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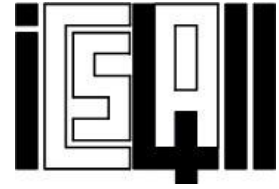


CAPTURE YOUR HORIZON





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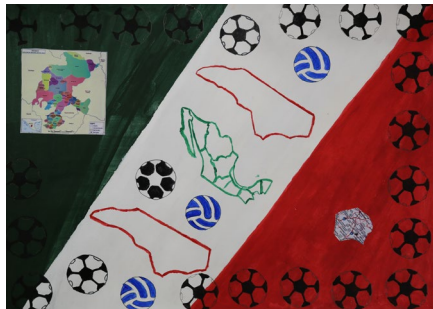


**Integrating Computer Science for All with
Music
in Three Rural Eastern North Carolina School
Districts**

**Curricular Activity System
Instructional Elements**

**R. Martin Reardon, Amber Christensen,
Claire D. Webb, & Rue Lee-Holmes**

I am from . . .



The curricular activities outlined in this booklet are aligned with the



North Carolina Essential Standards Grade Eight Music

<https://files.nc.gov/dpi/documents/curriculum/artsed/scos/new-standards/arts/music/k-8.pdf>

Musical Literacy

Essential Standard 8.ML.2

Interpret the sound and symbol systems of music

Clarifying Objective 8.ML.2.1

Interpret standard musical notation for whole, half, quarter, eighth, sixteenth, and dotted note and rest durations in 2/4, 3/4, 4/4, 6/8, 3/8, and alla breve meter signatures.

Essential Standard 8.ML.3

Create music using a variety of sound and notational sources

Clarifying Objective 8.ML.3.2

Construct short pieces within specified guidelines (e.g., a particular style, form, instrumentation, compositional technique), using a variety of traditional and non-traditional sound, notational, and 21st century technological sources.

Contextual Relevancy




Essential Standard 8.CR.1

Understand global, interdisciplinary, and 21st century connections with music

Clarifying Objective 8.CR.1.2

Understand the relationships between music and concepts from other areas.

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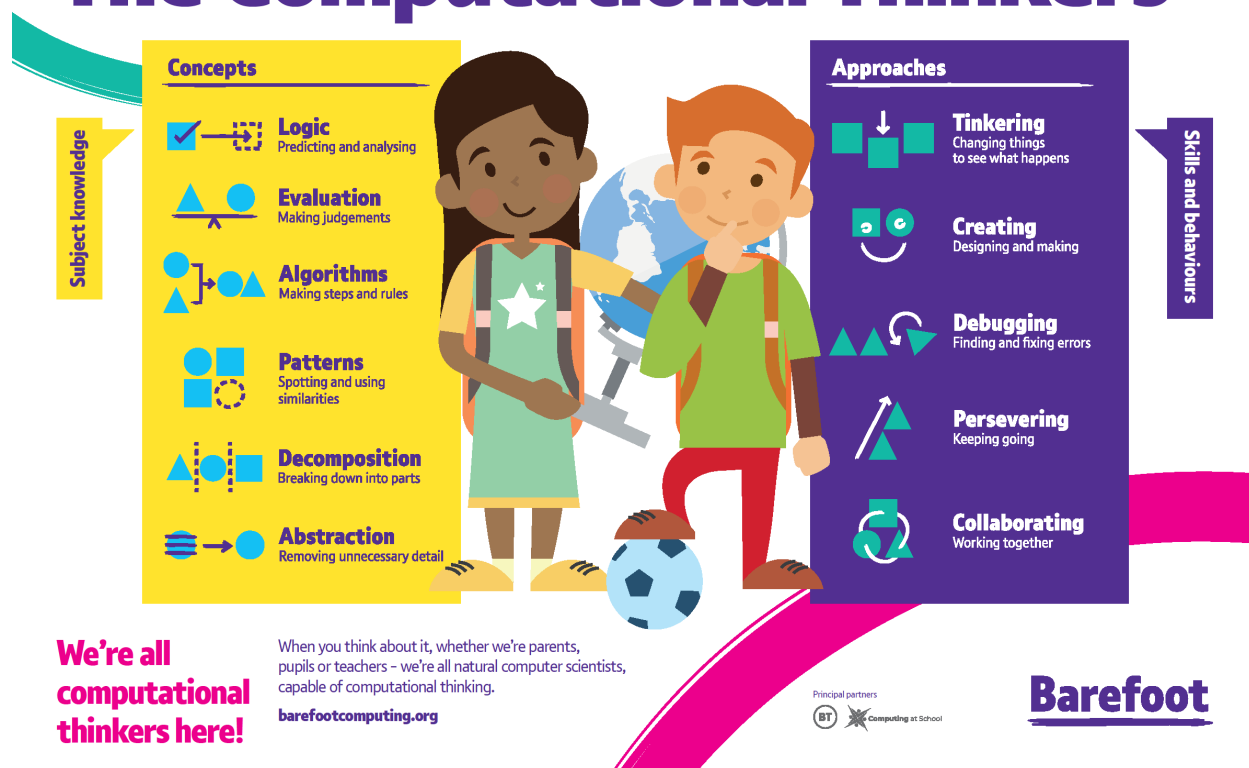


openreach



With the permission of Computing at School and BT *Barefoot* initiative (<https://barefootcas.org.uk/>), we have adopted both **the concepts** implicated in computational thinking and **the approaches** most likely to be adopted fruitfully by an individual who is engaged in computational thinking.

The Computational Thinkers



Computational Thinking Concepts

For each the activities we designate which of the *Barefoot* computational thinking (CT) concepts we believe likely to be primarily implicated in students' responses. The six concepts are reproduced here for the sake of clarity.



Logic helps to establish and check facts and make predictions.



An algorithm is a precise sequence of instructions, or set of rules, for performing a task.



Decomposition is breaking down a problem or system into parts.



By spotting patterns, one can make predictions, create rules, and solve other problems.



Abstraction is identifying what is important and leaving out detail we do not need.



We use evaluation when we make judgements based on different factors, such as design criteria and user needs.

Computational Thinking Processes

At the end of each of the activities, students are invited to self-assess which of the CT processes they used and the extent to which they used them. The five approaches are reproduced here for the sake of clarity.



Tinkering means trying things out through experimentation.



Creating is about planning, making, and evaluating things (e.g., animations, games, robotics).



Debugging is about finding out what is wrong in an algorithm or program and fixing it.



Persevering is never giving up, being determined, resilient, and tenacious.



Collaborating means working with others to ensure the best result.

CAS M1: Musical Instrument Digital Interface (MIDI) and Composer's Cut Video Composition

- Work with another student to research the topic “ABC notation” on the internet and take notes on what you learn. Perhaps begin with <http://abcnotation.com/blog/2010/01/31/how-to-understand-abc-the-basics/>
- When you are satisfied with your understanding, download the *EasyABC* app from <https://www.nilsliberg.se/ksp/easyabc/>
Check that you understand what the first five lines in the ABC code window mean.

```

ABC code
1  X:1
2  T:Notes
3  M:C
4  L:1/4
5  K:C

```

- Use ABC notation in the *EasyABC* app to play eight bars of a tune of your choice.
You may wish to start by copying the first eight bars of this example:

```

X:1
T:Speed the Plough
M:4/4
C:Trad.
K:G
|:GABc dedB|dedB dedB|c2ec B2dB|c2A2 A2BA|
GABc dedB|dedB dedB|c2ec B2dB|A2F2 G4:|
|:g2gf gdBd|g2f2 e2d2|c2ec B2dB|c2A2 A2df|
g2gf g2Bd|g2f2 e2d2|c2ec B2dB|A2F2 G4:|

```

After processing a typical result might look like this:

Speed the Plough *Trad.*

Here is another example:

```
X:1
T:What tune is this?
M:6/8
L:1/8
K:C
C3 C3| C2 D E3| E2 D E2 F| G6| ccc GGG| EEE CCC| G2 F E2 D| C6|
```

- Change a few elements in some of the ABC notation you have entered, predict what will happen, and then play the result to see if you are right.
- Create and share a video Composer's Cut of your MIDI composition project (approx. 3 mins.) in which you:
 - discuss your insight into the MIDI environment,
 - play your composition, and
 - evaluate your understanding of the MIDI environment.

Primary CT Concepts



To extrapolate from the research phase of ABC notation to the composition phase



To operate within the parameters of *EasyABC*



To make judgements about the MIDI environment and their composition

Self-Assessment:**CAS M1: Musical Instrument Digital Interface (MIDI)**

Which approaches did you use, and to what extent did you use them?

**Tinkering**

MIN.

MAX.

**Creating**

MIN.

MAX.

**Debugging**

MIN.

MAX.

**Persevering**

MIN.

MAX.

**Collaborating**

MIN.

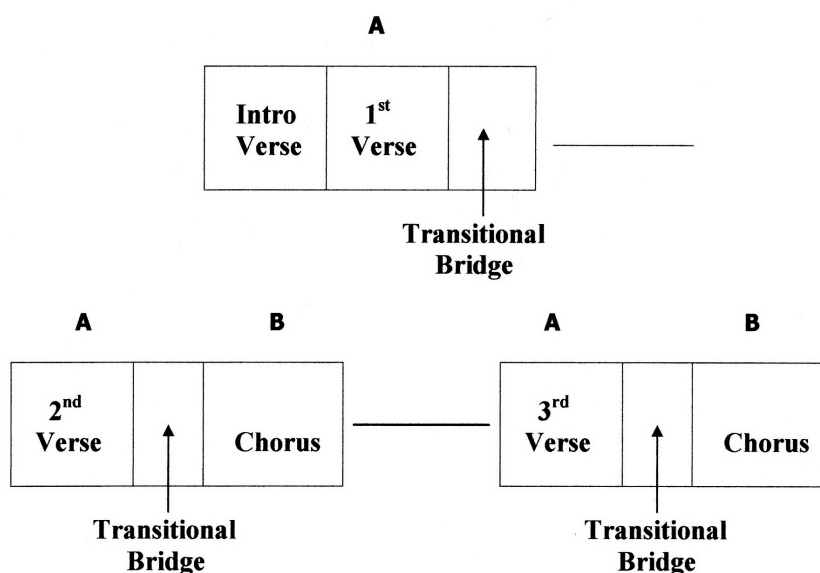
MAX.



CAS M2: MIDI Composition Extension

- Team with a partner who is prepared to swap his/her ABC notation file with you.
- Input the ABC notation of your partner's composition into *EasyABC*, and then extend it for another eight bars by creating a musical "bridge."

"The bridge is a section that provides relief from the repetitive nature of many songs. Not only does it have different lyrics from the verse and chorus, but the music is a little different as well. It usually will start on a different chord from what the verse and chorus start with."



URL: <https://www.fender.com/articles/play/parts-of-a-song-keep-it-straight>

- Create and share a video Composer's Cut of your MIDI composition extension project (approx. 3 mins.) in which you
 - discuss your insight into the concept of a musical "bridge",
 - play your extension of your remix of the original composition, and
 - evaluate the outcome.

Primary CT Concepts



To extrapolate from the listening phase of ABC notation to the composition phase and to determine the nature of an appropriate musical "bridge"



To distill the essence of their colleague's tune



To determine the pattern underlying the tune and adjust it appropriately to form a musical "bridge"



To make judgements about the MIDI environment and their composition

Self-Assessment:
CAS M2: MIDI Composition Extension

Which approaches did you use, and to what extent did you use them?



Tinkering

MIN.

MAX.



Creating

MIN.

MAX.



Debugging

MIN.

MAX.



Persevering

MIN.

MAX.



Collaborating

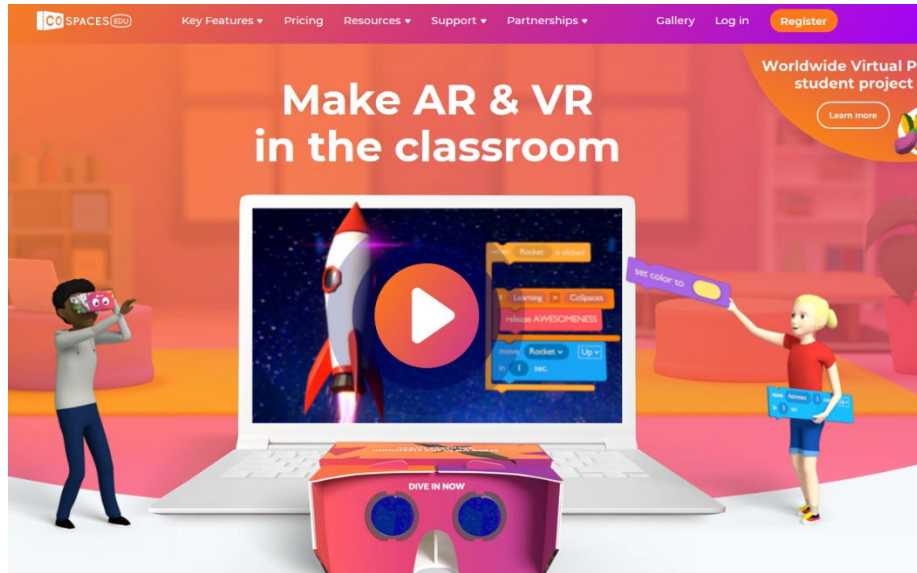
MIN.

MAX.



Introduction to

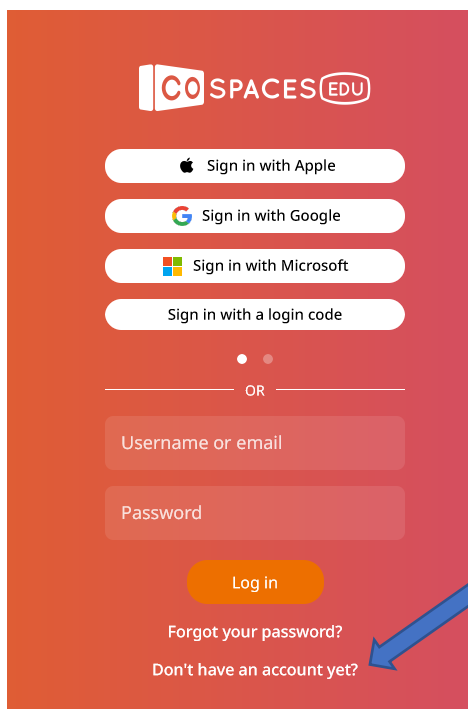
CoSpaces Edu is a cloud-based digital workspace in which you can create augmented reality (AR) and virtual reality (VR).



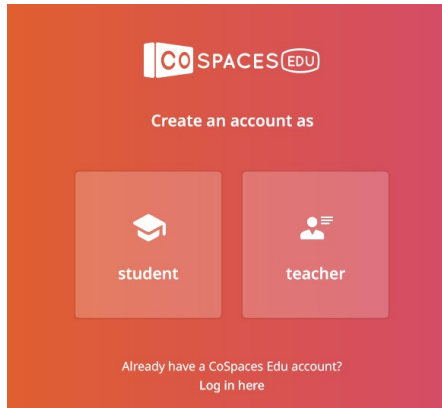
To get a sense of what AR/VR is, please view <https://www.youtube.com/watch?v=zUR9i60zLo8>

Now, please go to the Apple AppStore on your iPad. Search for “CoSpaces” and download the App (it’s free). Your teacher may have already downloaded the CoSpaces App for you.

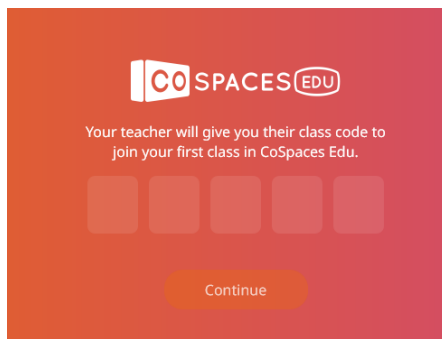
If you are on an iPad, you won’t see the above home screen. Instead you will see:



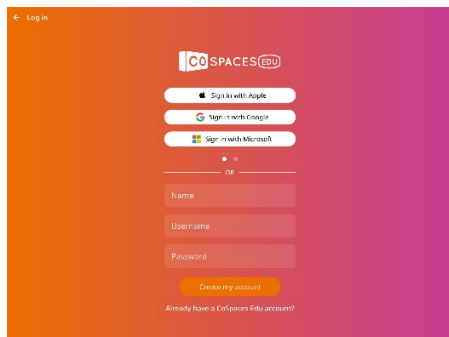
Select “Don’t have an account yet?”



Select the student option so you can enter the class code.
(should be 5 characters)

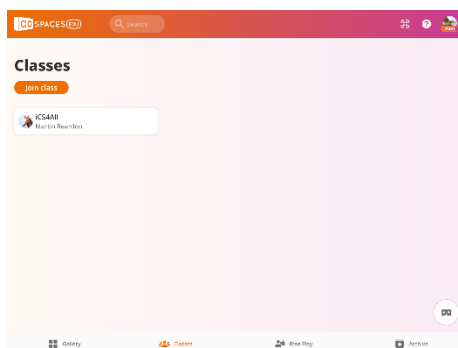


Type in your class code and click "Continue."



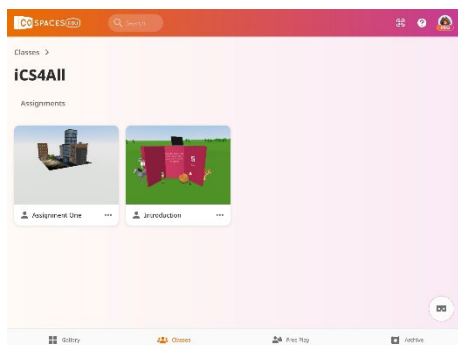
Create a username and password in collaboration with your teacher.

Click on "Create my account."



After you have created your account, you should see a screen that looks like this except that the name of your class will be where you see "iCS4All."

Click on the name of your class.

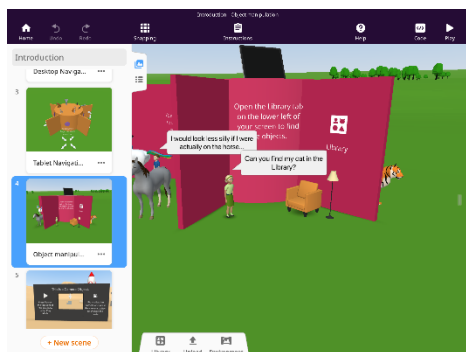


You should see a screen that looks like this except that you will see the name of your class (instead of “iCS4All”).

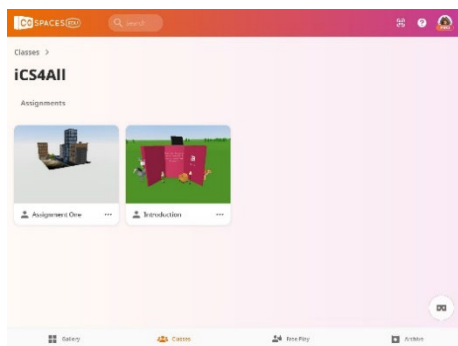
Select the “Introduction” assignment and follow the directions.

If you need to reference the instructions again, they appear in the top bar in the middle.

When you have finished working through the Introduction, start on Assignment One.



To find Assignment One, click on the home button in the top left of your screen to bring you back to your class page.



Select Assignment One and follow the instructions.

Make sure you scroll all the way to the bottom of the instructions. There are 4 components to the assignment.

Teacher Note:

If you or your students need more assistance in getting started, this video from CoSpaces Edu may be helpful: <https://www.youtube.com/watch?v=2WWCnNjeMzM>

Self-Assessment:**Introduction**

Which approaches did you use, and to what extent did you use them?

**Tinkering****MIN.****MAX.****Creating****MIN.****MAX.****Debugging****MIN.****MAX.****Persevering****MIN.****MAX.****Collaborating****MIN.****MAX.**

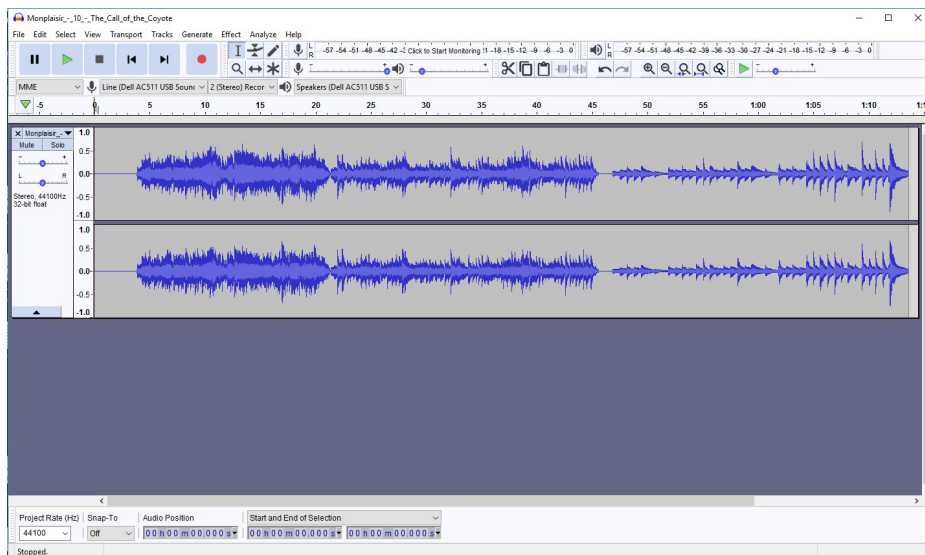
CAS M3: Sound Montage

Choose a piece of music you like and add a:

- contrasting rhythm, OR
- your voice, OR
- different instruments using Garage Band or Audacity.

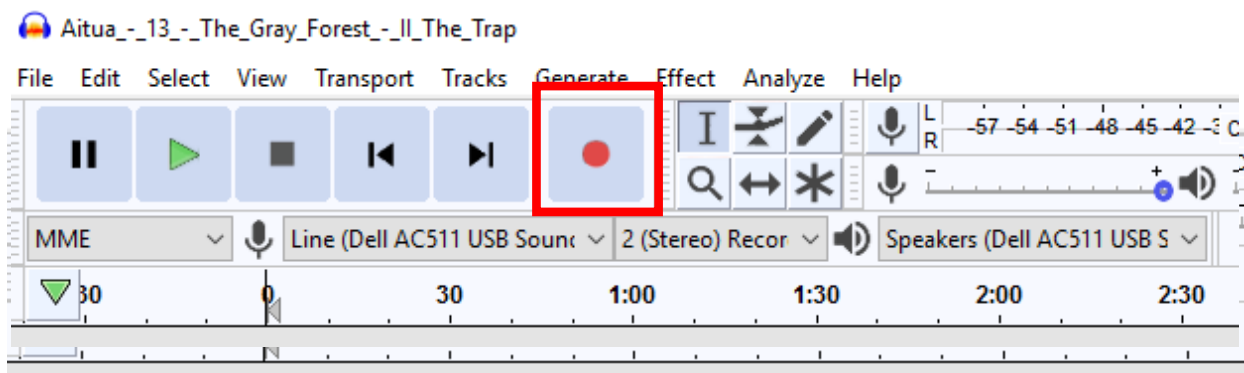
If you are using a Windows computer, you can use this link to download Audacity: <https://www.audacityteam.org/>

This screenshot shows a song loaded into Audacity.



You can **import** sound files (e.g., downloaded from Bensound <https://www.bensound.com/>, or rhythm, or instrument files) by clicking on File.

You can **record** your voice with the **red record** button.



Primary CT Concepts



To know where to place the interpolated additions most appropriately



To ensure a coherent product



To analyze the original composition to decide where to interpolate

**Self-Assessment:
CAS M3: Sound Montage**

Which approaches did you use, and to what extent did you use them?



Tinkering

MIN.

MAX.



Creating

MIN.

MAX.



Debugging

MIN.

MAX.



Persevering

MIN.

MAX.



Collaborating

MIN.

MAX.



CAS M3.1: Sound Montage Extension

Begin with the outcome of the Sound Montage activity or begin afresh.

The aim of this extension is to create a Scene in CoSpaces to accompany a song.

First, you need to get your sound file into CoSpaces.

EITHER

1. Use the sound file from your Sound Montage activity,
 - To export for use in CoSpaces:
 - In your library (where each song is shown in small thumbnails) tap and hold the file you want to export, until a menu appears
 - At the bottom of the menu, select “Share”, and then select the “Song” format
 - Use the “high quality sound” option and then hit “share” at the top right of the window
 - Select “Notes” as the app to which you want to export the file and remember the name of the Note in which the sound file will be saved and then hit “Save”
 - Go into the Notes app and find the Note where you just exported your song file
 - Then you will select “Save to Files,” and from the options under your iCloud Drive, select the “Downloads” folder and then hit “Save” in the top right corner of the window

OR

2. You can record the song in CoSpaces (you will need to play the sound clip on another device).
 - To record the sound, simply hit “record” and then begin your recording by clicking the orange button.
 - Once you have recorded the sound clip, you can rename it to whatever you would like and you should see it appear in the sound ribbon. (You may have to scroll to the right to see it.)

OR

3. You can go to bensound.com and download a free sound file, then go into CoSpaces and select “upload”, “sound”, and then “upload” and find your downloaded bensound file in the Download folder of your iCloud drive.

NOW

Whether you exported a file from bensound or GarageBand, the next step is to upload it into CoSpaces.

- Start with a new scene or a new CoSpace.
- At the bottom of the screen hit “upload,” and choose “sound,” and then hit the “upload” button again.
- From the locations available, select iCloud Drive and navigate to the Downloads folder and select it. Click on the sound file you want.
- Your sound file will appear in the bottom ribbon of your CoSpaces. (You may have to scroll to the right to find it.)

Once you have your sound uploaded into CoSpaces, you can select your song to be your “background sound.”

- Select “environment” at the bottom left of the screen and select “background sound.” You can then select your song or sound file.

Now you are ready to set the scene for your song!

- You can change your environment, by hitting “environment” at the bottom of the screen and then selecting “edit.”
- Add a few items to your scene from the library. Be conscious of picking items that coordinate with your song (just like it would in a movie).
- Turn on the coding for all of the items you add (refer to the introduction scenes if you have forgotten, or read the Reference Guide linked at the bottom of this assignment description), and code them to change animations or move using the transform or action options in the code tab at the top right of the screen

Remember to use the Reference Guide:

<https://cospaces.io/edu/CoBlocks-Reference-Guide.pdf>

Primary CT Concepts



To comprehend the CoSpaces environment

Self-Assessment:**CAS M3.1: Sound Montage**  **Extension**

Which approaches did you use, and to what extent did you use them?

**Tinkering**

MIN.

MAX.

**Creating**

MIN.

MAX.

**Debugging**

MIN.

MAX.

**Persevering**

MIN.

MAX.

**Collaborating**

MIN.

MAX.



CAS M4: Teach Me CT

- Find a music-only soundtrack to a song that you like and import it into Audacity or Garage Band.
 - You may find a suitable soundtrack on <https://www.bensound.com/>
- Use this soundtrack as the accompaniment and overlay a vocal composition (e.g., perhaps a rap) to teach one of the CT concepts.
 - The lyrics must identify and explain one of the CT concepts (e.g., algorithms, decomposition, logic, patterns, abstraction, evaluation).
 - One option may be to use an iPhone, or another recording device, to record your lyrics and import your lyrics file as a separate overlaid track into Audacity or Garage Band.

Primary CT Concepts



To fit words to the existing rhythms and melodies in a coherent way



To address user needs as they perceive them



To identify what is important and leave out unnecessary detail

Self-Assessment:
CAS M4: Teach Me CT

Which approaches did you use, and to what extent did you use them?



Tinkering

MIN.

MAX.



Creating

MIN.

MAX.



Debugging

MIN.

MAX.



Persevering

MIN.

MAX.



Collaborating

MIN.

MAX.



CAS M5: Music Diorama

You are going to make a diorama that layers music loops through the triggering of objects in four different sections of a diorama.

Using Garage Band, create a cohesive song by layering music loops.

- It is helpful to use loops that run for even numbered multiples of some unit bar length (e.g., 4 bars, 8 bars) so that the loops will mesh well when they are layered.
- Try to include a variety of musical styles so that there is auditory interest (e.g., don't just use bass loops or electronic beats).
- Make sure to take note of the loops that you use, so you can find them again later.
- Create at least four loops so you can have one loop for each scene in the diorama—which has four scenes—but you can use more if you like.
- Make sure that you divide whatever loops you have chosen to use into four groups. For example, if you had 10 total loops you could sequence them as 2,3,2,3 or 2,4,2,2 or 2,2,3,3, and write down what loops go together.
- To export for use in CoSpaces:
 - In your library (where each song is shown in small thumbnails) tap and hold the file you want to export, until a menu appears.
 - At the bottom of the menu, select “Share”, and then select the “Song” format.
 - Use the “high quality sound” option and then hit “share” at the top right of the window.
 - Select *Notes* as the app to which you want to export the file and then write down the name of the note it creates to house your sound file and hit “Save.”
 - Go into the *Notes* app and find the name of the note you just wrote down which contains your exported song file.

- Select the note (you should see your sound file) and touch and hold the file until you see a menu, and then select “Share” from the options listed.
- Then select “Save to Files” and from the options under your iCloud Drive, select the “Downloads” file and then hit “Save” in the top right corner of the window.
- Tip: To keep your sound files straight, consider naming them something that will help you remember which one is which. Perhaps add a number to the name of each. It will make uploading the files in the correct diorama space of your CoSpace much easier (as well as the coding to make the files play).
- First, export just the first loop using the above process (or the loops that you want to be in the first scene).
- Then, export the first loop(s) + the loop(s) you want to be used in the second scene.
- Then, export the sound file you just created + the loops for the third scene.
- Finally, go back to the original sound file of your complete song and export that. (It will include the loops you haven’t exported previously, so that you have a sound file that incorporates all the loops.)

Next, create the Scene in CoSpaces.

- Create a new CoSpace or create a new scene in a CoSpace that you already have.
 - Make sure you create it to be a 3D space and select the “Multi diorama” from the available templates, then select “Use template.”
- Keeping in mind the loops you have saved into four groups, create a scene that you want to go with each of the sound files you have just exported.
- Explore the library for the items you might like to add.
 - If there is an item you want that you can’t find in the CoSpaces library, you can go to the “Upload” tab and then select “3D models.” You will see a field that reads “Web search.” Type the name of the item you want, search for it, and then drag it onto the screen like you would any other item. (*Note.* Some items you find might be in an incompatible format. If an item won’t load, you can’t use it.)
- Remember you want to start with the file that contains just your first set of loops for the first scene of the diorama.

- Make sure that whatever direction you choose to rotate to the next scene, that you keep the scenes of the diorama and the sound files in sync.

Once you have created scenes that you feel go together with your sound files, choose an item in each scene that you want to be the trigger for your sound to play when it is clicked. The next step is to code it so it will act as a trigger.

- In each of your four scenes in the diorama select an item that is large enough and visible in play mode that you want to be your trigger. (You want the trigger item to be obvious so that a user with no knowledge of your CoSpace can easily locate your trigger items.)
- Turn on the coding for each of these trigger items one-by-one by double-clicking the item and from the menu, selecting “code,” and then turning on the switch for “Use in CoBlocks”.
 - The switch will turn blue when selected.
- Now that the items are ready for coding, select the “Code” button from the top right of the screen and choose the coding language “CoBlocks.”
- In the “Events” section (with the yellow icon), find the CoBlock “when item clicked” and drag and drop it into the space under “when play clicked.” You will need four of those “when item clicked” CoBlocks (one for each trigger item in your diorama scenes).
- In the dropdown of each “when item clicked” CoBlock, find a trigger item from the list and select it. When you are done there should be a “when item clicked” CoBlock that corresponds to each one of your trigger items.

Now we need to find the CoBlock that will play the sound files you recorded in your music loops and set up the coding for that.

- This CoBlock can be found in the “Actions” section, which has the purple icon.
- Find the CoBlock that starts with “play sound” and drag one INSIDE each of your “when clicked” items. You will know you have done it correctly if there is a yellow border in a “C” shape around the purple CoBlock on which you just dropped the “play sound.”
- From the sound drop down in the CoBlock you just used, select the sound file that you want to play for each scene of the diorama.
 - Make sure the sound file corresponds to the trigger item in the “when clicked” CoBlock and that it is on the correct side of the diorama.
 - If you have a short music file (e.g., under 10 or 15 seconds), select “True” for the “wait until finished” option from the dropdown in the

play sound CoBlock. This will make sure that your visitor gets to hear the full sound file before any other coding takes over.

- If your sound file is longer than 10 or 15 seconds, leave the “wait until finished” option as “False.” This will allow coding to take over before your sound file has finished playing.
 - Next, because we want to hear each sound file as a separate file, we need to find the CoBlock that will stop the sound. It's in the “Action” section just below the CoBlock you used to play the sound file. It is called “stop sound” and includes a drop down.
 - Drag and drop this CoBlock inside the YELLOW event CoBlock, but underneath the CoBlock used to play your sound. From the drop down, find the corresponding sound you need to stop.

Once you have placed the appropriate “action” items, test your sound triggers to make sure they work in play mode. To see your coding as it is happening during play mode, you can select the coding icon at the top right of the screen. It will show your coding panel while your code is being played.

Now, you need to create a way for a visitor to understand how to navigate your space.

- This is best achieved by placing an object or person at the beginning section of the diorama (where your camera starts when you enter play mode).
- Find a person, animal, or object you would like to give instructions to a visitor on how to view your diorama. Turn the coding on for whatever you choose. (Repeat what you did above for this step.)
- You now need to code your selected person, animal, or object (the “greeter”) to say what you want your visitor to know. Consider these steps:
 - In the “Actions” section, find the “say” blocks, near the top of the list.
 - There are two options so choose the one that allows you to set a time for what your greeter is going to say to explain how to navigate your diorama (so that your visitor has time to read the instructions before they disappear).
 - Place this CoBlock just below the “When Play Clicked” CoBlock that starts off the coding.
 - Select the greeter from the drop down and then type your explanation in the field after “say”.
 - Give an overview of the scene the visitor can see, but make sure your greeter tells the visitor what items to click to hear sound and which direction they need to move the diorama to see the next scene.

- If your explanation is longer than a couple of sentences, consider placing a second or third “say” block so that your visitor can see your instruction in sections.
- Play around with the timing of the appearance of the instructions by selecting a time and then testing it out in play mode. You want you visitor to know what to do, but you don’t want the instructions to stay visible for so long that they think something has gone wrong.

Congratulations! You have created your diorama! Run through it in play mode to make sure everything works the way you intend and then invite someone to visit it.

Primary CT Concepts



Self-Assessment:**CAS M5:**  **Music Diorama**

Which approaches did you use, and to what extent did you use them?

**Tinkering****MIN.****MAX.****Creating****MIN.****MAX.****Debugging****MIN.****MAX.****Persevering****MIN.****MAX.****Collaborating****MIN.****MAX.**



CAS M5.1: MERGE Cube, **Extension**

You are going to compose a song in Garage Band that utilizes the layering of a variety of music loops (like in the Diorama assignment), and then create scenes on the faces of the Merge Cube that will each be paired with a loop(s) from your song. The end goal is to create six cube faces with different scenes and music triggers, so that by the time your user has visited each face and selected a trigger item (in a specified order) they have seen all your CoSpaces creativity and have heard a full composed song.

In *Garage Band*, create a song that uses at least six different music loops (for each face of the cube). You can use more than six loops—you will just have to divide them into six groups.

- It is helpful to choose loops that run for even numbered multiples of some unit bar length (e.g., 4 bars, 8 bars) or use loops that run for the same bar amount, so that the loops will mesh well when they are layered.
- Try to include a variety of musical styles/genres so that there is auditory interest (e.g., don't just use bass loops or electronic beats).
- If you find a music loop that you like but aren't sure if you want to use it, place it within your music anyways; it can always be deleted later. There are thousands of loops, so it can be hard to go back and find a specific one later.
- Make sure to take note of the loops that you use in your finished product and which loops go together in each of the six sets of loops (for the cube faces), so you can find them again later.

Once you have the sets of loops that combine to form your song, you are going to create a new Garage Band file so that you can export the loops of your song in a progression.

- In your Garage Band library (where each song is shown in small thumbnails), tap and hold the file you want to export, until a menu appears.
- At the bottom of the menu, select "Share", and then select the "Song" format.
- Use the "high quality sound" option and then hit "share" at the top right of the window.
- Select *Notes* as the app to which you want to export the file, write down the name of the note the app creates to house your sound file, and hit "Save."

- Go into the *Notes* app and find the name of the note you just wrote down (it contains your exported song file).
- Select the note (you should see your sound file) and tap and hold the file until you see a menu, and then select “Share” from the options listed.
- Then select “Save to Files” and, from the options under your iCloud Drive, select the “Downloads” file and then hit “Save” in the top right corner of the window.

Tip: To keep your sound files straight, consider naming them something that will help you remember which one is which (and which loops it includes). Perhaps add a number to the name of each; this number can coordinate with the face number of the Merge Cube where you want the loops to play. It will make finding and eventually coding the files in your CoSpace much easier.

- First, export just the first loop using the above process (or the loops that you want to be on the first face of the cube).
- Then, export the first loop(s) + the loop(s) you want to be used on the second cube face.
- Then, export the sound file you just created + the loops for the third face
- Use the same progression for the loops for the fourth face, and then the fifth face. (You should have five separate music files at this point.)
- Finally, go back to the original sound file of your complete song and export that. (It will include the loops you haven’t exported previously, so that you have a sound file that incorporates all the loops.)

Create your accompanying Merge Cube CoSpace with cube faces to pair with your music loops.

- Create a new CoSpace and select “MERGE Cube” from the options on the left side of the window that pops-up, and then select “empty scene” from the options on the right.
- Keeping in mind the loops you have saved into six sets, create a scene that you want to go with each of the sound files you have just exported.
- Explore the library for the items you might like to add.
 - If there is an item you want that you can’t find in the CoSpaces library, you can go to the “Upload” tab and then select “3D models.” You will see a field that reads “Web search.” Type the name of the item you want, search for it, and then drag it onto the screen like you

would any other item. (*Note.* Some items you find might be in an incompatible format. If an item won't load, you can't use it.)

- Because users will be able to see every face when they are in play mode, it's important to use the "attach" feature for all the items that you place on each cube face. You will need to rotate the cube to be able to access every cube face.
 - To use the attach feature, double click on the item you want to attach to the cube face and select the "attach" option. You will then see blue dots appear on each face of the cube, select the blue dot on the face on which you want to place the item. If you were successful, the item should have moved to the place where the blue dot was previously.
 - Once the item appears here you can move it anywhere on the cube and it will still be "attached" to the cube face. You will see a large rectangle showing the space between your item and the spot on the cube face.

Once you have created scenes that you feel go together with your sound files, you will choose an item in each scene that you want to be the trigger for your sound to play when it is clicked. The next step is to code it so it will act as a trigger.

- On each of your six faces on the cube select an item that is large enough and visible in play mode to act as your trigger. (You want the trigger item to be obvious so that a user with no knowledge of your CoSpace can easily locate your trigger items.)
- Turn on the coding for each of these trigger items one-by-one by double-clicking the item and from the menu, selecting "code," and then turning on the switch for "Use in CoBlocks".
 - The switch will turn blue when selected.
- Now that the items are ready for coding, select the "Code" button from the top right of the screen and choose the coding language "CoBlocks."
- In the "Events" section (with the yellow icon), find the CoBlock "when item clicked" and drag and drop it into the space under "when play clicked." You will need six of those "when item clicked" CoBlocks (one for each trigger item on your cube faces).
- In the dropdown of each "when item clicked" CoBlock, find the specific trigger item from the list, and select it. When you are done there should be a "when item clicked" CoBlock that corresponds to each one of your trigger items.

Now we need to find the CoBlock that will play the sound files of your music loops and set up the coding for that.

- This CoBlock can be found in the “Actions” section, which has the purple icon.
- Find the CoBlock that starts with “play sound” and drag one INSIDE each of your “when clicked” items. You will know you have done it correctly if there is a yellow border in a “C” shape around the purple CoBlock on which you just dropped the “play sound.”
- From the sound drop down in the CoBlock you just used, select the sound file that you want to play for each scene of the diorama.
 - Make sure the sound file corresponds to the trigger item in the “when clicked” CoBlock and that it is on the correct side of the cube.
 - If you have a short music file (e.g., under 10 or 15 seconds), select “True” from the dropdown in the “wait until finished” play sound CoBlock. This will make sure that your visitor gets to hear the full sound file before any other coding takes over.
 - If your sound file is longer than 10 or 15 seconds, leave the “wait until finished” option as “False.” This will allow coding to take over before your sound file has finished playing.
 - Next, because we want to hear each sound file as a separate file, we need to find the CoBlock that will stop the sound. It’s in the “Action” section just below the CoBlock you used to play the sound file. It is called “stop sound” and includes a drop down.
 - Drag and drop this CoBlock inside the YELLOW event CoBlock, but underneath the CoBlock used to play your sound. From the drop down find the corresponding sound you need to stop.

Once you have placed the appropriate “action” items, test your sound triggers to make sure they work in play mode. To see your coding as it is happening during play mode, you can select the coding icon at the top right of the screen, and it will show your coding panel while your code is being played.

Now you need to create a way for a visitor to understand how to navigate your space.

- This is best achieved by placing an object or person at the beginning section of the diorama (where your camera starts when you enter play mode).
- Find a person, animal, or object you would like to give instructions to a visitor on how to view your diorama. Turn the coding on for whatever you choose. (Repeat what you did above for this step.)

- You now need to code your selected person, animal, or object (the “greeter”) to say what you want your visitor to know. Consider these steps:
 - In the “Actions” section, find the “say” blocks, near the top of the list.
 - There are two options so choose the one that allows you to set a time for what your greeter is going to say to explain how to navigate your diorama (so that your visitor has time to read the instructions before they disappear).
 - Place this CoBlock just below the “When Play Clicked” CoBlock that starts off the coding.
 - Select the greeter from the drop down and then type your explanation in the field after “say.”
 - Give an overview of the scene the visitor can see, but make sure to tell the visitor what items to click to hear sound on each face of the cube, giving those objects in the order so that they will start with the first loops and eventually end on the whole song.
 - If your explanation is longer than a couple of sentences, consider placing a second or third “say” block so that your visitor can see your instruction in sections.
 - Play around with the timing of the appearance of the instructions by selecting a time and then testing it out in play mode. You want your visitor to know what to do, but you don’t want the instructions to stay visible for so long that they think something has gone wrong.

When you are satisfied with your coding, test it out yourself in play mode to see if everything works as it should. If you have no issues in your coding, give it to someone else to try!

Self-Assessment:**CAS M5.1: MERGE Cube,  Extension**

Which approaches did you use, and to what extent did you use them?

**Tinkering****MIN.****MAX.****Creating****MIN.****MAX.****Debugging****MIN.****MAX.****Persevering****MIN.****MAX.****Collaborating****MIN.****MAX.**

CAS M6: Sounds of Home

- Please view “The Sounds of Atlanta” video.



DJ Kemit (a former member of the Grammy Award-winning Hip Hop group *Arrested Development* who now is clearing his own path in music; [facebook.com/DJKemit](https://www.facebook.com/DJKemit) twitter.com/djkemit) uses a field recorder to capture sounds for later incorporation into musical compositions.

I can provide the MP4 video for the website. Add that URL here.



<https://mailchi.mp/spreadlove/join-us-highervibe-music-stream-starting-now-and-adamaartsalon-218654>

- Use your phone to record some sounds that you associate with home.
- Compile the sounds you have recorded together with suitable background music into a “Sounds of Home” auditory experience.

Primary CT Concepts



To establish a fit between the sound segments



To establish an operating sequence of operations that facilitates the task

Self-Assessment:
CAS M6: Sounds of Home

Which approaches did you use, and to what extent did you use them?



Tinkering

MIN.

MAX.



Creating

MIN.

MAX.



Debugging

MIN.

MAX.



Persevering

MIN.

MAX.



Collaborating

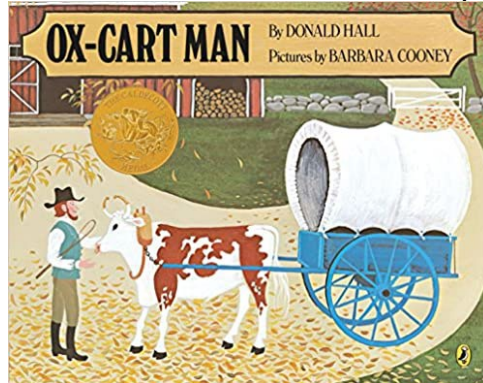
MIN.

MAX.



CAS M7: Multi-Literacies

- Select a children’s illustrated story and decompose it into eight-panel storyboard that covers the whole story (see <https://www.storyboardthat.com/storyboard-creator> to get the idea).
 - Perhaps choose a story that was one of your favorites when you were young, or one that your younger siblings or relatives enjoy.
 - One story that would be great for this activity is Donald Hall’s “Ox-Cart Man,” but the choice is up to you.



- If you prefer to create your own illustrations, please go ahead and do so. You can scan your illustrations and import them in the next step.
- Using *PowerPoint* or *Keynote*, create a slide to contain each of the eight panels you have selected above.
- Use *Audacity* or *Garage Band* to piece together music that fits the theme of each panel.
- Add the music to your *PowerPoint* or *Keynote* and create an autoplay timeline within the presentation software so that the slides automatically progress in sync with the playing of your uploaded music clips.

Primary CT Concepts



To break down the chosen story into comprehensible sections for each storyboard panel



To make predictions regarding the appropriate model and music for each storyboard



To sequence the panels and music in a way that makes sense to the observer/listener

Self-Assessment:
CAS M7: Multi-Literacies

Which approaches did you use, and to what extent did you use them?



Tinkering

MIN.

MAX.



Creating

MIN.

MAX.



Debugging

MIN.

MAX.



Persevering

MIN.

MAX.



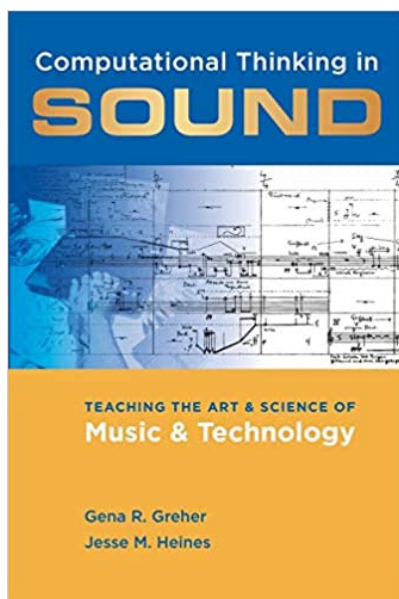
Collaborating

MIN.

MAX.



CAS M8: Create Your Own Instrument



Greher, G. R., & Heines, J. M. (2014). *Computational thinking in sound: Teaching the art and science of music and technology*. Oxford University Press.

Please view the video embedded in the following webpage (to the right of the fourth paragraph) to get the idea of this activity.

<https://www.uml.edu/News/stories/2016/EcoSonic-Playground.aspx>

This is the embed code for the website:

```
<iframe src='https://www.uml.edu/Brightcove/Video.aspx?video_id=5246491275001' allowfullscreen frameborder=0></iframe>
```

- Using everyday objects, create your own instrument.
 - Please use your imagination. Perhaps you can make something out of string, cardboard, and cans?
 - ONLY if you are stuck for ideas, there are some examples on these two websites:
 - <http://redtri.com/homemade-instruments/slide/8>
 - <https://feltmagnet.com/crafts/Music-Instruments-for-Kids-to-Make>
- Invent a notation that does not use the conventional staff to enable someone else to play your instrument and create a short composition that features the range of sound that your instrument can produce.
 - Perhaps you can use numbers, colors, or symbols to enable someone else to play your instrument.
- Provide your created instrument to someone else, give them a brief verbal explanation of the notation you invented (about 1 minute), and invite them to play your short composition from your notation.

Primary CT Concepts



To establish a notation that is consistent and meaningful to another



To judge the potential for an everyday object to be a musical instrument



To focus on the important aspects of the invented instrument and explain the essential features of the invented notation.

Self-Assessment:
CAS M8: Create Your Own Instrument

Which approaches did you use, and to what extent did you use them?



Tinkering

MIN.

MAX.



Creating

MIN.

MAX.



Debugging

MIN.

MAX.



Persevering

MIN.

MAX.



Collaborating

MIN.

MAX.



Culminating Activity

CAS M9: Personal Portfolio

Use *PowerPoint* or *Keynote* or other software or a website of your choice to create and narrate a portfolio of your creations from the previous eight activities.