

What is a Star?

Amount of time for this lesson = 30-45 minutes X 2 days. 4th Grade

1. Standards and Safety and Materials:

A. Standards – Wyoming State Standards SC4.1.5 Objects in the Sky: Students describe observable objects in the sky and their patterns of movement.

SC4.1.6 Change in Earth and Sky: Students describe observable changes in earth and sky, including rapid and gradual changes to the earth's surface, and daily and seasonal changes in the weather.

CCSS- RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

L.4.3- Use knowledge of language and its conventions when writing, speaking, reading, or listening.

SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

B. Safety Concerns: minimal safety concerns with regular class activity

C. Materials:

- a) Classroom Planetarium
- b) 4-square worksheet
- c) Computer w/ internet
- d) YouTube Access
- e) Index Cards
- f) Flashlight
- g) iPads
- h) Socrative App
- i) Brainpop.com subscription

2. Objectives:

A. SWBAT... **describe** the characteristics of a star.

B. SWBAT... **distinguish** the sun as a star.

C. SWBAT... **defend** the misconception that stars do not shine during the daytime.

3. Connections, Misconceptions, and Crosscutting Concepts:

A. Real world connections: Astronomers, Weather, Camping (Time and Seasons)

B. Student connections: Students will understand what they are seeing in the night sky.

C. Misconceptions:

Stars are brighter because they are larger.

Stars only shine at night.

Polaris, the North Star, is the brightest star of the nighttime sky.

D. Crosscutting Concepts: Patterns in the natural world can be observed and used as evidence. Many events are repeated.

E. Academic Language: diagram, distinguish, defend- Students will be required to use these terms in our discussions to describe what they have learned.

4. *Catch/Engagement*: Using a classroom planetarium I will shine the stars onto the ceiling with the lights off for the students to observe when they come inside from lunch. A classroom planetarium can be found at the link below.

http://www.target.com/p/ioptron-livestar-mini-planetarium-blue/-/A14502528?reco=Rec|pdp|14502528|ClickCP|item_page.vertical_1&lnk=Rec|pdp|ClickCP|item_page.vertical_1

5. Pre-test: 4 square-(Term- STAR / **Construct** a picture or diagram/ **Develop** a description or definition/ **Write** related terms)

6. *Activity/Exploration*:

Part 1: Classroom Planetarium/ Pretest

X – **Observe** what they see displayed on the classroom ceiling. (2-3 mins)

Y – Pre-test, students should work independently to complete the pre-test. (12-15 min)

Part 2: Class Discuss/ Lecture- Students will **describe** what they know about a star or make a prediction about stars. (5 min)

Part 3: Lab Centers/Stations (10-12 min per station)

M – Stars in the Day Sky- complete the stars activity and questions

N – Life Cycle of a Star- watch Brainpop.com video on iPad and take quiz

O- All about the Sun- Read the passage about the Sun's life cycle then Sketch and color the sun's life cycle.

Part 4: Discussion -Students will **list** and **describe** characteristics of a star. (5 min)

7. *Review/Essential Questions/Explanation*: Group test with iPad (5 min)

A. Low Level – Describe a star.

B. Middle Level – Explain why you can see more stars on a clear night rather than a foggy night.

C. High Level – Compare other stars size to the size of the Sun. Why does the Sun seem so much larger than the other stars, when it is actually a great deal smaller?

8. *Assessments (Post-test)/Evaluation*- 4 square-(Term- STAR / **Construct** a picture or diagram/ **Develop** a description or definition/ **Write** related terms)

A. Formative: Monitor stations and question students as they work.

B. Post-test: Same as pre-test

C. Explain how the data will inform tomorrow's teaching.- Day 1 will include Catch, Pre-test, and discussion. This will allow me time to look at the pre-test before moving on to our stations. At the beginning of day to we can have a short discussion to identify any misconceptions.

9. Timeline:	A. Catch	2-3 min
	B. Pre-test	12-15 min
	C. Activity	40-45 min
	D. Review	5 min
	E. Post-test	10 min

10. *Enrichment/Elaboration*: Read an article then write a paragraph about black holes.

11. IEP Accommodations/Differentiation/Diversity: What accommodations will you use to support

Term: Star	Definition/Description:
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struggling learners? Ability grouping- high achieving students partnered with a lower achieving student.

Related Terms:	Diagram/Picture
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Black Holes Paragraph

You may have heard of black holes in science fiction novels, movies, or TV. Read the following article about black holes and write a paragraph that explains what a black hole is.

What are black holes?

Have you ever had to vacuum your bedroom? When you do, watch closely because you will see the dirt and crumbs start to move towards the vacuum cleaner. A black hole is similar to a vacuum cleaner, cleaning up debris left behind in outer space.

However, it is not suction power that makes things fall into a black hole. Suction would not be strong enough. Instead, a black hole uses the power of gravity to pull things towards it.

How do black holes form?

When a large star runs out of fuel, or dies, it can no longer support its heavy weight and leaves behind a black hole. The pressure from the star's massive layers of hydrogen presses down forcing the star to get smaller and smaller and smaller.

How can something get smaller but retain the same amount of mass, or stuff?

It is really quite simple. If you take a sponge the size of a soda can, you can easily squish it in your hands until it is completely covered. But here is the interesting part. If you make something smaller by squishing it, its gravity becomes much stronger. Imagine then, if you squish a star how powerful its gravity would

Stars in the Day Sky Station

Directions:

- 1. Place index card into the envelope (index cards SHOULD have holes in them).
- 2. Turn the flashlight on and hold it to the envelope with the flashlight about two inches from the front.
- 3. Move the flashlight to the back and shine it onto the envelope about two inches behind it.
- 4. Complete the questions below.

I. Describe what happened when you put the flashlight in front of the envelope.

II. Describe what happened when you put the flashlight behind the envelope.

III. Do the stars shine all the time?

IV. Why is it hard to see them during the daytime?

All about the Sun

Read the following passage and complete the activity discussed at the end.

The Life Cycle of a Star:

A Focus on the Sun

What is a STAR?

STARS

A star is a big ball of gas that gives off heat and light. Stars are formed from gravity and dust in outer space. Stars evolve, or change, over time. It may take millions of years or it may take billions of years for a star to complete its life cycle.

There are many types of stars.

Can you think of a star?

Here's a Hint

THE SUN

The sun is star!

The Sun is by far the largest object in the solar system. It contains more than 99.8% of the total mass of the Solar System.

The sun provides life for Planet Earth.

How would life on Earth be different without the sun?

Would there even be life?

How old is the Sun?

Scientists suspect that the sun is almost 4.6 billion years old. Scientists also believe that the sun has enough fuel in it to live on for about 5 billion more years.

The Sun is our own special star yet, as stars go, it is a very average star. There are stars far brighter, fainter, hotter and cooler than the Sun.

The SUN

Medium mass stars, like our Sun, live by burning the hydrogen that dwells within their cores, turning it into helium. This is what our Sun is doing now. The heat the Sun generates by its nuclear fusion of hydrogen into helium creates an outward pressure. In another 5 billion years, the Sun will have used up all the hydrogen in its core.

The Life Cycle of a Star like the Sun

A Star is Born!

A star is formed from a nebula. A nebula is an interstellar cloud of dust and plasma. A nebula is also known as a stellar nursery.

The SUN

The Sun is a great ball of gas held together by equal forces. Inside the sun is burning gases like hydrogen and helium. When these gases are burned they push outward. The force of gravity pushes inward. When the forces are equal then an object is stable.

How Does a Star Die?

When a star runs out of fuel it dies because the inside force of burning the fuel is not equal to the gravity pushing on it from the outside.

When a main sequence star like the sun begins to die it will turn into.....

A Giant!

No, no, not that type of a giant, the sun will turn into a

RED GIANT!

What is a Red Giant?

A Red Giant is a star like the sun when it begins to die. Because the star has run out of fuel, it begins to cool, and contract. The core of the star is now hotter because of the unequal force of gravity pushing on the star. The star becomes a red giant.

What Next?

We already know that medium mass stars, like our Sun, become red giants. But what happens after that? Well, our red giant Sun is still eating up helium and cranking out carbon. But when it's finished its helium, it isn't quite hot enough to be able to burn the carbon it created. What now? What will the sun turn into next?

A Dwarf!

No, No, not that type of dwarf. The sun will turn into a
WHITE DWARF!

What is a White Dwarf?

A white dwarf is a star about the size of the earth. A white dwarf is an astronomical object which is produced when a low or medium mass star dies. A white dwarf is one of the densest forms of matter. The higher the density or mass of the white dwarf the smaller the size.

Most white dwarfs are extremely hot and remain hot for an extremely long time.

Is this end to our SUN?

Not Quite!

The White Dwarf will turn into a Black Dwarf

A black dwarf is what is left of a white dwarf star after it cools. Black dwarfs are not visible because they have no more fuel.

SKETCH AND COLOR THE LIFE CYCLE OF THE SUN.

