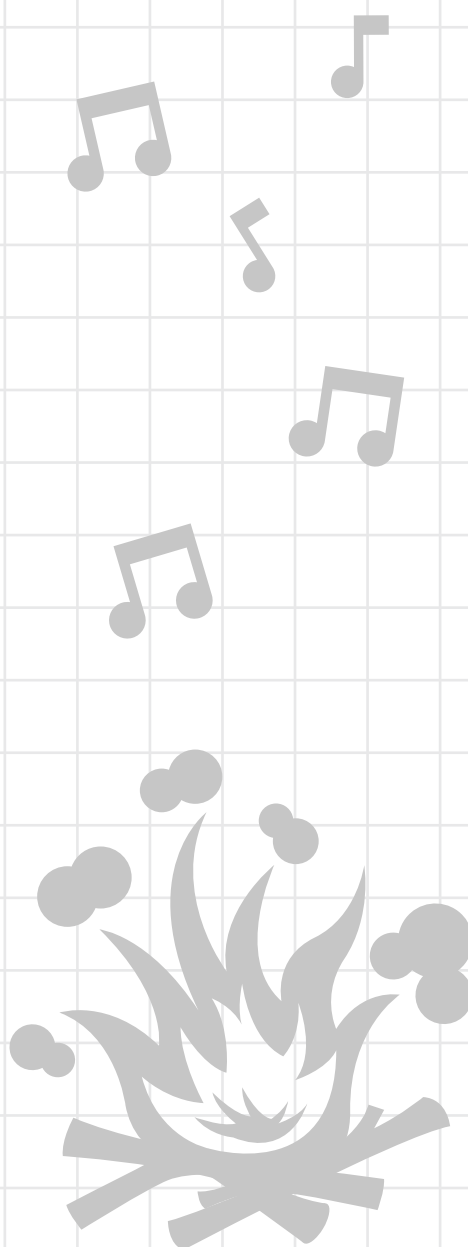
If the young people are working online, tell them to ask for permission before viewing any other websites. It's a good idea to set up parental controls — you can find instructions for this on the NSPCC website ([rpf.io/scouts-nspcc-online](https://www.nspcc.org.uk/keeping-children-safe/online-safety/)). You should also give each young person a Stay Safe leaflet ([rpf.io/scouts-staysafe](https://www.nspcc.org.uk/keeping-children-safe/online-safety/)).

## Adaptability

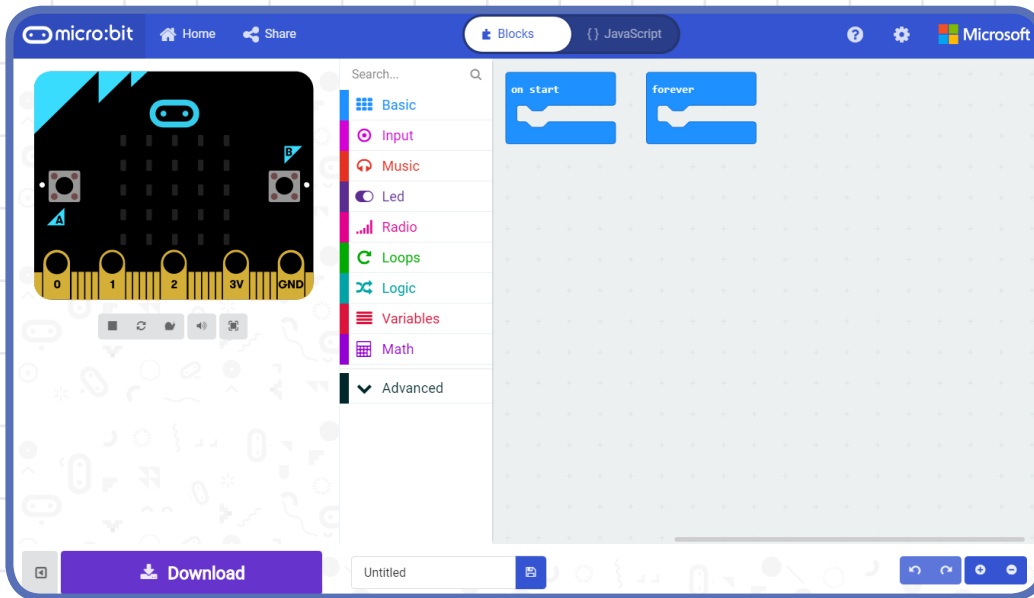


- To simplify this, you can share the complete program. This can be found here: [rpf.io/campfirecode](https://rpf.io/campfirecode).
- It can be tricky to connect the crocodile clips to the micro:bit, so do this before the meeting for Scouts who might struggle.

## Complete program



- 1 Open the micro:bit MakeCode editor at [rpf.io/makecode](https://rpf.io/makecode)



You'll see a virtual micro:bit on the left, which will react when you run your code. The menu in the middle is where you will find the blocks to build your program in the right panel.

First off, make your micro:bit make a sound when **button A** is pressed.

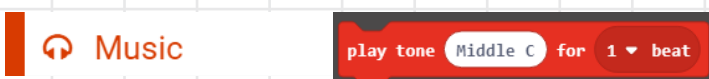
## Trivia

Did you know that the tune of Campfire's Burning is taken from the nursery rhyme London's Burning? This rhyme is said to be about the Great Fire of London, where the city burned for five whole days in 1666.

- 2 Click on the **Input** section of the menu, and click on on button A pressed.



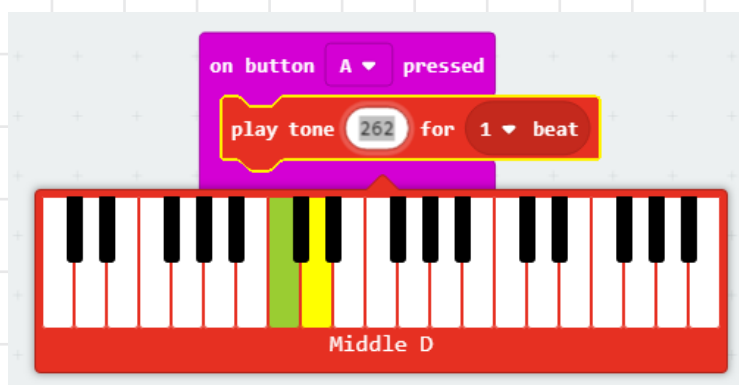
- 3 In the **Music** section of the menu, click on play tone Middle C for 1 beat.



- 4** In the right panel, drag the play tone block so it is attached to the on button A pressed block. Now, whenever **button A** is pressed, the tone **middle C** will be played for **1 beat**. The **tone** is the note which gets played, and the **beat** says how long the note is played for.

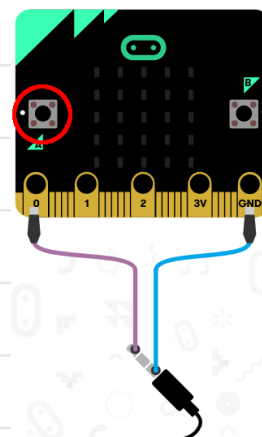


- 6** Try a different note by clicking on **Middle C** and selecting a new note on the piano that appears.



- 7** Change the number of the beat too, and then press **button A** to hear what difference it makes to the sound.

- 5** On the left, click **button A** of the virtual micro:bit to run your program and hear the tone being played.



A tune is a sequence of notes played one after each other in order. The tune Campfire's Burning is made up of the following sequence of notes:

D D G G  
D D G G  
A A B B  
A A B B  
D D D D  
D C B B  
D C B B

**8** Add 3 more play tone blocks to your program, attach them together.

**9** Change the tone and beats to play the first 4 notes, **D D G G**, each for the correct length:



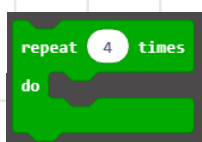
Tone	Beat
Middle D	1
Middle D	1
Middle G	2
Middle G	2

**10** Press **button A** to play your tune, you probably won't recognise it yet though.

The next section of the tune repeats the same four notes. You could add in four more play tone blocks, but it's much easier to use a repeat block that makes your program run the same code more than once!

**11** Go to the **Loops** section of the menu, click on the repeat 4 times block, and attach it to the bottom of the **on button A pressed** block.

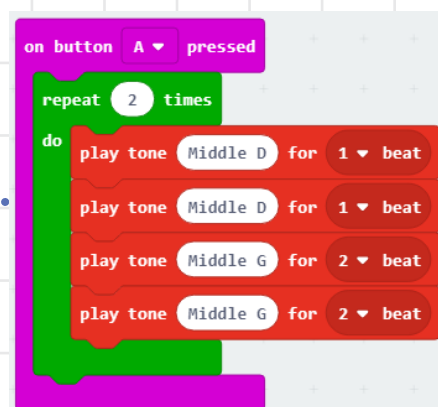
**Loops**



**12** Arrange your blocks so the four play tone ones are inside the repeat block.

**13** You only want these four notes to be played twice, so change the repeat 4 times to 2 times.

**14** You can play your tune again, but it might still be difficult to recognise it.



- 15** Now you understand how to play notes and repeat them, you should be able to create the next section of the tune, **A A B B**, which repeats twice.



Tone	Beat
Middle A	1
Middle A	1
Middle B	2
Middle B	2

- 16** The third section of the tune, **D D D D**, is slightly different: the four notes are played slower and for twice as many beats. That means you can also use a repeat block.



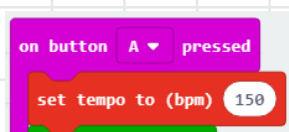
Tone	Beat
High D	2
High D	4
High D	2
High D	4

- 17** The final section of the tune, **D C B B**, works just like the first two sections, use a repeat 2 times block and four play tone blocks.



Tone	Beat
High D	1
High C	1
Middle B	2
Middle B	2

- 18** The Campfire's Burning tune is now complete, so you should recognise it when you play it. If you think it is too slow, change the **bpm (beats per minute)** of the tune to 150 by adding a set tempo to (bpm) block to the top of your program.

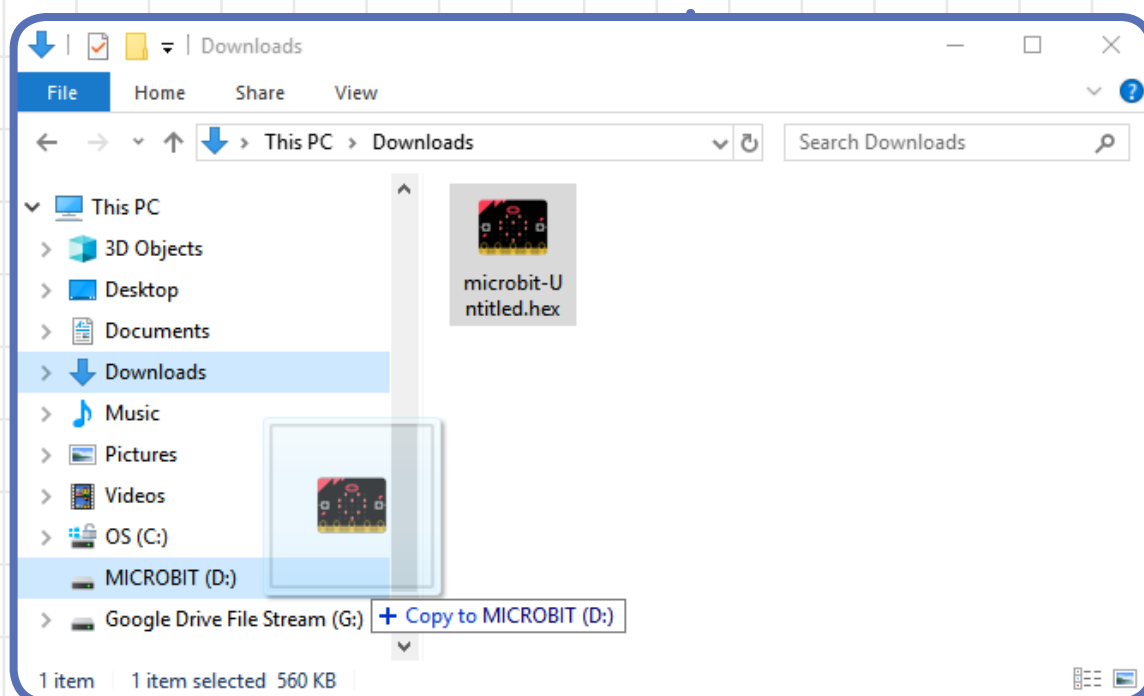


Next, you will need to download the program and transfer to your micro:bit.

- 19** First, plug your micro:bit into your computer using a micro USB cable.

- 20** Then, click on the **Download** button and copy the **.hex** file from your Downloads directory to your MICROBIT

 Download



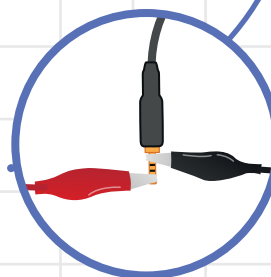
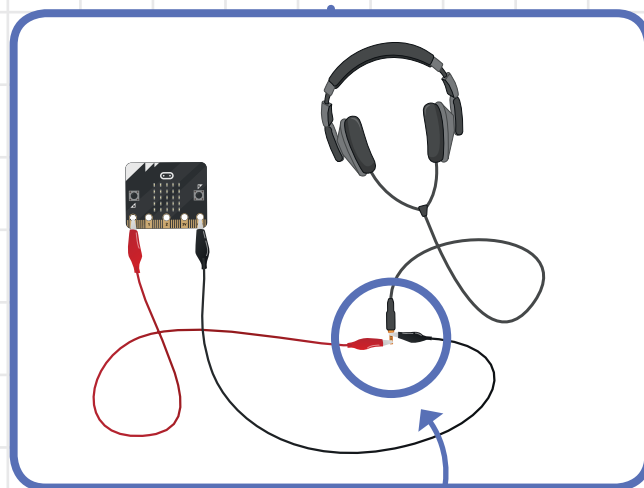


**21** Finally connect your headphones or speaker to your micro:bit using cables and crocodile clips so you can hear your tune:

- Attach one end of a crocodile clip to the base of the speaker or headphone jack and the other end to **GND** connector on the micro:bit.
- Attach the other crocodile clip to the tip of the jack and the connector **0** of the micro:bit.

## Be careful

The micro:bit might play the tune very loudly.



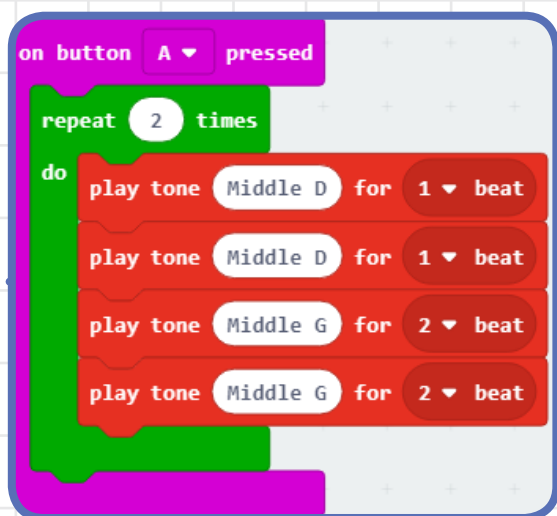
**22** Press **button A** on your micro:bit, and you should hear your tune through one of the headphones.

**23** If you're using speakers, you could play the song in a round by teaming up with others and starting your tune in time.

**Connect up a battery pack to your micro:bit and try this out at your next campfire.**

## Discuss

You used repeat blocks in your code so you didn't have to create as many code blocks. Look at this section of your code:



How could you have used additional **repeat** blocks to use fewer **play tone** blocks?

