

Sets (s): Triple award

YEAR 11

SUBJECT Physics

Knowledge Focus: Distance, speed, acceleration, Newton's laws, Work and energy



Ysgol Uwchradd
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High School

This half term : Skills, Knowledge and Understanding to be developed:

This topic introduces the ideas of distance, speed, velocity and acceleration. Use velocity–time graphs to determine the acceleration and distance travelled. the concepts of inertia, mass and weight and the relationship between them. The relationship between force, mass and acceleration is developed. Also explores the relationship between work and energy together with Newton's third law.

Key Terms to be learned this half term:

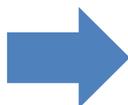
force, mass, acceleration, inertia, balanced, unbalanced forces, resultant force, weight and mass, gravitational field strength, terminal speed, terminal velocity, work done, energy transfer, kinetic energy, gravitational potential energy, elastic potential energy,

Week 1 and 2 Learning Objectives etc:

Students will study how to calculate speed, acceleration, distance-time graphs and speed-time graphs. Use velocity time graphs to determine acceleration and to calculate distance travelled.

Learn the principles of forces and motion to the safe stopping of vehicles.

The physics of motion together with presented data and opinions to discuss traffic control arising from stopping distances including the need for speed limits and safety belts.



Objective assessments:

Be able to calculate speed from distance –time graphs, acceleration, and distance from velocity-time graphs. Understand the terms reaction time, thinking distance, braking distance and overall stopping distance and discuss the factors which affect these distances.

Homework:

Question on distance or velocity time graphs

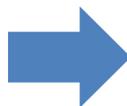
Week 3 and 4 Learning Objectives etc:

Recap on resultant forces and explore the concept of inertia, that mass is an expression of the inertia of a body.

Newton's first law of motion and be able to state it. How unbalanced forces produce a change in a body's motion.

Newton's second law of motion $F = M \times A$ and be able to state it.

Learn the distinction between the weight and mass of an object. Use the equation weight (N) = mass (kg) x gravitational field strength (N/kg).



Objective assessments:

Understand that balanced forces do not change the motion of an object. State Newton's first law.

Be able to calculate the resultant force. Be able to recognise direct or inverse proportion from tabulated or graphical data. Apply understanding to situations where mass is not constant e.g. a rocket on take-off.

Homework:

Questions on forces and motion

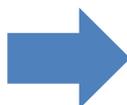
Week 5 and 6 Learning Objectives etc:

Learn the behaviour of objects moving through the air, including the concept of terminal speed.

Carry out the investigation of terminal velocity of a falling object in the student practical book.

Study Newton's 3rd law of motion and be able to apply it in different situations. **Higher tier be able to state it: if a body A exerts a force on body B then body B exerts an equal and opposite force on body A.**

When a force acts on a moving body energy is transferred. Work done can be calculated by Force x distance



Objective assessments:

Be able to use a velocity time graph to describe and explain the motion of a skydiver in terms of forces

Be able to explain how terminal speed is attained.

Be able to apply their knowledge of Newton's third law in different situations e.g. rocket propulsion, gravitational force of the Earth on a body and of the body on the Earth

Homework:

Questions on Newton's laws

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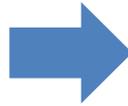
Week 7 and 8 Learning Objectives etc:

Work= energy transfer (if no thermal transfer)

Work is a measure of energy. An object can possess energy because of its motion, position or deformation.

Higher tier learn equations for kinetic energy and changes in potential energy.

Learn the equations for kinetic energy and changes in gravitational potential energy.
the relationship between force and extension for a spring and other simple systems; force = spring constant \times extension; $F = kx$



Objective assessments:

Need to be able to recognise situations where no work is done as there is no motion in the direction of the force.

Need to be able to link $W = Fd$ with changes in kinetic or gravitational potential energy to calculate the mean resistive force acting.

Homework:

Question on GPE and KE