

## How to Play



Scan the QR Code above to read the rules and learn how to play.

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## Target Types



### Galaxy

A huge collection of gas, dust, and billions of stars all held together by gravity.



### Star

Giant spheres of hot plasma, mostly made of hydrogen and helium.



### Nebula

Giant clouds of dust and gas in space.



### Planet

A celestial body that orbits around a star.

## Data Types



### Image

A picture captured through a telescope.



### Spectrum

The brightness of an object as measured over a range of wavelengths (colors).



### Timeseries

A series of measurements which shows how an astronomical object changes over time.



### Catalog

A large table of calculations and other properties taken from astronomical data.

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# **GALEX**

- SPACE TELESCOPE -



Ultraviolet Telescope

# **Hubble**

- SPACE TELESCOPE -



Ultraviolet Telescope

Optical Telescope

# **James Webb**

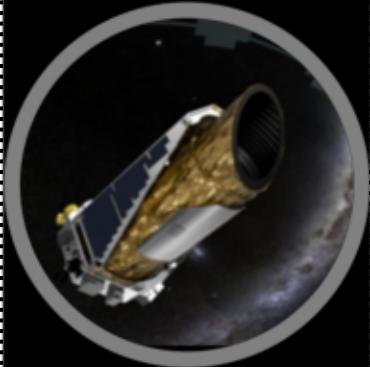
- SPACE TELESCOPE -



Infrared Telescope

# **Kepler**

- SPACE TELESCOPE -



Optical Telescope

# **IUE**

- SPACE TELESCOPE -



Ultraviolet Telescope

# **TESS**

- SPACE TELESCOPE -



Optical Telescope

# **Spitzer**

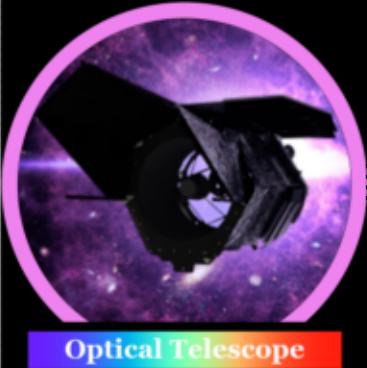
- SPACE TELESCOPE -



Infrared Telescope

# **Roman**

- SPACE TELESCOPE -



Optical Telescope

Infrared Telescope





## Exoplanet Kepler-16b

## TW Hydrae

## Stephan's Quintet



B

C

2021



## Butterfly Nebula

## Andromeda Galaxy

## Horsehead Nebula



## Pillars of Creation

## Dark Nebula

## Apep Star System





## Mars



## Orion Nebula



## Sagittarius C



## Saturn



## NGC 376



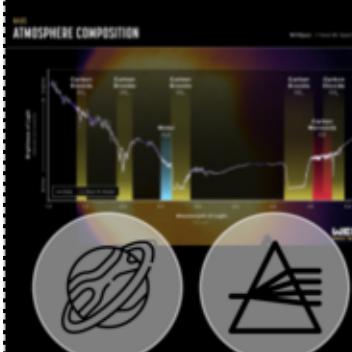
## Galaxy Merger ZW-096



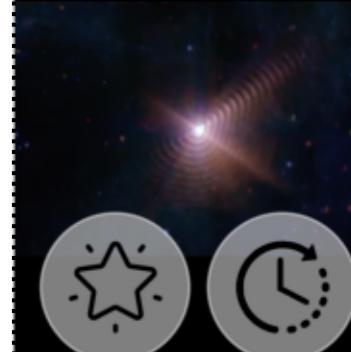
## Whirlpool Galaxy



## Martian Atmosphere



## Wolf Rayet Star





## Tarantula Nebula



## Westerlund 2



## Sombrero Galaxy



## Exoplanet GJ-386b



## Andromeda Galaxy



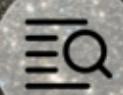
## Neptune



## Cassiopeia A



## Hercules Cluster



## Ring Nebula

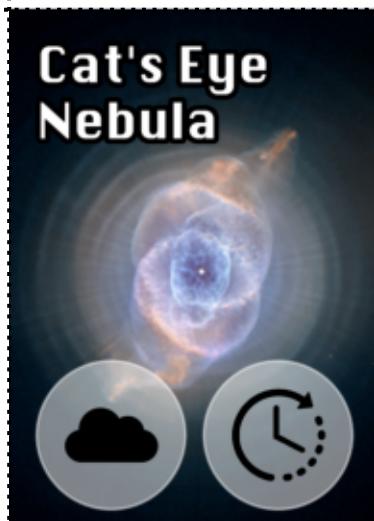




## Herbig-Haro Object



## Cat's Eye Nebula



## AG Carinae



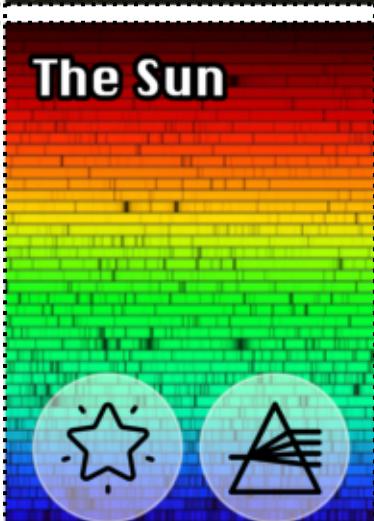
## Moons of Jupiter



## Messier 101



## The Sun



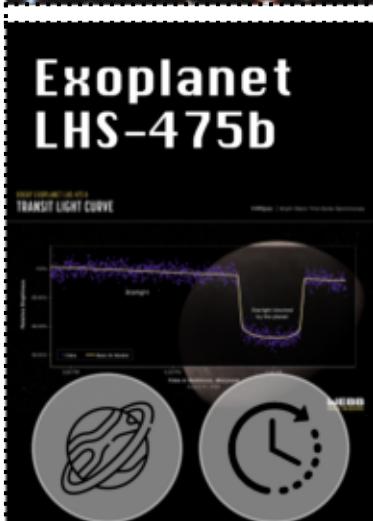
## CW Leonis



## Deep Field



## Exoplanet LHS-475b





## NGC 1087



## Crab Nebula



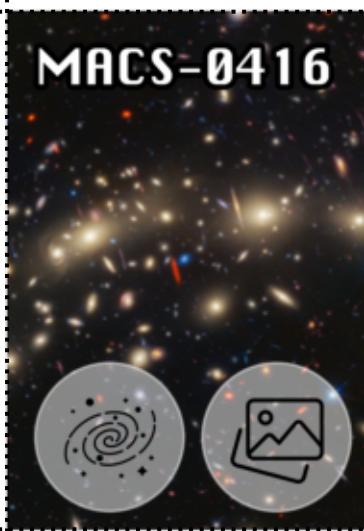
## Bullet Cluster



## M81 and M82



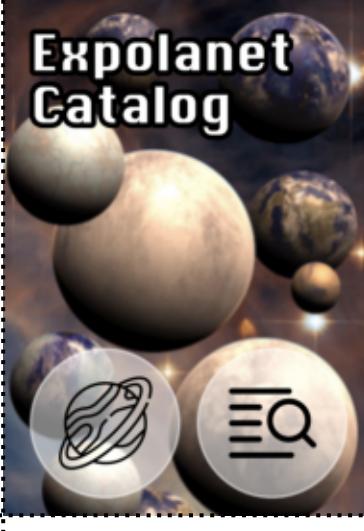
## MACS-0416



## Carina Nebula



## Exoplanet Catalog



## Cepheid Variable



## Exoplanet WASP-39b





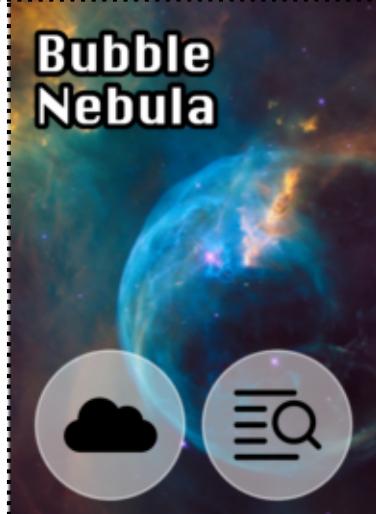

## Shoemaker Levy



## Jupiter



## Bubble Nebula



## Alien Weather Report

### Ultraviolet Science Goal

Measure the composition of an exoplanet's atmosphere

4



## The Stars Are Born

### Infrared Science Goal

Observe ongoing star formation inside of four different nebula to research star formation

6



## Binary Stars

### Optical Science Goal

Study a binary star system with a star's spectrum and light curves

4



## Photometry

### Optical Science Goal

Take a lot of images!

6



## Asteroid Impact

### Ultraviolet Science Goal

Observe an meteoroid hitting a planet with time series data of our Solar System

5



## Exoplanet Hunter

### Optical Science Goal

Collect time series data to detect exoplanets around a star

4



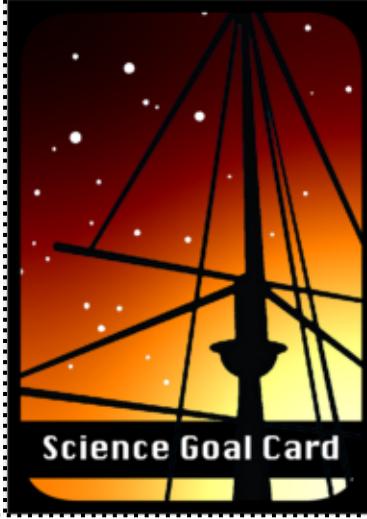
## Source Catalogs

### Ultraviolet Science Goal

Make a lot of catalogs!

6





## Galactic Hotspots

### Ultraviolet Science Goal

Find Where Stars Are Forming  
In A Nearby Galaxy

4



## Ultraviolet Data Archive

### Ultraviolet Science Goal

Collect one of each data type to  
win 3 science points

3



## Stellar Jets

### Ultraviolet Science Goal

Observe the jets thrown off by  
young stellar objects

5



## Stellar Graveyard

### Optical Science Goal

Characterize different types of  
supernova by observing the  
remnants of dead stars in  
nebulae

5



## Ultraviolet Sky Survey

### Ultraviolet Science Goal

Collect one of each object type  
to win 3 science points

3



## Spectroscopy

### Infrared Science Goal

Take a lot of spectra!

6



## Astereoseismology

### Optical Science Goal

Collect two star time series to  
study different types of variable  
stars

5



## Stellar Populations

### Ultraviolet Science Goal

Observe four different stars to  
measure their properties and  
learn about stellar populations

6



## Gravitational Lensing

### Infrared Science Goal

Use Gravitational Lenses To  
Study A Distant Galaxy's  
Properties

5





## Black Hole Indigestion

### Ultraviolet Science Goal

Monitor A tidal disruption event near the center of a galaxy

5



## The First Stars

### Optical Science Goal

Find the oldest stars in the galaxy to understand the history of the Milky Way

5



## High Redshift

### Infrared Science Goal

Observe four different galaxies to study the history of the Universe.

6



## Solar System

### Optical Science Goal

Observe four different planets to research how the Solar System was formed

6



## Galaxy Mergers

### Optical Science Goal

Study two galaxies that are merging together

5



## Dust Maps

### Infrared Science Goal

Catalog different nebula to determine where the dust is in the Milky Way

5



## Eye of The Storm

### Ultraviolet Science Goal

Find out what's at the center of a planetary nebula

5



## Cosmic Web

### Infrared Science Goal

Study the large scale structure of the Universe with catalogs of galaxies

5



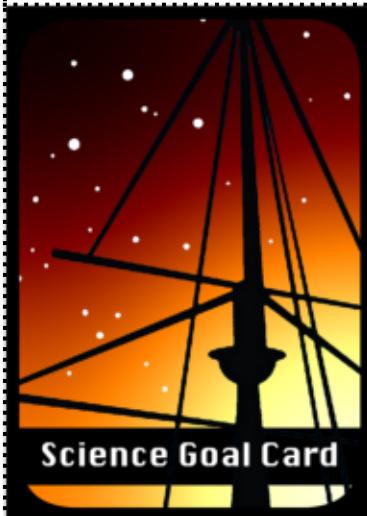
## Messier Catalog

### Optical Science Goal

Build a list of Messier objects by taking images and cataloging nebula

4





## Infrared Sky Survey

### Infrared Science Goal

Collect one of each object type to win 3 science points

3



## Infrared Data Archive

### Infrared Science Goal

Collect one of each data type to win 3 science points

3



## Interstellar Dust

### Infrared Science Goal

Study the gas between galaxies by observing galaxies and nebula

4



## Build-a-Galaxy

### Ultraviolet Science Goal

Study the star formation history of a galaxy by determining what kinds of stars it is made of

4



## Brown Dwarfs

### Infrared Science Goal

Study star formation inside nebulae to characterize brown dwarfs - are they planets or stars?

4



## Drake Equation

### Optical Science Goal

Estimate The Number of Habitable Earth-like Planets In The Milky Way by cataloging planets

5



## Mapping the Galaxy

### Infrared Science Goal

Map the Milky Way with large catalogs of stars

5



## Light Curves

### Optical Science Goal

Take a lot of light curves!

6



## The Dark Side

### Infrared Science Goal

Darkness here and nothing more. Study massive, cold dark nebulas.

5





## Methane Clouds

### Infrared Science Goal

Cloudy with a chance of Methane! Study the chemical composition of clouds on other planets

5



## Planet Formation

### Ultraviolet Science Goal

Study planet formation by observing planets in our solar system

5





## Deprecated Code

Play Later

When another player tries to collect an Observation Card, play this card to immediately make them discard it. They do not get any points for that Observation Card, and must still return the Telescope they used to the Telescope Row.

## Micrometeoroid Strike

Play Immediately

A telescope's mirror was just hit by a micrometeoroid! Place this card on top of one of the telescopes in the Telescope Row. No one can use this telescope until this card is discarded, which happens at the end of your next turn.

## Servicing Mission

Play Later

Your telescope gets an upgrade! When you play this card during an Observing Action, you can pick two cards from the Observation Row instead of one.

## Long Exposure

Play Later

When you play this card, choose two observations from the visible sky row using the same telescope, and then skip your next turn.

## Not Enough Coffee

Play Immediately

nan

## Conference Meeting

Play Later

Choose a card from another players observation row and replace it with one of your own

## Jupyter Notebook

Play Immediately

Choose one of your science goals, and place this card on top. You need one less card than usual to complete this science goal. For example, if you need 4 cards to complete the goal, you now only need 3.

## Proposal Deadline

Play Immediately

A big observing proposal is due this week! You skip your next turn. Keep this card in front of you as a reminder, and discard it at the end of your next turn.

## Target of Opportunity

Play Immediately

This card is a wildcard. Treat this as any target type, data type, and wavelength, and immediately play it towards one of your science goals.





## Press Release

Play Later

Host a press release to tell the world about your new result! When you complete your next science goal, reveal this card to immediately score an additional 2 points.



2

## Public Data

Play Later

Steal any observation card from another player. You can play the new card on any of your Science Goals Immediately, regardless of wavelength.

## Corrupted Data

Play Later

When another player tries to collect an Observation Card, play this card to immediately make them discard it. They do not get any points for that Observation Card, and must still return the Telescope they used to the Telescope Row.

## All-Nighter

Play Later

You decide to sacrifice sleep to get extra work done. Play this card at the beginning of one of your turns. You may take one additional action on your turn, for a total of two actions."

## Cloud Computing

Play Later

Thanks to the power of Cloud Computing, you are able to complete your research more quickly. All of your Science Goals are now worth one additional point.



+ 1

## Nobel Prize

Play Immediately

You win the Nobel Prize for your research. When you play this card, immediately score 5 points.



5

## Code Doesn't Compile

Play Immediately

Choose one of your science goals, and place this card on top. You need one more card than usual to complete this science goal (for example, if you need 4 cards to complete the goal, you now need 5)

## Dual Telescopes

Play Later

On your next turn, choose two telescopes. You may use both for observations for the duration of that turn. Discard this card.

## Grant Funding Ending

Play Immediately

Your grant funding runs out, forcing you to start on a new project. Discard one science goal of your choice (and any observation cards linked to it), and draw a new Science Goal to replace it.



## Proprietary Data

### Play Immediately

Look through the Observation Card draw pile and choose any card you would like. Play it towards any one of your science goals, but hide it underneath this card so the other players can't tell what it is. Re-shuffle the deck once you're done.

## Open Source Collaboration

### Play Later

Mirror an opponent's card (?)

## Hire a Student

### Play Later

Hire a graduate student to get more work done! Look through the draw pile and choose any card you want. Add the selected card to one of your science goals, and then discard this card and reshuffle the draw pile.

## Too many tabs open

### Play Immediately

You have too many tabs open and can't find where you saved your data! Choose one observation card from any of your science goals, and return that card to the bottom of the deck.

## High Solar Winds

### Play Immediately

High radiation causes your observation to fail; skip your next turn. Keep this card in front of you as a reminder, and discard it at the end of your next turn.

## Guiding Failure

### Play Later

The telescope failed to acquire guide star. If you have a telescope card currently in play, return it to the telescope row immediately.

## Telescope Malfunction

### Play Immediately

If you have a telescope card, return it to the Telescope Row now without collecting any observations.

