

Physics - Unit 3 - Forces

Unit Focus

Students will explore forces as being a push or a pull. They will begin by evaluating if a system of forces is balanced or unbalanced. They will be introduced to the creation of free body diagrams as a modality to analyze and survey motion in order to determine if the motion is, or is not, accelerated. Students will explore Newton’s three laws of motion and apply their understanding of which to real life situations. With this new understanding, students will explore the principle of force of frictions as an application of Newton's Third Laws of Motion. Ultimately, students will be using these skills to help them understand the Physics of a person skydiving.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer		
<p>Next Generation Science <i>High School Physical Sciences: 9 - 12</i></p> <ul style="list-style-type: none"> Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. <i>HS-PS2-1</i> Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. <i>HS-PS2-3</i> <p>Next Generation Science Standards (DCI) <i>Science: 9</i></p> <ul style="list-style-type: none"> Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. <i>ETS1.9.C1</i> <p><i>Science: 10</i></p> <ul style="list-style-type: none"> Newton's second law accurately predicts changes in the motion of macroscopic objects. <i>PS2.9.A1</i> <p>Student Growth and Development 21st Century Capacities Matrix <i>Critical Thinking</i></p> <ul style="list-style-type: none"> Analyzing: Students will be able to examine information/data/evidence to make inferences and identify possible underlying assumptions, patterns, and relationships. <i>MM.1.2</i> <p><i>Collaboration/Communication</i></p> <ul style="list-style-type: none"> Collective Intelligence: Students will be able to work respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. <i>MM.3.1</i> 	<p>T1 Use the scientific process to generate evidence that addresses the original questions.</p>		
	<p>Meaning</p>		
	<p>Understanding(s)</p>	<p>Essential Question(s)</p>	
	<p>U1 The motion of objects must be defined by using a frame of reference. U2 The acceleration of an object depends upon its mass and the net force acting on it.</p>	<p>Q1 How do I use tools and materials to carry out my test? How do I collect and record quality data? Q2 Why do forces always come in pairs? Q3 How does an object’s mass affect its motion?</p>	
	<p>Acquisition of Knowledge and Skill</p>		
	<p>Knowledge</p>	<p>Skill(s)</p>	
<p>K1 Weight and mass are different ; weight is the force of gravity on an object K2 Forces can be either contact or non contact K3 The Normal force is a term describing the force on an object from a surface K4 Friction is a force that opposes motion and depends on the normal force and the characteristics of the surface K5 An object may have balanced forces or unbalanced forces acting on it; an object with unbalanced forces will accelerate or decelerate K6 Newton's three laws of motion.</p>	<p>S1 constructing a free body diagram (using arrows to represent forces, and a rectangle to represent a given body) that shows all of the forces acting on an object in a given situation (such as a shoe being pulled across a lab table). S2 calculating friction on an object S3 solving problems to determine what force is needed to bring an object to equilibrium S4 solving problems to determine the net force and the resultant acceleration of an object S5 interpret a graph to determine the slope from a line of best fit ; relate the slope to a real world variable S6 identify a force as a contact or non contact force ; S7 identifying force pairs</p>		