Grade 3	Forces and Interactions		• **WE ARE ALL RESPONSIBLE** • **READ THE FEEDBACK** • **RECOGNIZE AND PROTECT THE COMMONS**
Grade 3	Balanced and Unbalanced Forces		• **WE ARE ALL RESPONSIBLE** • **A HEALTHY AND SUSTAINABLE FUTURE IS POSSIBLE** • **RECONCILE INDIVIDUAL RIGHTS WITH COLLECTIVE RESPONSIBILITIES**
Grade 3	Variation of Traits		• **RECOGNIZE AND PROTECT THE COMMONS** • **DIVERSITY MAKES OUR LIVES POSSIBLE** • **WE ARE ALL IN THIS TOGETHER** • **LIVE BY THE NATURAL LAWS** • **WE ARE ALL RESPONSIBLE**

PLTW Curriculum Framework – Third Grade
Stability and Motion: Science of Flight

PLTW

<table>
<tr><th>Established Standards/ Goals/Practices</th><th colspan="3">Desired Results (Stage 1)</th></tr>
<tr><td rowspan="4">For full details, see the Connections to Standards page in the Teacher Guide.
Next Generation Science Standards
<u>Science and Engineering Practices</u>
• Asking Questions and Defining Problems
• Developing and Using Models
• Planning and Carrying Out Investigations
• Analyzing and Interpreting Data
• Constructing Explanations and Developing Solutions
• Engaging in Argument from Evidence
• Obtaining, Evaluating, and Communicating Information</td><td colspan="3">Transfers: Students will be able to independently use their learning to...
• T1: Evaluate a problem in a new and novel situation.
• T2: Apply a step-by-step design process to solve a problem.
• T3: Predict the effects of balanced and unbalanced forces on the motion of an object.</td></tr>
<tr><td colspan="3">Essential Questions: Students will keep considering...
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• EQ2: How do balanced and unbalanced forces affect aircraft flight?
• EQ3: How can a step-by-step process help you design or improve a solution to a problem?</td></tr>
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Understandings are long-term takeaways that go beyond factual knowledge into broader and more conceptual comprehensions.
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Objectives articulate what students need to be able to do. (The learning objectives will become targets of assessment.)
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"It is expected that students will..."</td></tr>
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Scientists and engineers use standard practices to explain the world or solve problems.</td><td>O1.1: Follow a step-by-step method to solve a problem.</td><td>KS1.1.1: Define a simple design problem reflecting a need or a want.
KS1.1.2: Brainstorm possible solutions to the problem.
KS1.1.3: Make and use a model to test a design or aspects of a design, and to compare the effectiveness of different design solutions.</td></tr>
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Format guided by: Wiggins, G., & McTighe, J. (2011). *The understanding by design guide to creating high-quality units.* Alexandria, VA: ASCD

Established Standards/ Goals/Practices	Meaning	Acquisition	
	Understandings	Learning Objectives	Knowledge and Skills
Disciplinary Core Ideas • Motion and Stability: Forces and Interactions • Engineering Design *Crosscutting Concepts* • Patterns • Cause and Effect *Connections* • Engineering, Technology, and Applications of Science • Nature of Science ***Common Core English Language Arts*** • Reading: Informational Text • Writing • Speaking and Listening ***Common Core Mathematics*** • Measurement and Data • Mathematical Practices			KS1.1.4: Evaluate a model solution through observations and/or measurements and consider what revisions to the initial model are needed.
		O1.2: Use scientific reasoning to ask questions, make observations, and investigate ideas to acquire knowledge and solve problems.	KS1.2.1: Ask and identify questions to gain knowledge or solve problems.
			KS1.2.2: Make observations to draw conclusions of phenomena.
			KS1.2.3: Analyze data to look for patterns or to test whether data are consistent with an initial prediction.
	U2: Forces A force is a push or pull on an object. Forces can have different strengths and directions.	O2: Analyze the effect of forces on the stability and motion of an object.	KS2.1: Identify a push or a pull on an object.
			KS2.2: Describe the motion and stability of an object with balanced forces and unbalanced forces.
			KS2.3: Develop a basic understanding of Newton's three laws of motion.
			KS2.4: Plan and conduct an investigation into the effects of balanced and unbalanced forces on the motion of an object.
			KS2.5: Identify the forces working on an aircraft in flight.
			KS2.6: Explain the impact of balanced and unbalanced forces on an aircraft.

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Established Standards/ Goals/Practices	Meaning	Acquisition	
	Understandings	Learning Objectives	Knowledge and Skills
	U3: Aircraft Aircraft are all types of vehicles that fly or move through the air.	O3: Describe the different types of aircraft and their components.	KS3.1: Identify examples of aircraft.
			KS3.2: Explain the difference between powered and unpowered aircraft.
			KS3.3: Identify the components of a glider.
			KS3.4: Demonstrate how glider parts interact and affect the flight of the glider.
	U4: Mathematical Thinking Mathematical thinkers apply complex thinking and reasoning strategies where thinking is intentional and reflected upon.	O4: Apply mathematical thinking to solve problems.	KS4.1: Make sense of problems and persevere in solving them. [CCSS.MATH.PRACTICE.MP1]
			KS4.2: Use appropriate tools strategically. [CCSS.MATH.PRACTICE.MP5]
	U5: Collaboration Professionals function effectively and efficiently on multidisciplinary teams to be successful.	O5: Collaborate effectively on a diverse and multidisciplinary team.	KS5.1: Generate ideas as a team.
			KS5.2: Value the contributions of each team member.
			KS5.3: Demonstrate collaboration through effective communication.
	U6: Communication Professionals communicate effectively with a variety of audiences using multiple modalities to be successful.	O6: Communicate effectively for specific purposes and settings.	KS6.1: Document work in an organized notebook.
			KS6.2: Explain findings and justify evidence-based conclusions with others.
			KS6.3: Present data and information accurately and effectively.

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Established Standards/ Goals/Practices	Meaning	Acquisition	
	Understandings	Learning Objectives	Knowledge and Skills
	U7: Ethics Professionals conduct themselves so as to maximize benefits for society and minimize harm.	O7: Practice ethical behavior in all settings.	KS7.1: Engage in and maintain positive interactions and relationships with other children and adults.

Evidence (Stage 2)		
Activity, Project, Problem (APB)	Show evidence of the student's ability to…	Assessment opportunities include…
Introduction Story		• ***Interpreting*** essential concepts through formative assessment • Discussion

Activity 1
Balanced and Unbalanced Forces
	LO2
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion

Activity 2
Forces: Lift, Drag, Thrust, and Weight
	LO2
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion

Learning Plan (Stage 3)	
APB Description	Knowledge and Skills
Introduction Story The design challenge to create a glider that delivers aid to a remote area is introduced to the students.	
Activity 1 Students develop their understanding of balanced and unbalanced forces as they build a teeter-totter system. They add weight to their teeter-totter and explore the effects of motion and stability.	KS2.1 KS2.2 KS4.2 KS5.3 KS6.1 KS6.2 KS7.1
Activity 2 Students explore how planes fly and how forces push and pull an aircraft through the sky. They create a paper airplane and identify the forces at work. Also, students are introduced to Newton's Laws of Motion.	KS2.1 KS2.2 KS2.3 KS2.5 KS2.6 KS6.1 KS7.1

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Evidence *(Stage 2)*			Learning Plan *(Stage 3)*	
Activity, Project, Problem (APB)	Show evidence of the student's ability to…	Assessment opportunities include…	APB Description	Knowledge and Skills

Activity 3 Gliders and Other Aircraft	LO2
	LO3
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion
			Activity 3
			Students expand their understanding of aircraft to learn about gliders. Students learn about the basic parts of a glider—the fuselage, the wings, and the horizontal stabilizer. Students use this knowledge to design their own gliders in the project and the problem.
				KS2.5
				KS2.6
				KS3.1
				KS3.2
				KS3.3
				KS6.1
				KS7.1

Project Experimentally Gliding Along	LO1.2
	LO2
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		  • With guidance, demonstrate an understanding of the scientific inquiry process
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion
			Project
			Students use the scientific inquiry process to investigate how Newton's Laws apply to flight. Students investigate how the center of gravity affects a glider and analyze the features and benefits of different types of wings and horizontal stabilizers. Students conduct several test flights with their glider and document the effect of modifications including wing type and additional weight.
				KS1.2.1 KS4.2
				KS1.2.2 KS5.1
				KS1.2.3 KS5.2
				KS2.2 KS5.3
				KS2.4 KS6.1
				KS2.5 KS6.2
				KS2.6 KS6.3
				KS3.3 KS7.1
				KS3.4

Problem Glider Design	LO1.1
	LO2
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		  • With guidance, demonstrate an understanding of the design process
		• ***Interpreting*** essential concepts through summative assessment
		  • Design a glider to deliver aid to a remote area
			Problem
			Students follow the design process to sketch, build, test, and reflect on a glider to deliver aid to a remote area.
				KS1.1.1 KS4.1
				KS1.1.2 KS4.2
				KS1.1.3 KS5.1
				KS1.1.4 KS5.2
				KS2.2 KS5.3
				KS2.4 KS6.1
				KS2.5 KS6.2
				KS2.6 KS6.3
				KS3.3 KS7.1
				KS3.4

Evidence *(Stage 2)*			Learning Plan *(Stage 3)*	
Activity, Project, Problem (APB)	Show evidence of the student's ability to…	Assessment opportunities include…	APB Description	Knowledge and Skills
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion		

Curriculum Framework
PLTW Launch – 3rd Grade – Variation of Traits

Desired Results *(stage 1)*

Standards

Next Generation Science Standards

- LS3-1 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.
- LS3.A Inheritance of Traits – Many characteristics of organisms are inherited from their parents. Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.
- LS3.B Variation of Traits – Different organisms vary in how they look and function because they have different inherited information. The environment also affects the traits that an organism develops.
- 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.
- 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.
- Science and Engineering Practices – Asking Questions and Defining Problems – Asking questions and Builds on K-2 experiences and progresses to specifying qualitative relationships.
- Science and Engineering Practices – Developing and Using Models – Builds on K-2 experiences and progresses to building and revising simple models and

Transfer

Students will be able to independently use their learning to …

T1 – Analyze how traits are passed through generations.
T2 – Apply a step by step process to design and perform investigations to find answers to questions.

Meaning

UNDERSTANDINGS: Students will understand that …

- U1 – Scientists ask and identify questions to gain knowledge or solve problems.
- U2 – Scientists develop and use models to represent amounts, relationships, relative scales, and/or patterns in the natural and designed world(s).
- U3 –Scientists plan and conduct investigations collaboratively to produce data that serves as evidence used to answer questions.
- U4 – Scientists make predictions based on prior experiences.
- U5 – Scientists make observations and/or collect data to construct evidence-based conclusions for natural phenomena.
- U6 – Scientists keep and organize all of their work in a scientific notebook.
- U7 – Scientists work collaboratively and communicate their findings with others.
- U8– There is a variation in traits amongst individuals within a population.
- U9 – Some human traits and behaviors are learned, some are inherited, and some are influenced by the environment.
- U10 – Genetic information is transferred through generations on genes.
- U11 – Offspring may vary in traits because they inherited different genetic information from their parents.

ESSENTIAL QUESTIONS: Students will keep considering …

- Q1 – What determines our traits and abilities?
- Q2 – If children get their genes from their mothers and fathers, how is it possible that some children do not resemble either of their parents?

Acquisition

KNOWLEDGE: Students will…

- K1 – Recognize that individuals have two copies of each gene, one from their mother and one from their father. U10, U11
- K2 – Describe how a person's genes determine some aspects of their physical characteristics and abilities. U8, U9, U10, U11
- K3 – Recognize that many human characteristics are influenced by both genes and the environment. U8, U9, U10, U11

SKILLS: Students will…

- S1 – Characterize inherited traits versus learned behaviors. U8, U9
- S2 – Gather and analyze data on traits. U1, U3, U4, U5, U6, U7, U8
- S3 – Given a specific genotype, determine the associated phenotype. U2, U10, U11
- S4 – Predict phenotype of offspring based on genotypes of the parents. U2, U10, U11
- S5 – Perform an investigation in order to draw conclusions. U1, U3, U4, U5, U6, U7, U8
- S6 – Organize and maintain a notebook to document work. U6
- S7 – Organize and analyze data in the form of charts and graphs. U5, U6, U7
- S8 – Share findings and conclusions with others. U7

using models to represent events and design solutions. • Science and Engineering Practices – Planning and Carrying Out Investigations – Builds on K-2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Science and Engineering Practices – Analyzing and Interpreting Data – Builds on K-2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Science and Engineering Practices – Using Mathematics and Computational Thinking – Builds on K-2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. • Science and Engineering Practices – Constructing Explanations and Designing Solutions – Builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Science and Engineering Practices – Obtaining, Evaluating, and Communicating Information – Builds on K-2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Crosscutting Concept – Patterns – Patterns can be used as evidence to support an explanation. • Crosscutting Concept – Cause and Effect – Case and effect relationships are routinely identified, tested, and used to explain change.		

Common Core ELA
• RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
• RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.
• W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
  ○ W.3.2.B Develop the topic with facts, definitions, and details.
  ○ W.3.2.D Provide a concluding statement or section.
• SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
• SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
• SL.3.6 Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.
 	
Common Core Math
• 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.
• MP.2 Reason abstractly and quantitatively.
• MP.5 Use appropriate tools strategically.		

Evidence *(stage 2)*			Learning Plan *(stage 3)*	
Activities (A) Projects (P) Problems (B) (Module level)	Assessments FOR Learning	Assessments OF Learning	Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
Activity 1: Inventory of Traits	• Essential questions • Inventory of their personal traits, including whether they can taste PTC • Discussion of similarities and differences between each other in relation to the traits inventoried • Discussion and documentation of all steps of the scientific inquiry process • Discussion of prompts related to what influences our traits – can any of the traits be learned or influenced by the environment, and if a trait isn't learned or influenced by the environment, what determines whether or not you have each trait?	• Discussion and documentation of all steps of the scientific inquiry process for their experiment • Conclusion questions	Activity 1: Inventory of Traits • In this activity students will investigate some of the features, or traits, that make us who we are and investigate how common these traits are among their peers. Classroom data will help students answer a question they have about the distribution of traits among their classmates. • Students will learn about and follow the scientific inquiry process as they complete their investigation.	S1, S2, S5, S6, S7, S8
Activity 2: All About Inheritance	• Essential questions • Completion of the All About Inheritance presentation	• Record corresponding information in Launch Log, as prompted in the All About Inheritance presentation • Conclusion questions	Activity 2: All About Inheritance • In this activity students will explore how traits are passed down in families as they learn basic principles of genetics and inheritance.	K1, K2, S3, S6
Activity 3: Inheritance Practice	• Essential questions • Completion of Inheritance Practice presentation • Discussion on why two plants with the same genotype for height may look considerably different	• Complete corresponding practice problems in the Inheritance Practice presentation and record corresponding information in the Launch Log. • Conclusion questions	Activity 3: Inheritance Practice • In this activity the teacher will observe traits and inheritance in pea plants. They will then complete a variety of practice problems to test their knowledge.	K1, K2, K3, S3, S6
Project: Traits through the Generations	• Essential questions • Determination of the resultant baby plant's phenotype for each trait • Assembly of resultant baby plant based on genotype/phenotype information • Completion of inheritance problem using Punnett Square Inheritance boards with guidance	• Determination of the resultant baby plant's phenotype for each trait • Assembly of resultant baby plant based on genotype/phenotype information • Showing of all of the possible outcomes to an inheritance problem using the Inheritance board and explanation of what the information means • Conclusion questions	Project: Traits through the Generations • In this project students will work with Simple Plants, a fictional plant that only has a few genes. Students will explore how genes from the mother and father plants pass down to the baby plants. • They will use what they learned from the previous activities to determine what the baby plants look like based on the genotype for each trait. Students will then build these plants and observe the variation they see in their final products.	K1, K2, S3, S4, S6, S7, S8
Problem: Seed Solutions	• Essential questions • Documentation of each of the design process steps in the Launch Log • Discussion of each of the design process steps	• Documentation in the Launch Log of each of the design process steps • Discussion of each of the design process steps	Problem: Seed Solutions • In this problem students will apply what they have learned about variation and inheritance of traits to solve the problem presented in the Introduction story. Students will use the design process to model and test a solution that	K1, K2, S4, S5, S6, S7, S8

	• Observation of plant phenotypes and discussion about what is seen in each generation	• Determination of likely genotypes for each plant sample • Creation of diagram, flow chart, or web that models how genes are being passed through the generations • Inheritance board test of each solution • Explanation of which student – Angelina, Mylo, or Suzi was correct and the thought process involved in deducing this • Conclusion questions	explains genotypes and phenotypes of three generations of plants. • Students will have the chance to grow their own plants and analyze traits in their plant samples.	
Variation of Traits Check for Understanding		• Check for Understanding Summative Assessment	Variation of Traits Check for Understanding	K1, K2, S1, S3, S4

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• EQ2: How do machines make life easier?
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• Engineering, Technology, and Applications of Science
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• Writing
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A force is a push or pull on an object. Forces can have different strengths and directions.</td><td>KS1.2.3: Analyze data to look for patterns or to test whether data are consistent with an initial prediction.</td></tr>
<tr><td rowspan="2">O2.1: Understand the effect of forces on the stability and motion of an object.</td><td>KS2.1.1: Identify a push or a pull on an object.</td></tr>
<tr><td>KS2.1.2: Identify the effort and resistance forces on an object.</td></tr>
<tr><td rowspan="3">O2.2: Understand that magnetic interactions may occur between two objects.</td><td>KS2.2.1: Identify the magnetic interaction as a push (attract) or pull (repel).</td></tr>
<tr><td>KS2.2.2: Draw conclusions that magnets are attracted to iron-based metals.</td></tr>
<tr><td>KS2.2.3: Observe that magnetic interactions may occur between two objects not in contact with each other.</td></tr>
</table>

	U3: Machines Machines can be used individually, in pairs, or in systems.	O3: Compare and contrast simple machines and compound machines.	KS3.1: Identify the six simple machines.
			KS3.2: Recognize that when two or more simple machines operate together, they form a compound machine.
			KS3.3: Draw conclusions that simple and compound machines change the direction and magnitude of force.
	U4: Mathematical Thinking Mathematical thinkers apply complex thinking and reasoning strategies where thinking is intentional and reflected upon.	O4: Apply mathematical thinking to solve problems.	KS4.1: Make sense of problems and persevere in solving them. [CCSS.MATH.PRACTICE.MP1]
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	U5: Collaboration Professionals function effectively and efficiently on multidisciplinary teams to be successful.	O5: Collaborate effectively on a diverse and multidisciplinary team.	KS5.1: Generate ideas as a team.
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Evidence *(Stage 2)*			Learning Plan *(Stage 3)*	
Activities (A), Projects (P), and Problems (B)	Show evidence of the student's ability to…	Assessment opportunities include…	Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
Introduction Story		• ***Interpreting*** essential concepts through formative assessment • Discussion	Introduction Story Description The design challenge to create a compound machine model to rescue a trapped zoo animal is introduced to the students.	

Activity 1
Introduction to Forces
	LO2.1
	LO3
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion
			Activity 1 Description
			Students are introduced to forces and interactions through interactive presentations and literature. Students learn that these interactions may occur anywhere, but this module's focus is on the interaction of forces in simple machines. After being introduced to simple machines, students build a model with a wheel and axle to move a load.
				KS2.1.1
				KS2.1.2
				KS3.1
				KS5.1
				KS5.2
				KS5.3
				KS6.1
				KS6.3
				KS7.1

Activity 2
Simple Machines and Forces
	LO2.1
	LO3
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion
			Activity 2 Description
			Students explore three simple machines: the inclined plane, lever, and pulley. Students use VEX® IQ components to build each machine. After building, they sketch and interact with each machine focusing on the decrease in force or the change in direction that the simple machine caused.
				KS2.1.1
				KS2.1.2
				KS3.3
				KS5.1
				KS5.2
				KS5.3
				KS6.1
				KS6.2
				KS6.3
				KS7.1

Activity 3
Interactions in Compound Machines
	LO1.1
	LO2.1
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		  • With guidance, demonstrate an understanding of the design process
			Activity 3 Description
			Students expand their understanding of simple machines to learn about compound machines. Using the design process, students create compound machines by combining two or more of the simple machines they explored in the previous activities to solve a simple design problem.
				KS1.1.1
				KS1.1.2
				KS1.1.3
				KS1.1.4
				KS2.1.1
				KS2.1.2
				KS3.2
				KS3.3

Format guided by: Wiggins, G., & McTighe, J. (2011). *The understanding by design guide to creating high-quality units*. Alexandria, VA: ASCD

Evidence *(Stage 2)*			Learning Plan *(Stage 3)*	
Activities (A), Projects (P), and Problems (B)	Show evidence of the student's ability to…	Assessment opportunities include…	Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion		KS4.1 KS4.2 KS5.1 KS5.2 KS5.3 KS6.1 KS6.2 KS6.3 KS7.1

Project
Magnetic Interactions
	LO1.2
	LO2.2
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		• ***Reflecting on*** essential questions and conclusion questions through guided discussion
			Project Description
			Students use the scientific inquiry process to investigate the cause and effect relationship of magnetic interactions and learn that magnets attract or repel iron-based metals. They also explore the interactions of magnetic poles and observe the effects of magnetism through a solid object.
				KS1.2.1
				KS1.2.2
				KS1.2.3
				KS2.2.1
				KS2.2.2
				KS2.2.3
				KS5.1
				KS5.2
				KS5.3
				KS6.1
				KS6.2
				KS6.3
				KS7.1

Problem
Animal Rescue
	LO1.1
	LO2.1
	LO3
	LO4
	LO5
	LO6
	LO7
		• ***Interpreting*** essential concepts through formative assessment
		  • PLTW Launch Log
		  • Discussion
		  • With guidance, demonstrate an understanding of the design process
		• ***Interpreting*** essential concepts through summative assessment
			Problem Description
			Students follow the design process to sketch, build, test, and reflect on a compound machine to rescue a trapped zoo animal.
				KS1.1.1
				KS1.1.2
				KS1.1.3
				KS1.1.4
				KS2.1.1
				KS2.1.2
				KS3.2
				KS3.3
				KS4.1
				KS4.2
				KS5.1

Format guided by: Wiggins, G., & McTighe, J. (2011). *The understanding by design guide to creating high-quality units*. Alexandria, VA: ASCD

Evidence *(Stage 2)*			Learning Plan *(Stage 3)*	
Activities (A), Projects (P), and Problems (B)	Show evidence of the student's ability to…	Assessment opportunities include…	Activities (A), Projects (P), and Problems (B)	Knowledge and Skills
		• Design a model to rescue a trapped zoo animal • ***Reflecting on*** essential questions and conclusion questions through guided discussion		KS5.2 KS5.3 KS6.1 KS6.2 KS6.3 KS7.1

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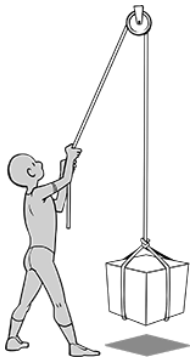
Stability and Motion: Forces and Interactions
Check for Understanding

1. Circle the simple machine that best completes the sentence.



The person in the image is using _____ to lift a box.

a pulley an inclined plane a lever

How does the simple machine help the person lift the box?

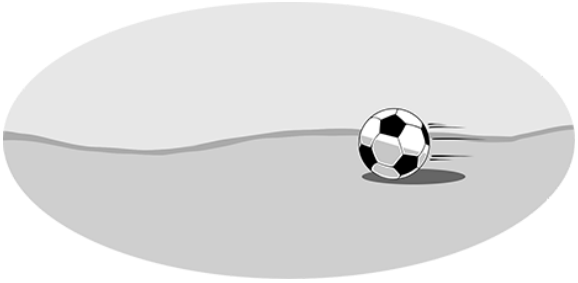
_____

_____

_____

_____

2. Look at the picture.



Why will the ball eventually stop rolling when it crosses an empty field?

_____

_____

_____

_____

3. Describe the **effort force** and the **resistance force** in play as Mylo lifts up the rock with the stick.

_____

_____

_____

_____

_____

4. Explain how this picture shows a force.

_____

_____

_____

_____

5. Explain how this picture shows a force.

_____

_____

_____

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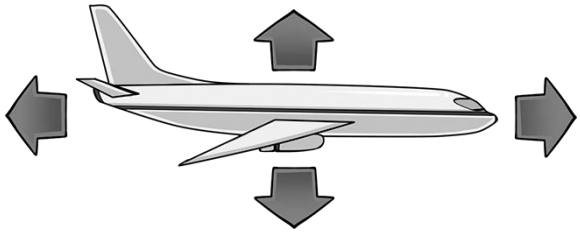
Stability and Motion: Science of Flight
Check for Understanding

Use the following picture to answer questions 1 and 2.



1. Circle the phrase that makes the statement true.

   When an airplane lands on the ground, the thrust is _____ the drag.

   greater than less than

   Explain why the statement above is true.

   _____

   _____

   _____

   _____

2. Circle the phrase that makes the statement true.

   When an airplane takes flight, the lift is _____ the weight.

   greater than less than

   Explain why the statement above is true.

   _____

   _____

   _____

   _____

3. How do you know when forces are balanced or unbalanced? Provide an example of a balanced force and an unbalanced force.

   _____

   _____

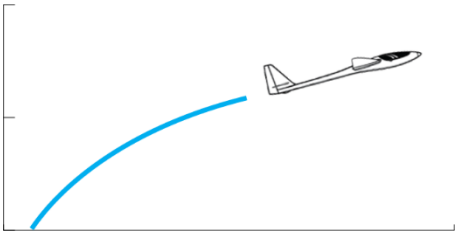
   _____

_____

4. The picture shows the path of a glider through the air. Explain whether the lift and weight forces are **balanced** or **unbalanced**. Use the picture to provide evidence to support your thinking.

_____

_____



_____

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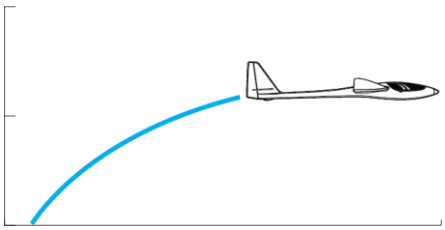
5. Explain whether the lift and weight forces are **balanced** or **unbalanced** with the glider now. Use the picture to provide evidence to support your thinking.



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PLTW | Launch

Variation of Traits
Check for Understanding

1. Some human traits and behaviors are learned, and some are inherited.

    a. Circle the traits below that are learned:

Height	Riding a bike	Hair color
Tap dancing	Nose shape	Playing music

    b. Choose one of the traits you circled and explain why it is a learned trait and not inherited.

_____

_____

_____

_____

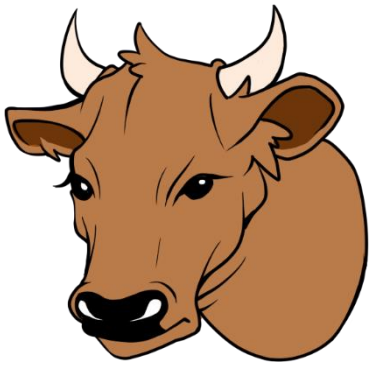
_____

2. In cattle, having horns is a recessive trait. This means that the animal must have two copies of the recessive gene to have horns.

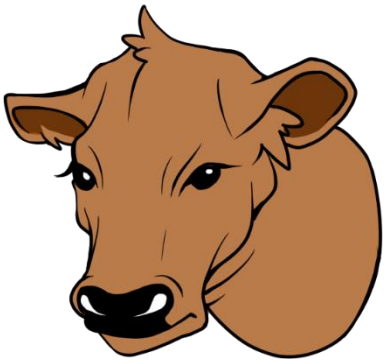
Phenotype:	Polled (no horns)	Horns
Genotype:	HH	hh

Will the calf, or offspring, of the following parents have horns? Explain.

Mother: Horns, hh



Father: Polled (no horns) HH



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