THE LIFE OF STARS

60 – 90 MINUTES

PHYSICAL SPACE SCIENCES YRS 7-10

LESSON PLAN: MISSION GRAVITY

MATERIALS:

Pens, Data Lab Manual*, Mission Guide*, Mission Gravity Slides*, Lenovo Mirage Solo with remote**

Australian Essential Standards: Year 7/8 Examples

ACSSU117, ACSHE119, ACSIS124, ACSIS125, ACSIS126, ACSIS129, ACSIS132, ACSIS133, ACSSU182

Physical Sciences (Years 7-10)
Space Sciences (Years 7-10)
Science as a Human Endeavour (Years 7-10)
Science Inquiry Skills (Years 7-10)

LESSON OBJECTIVES

- Framing the experimental question
- Observations of stellar properties over time
- Scientific Modeling of stellar evolution using observations
- Presentation of results to the class
- Relate the mass and lifetime of a star
- Relate temperature and colour of a star
- Observe the size changes of a star over its lifetime
- Understanding that stars can become different remnants at the end of their lives

DIFFERENTIATION STRATEGIES TO MEET DIVERSE LEARNER NEEDS:

Differentiation will be based on year level and student comfort with the technology. Teacher does an informal assessment of knowledge at the start of the lesson to determine how much content the degree to which the students require more direction.

VR output will include results to reduce the need for mathematical manipulations that can often divert learners' focus on objectives.

ENGAGEMENT

The purpose of these questions is to allow the students to share their understanding with their peers and leader and to subsequently think about what learning could be new to them.

- Why is it important to understand stars?
- What is the closest star to us? What do we know about it?
- What do you know about stars?
- What do you want to know about stars?

* These resources are available in digital form for download

** In lieu of VR, the Mission Gravity program can be access through a browser based version

LESSON PLAN: MISSION GRAVITY

EXPLORATION

In this portion of the lesson, students will have the opportunity to make observations of stars at various ages and collect data on their physical properties.

- Discussion of what properties a star has, i.e. how can we describe a star?
- Overview of how we could measure these, i.e. how can we find the size of a star?
- Show students how to travel to stars in the VR and review how to make observations
- Allow students directed time to use the VR realm to make observations.
- This time will require the teacher to provide cues for maneuvering and observing in VR.

EXPLANATION

- Allow students to use their observations to make general statements about their star's lifetime
- Allow students to make a whiteboard to share their models using a general template provided by the teacher
- Some questions to lead student explanation can include:

1. *How long did your star live for? And what was its mass? Are these related?*
2. *What happened at the end of the star's life? What did it become?*
3. *How does the colour of the star relate to its temperature? And how does that change over time?*

ELABORATION

- Students will create an overview that others can see to understand the presented star. What are the most important features to share? Focus on a verbal and picture representation.
- After developing group models, groups will share their models
- Teacher will ask leading questions to help students identify common themes about what characteristics change, such as *what do all of the starts have in common? What features are different? And how do these affect the star's life cycle?*
- The consensus will introduce key words: white dwarf, neutron star, black hole,

Note: This understand allows students to comprehend the difficulties associated with studying stars and also allows for progression of technology in society by development of technologies to support difficult detections.

EVALUATION

- Students will demonstrate knowledge by contributing to a map of stellar evolution using class consensus and then comparing with the actual models
- The engaged teacher will rotate around to student groups to ask questions about their work during the entire process.
- If time allows, a pre- and post-incursion set of content questions can be provided to evaluate content gains
- If time allows, a pre- and post-incursion set of attitude questions can be provided to evaluate attitude toward scientific process and experimentation