Mission Gravity: Blackbody Radiation

60 MINUTES

PHYSICS YRS 11-12

LESSON PLAN: MISSION GRAVITY

MATERIALS:

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

VCE Physics Curriculum Links:

Unit 1, Area of Study 1, Outcome 1
Unit 2, Area of Study 2, Outcome 2.1
Unit 3, Area of Study 2, Outcome 2

LESSON OBJECTIVES

- Framing the experimental question;
- Observations of stellar properties over time;
- Scientific Modeling of stellar evolution using temperature observations;
- Relate temperature and colour of a star
- Graphical analysis of non-linear data
- Develop Temp / wavelength relationship for EM Spectrum
- 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.

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 do you know about the light from stars?
- What information does the light from stars tell us?
- Have you ever heard of a blackbody radiation? What do you know about it?
- What types of energy are associated with 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.

- How can we determine the temperature of a star? What do we measure? And how do we measure it?
- What type of relation would we expect between the wavelength of the light and the temperature?
- 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 and fate
- Allow students to graphically express their data relating temperature and wavelength
- Allow students to mathematically model the data
- How long did your star live for? And what was its mass? Are these related?
- What happened at the end of the star's life? What did it become?
- How does the colour of the star relate to its temperature? And how does that change over time?
- Teachers will assist students in the linearization of their data is needed

ELABORATION

- After developing group models, groups will share their models
- Introduce key words: blackbody radiation, Wein's Law
- This knowledge allows students to comprehend the difficulties associated with studying stars. Understanding them helps understand our sun. Also allows for progression of technology in society by development of technologies to support difficult detections.

EVALUATION

- Students will now use their model to test a stat of 'unknown' temperature and compare to a 'known' answer
- 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