

Planets • Galaxies •
Design Process



Project Essential Questions

- How can we create a visual representation of the different types of galaxies?
- How can we use experimental design to create paintbrushes that represent the characteristics of the galaxies?

PROJECT DESCRIPTION

In this arts integrated component, students will create a visual representation of a glowing galaxy using paintbrushes that they create from everyday materials. Students will identify three types of galaxies found in our universe. Students will also describe the shapes and colors of these galaxies, understanding the reasons behind the shape and color of the galaxy.

LEARNING TARGETS

“I Can...”

- Identify the types of galaxies found in the universe
- Describe the Milky Way galaxy and where our solar system is located within that galaxy
- Distinguish the shape and color of different types of galaxies
- Use the design process to create experimental paintbrushes
- Identify the elements of art and principles of design in photographs of galaxies

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Units provide differentiated ideas and activities aligned to a sampling of standards. The units do not necessarily imply mastery of standards, but are intended to inspire and equip educators.

DURATION: 1 Day

Project Description	Learning Targets
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ESSENTIAL QUESTIONS

<ul style="list-style-type: none"> ● How can we create a visual representation of the different types of galaxies? ● How can we use experimental design to create paintbrushes that represent the characteristics of the galaxies?
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STANDARDS

Curriculum Standards	Arts Standards
<p>S6E1. Students will explore current scientific views of the universe and how those views evolved</p> <p>a. Relate the Nature of Science to the progression of basic historical scientific models (geocentric, heliocentric) as they describe our solar system, and the Big Bang as it describes the formation of the universe</p> <p>b. Describe the position of the solar system in the Milky Way galaxy and the universe</p>	<p>VA6MC.2. Identifies and works to solve visual problems through creative thinking, planning, and/or experimenting with art materials, tools and techniques</p> <p>VA6PR.1. Understands and applies media, techniques, and processes</p> <p>VA6PR.2. Creates artwork reflecting a range of concepts, ideas, and subject matter</p>

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
<ul style="list-style-type: none"> ● Universe ● Galaxy ● Milky Way ● Solar System ● Spiral Galaxy ● Elliptical Galaxy 	<ul style="list-style-type: none"> ● Design process: to plan and make decisions about something that is being built or created ● Brushstroke: the configuration given to paint by contact with the bristles of a brush ● Light spectrum: the group of colors that a ray of light can be separated into including red, orange, yellow, green, blue, indigo, and violet: the colors that can be seen in a rainbow

	<ul style="list-style-type: none"> • Black light: invisible ultraviolet light, a lamp that radiates black light • Line: an element of art which refers to the continuous mark made on some surface by a moving point • Shape: an enclosed space defined by other elements of art • Form: an element of art that is three-dimensional and encloses volume (cubes, spheres, and cylinders are examples of various forms) • Color: an element of art with three properties 1) hue, the name of the color 2) intensity or the purity and strength of the color such as brightness or dullness 3) value, or the lightness or darkness of the color • Space: refers to the distance or area between, around, above or within things • Movement: associated with rhythm and refers to the arrangement of parts in an artwork that creates a sense of motion to the viewer's eye through the work • Proportion: refers to the relationships of the size of objects in a body of work • Balance: a sense of stability in the body of work • Harmony: this is achieved in a body of work by using similar elements throughout the work • Unity: this is seen in a painting or drawing when all the parts equal a whole
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TECHNOLOGY INTEGRATION

<ul style="list-style-type: none"> • Design Process/Makerspace • Computer, internet, projector
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ASSESSMENTS

Formative	Summative
<ul style="list-style-type: none"> • Teacher led questioning through Activating Strategy and Main Activity 	<ul style="list-style-type: none"> • Galaxy painting • Paint brushes • Reflection Questions (see downloads)

MATERIALS

<ul style="list-style-type: none"> • White cardstock, paper clips, string, toothpicks, yarn, binder clips, corks, scrap paper, clothes pins, cardboard, paper plates • Black lights (the link provided below is one option from which to order black lights)
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- https://www.amazon.com/Eliminator-Lighting-Black-Lights-24/dp/B000GATTMY/ref=sr_1_10?ie=UTF8&qid=1473740261&sr=8-10&keywords=black+lights
- Fluorescent paint (the link provided below is one option from which to order fluorescent paint)
 - https://www.amazon.com/dp/B0042SR7V6/ref=sxr_pa_click_within_right_2?pf_rd_m=ATVPDKIKX0DER&pf_rd_p=2329824862&pf_rd_r=GRYCHSQY4Y1XK5VNSFG6&pd_rd_wg=Wqv4L&pf_rd_s=desktop-rhs-carousels&pf_rd_t=301&pd_rd_w=itQxf&pf_rd_i=neon+paint&pd_rd_r=SWFJBZ3KSYMACMDGH3J0&pvc=1

Activating Strategy (5- 10 min)

- Project NASA photographs of galaxies onto whiteboard:
 - <http://hubblesite.org/gallery/album/galaxy/>
- Discuss the characteristics of galaxies using the Elements of Art and Principles of Design.
- Compare and Contrast different types of galaxies.

Guiding Questions:

- Look closely, What do you notice about these photographs?
- What can we learn from them?
- Using your background knowledge of galaxies, where is the light coming from?
- Do you notice a pattern in the images?
- How do you think these photographs were taken?
- If you were asked to recreate this photograph as a painting what type of brushstrokes would you use? What color choices would you make?

Main Activity

PROCESS:

- Students decide what type of Galaxy to paint.
- Pass out materials for paint brushes.
- Pass out White paper for paint.
- Have black lights off, but accessible.

PART 1

Design Challenge

- Introduce students to the Design process.
- Students are instructed to choose a galaxy to represent in a painting based off of their knowledge and the NASA images. Give students time to brainstorm ideas on paper or in small groups.
- Students are challenged to think about what kind of paintbrush they would need to create the specific brushstrokes to best represent their type of galaxy.
- Students are presented with everyday materials and found/recycled objects.
- Students may work alone or in small groups to create 3 paintbrushes each.
- Allow approximately 15 minutes.

PART 2

Glowing Galaxy Painting

- Distribute the black lights around the room.
- Portion the neon paint onto paper plates. Distribute cups of water and paper towels.
- Give each student a piece of paper.
- Explain the process: Students will use their handmade paint brushes to create a galaxy.

- Some paintbrushes may work better than others. The goal is to create a visual representation of a specific type of galaxy.
- Turn off the overhead lights and turn on the blacklights.
- What do you notice about the paint?
- Allow approximately 25-30 minutes.

Reflection:

- How did working in the black light inspire your work?
- Which of your paintbrushes worked best and why?
- How did you use problem solving skills to complete your painting?
- Compare and contrast your painting viewed under black light and regular classroom lights.

Classroom Tips:

- If carpeted room, put down drop cloths or newspaper for painting.
- Room with no windows works great!

REFLECTION

Reflection Questions

- What brush worked the best? Why?
- What did you change or improve on your brush while you were painting?
- What object helped you create the effect you needed for your type of galaxy?

DIFFERENTIATION

BELOW GRADE LEVEL/EL STUDENTS:

- Lead students in a directed painting exercise. All students will be painting the same type of galaxy. Give students step by step instructions, including color suggestions and specific brushstrokes. The galaxy may be painted with a standard paintbrush.

ABOVE GRADE LEVEL:

- Ask students to pay close attention to the positive and negative space of the painting, noting the areas where the light shines the brightest. Ask students to visually define the specific characteristics of their galaxy painting. (i.e. Spiral galaxies are known for black holes, radiating arms and bulges.)

ADDITIONAL RESOURCES

- <http://www.jpl.nasa.gov/visions-of-the-future/>

Books:

- *Our Solar System* by Seymour Simon
- *A Trip through the Milky Way* by Heather Moore Niver
- *Planetary Motion* by Andrew P. Karam
- *The Planets [The definitive visual guide to our solar system]* by Ben Morgan
- *Neptune* by Ruth Owen
- *Uranus* by Ruth Owen
- *Jupiter* by Ruth Owen
- *Mars* by Linda T. Elkins-Tanton
- *Mercury* by L.H. Colligan

APPENDIX

- **Written Reflection Sheet**
- **Photo examples of student work**

CREDITS

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Reflection Questions - Glowing Galaxies

1) What brush worked the best? Why?

2) What did you change or improve on your brush while you were painting?

3) What object helped you create the effect you needed for your type of galaxy?

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Reflection Questions - Glowing Galaxies

1) What brush worked the best? Why?

2) What did you change or improve on your brush while you were painting?

3) What object helped you create the effect you needed for your type of galaxy?

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Photographs of the design process and student paintings:

