

ZOONIVERSE GALACTIC EXPLORERS CHALLENGE



COMPETITION PACK

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DEPARTMENT OF

PHYSICS

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INTRODUCTION

Thank you for signing up to the Galactic Explorers Challenge, December 2023! The University of Oxford Physics Department and Zooniverse are inviting 7 - 12-year-olds from across the UK to become astrophysicists for the week, classifying galaxies from real images from space telescopes and creating their very own mini-science communication project!

All participants will receive a certificate, and budding scientists can go a step further and create a mini project for the chance to win some exciting prizes!

ZOONIVERSE & GALAXY ZOO

Students will have the chance to use the cutting-edge citizen science portal Zooniverse, joining hundreds of thousands of volunteers on the Galaxy Zoo project to help with the largest galaxy census ever carried out. To date over 900,000 galaxies have been classified through Galaxy Zoo.

How does it work? Each galaxy is classified by 40 different volunteers and scientists. When lots of people agree on galaxy features - such as spiral arms - that gives scientists a clear picture of what's happening. When people classify the galaxy differently that gives us a clue that a particular galaxy might be showing something unique, like colliding and merging with a neighbouring galaxy.

IF YOU NEED SUPPORT OR HAVE QUESTIONS CONTACT US
ZOONIVERSEINSCHOOLS@PHYSICS.OX.AC.UK

THE COMPETITION

Budding astrophysicists learn about galaxies and then use the cutting-edge citizen science platform Zooniverse to help our researchers to classify real images from space telescopes!

LEARNING OBJECTIVES

- Be able to describe what a galaxy is*
- Understand that galaxies have different shapes and features*
- Apply knowledge of elliptical and spiral galaxies to make observations and categorise images*

BRONZE

Classify at least 20 galaxies from our schools' collection for a Bronze Galactic Explorers certificate!

Estimated time required: 3 HOURS

SILVER

Keep going and classify at least 15 galaxies from the more challenging images in the live galaxy zoo collection and you will get a Silver Galactic Explorers certificate!

Estimated time required: 3.5 HOURS

GOLD

Take it one step further and create your own mini-science communication project about galaxies in a format of your choice for a Gold Galactic Explorers certificate! What's more, the best 10 projects will win a £50 voucher for the science museum shop!

Estimated time required: 5 HOURS

TEACHER DELIVERY GUIDE

BRONZE CHALLENGE

Challenge your students to classify at least 20 galaxies from our schools collection for a Bronze Galactic Explorers certificate!

These images have been specially selected because they are clear and easier to classify. A great starting point for students to practice their newfound classification skills!

KIT LIST

- Classifications handouts
- Bronze classifications worksheet
- Internet-connected tablet or computer

STEP-BY-STEP INSTRUCTIONS

1 Before challenge week (1 hour)

- Use the PowerPoint provided to introduce the challenge. Once you have finished, gather and submit your students' questions for astrophysicist Alex Andersson.
- Join one of the introductory webinars (or watch a recording afterward). Meet astrophysicist Alex Anderson, find out about his work, and get ready for challenge week with a Galaxy Zoo tutorial. Sign up here

2 Challenge Week! Get classifying! (.1 hour)

- Give out the classification handout, the classification worksheet and an internet connected device (tablet or laptop)
- Direct students to <https://bit.ly/galacticbronze>
- Support students to complete 20 classifications or more and record their classifications and observations on the handout
- Allow time at the end for students to share their observations and their favourite galaxy with the rest of the class
- Complete this feedback form to get the printable certificates

3 Join the celebration webinar (1 hour) to hear about what scientists are doing with the classifications!

TEACHER DELIVERY GUIDE

SILVER CHALLENGE

Classify at least 10 galaxies from the live collection for a Silver Galactic Explorers certificate!

These images are of galaxies that are further away, they are less clear and more difficult to classify. A great follow-on for those that enjoyed the bronze challenge.

KIT LIST

- Classifications handouts
- Silver classifications worksheet
- Internet-connected tablet or computer

STEP-BY-STEP INSTRUCTIONS

1

Before challenge week (1 hour)

- Use the PowerPoint provided to introduce the challenge. Once you have finished, gather and submit your students' questions for astrophysicist Alex Andersson.
- Join one of the introductory webinars (or watch a recording afterward). Meet astrophysicist Alex Anderson, find out about his work, and get ready for challenge week with a Galaxy Zoo tutorial. Sign up here

2

Challenge Week! Get classifying! (.15 hours)

- Complete the Bronze Challenge activity
- Explain that those images are of nearby galaxies therefore the images from telescopes are a lot clearer than those of far away galaxies. Ask students if they found them easy to classify. Are they up for a real challenge? For the Silver challenge they are going to look at some images of far away galaxies and attempt to classify them. They might be a little bit blurry, but now they've had some practice they are pros!
- Direct students to <https://bit.ly/galacticsilver> and support students to complete at least 10 classifications
- Complete this feedback form to get the printable certificates

3

Join the celebration webinar (1 hour) to hear about what scientists are doing with the classifications!

TEACHER DELIVERY GUIDE

GOLD CHALLENGE

Now that students have become experts in classifying galaxies, it's time to tell the rest of the world all about them! In this challenge, students are asked to use their creativity and communication skills to create a project to spread the word about galaxies and Galaxy Zoo.

KIT LIST

- Galaxy Guru handout
- Internet-connected tablet or computer
- Pens, paper and imagination!

STEP-BY-STEP INSTRUCTIONS

1 Before challenge week (1 hour)

- Use the PowerPoint provided to introduce the challenge. Once you have finished, gather and submit your students' questions for astrophysicist Alex Andersson.
- Join one of the introductory webinars (or watch a recording afterward). Meet astrophysicist Alex Anderson, find out about his work, and get ready for challenge week with a Galaxy Zoo tutorial. Sign up here

2 Challenge Week! Get classifying! (2 -3 hours)

- Complete the Bronze and Silver Challenge activities
- Give out the Galactic Guru handout. Explain to students that a really important part of a scientist's job is communication. It's no good doing loads of amazing research and then not telling anyone about it! Explain to students that the researchers working on Galaxy Zoo need their help to tell everyone about what galaxies are, the different types of galaxies, and the Galaxy Zoo project.
- Tell students they can be as creative as they like, they could make a poster, a drawing, a poem or song, a presentation, or something else completely. And the best 10 projects from the competition will win a £50 voucher for the science museum online shop!
- Support students to complete their projects, take a photo or save the file, and submit it here to receive the printable certificates.

3 Join the celebration webinar (1 hour) to hear about what scientists are doing with the classifications!

HOW TO ENTER

- 1** Use the PowerPoint presentation to introduce the topic and the competition to your students.
- 2** Sign up to attend ONE of the 'Meet a Scientist' sessions with your students on the following dates, and submit your students' questions ahead of time here <https://form.jotform.com/233063464965361>
 - Tuesday 28 November @ 10 - 10.45am
 - Wednesday 29 November @ 12.30 - 1.15pm
 - Thursday 30 November @ 2 - 2.45pm
- 3** COMPETITION WEEK 4 - 8 Dec
Support students to classify galaxies on the Zooniverse platform using the instructions on pages 4 -6 of this

Complete this feedback form to get the printable certificates
<https://form.jotform.com/232982102601346>
- 4** BY 8 NOVEMBER (OPTIONAL EXTRA)
Support students to complete a mini project, using the guide on page 7
Take a photo of your students' project and submit it.
<https://form.jotform.com/232982102601346>
- 5** Join the celebration webinar to hear about how the data your students collected will be used and find out if your project won a prize!
 - Thursday 14 December 11am - 12 noon

HANDOUT

CLASSIFICATIONS

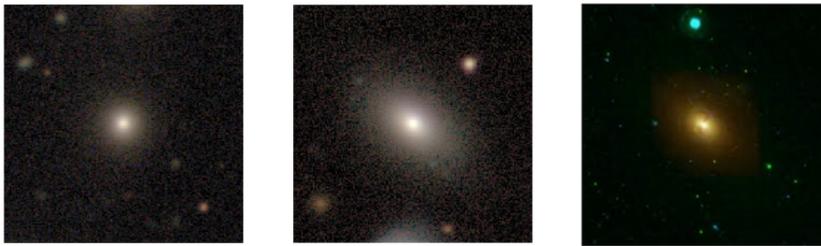
A galaxy is a huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity. Astronomers classify galaxies into two major categories: elliptical and spiral. These galaxies span a wide range of sizes, from dwarf galaxies containing as few as 100 million stars to giant galaxies with more than a trillion stars.

ELLIPTICAL, SPIRAL OR NOT A GALAXY?

1 SMOOTH EXAMPLES (ELLIPTICAL)

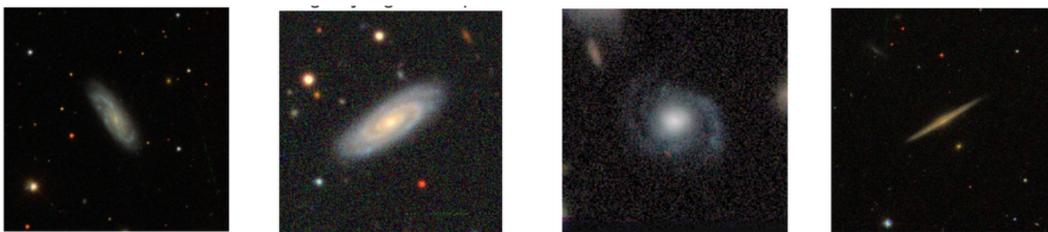
The galaxy gradually fades in all directions from the center.

There may be a small bright symmetric core.



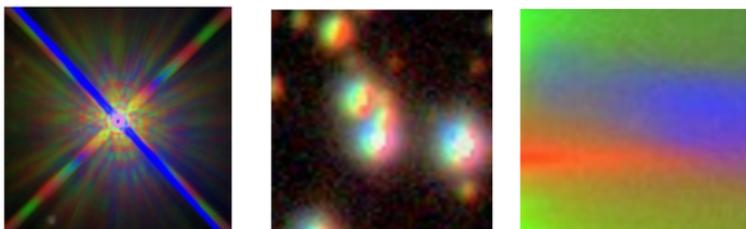
2 DISC OR FEATURES EXAMPLES (SPIRAL)

The galaxy has 'features', such as spiral arms, a 'bar' through the middle, or look like a disc on its side.



3 STAR OR ARTIFACT (NOT A GALAXY) EXAMPLES

Click this option when the image doesn't look like a galaxy at all.



WORKSHEET

CLASSIFICATIONS

Go to <https://bit.ly/galacticbronze> and classify at least 20 galaxies using what you have learned to get your Bronze certificate.

NAME _____

NUMBER	CLASSIFICATION	ANY INTERESTING OBSERVATIONS?
E.g. 1	Disc or features	<i>This one looks like a sprial with four arms and the colour looked blue.</i>

WORKSHEET

CLASSIFICATIONS

These images are further away so they are more difficult to classify than the Bronze challenge images, we really need you to use your best observation skills!

Go to <https://bit.ly/galacticsilver> and classify at least 10 galaxies using what you have learned to get your Silver certificate.

NAME _____

NUMBER	CLASSIFICATION	ANY INTERESTING OBSERVATIONS?
E.g. 1	Smooth	<u>This image had a very bright centre. and I can't see any features.</u>

HANDOUT

GALACTIC GURU SCIENCE PROJECT

A galaxy is a huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity.

Our Sun is in a spiral galaxy called the Milky Way. It is about half-way from the centre of the galaxy, on one of the arms. The Milky Way contains about 100 000 million stars. The universe is thought to contain 200 000 million galaxies, each with 100 000 million stars... That's a lot of stars!

Some galaxies are spiral-shaped like ours. Other galaxies are smooth and oval shaped. They're called elliptical galaxies. And there are also galaxies that aren't spirals or ovals. They have irregular shapes and look like blobs. The light that we see from each of these galaxies comes from the stars inside it.

The scientists on the Galaxy Zoo project want to understand more about the shape of different galaxies. Can you help them to spread the word?

TASK:

Create a communication project to help other students and members of the public to learn more about galaxies. Your project can be in a format of your choice. This could be a poster, infographic, poem/song, presentation, video or something else!

You might find the following links helpful to find information for your project.

- <https://hubblesite.org/science/galaxies>
- <https://imagine.gsfc.nasa.gov/science/objects/galaxies1.html>
- <https://www.livescience.com/why-are-galaxies-different-shapes.html>



TOP TIP!

Include your results and observations from the Bronze and Silver activities



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