

YEAR: 11 Science (Double Award) Physics

Knowledge Focus: 6.1 Distance, speed and acceleration, 6.2 Newton's Laws, 6.3 Work & Energy, 6.4 Stars & planets & 6.5 Types of radiation



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

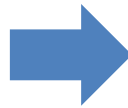
How distance, speed and acceleration are interconnected. The relationship between work and energy. The equations for kinetic energy and change in gravitational potential energy are developed. The principles of force, energy and motion are used to analyze such safety features of cars as air bags and crumple zones. The main features of our solar system & the life cycle of stars of different masses. The nature of nuclear decay and the nature of alpha, beta and gamma radiation.

Key terms to be learned in this

LP: Acceleration, terminal velocity, work, kinetic, Elastic, Gravitational Potential Energy, spring constant, force-extension, astronomical unit, light-year, protostar, supernova, nucleon, background radiation, random

Week 1 Learning Objectives: 6.1 Distance, speed & acceleration

How is distance, speed and acceleration linked together?
Use distance-time and speed-time graphs to represent motion.
Perform calculations to work out both speed and acceleration. **Distance travelled** is the area under a velocity-time graph.
Factors that affect thinking and braking distances of cars



Assessment
6.1 End of Topic

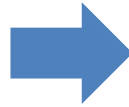
Objective assessments:

Be able to calculate speed and acceleration from given data. Interpret graphs of motion to describe journeys. Identify factors that affect thinking or braking distances of cars.

Homework:

Set:
Due:

Week 2 - 3 Learning Objectives: 6.2 Newton's Laws
Appreciate how mass is an expression of a property called inertia. **State** and understand Newton's first law. Know that forces work in pairs and that unbalanced forces produce a change in the motion of a body.
State Newton's 2nd law resultant force = mass x acceleration.
Contrast weight and mass. Do you have mass in space?
Perform calculations with weight = mass x GFS



Assessment
6.2 End of Topic

Objective assessments:

Be able to explain how inertia must be overcome for objects to move. Calculate force pairs and explain how the object will be affected in terms of place and speed.
Specified Practical
Investigate the terminal speed of a falling object.

Homework:

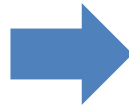
Set:
Due:

Homework:

Set:
Due:

Week 4 - 5 Learning Objectives: 6.3 Work & Energy

How much energy do moving objects have?
work = force x distance $W = Fd$
work = energy transfer (in the absence of thermal transfer)
Use Hooke's Law to describe the extension of a spring. force = spring constant x 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.)

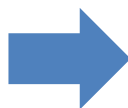
Homework:

Set:
Due:

Week 6 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.
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.

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



Assessment
6.4 End of Topic

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.

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:

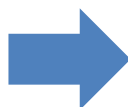
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Due:

Homework:

Set:
Due:

Week 7 - 8 Learning Objectives: 6.5 Types of radiation

What is an 'isotope' and a 'radioactive isotope'?
What to do with waste materials from nuclear power stations and nuclear medicine?
Is 'background radiation' dangerous and what are the sources of this? Know the natural and artificial sources of background radiation
What is the difference between alpha, beta and gamma radiation?
Alpha radiation as a helium nucleus, beta radiation as a high energy electron and gamma radiation as electromagnetic
Producing and balancing nuclear equations for radioactive decay.



Assessment
6.5 End of Topic

Objective assessments:

Be able to:
Tell the number of protons and neutrons from the nucleon and proton number.
Understand the long-term implications of radioactive material for health & storage.
Calculate radiation levels, taking background radiation into account.
Remember the 3 types of nuclear radiation.
Balance nuclear equations.

Homework:

Set:
Due: