

Celestial Treasure Hunt

How Do Stars and Planets Form?

About the Activity

Participants tour the telescopes to hunt for different objects that contribute to stellar and planetary formation, using a Treasure List. Participants can mark each item with a pen or pencil or sticker. When all the items on the handout are found, one of the astronomers signs off on it.

Topics Covered

- An overview of how stars and their planets form
- Find objects in the telescope that illustrate this process

Materials Needed

- 1 copy of the Treasure Hunt Handout for each participant
- Telescopes
- Pen or pencil for each participant
- (Optional) Observers Cards from the Night Sky Network:

nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=529

Set Up

Ask each astronomer to point at one of the types of objects listed on the handout. See the Activity Description and Background Information for more details and suggestions.

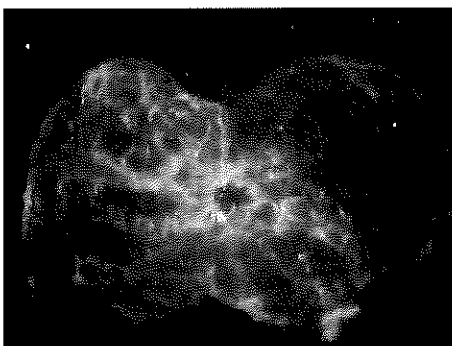


Photo Credit: NASA/Spitzer

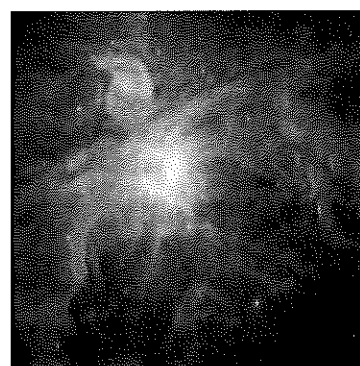


Photo Credit:
NASA/Hubble/Spitzer

Participants

Adults, teens, families with children 5 years and up

If a school/youth group, ages 9 and higher

No minimum or maximum number of participants

Location and Timing

Use with telescopes at a star party.

Can last as long as participants want to observe, usually an hour to find the objects.

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Detailed Activity Description

Leader's Role	Participants' Roles (Anticipated)
Preparation Notes: <u>To Do:</u> 1. Each participating amateur astronomer may pick any object(s) he or she wishes to show and that his or her telescope is capable of viewing. 2. Prepare the astronomers by giving each person a copy of the Treasure Hunt Handout. Explain that your visitors will have these and be on a "treasure hunt" to look at these objects. The information on the Treasure Hunt Handout may give each astronomer some talking points about their object. The PlanetQuest Observer Cards are a perfect compliment to the Treasure Hunt, with talking points about each object. Find those here:	
<u>Note:</u> If examples of one or more of the objects on the Treasure List are not accessible (sky too bright, out of range of the telescopes, no examples far enough above the horizon) of the items on the Treasure List, you can have someone explaining about the object (e.g. supernova remnant Crab Nebula) and indicating its position in the sky if it was dark enough to see it, or when you would be able to see it.	
<u>Introduction:</u> Introduce the activity and explain to the participants what to expect. You can use the following script, if you wish: <u>To Say:</u> Tonight, you will be on a treasure hunt as you tour the telescopes. You can find many different and exotic objects found in our Galaxy that contribute to the formation of stars and planets. Travel from telescope to telescope and hunt for these amazing objects. You will receive a Treasure List and pen. For each object on the Treasure List that you see through a telescope, record your observation. (Hold up the Treasure List)	Participants tour from one telescope to another to view different objects in the night sky. At each telescope, participants can place a sticker on their Treasure List next to the object they viewed.



<u>To Say (continued):</u> When you have found all the items on the Treasure List, take the List to any one of the astronomers and he or she will sign off on your Treasure List. Look up at all the stars. Where do you think they come from? Have they always been there? How many of these do you think we will find planets around – like the planet you are standing on? Tonight, you will see a star, other than our own Sun, that actually has been found to have planets orbiting around it. You won't be able to see the planets themselves, but as you gaze at the star, imagine the kinds of planets orbiting the star – does it have any planets like ours? Any with life? The more we study the stars, the more planets we are finding. So enjoy your treasure hunt and discover the secrets of the sky! You may pick up your Treasure Lists and pens...<indicate how you are distributing the Treasure Lists and stickers>. <u>Or, even more simply:</u> Did you know that the calcium in your bones and the oxygen you breathe were formed inside of a star? Here's a Treasure List to take on a treasure hunt through the telescopes to view objects in the sky that make stars like our Sun and planets like the Earth we're standing on. Record each object you see in the box.	Discuss questions
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Helpful Hints

You can also use stickers to mark each object the participants view.

Background Information

Please Note: Not all objects needed for the Treasure Hunt are visible in the sky all year around (see **NOTES** below). Examples of objects in each category on the Treasure List:

Supernova Remnant:

M1: Crab Nebula

NGC 6960 & NGC 6992: Veil Nebula

NOTE: There are no “Supernova Remnants” visible through amateur telescopes from about **mid-April to the end of June** in the early evening (before 11 p.m.). The Crab Nebula is no longer visible after mid-April and the Veil Nebula does not get high enough to be seen (and only under very dark skies) until the beginning of July.

Planetary Nebula:

M57: Ring Nebula

M27: Dumbbell Nebula

NGC 2392: Eskimo or Clown Nebula

Clouds of Gas and Dust (star forming regions):

M8: Lagoon Nebula

M20: Trifid Nebula

NGC 7000: North American Nebula

M42: Orion Nebula

NOTE: There are no “Clouds of Gas and Dust” visible through amateur telescopes from **May to the end of June** in the early evening (before 11 p.m.). The Orion Nebula is no longer visible after the end of April and the Lagoon (M8), the Trifid (M20), and the North American Nebula (NGC 7000) all start coming into view toward the end of June.

Open Star Clusters:

M11: Wild Duck

M45: Pleiades

NGC 869 and 884: Perseus Double Cluster

A Star with Planets:

See the star maps in the Night Sky Network Activity: “Where are the Distant Worlds?”

A Planet Orbiting our Sun:

Check your favorite astronomy reference or magazine for star maps that show planets visible at the time you are observing.

HUNT

See these through binoculars or a telescope:

Star Nursery These newborn stars are wrapped in a warm haze of gas and dust.

I saw...



Planetary Nebula The symmetry of gas from dying stars makes beautiful viewing.

I saw...



Supernova Remnant While it's unlikely you'll see a star go supernova tonight, you can still see the ghostly remnants of past explosions.

I saw...



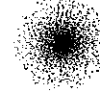
Double Star Imagine living on a planet orbiting more than one star!

I saw...



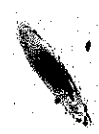
Globular Cluster These dense groups of stars are like swarms of bees orbiting our galaxy.

I saw...



Another Galaxy This is the farthest object we can see. Everything else you've seen is part of our own galaxy.

I saw...



PLANETQUEST

THE SEARCH FOR ANOTHER EARTH

This cosmic recycling process is happening all over our **galaxy** and in galaxies across the Universe, creating the building blocks for new stars, planets, and moons.

NASA scientists are discovering a multitude of **exoplanets** - planets around **distant stars**. In fact, it appears that most stars host planets!

Access the latest discoveries:

planetquest.jpl.nasa.gov

If you don't see all of the objects on the Treasure Hunt tonight, ask us when you can see more.

Find astronomy clubs and upcoming events near you with the NASA Night Sky Network:

nightsky.jpl.nasa.gov

National Aeronautics and
Space Administration



CELESTIAL TREASURE HUNT

Have you heard that we're made of stardust? It's true! The material that makes up our Sun and all the planets in our Solar System, including Earth, was once buried inside other stars.

Our Solar System is not alone. The Universe recycles old stars to make new stars and planets throughout our galaxy and beyond.

Looking up, you can see the steps in this process. **See how many pieces of the story you can find in the sky tonight.**

You may be surprised to see how much you can spot just looking up. The first 5 objects are easy to see without a telescope, if you know where to look. Then treat yourself to a look through binoculars or a telescope for some sights you won't see every night.

Note which example you observed in the space provided.

TREASURE

There are many objects visible in the sky without any help from binoculars or telescopes. If you know where to look on a clear dark night, you can **find these things with your eyes alone:**

A Moon Earth's Moon is the easiest thing to find, if it's up! Did you know you could see some moons of other planets with binoculars?



I saw...

Planet (not Earth) While you can see a few with your eyes alone, look through a telescope for a real treat!



I saw...

Star with Planet Our Sun is not the only star with planets. You can even see some of these stars tonight.



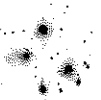
I saw...

Red Stars Did you know stars are different colors? See if you can find a red star. (Don't be fooled by Mars!)



I saw...

Open Cluster Once you find this loose group of stars, you'll want to see more with binoculars or a telescope.



I saw...

The Universe is a huge cosmic recycling factory, constantly creating stars and planets. Here's how it works:

Stars are born in clouds of gas and dust, like those seen in the **star nursery**. Many of these stars, like our Sun, are born nurturing **planets** and **moons** in orbit around them. As they become "teen-agers," they blow off the gas and dust surrounding them, and are found grouped together in **open clusters**. Eventually they take off on their own (or as **double stars** and sometimes in groups of 3 or more!). A star like our Sun stays quite stable for a very long time. But as it nears the end of its life, it gets big and bloated, becoming a **red giant** star. As this giant star dies, it throws off gas and dust and forms a **planetary nebula**.

The biggest stars are rare and live short lives that end differently from all other stars. They finish their lives in a giant explosion called a **supernova**. This flings gas and dust into the surrounding space, eventually creating a new **star nursery** and starting the process again. The calcium in our bones and iron in our blood were once part of these large stars!

