EARTH SCIENCE Lesson Plan

Quarter 4, Week 8, Day 1

Outcomes for Today

Standard Focus: Earth Sciences 1.d *"students know the evidence indicating that the planets are much closer to Earth than the stars are"* and 2.d *"Students know the stars differ in their life cycles and that visual, radio, and x-ray telescopes may be used to collect data that reveal those differences"*

PREPARE

1. Background knowledge necessary for today's reading.

Looking at the night sky, it is impossible to determine if a star seem bright because it is naturally bright or because it is close. Without knowing its distance from Earth it is impossible to get meaningful information about a star's other properties, such as its mass, diameter, temperature, energy output, and composition.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

parallax **apparent magnitude** **absolute magnitude** **luminosity**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 30.2, pp. 815-817

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- Scientists still used the system, with some refinements, established by the Greek to classify the brightness of stars.
- The absolute magnitude classification system takes distance into account when comparing the brightness of stars.
- As Earth moves from one side of its orbit to another, nearby stars appear to shift back and forth.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: MiniLab – Parallax in the Classroom, text page 817

Procedure: Students model stellar parallax and the change in parallax angle with distance

Discussion: Discuss the characteristics of stars

Key question: How does parallax depend on distance?

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 4, Week 8, Day 2

Outcomes for Today

Standard Focus: Earth Sciences 2.f *"students know the evidence indicating that the color, brightness, and evolution of a star are determined by a balance between gravitational collapse and nuclear fusion"*

PREPARE

1. Background knowledge necessary for today's reading.

Just as the Sun has dark absorption lines in its spectrum at specific wavelengths, so do other stars. Stars are classified according to their spectral patterns, which correspond to their temperatures. Each element produces a unique pattern of electron orbits which determine the spectral lines created. The spectral lines can be affected by electrons lost to ionization of a gas, which is related to its temperature. So, two stars with the same composition, but different temperatures, can have different spectral lines.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

Hertzsprung-Russell diagram **main sequence**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 30.2, pp. 817-820

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- It is possible to estimate a star's temperature by examining its spectrum.
- A star's spectral lines shift in wavelength depending on whether the star's motion is towards or away from the observer, an example of the Doppler effect.
- The H-R diagram relates the basic properties of stars.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: Hertzsprung - Russell Diagram

Procedure: Students plot near and bright stars on a H-R diagram in order to compare them

Discussion: Discuss apparent and absolute magnitude

Key question: In general, what is the relationship between the temperature of a star and its brightness?

Source: **http://solar.physics.montana.edu/tslater/plunger/hr_digram.htm**

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 4, Week 8, Day 3

Outcomes for Today

Standard Focus: Earth Sciences 1.e, 2.c, and 2.d

PREPARE

1. Background knowledge necessary for today's reading.

How much mass a star has when it first forms determines most of its characteristics. Low mass stars burn more slowly and at low temperatures. They may survive for billions of years. High mass stars survive for a few million years and burn at higher rates and temperatures. Big stars die in spectacular explosions.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

nebula **protostar**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch.30.3, pp. 821-822

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- The mass and composition of a star determines nearly all of its other properties.
- All stars from in much the same way the sun did.
- Once the internal temperature of a protostar is hot enough for nuclear fusion to occur, the first reaction is the fusion of hydrogen to helium.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: Life Cycles of Stars, activity 2

Procedure: Students classify pictures of big stars from birth to stellar death

Discussion: Discuss the life cycle of humans using activity 1

Key question: Can you justify your sequence?

Source: http://btc.montana.edu/ceres/html/LifeCycle/stars1.html

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 4, Week 8, Day 4

Outcomes for Today

Standard Focus

PREPARE

1. Background knowledge necessary for today's reading.

All stars form from clouds of interstellar dust and gas that collapses under its own gravity. The center heats up enough to hydrogen nuclei to fuse into helium nuclei. This nuclear fusion releases energy and light. The hydrogen serves as a building block for other increasing heavier elements. As the star ages, the percentage of hydrogen decreases and the percentage of other heavier elements increase. The heaviest elements are fused in the largest stars.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

red giant **white dwarf**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 30.3, pp. 822-823

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- As a star ages, its internal composition changes as its nuclear fusion reactions change one element into another.
- The life cycle of a star depends on its mass.
- A star without the mass to make carbon eventually becomes a white dwarf.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: A Star is Born, a two-day activity

Procedure: Students research and report on a particular stage of stellar development

Discussion: Review the concept of a star's initial mass determines its various stages of life

Key question: Students collect sources for their information and visuals to accompany their posters

Source: http://school.discoveryeducation/programs/astarisborn.rtm

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 4, Week 8, Day 5

Outcomes for Today

Standard Focus

PREPARE

1. Background knowledge necessary for today's reading.

Star evolution takes place over very long periods of time – with the exceptions of novas and supernovas, we are unable to see stars move or change. In 1987 the first visible supernova in nearly 400 years gave astronomers new information about how stars become unstable and explode**.**

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

supergiant **neutron star** **supernova** **black hoe**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch.30.3, pp. 824-825

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- A massive star goes through many more reaction phases and produces many elements in its interior.
- Once the core of star has created iron, no further energy-producing reaction can occur and the core collapses on itself.
- Some stars are too massive to become a neutron star and its core collapses forever to become a black hole.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: A Star is Born, Day 2

Procedure: Students present their posters and report on their findings

Discussion: Discuss how astronomers use their knowledge of star behavior at various stages to piece together a picture of a star's entire life

Key question: What can be inferred about earlier or later stages of a star's development based on the stage you researched?

Source: http://school.discoveryeducation/programs.astarisborn.rtm

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world