

YEAR: 11 Science (Double Award) Physics & Biology

Knowledge Focus: 6.3 Work & Energy, 6.4 Stars & planets & 4.1 Classification and biodiversity, 4.2 Cell division and stem cells



Skills, knowledge and understanding to be developed in this Learning Plan:

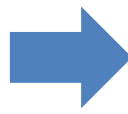
The principles of force, energy and motion are used to analyse such safety features of cars as air bags and crumple zones. The main features of our solar system & the life cycle of stars of different masses. Classify organisms based on featured and scientific names, understand adaptations for survival, investigate population size and factors affecting it, measuring biodiversity and explore conservation methods, use of quadrats and processing data, capture-recapture techniques, evaluate impacts of biological control methods, mitosis, meiosis, stem cells and uses, ethics of stem cells, links between cell division and cancer

Key terms to be learned in this LP:

work, spring constant, astronomical unit, light-year, classify, DNA, complementary base

Weeks 1-2 Learning Objectives: 6.3 Work & Energy

How much energy do moving objects have?
 $work = force \times distance \quad W = Fd$
 work = energy transfer (in the absence of thermal transfer)
 Use Hooke's Law to describe the extension of a spring. $force = spring\ constant \times extension; F = kx$
 How the energy efficiency of vehicles can be improved
 The principles of forces and motion to an analysis of safety features of cars e.g. air bags and crumple zones



Assessment
6.3 End of Topic

Objective assessments:

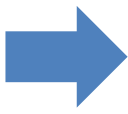
Be able to:
 Calculate work done.
 Recognize that energy transferred is equal to work.
 Investigation of the force-extension graph for a spring (***specified practical***)
 Link energy to case study of cars and safety (air bags etc.)

Homework:

Set:
Due:

Week 3 Learning Objectives: 6.4 Stars & planets

What are the main features of our solar system?
 What are the main features of the observable universe?
 Space is vast, what are the appropriate units of distance: astronomical units (AU) and light years (l-y)
 What are the stages in the life cycle of stars of different masses?
 The stability of stars depends upon a balance between gravitational force and gas and radiation pressure.



Objective assessments:

Be able to:
 Describe the trends in the data of planets and stars.

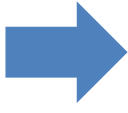
 Describe objects in the universe such as planetary systems and galaxies.

Homework:

Set:
Due:

Week 4 Learning Objectives: 6.4 Stars & planets

The return of material, including heavy elements, into space during the final stages in the life cycle of giant stars.
 The origin of the solar system from the collapse of a cloud of gas and dust, including elements ejected in supernovae.



Assessment
6.4 End of Topic

The Hertzsprung-Russell (H-R) diagram as a means of displaying the properties of stars, depicting the evolutionary path of a star

Objective assessments:

Be able to:
 know the units of distance and be able to use standard form to describe distances in space.
 Know the stages of the life-cycle of stars for both Sun-sized stars and X8 sized stars.

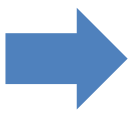
 Explain the changes in the stages of the life-cycle of stars using the **H-R diagram**.

Homework:

Set:
Due:

Weeks 5-6 Learning Objectives: 4.1 Classification and biodiversity

- Classify organisms based on features and scientific names.
- Understand adaptations for survival.
- Investigate population size and factors affecting it.

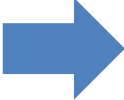


Objective assessments:

Be able to classify organisms based off their morphological characteristics
 Be able to explain the need for classification
 Be able to sample biodiversity and explain why we need

Homework:

Set:
Due:

<ul style="list-style-type: none"> • Measure biodiversity and explore conservation methods. • Use quadrats and sampling techniques in fieldwork. • Apply capture-recapture methods for estimating populations. <p>Evaluate impacts of biological control and invasive species.</p>	<p>biodiversity</p> <p>Be able to explain how we are protecting biodiversity.</p> <div data-bbox="694 488 895 591" style="border: 1px solid black; background-color: #FFC0CB; padding: 5px; text-align: center;"> Assessment 4.1 End of Topic </div>	<p>Homework:</p> <p>Set:</p> <p>Due:</p>
<p>Week 7 Learning Objectives: 4.1 Classification and biodiversity, 4.2 cell division and stem cells</p> <ul style="list-style-type: none"> • Summarise the need for the preservation of biodiversity. • Understand what genetic material is, where it is found and why it replicates. • Understand what mitosis and meiosis are • Compare and contrast mitosis and meiosis. • Explore the uses of stem cells in medicine <p>State and explain the ethical arguments surrounding stem cells</p>	<div data-bbox="742 629 866 728" style="text-align: center;">  </div> <p>Objective assessments:</p> <p>Be able to explain how cells divide to create cells with different functions (e.g. growth and repair)</p> <p>Be able to analyse the ethical arguments surrounding stem cell usage and sourcing</p> <div data-bbox="703 920 904 1023" style="border: 1px solid black; background-color: #FFC0CB; padding: 5px; text-align: center;"> Assessment 4.1 End of Topic </div>	