**Unit Plan – Astronomy**

**Introduction**

The unit will cover the Earth and Space Sciences section of the year 10 science Australian Curriculum.

Requirements of the Australian Curriculum:

The universe contains features including galaxies, stars and solar systems, and the Big Bang theory can be used to explain the origin of the universe

It will be taught over 13 x 50min lessons including one lesson for revision and one lesson for the unit test.

**Learning Objectives lesson-by-lesson**

Lesson 1: The Moon

Outcomes

* Understand how the moon was formed
* Determine the phase of the moon given the position of the moon in relation to the Sun and Earth
* Understand the inclination of the moon and how eclipses occur

Resources

* Astronomy The Moon Workbook
* Video on the creation of the moon: <https://www.youtube.com/watch?v=m8P5ujNwEwM>
* Basketball and tennis ball to give perspective.

Lesson 2: Distances

Outcomes

* Attempt to grasp the massive scales that occur in space.
* Introduce distance scales:
  + Astronomical Unit
  + Light Year
* Determine the time it takes for light to travel to the planets
* Determine the time it would take for a space shuttle to travel to the planets from Earth
* Produce a scale model of the Solar System
* Investigate the distances to objects outside our Solar System

Resources

* Distances Workbook
* Video on how big the universe is compared to a grain of sand: <https://www.youtube.com/watch?v=AC7yFDb1zOA>

Lesson 3 and 4: Temperature, Brightness and Stellar Evolution

Outcomes

* Understand the SI unit for temperature is Kelvin and be able to convert between Celsius and Kelvin
* Define Apparent and Absolute brightness
* Investigate stellar evolution

Resources

* Temperature and Brightness Workbook and PowerPoint Presentation
* Stellar Evolution Worksheets – each group to have a worksheet for a particular area;
  + Nebula and Protostar
  + Source of a Stars Energy
  + A Stars Characteristics
  + Red Giants and Supernova
  + White Dwarfs, Neutron Stars and Black Holes.
* Use textbooks, internet, etc as resources for investigation

Lesson 5: H-R Diagrams

Outcomes

* Use a H-R Diagram to understand the relationship between a stars brightness and temperature and the different stages of a stars lifetime.
* Follow the life cycle of a star on the H-R Diagram

Resources

* Workbook: ‘The Life Cycle of a Star and the Hertzsprung-Russell Diagram
* Video on size comparison: <https://www.youtube.com/watch?v=HEheh1BH34Q>

Lesson 6: Different Types of Galaxies

Outcomes

* Understand how galaxies are formed
* Be able to identify the different types of galaxies

Resources

* Pictures of 32 different galaxies for each group (groups of 2 or 3 students)

Lesson 7: Constellations

Outcomes

* Understand that groups of stars form identifiable constellations
* Determine how the constellations move through the night sky
* Understand how the position of the Earth at a particular time of year changes what constellations can be seen

Resources

* Constellation Worksheet
* Use the program Stellarium to complete the worksheet

Lesson 8 and 9: Aboriginal Constellations

Outcomes

* Understand that Aboriginals had their own constellations and how they were used to as part of the Dreamtime, for navigation and to determine the seasons.
* To determine the types of stellar objects that make up the aboriginal constellations / objects
* Complete assignment on Aboriginal Astronomy

Resources

* Video on Aboriginal Astronomy: <https://www.youtube.com/watch?v=uRD3HbJQSGI>
* Stellarium is used to identify the aboriginal constellations / objects through the ‘Boorong’ setting.
* Stellarium is used to identify the stellar objects that make up the constellation / object
* Internet to investigate the Aboriginal meaning behind the constellation / object
* Assignment sheet – Aboriginal Astronomy

Lesson 10 and 11: Red Shift, Expanding Universe, MBR and Big Bang

Outcomes

* Understand what Red / Blue Shift is and how it relates to the other galaxies
* Investigate via a balloon practical that if almost all galaxies are moving away from each other and more distant galaxies are moving away quicker this implies an expanding universe
* Understand what the Microwave Background Radiation (MBR) is
* Understand that the expanding universe and the MBR are two pieces of evidence that support the Big Bang Theory

Resources

* The Big Bang Worksheet and PowerPoint presentation
* Video on the Doppler effect: <https://www.youtube.com/watch?v=1kTXmT_KJvE>
* Video on the MBR discovery: <https://www.youtube.com/watch?v=2bnL_ztPo6s>

Lesson 12: Revision

Outcome

* Revise all concepts of the topic

Resources

* Prepared questions
* Kahoot quiz

Lesson 13: Test

Outcome

* Summative – Unit test

Resources

* Astronomy Test

**Assessment Plan**

* Formative assessment: Daily worksheets to be completed for homework if unable to complete in class
* Formative assessment: If time permits, use short quizzes or Kahoot
* Summative assessment: Aboriginal Astronomy assignment
* Summative assessment: Unit test