BBC LEARNING PRESENTS

Doctor Who and the micro:bit - Live Lesson

Date: Tuesday, 28th March 2016
Time: 11:00am
Duration: 50 minutes (approx.)
Location: bbc.co.uk/livelessons
(Note: if you can't watch the webcast live, you will be able to watch the recording on the Live Lessons website)

Curriculum links include:

Computer Science – Key Stage 3
- Learning about key algorithms that reflect computational thinking (searching)
- Know that different algorithms exist for the same problem and that some algorithms have different performance characteristics for the same task
- Designing, developing and adapting programs to achieve specific goals
- Understanding the need for care and precision to avoid errors and being able to find and correct errors (bugs) in algorithms and programs
- Learning about the hardware and software components that make up computer systems
- Learning how data and instructions are stored and executed within a computer system
- Understand how computers collect data from various input devices, including sensors

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Setup

How much space and equipment is needed?

The lesson can be screened in a classroom with a large screen linked to a reliable broadband connection. Good audio equipment is not essential but will make the event more enjoyable.

Students will benefit from ready access to:

- Their **BBC micro:bit** with the hex files from **Activity 2** and **Activity 4** running on it. They can flash the second hex file to the micro:bit after Activity 2 has ended in the programme or when cued to by the presenters.
- A **PC** running Windows 7 of later, or a **Mac** running OS X 10.6 or later
- **Access to the Internet**

- A **Male to Micro USB cable** to connect their computers to your micro:bit. This is the same cable that is commonly used to connect a smart phone to a computer

If you or your students are using the BBC micro:bit for the first time, you can find more details about how to run scripts on the BBC micro:bit here.

How many students can participate?

It's completely up to you how many students you have participating in the session. We want to get as many students as possible engaged in this Live Lesson. Space and access to computers might be a consideration if you have a very large group.

How to prepare for the lesson

Before the lesson

Visit The micro:bit Foundation website to learn more about the micro:bit and its functions and capabilities.

There you'll also find some short videos to get started with the BBC micro:bit and information about the different code editors.

Locating the TARDIS

In the first segment of the Live Lesson is based around locating the TARDIS. The narrative introduces that the TARDIS is lost in time and space, and as a group, we're going to have to find it.

This activity makes use of the compass function on the micro:bit. You'll find the **Locating the TARDIS hex file** on our website, and you should encourage students to put these onto their micro:bits before the Live Lesson commences. If they press button A or B, they will be prompted to calibrate the compass on their micro:bits. Ideally, they should also do this before the Live Lesson.

The micro:bit will display the message '?' until the students are facing a particular compass heading and press button A. Then, it will display the message 'TARDIS', showing that they have found the TARDIS.

We will be teaching students about linear and binary search algorithms in the context of our locating the TARDIS game, with a live demonstration in the studio. You can replicate this live demonstration using **Activity 1: Linear and binary search**, downloadable from our website. It might be useful if you have a compass to hand to check where North is in relation to your classroom – these are available on most smart phones.

To find out how the code on the micro:bit works and how your students can adapt it, you and your students can use the worksheets for **Activity 2: Locating the TARDIS**. These have been created for Block Editor, PXT JavaScript and MicroPython, depending on your preference of code editor.

Fixing the TARDIS

Now that we've collectively located the TARDIS, we'll be tasked with fixing the TARDIS. In this segment of the Live Lesson, we'll be looking more closely at the concept of debugging and different types of errors.

Students will be introduced to three different kinds of error that can present itself in a computer program: a syntax error, a run time error and a logic error.

They will be tasked to identify one of each in a few lines of MicroPython code in **Activity 3: Fixing the TARDIS**.
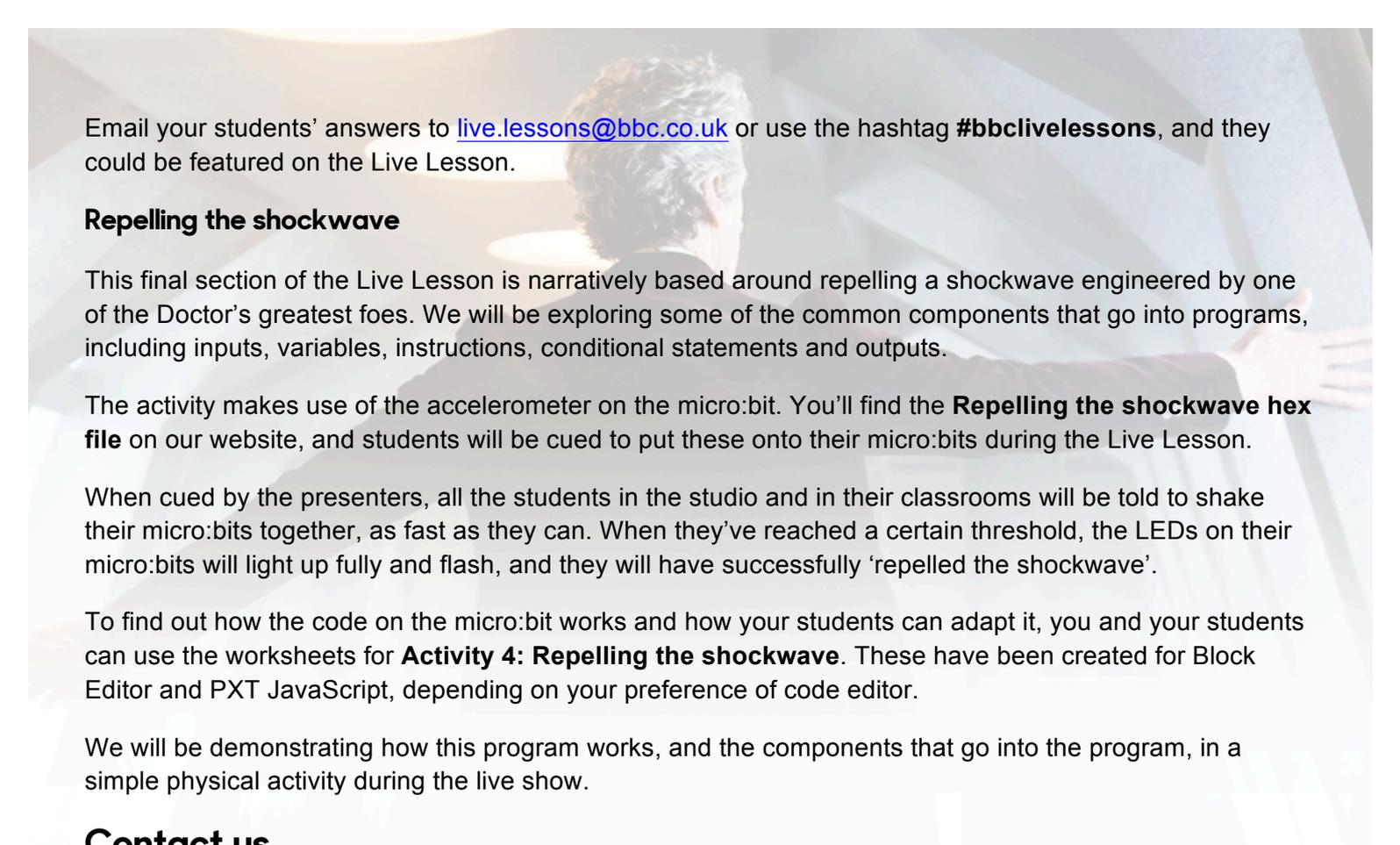
Email your students' answers to live.lessons@bbc.co.uk or use the hashtag **#bbclivelessons**, and they could be featured on the Live Lesson.

Repelling the shockwave

This final section of the Live Lesson is narratively based around repelling a shockwave engineered by one of the Doctor's greatest foes. We will be exploring some of the common components that go into programs, including inputs, variables, instructions, conditional statements and outputs.

The activity makes use of the accelerometer on the micro:bit. You'll find the **Repelling the shockwave hex file** on our website, and students will be cued to put these onto their micro:bits during the Live Lesson.

When cued by the presenters, all the students in the studio and in their classrooms will be told to shake their micro:bits together, as fast as they can. When they've reached a certain threshold, the LEDs on their micro:bits will light up fully and flash, and they will have successfully 'repelled the shockwave'.

To find out how the code on the micro:bit works and how your students can adapt it, you and your students can use the worksheets for **Activity 4: Repelling the shockwave**. These have been created for Block Editor and PXT JavaScript, depending on your preference of code editor.

We will be demonstrating how this program works, and the components that go into the program, in a simple physical activity during the live show.

Contact us

You can email any questions or comments before and during the Live Lesson to **live.lessons@bbc.co.uk**, or by using the hashtag **#bbclivelessons**. We'll aim to answer as many of your questions as possible.

We'd also love to see examples of your students' work. If your classes have created any work or carried out any activities using the resources on our website, please do send it in to live.lessons@bbc.co.uk, and they could be showcased on the programme and on our website.

If you let us know if your school is planning to tune in on the day, your school name could also be featured on the programme.

Thank you for your interest in our Doctor Who and the micro:bit Live Lesson, and we hope you'll join us on 28th March.