**Science C: Motion and Force**

**Parent Lesson**

**Idaho Content Standards-Science (ICSS):**

* PS2-5-1 Support an argument that the gravitational force exerted on an object is directed downward.
* PS2-MS-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* PS3-MS-5 Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object.

**Math Common Core State Standards (Math-CCSS):**

n/a

**Next Generation Science Standards (NGSS):**

* MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* 5-PS2-1 Support an argument that the gravitational force exerted on an object is directed downward.
* MS-PS3-5 Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object.

**English Language Arts Common Core State Standards (ELA-CCSS):**

* SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
* SL.5.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
* SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* SL.5.4 Report on a topic or text or present an opinion sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

**Newton’s Activities**

**ICSS:**

* PS2-5-1 Support an argument that the gravitational force exerted on an object is directed downward.
* PS2-MS-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* PS3-MS-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
* PS3-MS-5 Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object.

**Math CCSS:**

* 5.NBT.A.3.A Read write and compare decimals to the thousandths.
* 5.MD.B.2 Represent and interpret data.
* 6.EE.B.5 Understand solving an equation or inequality as a process of answering a question.

**NGSS:**

* MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* 5-PS2-1 Support an argument that the gravitational force exerted on an object is directed downward.
* MS- PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
* MS-PS3-5 Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object.

**ELA-CCSS:**

* RF.5.3 Know and apply grade-level phonics and word analysis skills in decoding words.
* RF.5.4.A Read on-level text with purpose and understanding.
* SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
* SL.5.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
* SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* SL.5.4 Report on a topic or text or present an opinion sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
* L.5.4 Determine or clarify the meaning of unknown and multiple-meaning words, and phrases choosing flexibly from a range of strategies.
* L.5.4.B Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., photograph, photosynthesis).

**CO₂ Dragsters**

**ICSS:**

* PS1-4-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.
* PS2-MS-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* PS3-MS-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**Math CCSS:**

* 4.MD.A.1 Know relative sized of measurement units within one system of units including km, m cm; kg, g; lb, oz.; l, ml; hr, min, sec.
* 5.MD.B.2 Represent and interpret data.

**NGSS:**

* MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**ELA-CCSS:**

* SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
* SL.5.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
* SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* SL.5.4 Report on a topic or text or present an opinion sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

**Straw Rockets**

**ICSS:**

* PS2-5-1 Support an argument that the gravitational force exerted on an object is directed downward.
* PS2-MS-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* PS3-MS-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**Math CCSS:**

* 3.MD.A.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (L). Add, subtract, multiply, or divide, to solve one-step word problems involving masses or volumes that are given in the same units by using drawings to represent the problem.
* 4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100.
* 4.MD.A.1 Know relative sized of measurement units within one system of units including km, m cm; kg, g; lb, oz.; l, ml; hr, min, sec.
* 5.MD.B.2 Represent and interpret data.

**NGSS:**

* 3-5-ETS1-1 Define a simple problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
* 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
* 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
* 4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.
* 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
* 5-PS2-1 Support an argument that the gravitational force exerted on an object is directed downward.
* MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**ELA-CCSS:**

* SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
* SL.5.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
* SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* SL.5.4 Report on a topic or text or present an opinion sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
* L.5.4.B Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., photograph, photosynthesis).

**Water Rockets**

**ICSS:**

* PS2-5-1 Support an argument that the gravitational force exerted on an object is directed downward.
* PS2-MS-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* PS3-MS-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**Math CCSS:**

* 4.MD.A.1 Know relative sized of measurement units within one system of units including km, m cm; kg, g; lb, oz.; l, ml; hr, min, sec.
* 4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement.
* 4.MD.C.6 Measure angles in whole-number degrees using a protractor.
* 5.NBT.A.3.A Read write and compare decimals to the thousandths.
* 5.NBT.A.4 Use place value understanding to round decimals to any place.
* 5.MD.B.2 Represent and interpret data.

**NGSS:**

* MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* 5-PS2-1 Support an argument that the gravitational force exerted on an object is directed downward.
* PS3-MS-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**ELA-CCSS:**

* SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
* SL.5.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
* SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* SL.5.4 Report on a topic or text or present an opinion sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
* L.5.4 Determine or clarify the meaning of unknown and multiple-meaning words, and phrases choosing flexibly from a range of strategies.

**Solid Propellant Rockets**

**ICSS:**

* PS1-4-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.
* PS2-MS-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* PS3-MS-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

**Math CCSS:**

* 4.MD.A.1 Know relative sized of measurement units within one system of units including km, m cm; kg, g; lb, oz.; l, ml; hr, min, sec.
* 4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement.
* 4.MD.C.6 Measure angles in whole-number degrees using a protractor.
* 5.NBT.A.3.A Read write and compare decimals to the thousandths.
* 5.NBT.A.4 Use place value understanding to round decimals to any place.
* 5.MD.B.2 Represent and interpret data.

**NGSS:**

* MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.
* 5-PS2-1 Support an argument that the gravitational force exerted on an object is directed downward.

**ELA-CCSS:**

* SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-lead) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
* SL.5.1.B Follow agreed-upon rules for discussions and carry out assigned roles.
* SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
* SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
* SL.5.4 Report on a topic or text or present an opinion sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
* L.5.4 Determine or clarify the meaning of unknown and multiple-meaning words, and phrases choosing flexibly from a range of strategies.