UNIT 4.3

We are musicians
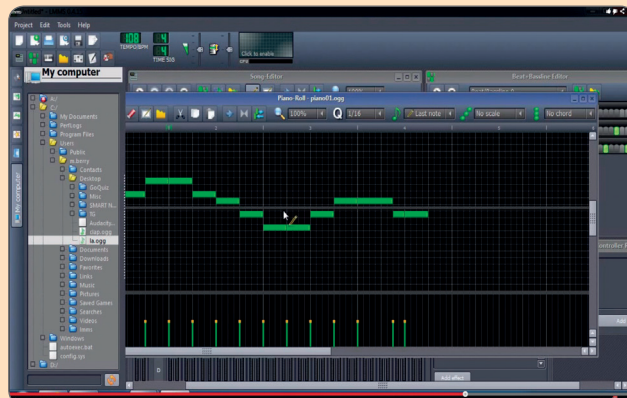
Producing digital music

1 About this unit

Software: Isle of Tune, Audacity®, LMMS/GarageBand, MuseScore (optional)
Apps: Isle of Tune, GarageBand
Hardware: Computers or tablets, microphones, midi instruments, if available
Outcome: A piece of backing music to accompany work in another medium

UNIT SUMMARY

How many children in your class play an instrument? How many of them like singing, or simply enjoy listening to music? In this unit, the children produce music suitable for any purpose they choose.

CURRICULUM LINKS

Computing PoS

- Use sequence, selection and repetition in programs; work with variables and various forms of input and output.
- Understand computer networks, including the internet; ... and the opportunities they offer for communication and collaboration.
- Be discerning in evaluating digital content.
- Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information ... .
- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour.

Suggested subject links

- **Music:** Pupils develop their understanding of musical and staff notation (extensions).
- **Maths:** The unit provides opportunities for links with recalling multiplication and division facts if the idea of 'beats per bar' is discussed.
- Aspects of dance, drama, geography, history and religious education might provide a context for the children's compositions.

TRANSLATING THE COMPUTING PoS

- This unit has a strong creative focus, with pupils developing digital *content*, in this case a musical composition. The pupils *combine a variety of software* to achieve this, most obviously Audacity® and LMMS. The pupils might also use other *digital devices* such as tablets or audio recorders.
- The audio files the pupils record, process and export are just one form of *information* that can be *collected and presented* using a computer.
- The pupils work with a range of *input* devices, including sequencing software and midi instruments and/or tablets, if available, to create their own original composition. They use an audio editor to create their final mix, which is exported in a standard compressed format.

LEARNING EXPECTATIONS

This unit will enable the children to:
- use one or more programs to edit music
- create and develop a musical composition, refining their ideas through reflection and discussion
- develop collaboration skills
- develop an awareness of how their composition can enhance work in other media.

The assessment guidance on page 40 will help you to decide whether the children have met these expectations.

VARIATIONS TO TRY

- This unit works well when the children have a clear purpose for the music they're composing. You could link to a topic in another curriculum area, or to other computing units, such as making a jingle for the weather broadcast in *Unit 4.6 – We are meteorologists*.
- The children could create a musical accompaniment for work in drama or dance.
- Children could create backing music for a slideshow of their art or photographs.

2 Getting ready

THINGS TO DO
- Read the *Core steps* sections of *Running the task.*
- Choose which software/tools are most accessible/appropriate for use with your class. A range of software should be made available to the children to explore (see *Useful Links*).
- Watch the *Software in 60 seconds* walkthroughs for this unit.
- Spend some time familiarising yourself with your chosen software/tools.
- Think about the individuals and groups you have in your class. Could you use any of the *Extensions* on pages 34–39 to extend your more able children? Could you use any of the suggestions in *Inclusion* (see below) to support children with specific needs, e.g. SEN or EAL? Have you considered how a Teaching Assistant will support you and the children, if one is available?
- Identify a suitable piece of work for which the children can create backing music or accompaniment (see *Variations to try* on page 32).
- Invite the children to bring in musical instruments or other music resources they would like to use (including music CDs).
- Create any necessary accounts.
- Think about how you will manage the recording of music samples in Step 3. It would be worth considering smaller groups for this work.

THINGS YOU NEED
- Computers/laptops/tablets loaded with, or having access to, the software/tools you have chosen
- Microphones and headphones (one set per pupil)
- Musical instruments
- Internet access

CD-ROM RESOURCES
- Sound effects
- *Software in 60 seconds* – LMMS (1, 2, 3)
- *Software in 60 seconds* – Audacity® (1, 2, 3)
- Unit poster – Main tools of LMMS
- Pupil self-assessment information

E-SAFETY
- The children's compositions and public performances may be uploaded to the learning platform or school website. Uploading to external websites or iTunes should only be allowed if this is in accordance with school policy and providing any relevant permissions are obtained. Your school's photo permission form could be extended to cover children uploading their own identifiable work. Remember that the children own the copyright to the work they produce.
- Discuss illegal downloading and file sharing of copyrighted music, as well as more positive ideas, such as collaboration, remixing and Creative Commons licences.
- The use of copyrighted music recordings in UK schools is allowed by law if used as part of the curriculum and if no visitors are present. A licence must be obtained for other purposes. See www.cefm.co.uk/school.aspx.

INCLUSION
- You may wish to explore specially adapted musical instruments or other assistive technology to meet the individual needs of some children in your class.
- Make sure there is suitable provision for hearing-impaired pupils.

USEFUL LINKS
Software and tools
- Isle of Tune: online at http://isleoftune.com or for iOS at https://itunes.apple.com/us/app/isle-of-tune-mobile/id430845597?ls=1&mt=8.
- GarageBand: www.apple.com/uk/ilife/garageband (OS X) and www.apple.com/uk/apps/garageband (iOS).
- LMMS (Windows and Linux): http://lmms.sourceforge.net/download.php.
- Audacity® (Windows, OS X, Linux): http://audacity.sourceforge.net/. (To create MP3 files using Audacity®, the LAME encoder needs to be installed. See http://audacity.sourceforge.net/help/faq?s=install&item=lame-mp3 for details.)
- MuseScore (Windows, OS X, Linux): http://musescore.org.

Online tutorials
- Isle of Tune: www.youtube.com/watch?v=Y_6oH70V_xM.
- GarageBand (OS X only): http://help.apple.com/garageband/interface/index.html.
- LMMS (Windows and Linux): www.youtube.com/watch?v=-OK6YXDHrvU.
- Audacity®: http://audacity.sourceforge.net/manual-1.2/tutorials.html.
- MuseScore: http://musescore.org/en/download-handbook.

⊶ 3 Running the task – We are musicians

Software: Isle of Tune, Audacity®, LMMS/GarageBand, MuseScore (optional)
Hardware: Computers or tablets, microphones, midi instruments, if available

Apps: Isle of Tune, GarageBand
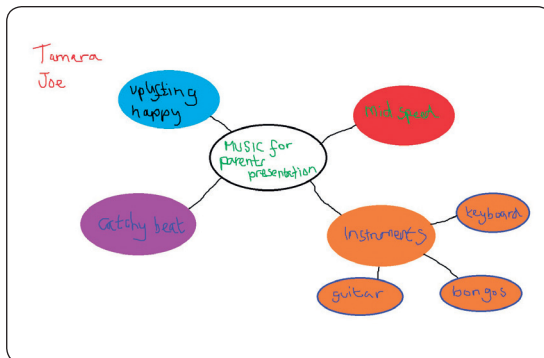**Outcome:** A piece of backing music to accompany work in another medium

Core steps

Extensions

Step 1: Introduction

RESOURCES

WWW
- YouTube clips of relevant compositions/projects

POSSIBLE OUTCOME FOR THIS STEP:

Consider the composition of groups for this project, ideally including children with some technical and musical expertise in as many groups as is practical.

- Brief the children on the project, explaining that they will be creating a piece of original music, and describe to them the context and purpose.
- Share the *Learning expectations* for the unit (see page 32) and explain the success criteria.
- Listen to examples of music from a context similar to the one chosen for the project.
- Discuss some of the ways in which digital technology plays a role in creating and distributing music. Some or all of the instruments used to play the music may be digital. Music is mixed digitally and recorded as digital audio files. These files can be burned onto a CD or downloaded from the internet and played on a range of digital devices.
- In groups, ask the children to brainstorm appropriate styles of music for their task. You may wish to use examples to illustrate how important it is to match music style to the context. For example, heavy metal music would not be appropriate to play to a child to help them go to sleep. Provide a few musical instruments to allow the children to explore ideas practically.

SCHOOL

- This might be an opportunity for pupils who take part in musical activities outside school to bring in their instruments or to talk to the rest of the class about what they do.

HOME

- You might like to invite the children to bring in music from home (on CD or as MP3s) that might be appropriate for the given context. For the law on playing recorded music in lessons, see www.legislation.gov.uk/ukpga/1988/48/section/34.
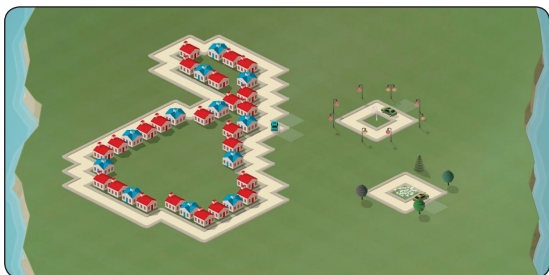
Step 2: Making a start with sequencing

RESOURCES

- Isle of Tune (http://isleoftune.com)

POSSIBLE OUTCOME FOR THIS STEP:

- Introduce the pupils to the idea of sequencing software, i.e. music software in which short sound clips (samples) are placed in order, perhaps with varying pitches, to create a rhythm and/or melody. Illustrate this by showing the pupils one or more shared islands developed in Isle of Tune (click the *View* button).

- Ask the pupils to explain how the islands in Isle of Tune work. They should spot that the car plays the notes or beats as it passes the street furniture, that some sounds vary in pitch, and that repeating loops occur as the car travels round roads that loop back on themselves.

- Model to the pupils how they can create their own island by dragging and dropping elements onto the interface. Encourage them to experiment with the tools independently.

- Provide time for pupils to create their compositions in Isle of Tune and encourage them to refine and develop their pieces.

- Ask the pupils to play their compositions to one another, receiving feedback and making further improvements based on this. Encourage them to give constructive criticism. It's easy to create a rhythm and melody in Isle of Tune, but much harder to make a composition that is pleasing to listen to.

- Use a plenary for at least some pupils to play their compositions to the class.

SCHOOL

- Some pupils could explore other music software. Piano Free and Smule's Guitar! are possible starting points for use with tablets. If the pupils don't have access to tablets, they could explore games like Guitar Hero, tutorial software like Piano Booster (http://pianobooster. sourceforge.net) and automated accompaniment software like Songsmith (http://research.microsoft.com/en-us/ um/redmond/projects/songsmith).

HOME

- The pupils could continue to use Isle of Tune at home, perhaps explaining to their parents or carers how the tool works.
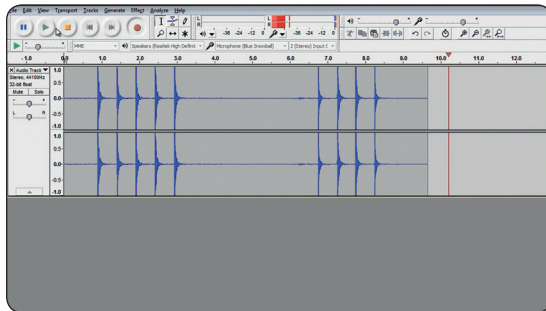
Core steps

Extensions

Step 3: Recording samples

RESOURCES

- *Software in 60 seconds* – Audacity® (1, 2, 3)
- Sound effects

- http://freesound.org (for audio samples licensed under Creative Commons)

POSSIBLE OUTCOME FOR THIS STEP:

It is advisable to spread this step out (in time and/or space), so that only a small number of pupils are recording audio in the same room at the same time.

- Tell the pupils that they are going to record music samples to use in their compositions.

- Introduce Audacity® as a program for recording and changing sounds. Demonstrate how to use the main tools, such as the *record, pause* and *playback* functions. Show the pupils how to move to and select part of the audio, and how to cut, copy and paste work. Also show how clips can be shifted forward or backward on the timeline, and how clips can be split.

- In groups, the children start using microphones and Audacity® to record sound samples to include in their composition. Samples could include music played on analogue (traditional, non-digital) instruments, singing, speech or ambient sounds. Tell pupils that their audio clips do not have to be long as the software will allow them to make copies of the sample and edit them together.

- Pupils could review their recordings using headsets and re-record their samples until they are satisfied with the results.

- Ask the pupils to explore the effects available in Audacity®, such as amplifying clips and changing pitch. The pupils might also like to explore some of the other filters such as echo and reverse. Ask the pupils to experiment with layering clips together by recording a new track, or pasting a selection from an existing track as a new track on the timeline. Pupils could also explore changing clips slightly when they are repeated.

- Show the pupils how to export their finished clips. It is worth explaining the difference between compressed and uncompressed file formats. It is easiest to import .ogg formatted samples into LMMS.

SCHOOL

- The use of portable digital audio recorders would strengthen this step, freeing the pupils from having to record sound near their computers and also allowing them to practise uploading and managing files. These devices would further facilitate the use of ambient sounds.

HOME

- Pupils with sound recording equipment at home could be asked to record sounds at home for use in their compositions.
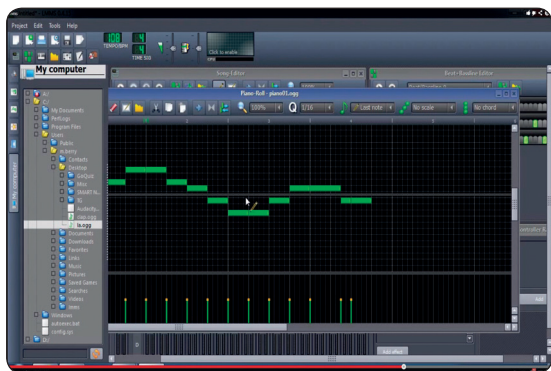
Step 4: Working with samples

- *Software in 60 seconds –* LMMS (1, 2, 3)

- http://en.wikipedia.org/wiki/Pianola

POSSIBLE OUTCOME FOR THIS STEP:

In this step, the pupils will explore some of the aspects of the LMMS digital audio workstation software, or equivalent. You may need to adapt the ideas in this step to suit your class and the software available.

- Start by modelling how to use your chosen software. If working in LMMS, start by creating a new project. Turn the default bassline on for all the bars in the composition, and then double-click one of these blocks to open the bassline Editor. Drag one of the built-in samples onto the bassline Editor and create a simple rhythm pattern. Show how one of the samples recorded in Audacity® can also be used on the bassline. Ask the pupils to experiment with this for themselves.

- If working in LMMS, show how to add one of the built-in instrument samples directly into the song editor, double-clicking on the bar indicators to create a melody in piano-roll mode, where you indicate the pitch and duration of a note by drawing a line on the piano-roll. It's worth relating this way of representing music to original piano-rolls for pianolas (self-playing pianos), where the tune and harmony were represented as binary patterns (see the link in *Resources*). Compare this with staff notation (the way that music is written in sheet music). Show how the pupils can do this with a sample recorded in Audacity®, using LMMS to vary the pitch of the sample. Encourage the pupils to experiment with this themselves.

- Show how instruments can be gradually added to the music, perhaps starting with just one, and then adding more as the piece progresses.

- Once the pupils have had a chance to experiment with LMMS (or equivalent), ask them to work on their composition using built-in samples together with those they recorded in Audacity®.

SCHOOL

- Some pupils could explore the 'fx' options available in LMMS, comparing these with the filters in Audacity®.

- Some pupils could use computer-based music notation software, such as MuseScore, to compose music using traditional musical notation.

- Some pupils could compose their music by playing midi keyboards or other digital instruments connected to the computer.
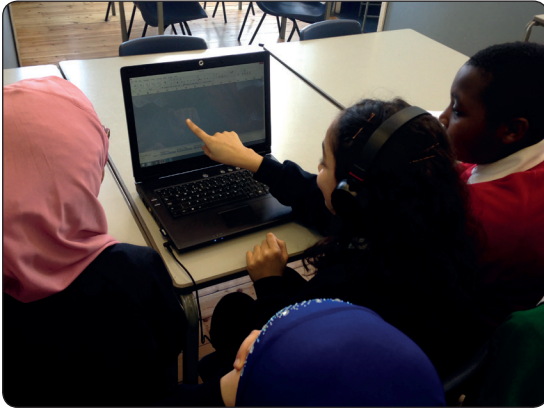
HOME

- Encourage the pupils to continue to work on their compositions at home, if they can. Their parents or carers could provide useful feedback on their work as it progresses.

Step 5: Reviewing our work

POSSIBLE OUTCOME FOR THIS STEP:

- In this step, the pupils bring together their work from previous steps to create or complete their composition. It is advisable to step back, providing support if needed, perhaps giving feedback on music as it's produced and making suggestions for improvements that could offer a further challenge. Encourage the pupils to work together as a team on this task.

- Although the pupils might have developed a preference for one program, it's worth encouraging them to move between the two approaches, perhaps exporting work from LMMS into Audacity®, or recording and editing other sounds in Audacity® before importing them into LMMS. Encourage the pupils to think about the differences between these two programs: emphasise that Audacity® is about editing audio files, whereas LMMS is about editing music.

- It is worth drawing a parallel between editing music and writing programs – music notation is essentially a series of instructions to the computer or musician to produce certain output; it even allows for repetition, as do programming languages.

- Encourage pupils to evaluate the success of their compositions, as well as providing feedback to one another.

SCHOOL

- The children could combine a live performance on analogue or digital instruments with the music they have created.

HOME

- The children could play their compositions to their parents or carers, and invite feedback.

Step 6: Performance

RESOURCES

- Pupil self-assessment information

- See http://creativecommons.org/choose for how to choose a Creative Commons licence
- ccMixter: http://dig.ccmixter.org
- Jamendo: www.jamendo.com/en

POSSIBLE OUTCOME FOR THIS STEP:

Things that went well

The music piece was really exciting and different. The baseline was really strong which helped for our dance.

Things we could have changed

The music was a bit short. It didn't run for long enough. Next time we write music for a dance we need to time the dance first.

- In this final step, the pupils combine their musical composition with the work it was intended to accompany, performing this to their classmates and/or others. Provide an opportunity for the pupils to give feedback to one another.
- Ask the pupils how they would feel if someone else in the class had simply copied their work. Would they have minded so much if the person had asked first, or had said their composition was based on the other? Explain that copyright exists to protect the rights of those who create music and other original work, and that the children automatically own the copyright to their music. Encourage them to think about the options in Creative Commons licences for allowing other people to use their work without having to ask permission.
- An alternative is for the pupils to create a slideshow of images to accompany their original composition, perhaps using the Creative Commons images on Flickr as a starting point.
- Uploading the children's compositions, perhaps with recordings or copies of the work they accompanied, to the school learning platform or website would provide a wider audience for the children's work.
- Invite groups to discuss, or reflect on, the process of working collaboratively and of learning to use the software.
- Finally, the children should evaluate the success of their work.

SCHOOL

- Some groups might like to share their compositions globally via Creative Commons music sharing sites, such as ccMixter or Jamendo, subject to the relevant policies and permissions.

HOME

- Encourage the pupils to explore a range of musical genres for themselves, considering the contribution made by digital technology.

4 Assessment guidance

Use this page to assess the children's computing knowledge and skills. You may wish to use these statements in conjunction with the badges provided on the CD-ROM or community site and/or with your own school policy for assessing work.

ALL CHILDREN SHOULD BE ABLE TO:	BADGE	COMPUTING PoS REFERENCE
Explain how digital technology contributes to creating music	COMMUNICATOR	Understand the opportunities networks offer for collaboration
Create a simple composition using sequencing software	CONTENT CREATOR 2	Design and create content
Record samples for use in sequencing software	PROGRAMMER 2	Work with various forms of input
Combine samples to produce a piece of music	CONTENT CREATOR 2	Design and create content
Export their composition in a standard compressed format	PROGRAMMER 2	Work with various forms of output

MOST CHILDREN WILL BE ABLE TO:	BADGE	COMPUTING PoS REFERENCE
Explain how digital technology contributes to distributing music	COMMUNICATOR	Understand the opportunities networks offer for communication
Edit samples	CONTENT CREATOR 2	Design and create content
Refine and develop their composition	SEARCHER	Be discerning in evaluating digital content
Edit their final composition	CONTENT CREATOR 2	Design and create content

SOME CHILDREN WILL BE ABLE TO:	BADGE	COMPUTING PoS REFERENCE
Use staff-based music notation software	CONTENT CREATOR 2	Design and create content
Appreciate the similarities and differences between composition and programming	PROGRAMMER 2	Use sequence, selection, and repetition in programs
Appreciate that copyright exists in original work and that this should be respected	E-SAFETY 2	Recognise acceptable/unacceptable behaviour

PROGRESSION

The following units will allow your children to develop their knowledge and skills further.

- *Unit 5.1 – We are game developers*
- *Unit 6.6 – We are marketers*

♟ 5 Classroom ideas

Practical suggestions to bring this unit alive!

📰 DISPLAYS AND ACTIVITIES

- Look for opportunities for the children's music to be performed alongside the work it was intended to accompany, such as in a school assembly, perhaps inviting parents or carers to visit.
- Consider using background music while your class are working.

www WEBLINKS

- There are some useful links for digital music in primary education at http://digitalmusiceducator. wordpress.com/2010/02/08/15-resources-for-elementary-music-teachers.
- This unit could provide an opportunity for discussing copyright and file sharing with the children. BBC resources at www.bbc.co.uk/ learningzone/clips/5816 and www.bbc.co.uk/ learningzone/clips/9567 are aimed at older children, but may be useful.
- Legal music-sharing sites include ccMixter (http://dig.ccmixter.org) and Jamendo (www.jamendo.com/en), to which you might like to encourage the children to upload their final compositions.
- News on Creative Commons licensing for music and other audio is available at http://creativecommons.org/audio.
- Audionetwork is a database of over 4000 music and sound files, accessible for all London Grid for Learning schools: http://audionetwork.lgfl.net.

- 'Minute of Listening' project: http://musiccornwall. org/minute-listening-project-begins-30-primary-schools.
- 24-piece iPad performance: www.youtube.com/ watch?v=2W9z-nrTQD4.

👣 VISITS

- Your local authority development centre, or a nearby secondary school or FE college, might have a music technology suite that you can visit with your class.
- Local musicians, perhaps from among your school's parents or carers, might be receptive to an invitation to visit the school, to talk about their work.

📖 BOOKS

There seem few, if any, books written for young people about digital music making, but you may find some of the following titles of interest if you wish to pursue this area in more detail.

- Hewitt, M. *Music Theory for Computer Musicians*. (Delmar, 2008)
- Hewitt, M. *Composition for Computer Musicians*. (Delmar, 2009)
- Milner, G. *Perfecting Sound Forever: The Story of Recorded Music*. (Granta Books, 2010)
- Strong, J. *Home Recording for Musicians for Dummies*. (John Wiley and Sons, 2011)
- White, P. *Home Recording Made Easy: Professional Recordings on a Demo Budget*. (Sanctuary Publishing Ltd, 2001)

♪ 6 Taking it further

When you've finished, you might want to extend the project in the following ways.

- Ask the children to listen out for some of the techniques they've practised themselves as they listen to music.
- Invite the children to consider the way background music is used in television and film, perhaps focusing on occasions when it enhances atmosphere.

- Look for ways in which music might be used across the curriculum, or where backing music might further enhance projects in computing.
- Provide opportunities for the children to share their extra-curricular musical activities with their classmates, if you haven't already done this.