

The Life and Death of Stars

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Complete Teacher Instructions

The Life and Death of Stars – 5E Lesson

Grades 7-10	The Life and Death of Stars	On
Lesson Objective: Students will learn about: - A star's beginning - Nebulas and protostars - The life cycle of stars - Types of stars - H-R diagrams - Fusion - How the elements are forged in stars - Supernovas - Black holes - Main sequence stars - The Hubble telescope and its applications		
Possible Student Misconceptions: - All stars are the same - Stars are static, never changing		
Materials: 1 device (smartphone, Chromebook, laptop, tablet, or computer) - A means of projecting a PowerPoint presentation - Internet access		
Teacher Notes: - All videos can be accessed directly from the PowerPoint. To view a video, click on the video icon while in slideshow mode and it will automatically open in a new window. If you don't see the video, right-click on the image and click Edit Hyperlink or Edit Hyperlink to edit the link. - I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCIKIP9SaDQ - I don't believe in long lessons. If you feel your students are bored, stop the PowerPoint and give them a 5-minute break. If you need more resources, I recommend my video collection here - http://www.teachwithfergy.com are tons of brain-break videos to choose from all grouped by topic.		

The Life and Death of Stars – 5E Lesson

Engagement Phase Video - Prior to watching the video, have your students answer the following question. How many times larger do you think the largest star is compared to our own? The answer is a billion times larger. - Have your students watch the video – Big Stars. It can be accessed here - http://www.teachwithfergy.com/big-stars-how-the-universe-works/ - Once it's done, ask your students to review and revise their answer - Use their answers (old and new) to create a classroom discussion about the size of the objects that make up our universe	Duration: Teacher F learning a student ur ☐ Connect experien ☐ Create ☐ Ask que ☐ Underst objectiv
Teacher Notes: - The video is about one and a half minutes long - If for some reason the video doesn't play, go to www.youtube.com and type in "Big Stars How the Universe Works Science Channel" to locate it.	
Explanation Phase Exploration – Lab Station Activity In groups of 2-3, have your students complete Exploration – Lab Station Activity. Once they're done, they will submit their passport to you.	Duration: Teacher F learning a student ur ☐ Student experien topic ☐ Student develop thinking ☐ Student observa results, connect
Teacher Notes: The complete instructions for my Lab Station activity can be found in the START HERE – Instructions file.	
Explanation Phase Explanation – Lesson - Complete – Explanation – The Life and Death of Stars Lesson. This lesson is designed to be completed over one – two day(s) - There are multiple embedded videos and lots of opportunities to engage and interact with your students - This lesson covers the following topics: - A Star's Beginning - Nebulas and Protostars - Fusion	Duration: Teacher F the conce presentin found in tr

- Low-Mass Stars - Intermediate-Mass Stars - Red Giants - High-Mass Stars - Supernovas - Black Holes - HR Diagram - Main Sequence Stars	Goals ☐ Students develop understanding of the content ☐ Observations and experiences are discussed and critiqued ☐ Students develop vocabulary ☐ Students are able to connect the content presented to previous experiences
Teacher Notes: - No prior knowledge is required - All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar. - I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCIKIP9SaDQ - I have also enclosed a .PDF version of both the teacher and student versions	
Elaborate Phase Elaborate – Reading Your students will complete – Elaborate – Stars – The Element Factories Reading . This reading will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding.	Duration: 1-2 hours Teacher Role – Facilitate learning and keep students focused Goal ☐ Students use their newly obtained knowledge to propose solutions and extend their learning to new situations
Teacher Notes: - Students will work individually or in small groups - This reading contains 9 comprehension questions and 1 extension question. It is fully editable so I encourage you to remove any question(s) in order to meet the needs of your students as well as your time frame	
Evaluate Phase Quiz Have your students complete - Evaluate – Stars – Quiz All quiz questions will come from the lesson.	Duration: 20 – 30 min. Teacher Role – Distribute and collect evaluation Goal ☐ Students are given the opportunity to demonstrate their understanding and evaluate their own progress
Teacher Notes: - It's sometimes best to have the students peer evaluate - Placing students in small groups and having them exchange papers to mark will accomplish two things 1) Provide immediate feedback on the quiz they just completed 2) Significantly reduce your marking time - Peer evaluation is not needed, only suggested when appropriate	

Each phase is clearly described

Complete Lesson

Teacher and Student versions

Videos embedded right into
your slideshow

Blanks on student versions

High-Mass Stars



When Stars Go Boom!

- 8-25X larger than our Sun
- Consume their fuel very fast – die more quickly and more violently
- Star explodes creating a Supernova followed by a Neutron Star



Figure 8.30 The image on the left shows the supernova discovered by Ian Shelton. The image on the right shows the same area before the supernova.

High-Mass Stars



When Stars Go Boom!

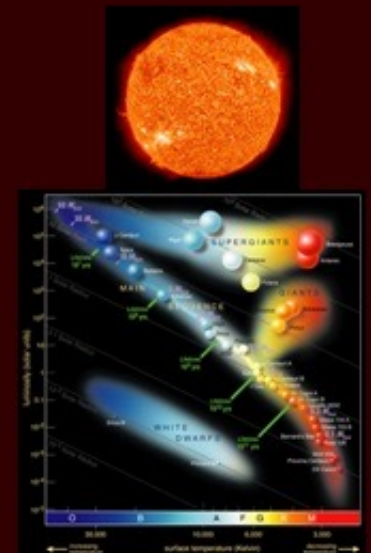
- 8-25X larger than our Sun
- Consume their fuel very fast – die more quickly and more violently
- _____



Figure 8.30 The image on the left shows the supernova discovered by Ian Shelton. The image on the right shows the same area before the supernova.

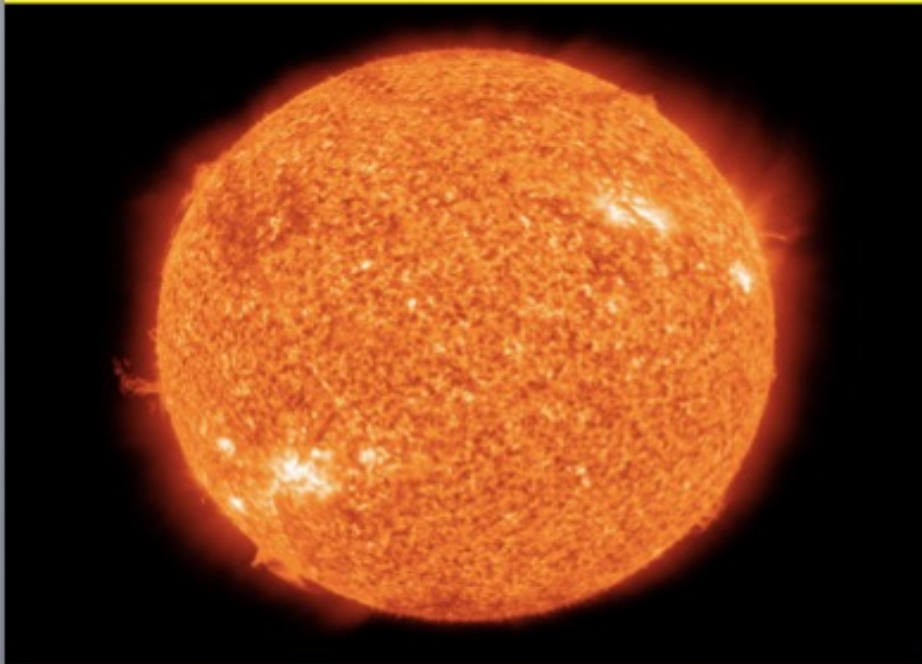
Space – The Life and Death of Stars

- A Star's beginning
 - Nebulas and Protostars
- Fusion
- Low-Mass Stars
- Intermediate-Mass Stars
 - Red Giants
- High-Mass Stars
 - Supernovas
 - Black Holes
- HR Diagram
 - Main Sequence Stars
- Inquiry Activities



Interactive and Engaging Activities

The Life and Death of Stars Lab Station Activity



7 Lab Station Activities to get your kids
out of their seats and engaged in their
learning

Stars - The Element Factories Scientific Reading Comprehension Article

Stars: The Element Factories of the Universe

The universe began 13.7 billion years ago with the Big Bang, a massive explosion of space and time after which the entire universe was formed. This explosion of space and time created the three lightest elements: hydrogen, helium, and lithium. Hydrogen and helium are the two most common elements in the universe, making up over 99% of all matter.



It's important to take a step back and learn about elements before we continue. Matter, which makes up everything, is composed of protons, neutrons, and electrons. Protons are positively charged, neutrons carry no charge, and electrons have a negative charge. The element an atom is made of depends on the number of protons it contains. Hydrogen atoms contain one proton, helium contains two, and lithium three. The number of protons in the element's "atomic number." Hydrogen is atomic number 1, helium is atomic number 2, and lithium is atomic number 3.

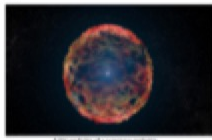
As the universe cooled, the first atoms were formed. These were hydrogen and helium. The first atoms were formed from the Big Bang, and the first stars were formed from the gas and dust that remained. The first stars were made of hydrogen and helium, and they lived for only a few million years before exploding and creating the elements we know today.

The first known particles created following the Big Bang were protons. As the expanding universe began to cool, these protons began to combine, creating the lightest elements.

Hydrogen and helium, the resulting gas from the Big Bang, expanded and cooled, eventually condensing into stars. Within the cores of these stars, hydrogen atoms fused to create helium, and a lot of energy. Helium, oxygen, carbon, and all the way up to iron, with its 26 protons, is made from the fusion of lighter elements. The elements created in a star's core are then blown off into space. When the gas is blown off, it cools and contracts, creating a new star. The star then continues to burn, creating more energy, creating enough energy to fuse heavier elements together to create the elements we know today.



These elements are dispersed throughout space when stars explode, scattering into the void. The elements we know today are the products of our star system and the stars and planets of Earth, including us. Humans are made of about 70% hydrogen, 28% oxygen, 1% carbon, and 1% phosphorus. Several other elements are present in the human body in small amounts, including potassium, sulfur, sodium, chlorine, magnesium, and iron. 99% of our bodies are made from an element that has been around for billions of years and the rest is made of the products of that element fusing over and over in our bodies and more energetic environments.



Improve your students **Scientific Literacy** and **Analysis Skills**, use as an **Emergency Substitute Plan** or create **Applicability** in your classroom

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration

