

Student 1 Name: \_\_\_\_\_  
Student 2 Name: \_\_\_\_\_  
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## Exploring GalaxyZoo Online Lab

Due April 20, 2012

**This online lab will be graded out of 100 points (point values for each section and/or question are marked). You may work in groups of up to three students and turn in one report for your group.**

**Big Idea:** The countless galaxies of stars spread throughout the Universe have characteristics that can be observed and classified.

**Goal:** Students will conduct a structured series of scaffolded scientific inquiries about the nature of observed galaxies using the Internet sites prescribed, particularly the Sloan Digital Sky Survey via the original Galaxy Zoo [<http://zoo1.galaxyzoo.org/>]

### **Computer Setup:** (4 pts)

- a) Access <http://zoo1.galaxyzoo.org>  
b) (2 pts) Select REGISTER and set up a username as:  
    WHF \_\_\_\_\_  
    (where the five blanks are numbers) and a password that is identical to your username.  
    *Record this information in the box.*

Userid: WHF _____
Password: <i>same as above</i>
Email: _____
Security Question: _____
Answer: _____

- c) (1 pt) Use one of your team member's email addresses. *Record it in the box.*  
d) (1 pt) Create and enter a security question and answer. *Record it in the box.*  
e) Select CREATE USER and, when set up, select CONTINUE.

### **Background Information** (20 pts)

1. (10 pts) From your book, your class notes, or from the Internet, find a reasonably good definition of a galaxy and write it in the space below. *Include one rough sketch of what one looks like.*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

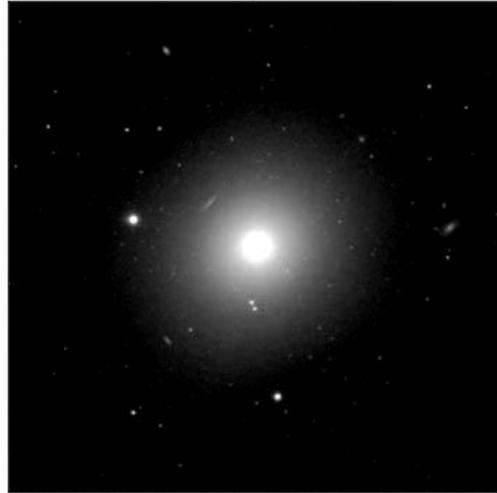


Group Member Names: \_\_\_\_\_

2. (10 pts) Imagine that each of the images below shows a single galaxy of billions of stars.



**Spiral Galaxy**



**Elliptical Galaxy**

In the space below, create a detailed listing of the characteristics of each that allow you to distinguish one galaxy from the other.

Observable Characteristics of a Spiral Galaxy	Observable Characteristics of an Elliptical Galaxy

Group Member Names: \_\_\_\_\_

### **GalaxyZoo Tutorial (12 pts)**

After logging into <http://zoo1.galaxyzoo.org>, select HOW TO TAKE PART and complete the online TUTORIAL, completing the tables below as you go along.

#### 3. (1 pt) TUTORIAL PART 1A: SPIRAL or ELLIPTICAL


First record your answers in the blocks above. Then, check your answers and in the event your answer does not agree, mark a single line through your response. *There is no penalty for having an incorrect answer.*

#### 4. (1 pt) TUTORIAL PART 1B: SPIRAL or ELLIPTICAL


First record your answers in the blocks above. Then, check your answers and in the event your answer does not agree, mark a single line through your response. *There is no penalty for having an incorrect answer.*

#### 5. (1 pt) TUTORIAL PART 1C: MERGING or NOT MERGING


First record your answers in the blocks above. Then, check your answers and in the event your answer does not agree, mark a single line through your response. *There is no penalty for having an incorrect answer.*

#### 6. (1 pt) TUTORIAL PART 1D: SPIRAL or ELLIPTICAL


First record your answers in the blocks above. Then, check your answers and if your answer does not agree, mark a single line through your response. *There is no penalty for having an incorrect answer.*

#### 7. (1 pt) TUTORIAL PART 2B: CLOCKwise or ANTI-clockwise or EDGE on/can't tell


First record your answers in the blocks above. Then, check your answers and in the event your answer does not agree, mark a single line through your response. *There is no penalty for having an incorrect answer.*

#### 8. (1 pt) TUTORIAL PART 3: GALAXY or —"??"


First record your answers in the blocks above. Then, check your answers and in the event your answer does not agree, mark a single line through your response. *There is no penalty for having an incorrect answer.*

Group Member Names: \_\_\_\_\_

10. (5 pts) At the bottom of the HOW TO TAKE PART – TUTORIAL page, select the PROCEED TO THE TRIAL button. Your team will be asked to fully classify 15 galaxies. If your classification agrees with scientists’ classifications 8 or more times, you will be able to enter the GalaxyZoo scientific database to conduct your research. You can repeat this step if necessary.

Record the results of your TRIAL data collection here:

	<b>CIRCLE ONE</b>		
Image #1	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #2	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #3	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #4	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #5	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #6	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #7	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #8	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #9	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	

Group Member Names: \_\_\_\_\_

	<b>CIRCLE ONE</b>		
Image #10	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #11	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #12	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #13	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #14	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	
Image #15	Clockwise Spiral	Anticlockwise Spiral	Edge On Unclear
	Elliptical Galaxy		
	Star Don't Know	Merging Galaxies	

11. (1 pts) Rate the relative DIFFICULTY your team has distinguishing the following by circling one on each line.

<i>Rate the difficulty of classifying each of the following:</i> <i>Circle one</i>	Nearly Impossible	Challenging	Some easy, some not	Pretty Easy
Elliptical Galaxies	Imposs.	Chall.	Varies	Easy
Spiral Galaxies	Imposs.	Chall.	Varies	Easy
Edge-on Spiral Galaxies	Imposs.	Chall.	Varies	Easy
Merging Galaxies	Imposs.	Chall.	Varies	Easy
Stars	Imposs.	Chall.	Varies	Easy
Cosmic Rays or Satellite Streaks	Imposs.	Chall.	Varies	Easy

Group Member Names: \_\_\_\_\_

**Does the Evidence Match the Conclusion?** (44 pts)

12. (15 pts) Enter the GALAXY ANALYSIS Galaxy Zoo scientific database and classify thirty (30) images. Keep a record of your results in the Tally Sheet below using tick marks.  After you have classified 30 galaxies, click on “**Show My Galaxies**” on the left hand side of the screen and print your lists of “Recent Galaxies WHFXXXXX has Analyzed.” Attach these to the end of your lab guide.

Clockwise Spiral	Anticlockwise Spiral	Edge On	Unclear
Elliptical Galaxy			
Star	Don't Know	Merging Galaxies	

Consider the research question, “**What type of galaxy is most common?**”

13. (3 pts) How many total galaxies did you classify (exclude “Star/Don't Know” from this total)? \_\_\_\_\_

14. (9 pts) What was the total number of:

a. elliptical galaxies? \_\_\_\_\_

b. spiral galaxies? \_\_\_\_\_

c. merging galaxies? \_\_\_\_\_

*(Note: you need to sum up all three sub-types of spirals to get the total numbers of spirals in your data.)*

15. (9 pts) What percentage of the galaxies in your survey were

a. elliptical galaxies? \_\_\_\_\_

b. spiral galaxies? \_\_\_\_\_

c. merging galaxies? \_\_\_\_\_

16. (3 pts) What type of galaxy did you find to be the most common? \_\_\_\_\_

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17. (5 pts) If a student proposed a generalization that “**most galaxies are elliptical,**” would you *agree* or *disagree* with the generalization based on the evidence you collected? *Explain your reasoning and provide specific evidence from your observations.*

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**What Conclusions Can You Draw From the Evidence?** (20 pts)

Galaxies are observed to have numerous different shapes. Consider the research question, “**which direction do spiral galaxies usually spin?**”

For this part of the exercise, we will use the following data collected by a student from Galaxy Zoo.

Clockwise Spiral	Anti-clockwise Sprial	Edge-on/Unclear
30	27	16

18. (3 pts) What was the total number of spiral galaxies classified by this student? \_\_\_\_\_

19. (12 pts) What percentage of spiral galaxies in the data table

- a. rotate clockwise? \_\_\_\_\_
- b. rotate anti-clockwise? \_\_\_\_\_
- c. are edge-on or have an unclear direction of rotation? \_\_\_\_\_

20. (5 pts) What conclusions and generalizations can you make from your data in terms of DO SPIRALS GENERALLY SPIN CLOCKWISE OR ANTI-CLOCKWISE?

*Explain your reasoning and provide specific evidence either from the above questions or from evidence you yourself generate using GalaxyZoo.*

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