



**ASTRO**EDU

Peer-reviewed Astronomy Education Activities

# Create Your Own Astro-Music

**Create your own music inspired by images of space.**

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 <b>AGE</b> 8 - 19	 <b>LEVEL</b> Primary, Middle School, Secondary, Informal
 <b>TIME</b> 1h	 <b>GROUP</b> Group
 <b>SUPERVISED</b> Yes	 <b>COST PER STUDENT</b> Low Cost
 <b>LOCATION</b> Large Indoor Setting (e.g. school hall)	 <b>CONTENT AREA FOCUS</b> Astronomy
 <b>ASTRONOMY CATEGORIES</b> The Sun, Planetary systems, Stars, Nebulae, The Milky Way, Galaxies, Cosmology	
 <b>CORE SKILLS</b> Constructing explanations, Communicating information	
 <b>TYPE(S) OF LEARNING ACTIVITY</b> Creative Expression, Fine Art focussed, Fun activity	
 <b>KEYWORDS</b> Astronomy, Music, Art, Creativity	



## GOALS

- To learn about the phenomena depicted in astronomical images.
  - To use astronomical images as a basis for creating original music.
  - To encourage students to consider cross-curricular links between science and art.
  - To develop students' musical improvisation skills.
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## LEARNING OBJECTIVES

- Students will be able to describe some of the phenomena depicted in astronomical images.
  - Students will interpret astronomical images to compose a short piece of music.
  - Students will perform their improvisations and describe how they interpreted the images.
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## EVALUATION

- Were students able to create short (15-30 second) improvisations? (Yes/No)
- Were students able to explain to their peers how their improvisations connect with the images they selected? (Yes/No)
- Do students' explanations represent a coherent understanding of the astronomy concepts behind the images they selected? (Yes/No)
- If this activity is repeated, are students able to create more complex and/or longer improvisations? (Yes/No)
- If this activity is repeated, do students seem more confident? (Yes/No)

Peer evaluation can also be used in this activity. At the end of the activity, students can vote on which of their peers' improvisations best represent the astronomical phenomena depicted in the images.

It should be emphasized that this is a creative activity. Each student will have his/her own way of illustrating science concepts through music. Teachers should welcome these differences as they evaluate students' performances. The key point is that students are able to give coherent explanations of how they used astronomy concepts to create their improvisations.

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## MATERIALS

- One or more astronomical images, see links under additional information for suggestions.
  - A method of displaying the images (i.e. computer, LCD projector, and screen). In the absence of a computer and projector, students can be given printouts of the images.
  - One or more musical instruments. Examples include drums, orchestral instruments such as violins, flutes and trumpets, or a piano. Drums or other percussion instruments (i.e. tambourines, cymbals, shakers) work especially well for students with little or no musical background.
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## BACKGROUND INFORMATION

Example image: Star cluster M47. This star cluster has many young, hot, blue stars, but also contains a few older, cooler, red stars. Image credit: ESO.

Improvisation is the art of creating music without a notated musical score (i.e. making music 'on the fly'). The wonderful thing about improvisation is that it is creative and open ended. When improvising, there are no mistakes. Engaging students in musical improvisation is a great way of building confidence and encouraging creative risk taking.

In this activity, students create brief (15-30 second) musical improvisations in response to astronomical images. They then describe how the music they created connects with the image. Students thus explore ways of using sound to depict what they see.

This activity is designed for use by both music and science educators. Improvisation is an important skill for students to develop in the music classroom. Many musical traditions incorporate improvisation, most notably jazz. Music curriculum guidelines from various countries emphasize that students should not only perform music composed by others, but also create their own music. This activity provides a way of building confidence by giving students an opportunity to improvise in a free-form manner in which it is almost impossible to fail. Science and music teachers may wish to collaborate in leading this activity.

The activity is designed to be adaptable to the resources at hand. If many of your students have musical backgrounds and play instruments, they may bring their own instruments for the activity. The activity can also be done with instruments that are available locally in a school or community. If you have only one or two instruments available, they can be passed around the class as students take turns.

For students that have little or no musical background, percussion instruments (drums, shakers, etc.) are best. Anything that makes sound will work.



## FULL ACTIVITY DESCRIPTION

Example image: Hubble Space Telescope image of the "Pillars of Creation" in the Eagle Nebula. New stars are forming in these giant pillars of gas and dust. Image credit: NASA, ESA, STScI, J. Hester and P. Scowen (Arizona State University). Please find more images on the 'Additional Information' section.

### Preparation:

- Gather musical instruments. If many of your students play instruments, encourage them ahead of time to bring their own. It's also possible to do

this activity with one instrument that is passed around the class as each student takes turns. If you use one instrument, percussion instruments (drums, shakers) tend to work best.

- Select one or more images. Possible sources include HST image galleries, observatory image galleries (i.e. ESO, NOAO), or The World at Night. Some suggested images and links are included in the additional information section.
- Display your images, either by projecting on a screen or providing printouts.

Example image: The Helix Nebula. This is an example of a planetary nebula, the remnants of a Sun-like star that has died. Image credit: ESO. Please find more images on the 'Additional Information' section.

## **Step 1**

Guide students in understanding the image you've selected. This should be done as interactively as possible. Ask leading questions, such as:

- What type of object is depicted in this image (planet, nebula, galaxy, etc.)?
- What types of astronomical processes are represented by this image (star formation, galaxy collision, planetary geological processes, etc.)?
- What aspects of the image stand out visually (bright stars, spiral arms of a galaxy, planetary features, etc.)?

## **Step 2**

After the students understand the image, explain that they will be creating short improvisations based on their reactions to the image. Their improvisations should be based on visual aspects of the image, or the astronomical processes behind the image, or anything else related to the image that the students find interesting. It's important to emphasize that there are many possibilities; students should not worry about making mistakes.

## **Step 3**

Create your own improvisation for the students. It's important that the teacher try first. This provides students an example, and also shows that you as the teacher are willing to take creative risks.

## **Step 4**

Get your instruments ready. If students brought their own instruments, make sure they have their instruments available. If you are providing instruments, distribute them to the class (allow students to choose, and give students a minute or so to experiment with the instruments they've selected). If you have one instrument that you're passing around, ask one student to volunteer to be first and pass the instrument to that student.

## **Step 5**

Invite students to take turns creating 15-30 second improvisations based on the image. The other students should try to explain how the music connects with the image. After a few students have offered explanations, the student creating the improvisation can explain his/her thoughts on how the music relates to the science phenomena depicted in the image.

## Step 6

The student who has just improvised should select who's next (and pass the instrument if needed). This adds an element of surprise; no one knows who's next. Make a game out of it!

## Step 7

Once all students have improvised, explore ways to extend the activity if time allows. Invite students to create additional improvisations based on aspects of the image that they haven't explored yet. Or challenge students to create improvisations that are completely different from their first attempts. For instance, students could use different musical textures or different instruments altogether. If desired, select a different image.

**Tip:** If the class is large, you could break the class into small groups (3-4 students).



### CURRICULUM

Country	Level	Subject	Exam Board	Section
UK	KS2	Music	-	Improvise and compose music for a range of purposes using the inter-related dimensions of music.
UK	KS3	Music	-	Improvise and compose; and extend and develop musical ideas by drawing on a range of musical structures, styles, genres and traditions.

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### ADDITIONAL INFORMATION

Resources for images:

- Hubble Space Telescope image gallery: <http://www.hubblesite.org> .
- The Hubble heritage album includes some of the most visually appealing images: <http://hubblesite.org/gallery/album/heritage/>
- European Southern Observatory: <http://www.eso.org/public/images>
- NASA: <http://www.nasa.gov/multimedia/imagegallery/index.html>
- The World at Night: <http://www.twanight.org>

Examples of astronomy-inspired music (with sound files): [http://www.matthewwhitehouse.com/Gallery\\_II.html](http://www.matthewwhitehouse.com/Gallery_II.html)

Below are some examples of astronomical images you could use for the exercise, which include background information:

- Eagle Nebula <http://hubblesite.org/newscenter/archive/releases/2015/01/full/>

- Helix Nebula <http://www.eso.org/public/images/eso0907a/> <http://hubblesite.org/newscenter/archive/releases/2004/32/>
  - Saturn <http://hubblesite.org/newscenter/archive/releases/2003/23/>
  - Solar Prominence <http://sdo.gsfc.nasa.gov/gallery/main/item/170>
  - Star Cluster M47 <http://www.eso.org/public/images/eso1441a/>
  - Whirlpool Galaxy <http://hubblesite.org/newscenter/archive/releases/2005/12/image/a/>
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## CONCLUSION

By performing original musical improvisations, students enhance their knowledge of what astronomical phenomena are represented in images and experiment with creative ways of representing these using music. This activity engages students in first hand exploration of music and astronomy connections.

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## CITATION

Whitehouse, M., 2016, *Create Your Own Astro-Music*, [astroEDU](#), [doi:10.14586/astroedu/1617](https://doi.org/10.14586/astroedu/1617)

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