Visuals:

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The Life and Death of Stars

Image Here

Next

Script/Audio:

Massive explosions. Objects that defy time. Planet destroying power.

Sounds like the makings of a fantasy novel, right? Astonishingly, these fantastical ideas transform into reality when we talk about the science of stars. The "life cycle" of a star is one of the most mysterious, mind-bending, and fascinating processes in the entire universe.

Grab your space suit and strap in- today we're exploring the life and death of stars!

Interactions:

Objects/Feedback- None

Navigation-
    If user clicks "Next," module moves on to Slide 2
    User clicks "Home," module stays on Home Page.

Notes:

This module assumes prior knowledge of basic astronomy terms (i.e. galaxies, planets, gravity)

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Learning Objectives

By the end of this module you will be able to
1. Identify the three main criterion for star formation.
2. Explain the concepts of mass and solar mass.
3. Compare and contrast neutron stars, and black holes.
4. Predict the "life cycle" of a star given its mass.

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Script/Audio:

Before we begin, let's take a look at where we're going!

Interactions:

Objects/Feedback- None

Navigation-
If user clicks "Next," module moves on to Slide 3
If user clicks "Back," module returns to previous slide
User clicks "Home," module stays on Home Page.

Notes:

Visuals:

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Click Here for Animation

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Script:

What exactly is a star? A star is a giant mass of gas and dust that's held together by its own gravity and produces energy from inside it's core.

While stars are not actually "alive," it can be helpful to think of them as having a life-cycle like living creatures. This helps us organize how they change over time!

So, how exactly, is a star "born"?

Click the animation on the screen to watch a star form!

Interactions:

Objects/Feedback-
   If user clicks on picture, animation begins

Navigation-
   If user clicks "Next," module moves on to Slide 4
   If user clicks "Back," module returns to previous slide
   User clicks "Home," module stays on Home Page.

Notes:

Visuals:

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Drag and Drop to Arrange Each Item
in the Correct Order!

Submit

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Script:

Let's check you understanding of star formation!

Drag and drop the items below to arrange them in the correct order...

Interactions:

Objects/Feedback- Users arrange items in order. After each attempt "Correct!" will appear if correct answer is given and "Next" button will become available to click. If incorrect, wrong answers will be highlighted and "Try Again" will appear.

Navigation- If user clicks "Next" after correct response module moves on to Slide 5.
If user clicks "Back," module returns to previous slide.
User clicks "Home," module stays on Home Page.

Notes:

"Next" button will only be available upon successful completion of task.

Visuals:

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Click Here to Watch Video!

(Video on Mass and Solar Mass Here)

Back I Next

Script:

Now that we know how stars form, what happens next?

The future of a star after it's "born" is mainly dependent on one factor- its mass! What is mass?

Mass is the amount of matter or "stuff" in an object. Mass is often confused with the idea of **weight**. Weight is the measure of the pull of gravity on an object and does not affect star formation.

The mass of a star dictates the path that it's "life-cycle" takes. Click on the video to learn more about how we measure a star's mass.

Interactions:

Objects/Feedback-
    When video thumbnail clicked video will play.

Navigation- If user clicks "Next," module moves on to Slide 6
    If user clicks "Back," module returns to previous slide
    User clicks "Home," module stays on Home Page.

Notes:

Video will be interactive and include questions at the end.

Visuals:

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Star Category	Solar Mass
Very-low mass	< 0.5
Low mass	0.5-5
High mass	> 5

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Script:

There are three main categories of star life-cycle.

1. Very-low mass star: Solar mass < 0.5
2. Low mass star: Solar mass of 0.5-5
3. High mass star: Solar mass of 5-100

Click on each star category to see an example!

Interactions:

Objects/Feedback- When user clicks on a star category an info box pops up with an example for that category.

Navigation- If user clicks "Next," module moves on to Slide 7
If user clicks "Back," module returns to previous slide
User clicks "Home," module stays on Home Page.

Notes:

Visuals:

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Very-low mass stars do not perform nuclear fission as quickly as low mass or high mass star. Because of this they last a LONG time. Like almost as old as the universe itself kind of old! That's around 13.7 BILLION years old.

Low mass stars called "red dwarfs" are the most common stars in the universe, but can't be seen with a normal telescope due to their dim glow. Interestingly, red dwarfs often have their own planets orbiting them. Because of the typical red dwarfs size, life-span, and the amount of light and heat they radiate, scientists have categorized the planets that orbit them as one of the universe's most likely places to find life!

Red dwarfs consist primarily of hydrogen gas that is slowly converted to helium through nuclear fission. When their supply of hydrogen runs out and they no longer have any fuel, a red dwarf becomes a "dead" star called a white dwarf. Eventually the white dwarf will lose all of its heat and be classified as a "black dwarf."

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Script:

Read the passage on this page to learn about the life of a very-low mass stars

Interactions:

Objects/Feedback- None

Navigation- If user clicks "Next," module moves on to Slide 8
If user clicks "Back," module returns to previous slide
User clicks "Home," module stays on Home Page.

Notes:

Visuals:	Script:
Home Click Here to Watch Video! (Video on Low Mass Stars Here) Back I Next	Our next category- low mass stars, are particularly interesting because it's the category that our star, the Sun, is in! So what is the fate of a star with a mass similar to our own? Click the thumbnail to watch a video about the life and death of a low mass star.

Interactions:
Objects/Feedback-
      When video thumbnail clicked video will play.
 	
Navigation- If user clicks "Next," module moves on to Slide 9
      If user clicks "Back," module returns to previous slide
      User clicks "Home," module stays on Home Page.
	Notes:

Visuals:

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What characteristic describes the amount of matter in an object?
        a.   density
        b.   mass
        c.   volume
        d.   weight

Back I Next

Script:

Test your knowledge of the module so far by answering the following questions...

Interactions:

Objects/Feedback- Users answer MC questions. After each attempt "Correct!" will appear if correct answer is given and "Next" button will become available to click. If incorrect, correct answer will be highlighted with an explanation of each wrong answer.

Navigation- If user clicks "Next," module moves on to Slide 10
If user clicks "Back," module returns to previous slide
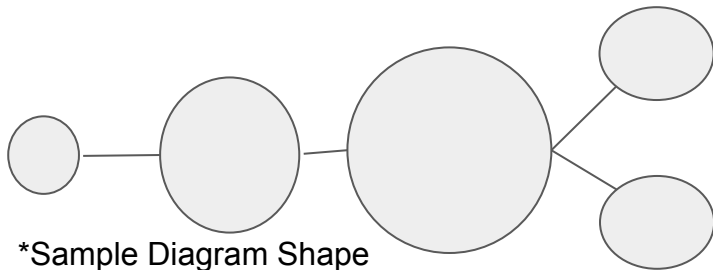User clicks "Home," module stays on Home Page.

Notes:

"Next" button will only be available upon successful completion of task.

Visuals:

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Click on each picture in the diagram to learn more!

*Sample Diagram Shape

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Script:

Great job! Only one more category left and this one is even more mind-blowing than the last. Let's talk about high mass stars!

High mass stars die in one of two ways. Once again, their fate depends on their mass. Click on each section of the diagram to learn more!

Interactions:

Objects/Feedback- When users click on each thumbnail information about each subcategory will appear. When all object have been clicked the "Next" option will appear..

Navigation- If user clicks "Next," module moves on to Slide 11
If user clicks "Back," module returns to previous slide
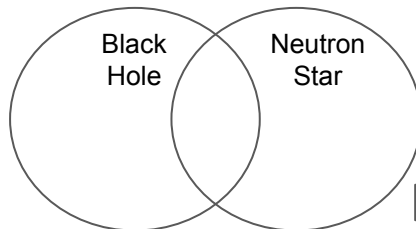User clicks "Home," module stays on Home Page.

Notes:

"Next" button will only be available when all categories have been clicked.

Visuals: **Home** For this activity, drag and drop each characteristic to the proper side of the venn diagram. Click submit to check your answer. Black Hole　Neutron Star Submit Back I Next	Script: For this activity, drag and drop each characteristic to the proper side of the venn diagram. Click submit to check your answer.
Interactions: Objects/Feedback- Users drags all items to the correct place and clicks submit. After each attempt "Correct!" will appear if correct answer is given and "Next" button will become available to click. If incorrect, wrong answers will be highlighted and "Try Again" will appear. Navigation- If user clicks "Next," module moves on to Slide 12 If user clicks "Back," module returns to previous slide User clicks "Home," module stays on Home Page.	Notes: "Next" button will only be available upon successful completion of task.

Visuals:

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Click Here to Play!

Interactive Simulation/Game

(Users will predict star life cycle based on a given mass)

Back I Finish

Script:

Wow! You've learned a lot about the star life and death of stars. Let's put your newfound knowledge to use by playing a game!

Click on the thumbnail to start the game!

Interactions:

Objects/Feedback- When users click the game thumbnail they will enter into the simulation.

Navigation- If user clicks "Finish" after successfully completing the game the module goes to end screen
If user clicks "Back," module returns to previous slide
User clicks "Home," module stays on Home Page.

Notes:

"Finish" button will only be available upon successful completion of task.