



Marietta City Schools
District Unit Planner

Grade 4 Science

Theme	<i>Unit 6 Force and Motion Planner</i>	Unit duration	<i>4 weeks</i>
--------------	--	----------------------	----------------

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GaDoE Standards/3D Science Elements

Georgia Standards:

S4P3. Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces.

- Plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results.
- Construct an argument to support the claim that gravitational force affects the motion of an object.
- Ask questions to identify and explain the uses of simple machines (lever, pulley, wedge, inclined plane, wheel and axle, and screw) and how forces are changed when simple machines are used to complete tasks. (Clarification statement: The use of mathematical formulas is not expected.)

Unit Objectives:

Students will analyze interactions and relationships between force, motion, energy, and matter
Students will determine whether forces are balanced or unbalanced.
Students will understand the effect of gravity and friction on moving objects.
Students will have experiences with simple machines.
Students will be able to identify simple machines at school and home.

Unit Phenomena: Egg Drop – Teacher sets up an egg on top of a toilet paper roll which is on top of a pizza pan which is on top of a glass of water. Students are challenged to figure out a way of getting the egg into the glass of water using only a broom. [YouTube Video](#) of Steve Spangler performing the Egg Drop experiment – for teacher use only.

Page Keeley Probes: Page Keeley probes can be used as phenomena. They are intended to elicit student understanding about science concepts. Starting a unit or lesson with a probe will help you uncover misconceptions and see what students already know about a topic. Using a probe at the beginning of a lesson and then at the end of the lesson serves the purposes of

pretesting and then formatively evaluating student thinking. **Below is a list of probes from Page Keeley's book Uncovering Student Ideas in Science, that are appropriate for this unit.** This book has been purchased for your grade level by the Office of Academic Achievement and can be found in your media center.

- **Is It a Model? (Volume 4)**
- **Is It a System? (Volume 4)**
- **Apple on the Desk (Volume 1)**
- **About Gravity (Volume 1)**
- **Rolling Marbles (Volume 3)**
- **Dropping Balls (Volume 3)**

Science & Engineering Practices: <ul style="list-style-type: none"> • Asking questions and defining problems • Developing and using models • Construct explanations and designing solutions • Obtaining, evaluating, and communicating 	Disciplinary Core Ideas: <ul style="list-style-type: none"> • Balanced and unbalanced forces • Gravitational force • Simple machines 	Crosscutting Concepts: <ul style="list-style-type: none"> • Energy and Matter • Cause and Effect
---	--	---

Misconceptions:

The only —natural motion is for an object to be at rest and, if an object is at rest, there are no forces acting on the object.

It is natural for things to fall down toward the earth and there is no need to consider gravity as a concept to help explain why objects in the air fall to the earth.

Gravity only pushes down on objects to hold them in place.

Simple machines do work for us.

Math/ELA Connections/STEM Connections

ELAGSE4RI3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

ELAGSE4RI4: Determine the meaning of general academic language and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

ELAGSE4RI7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

ELAGSE4RI10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

ELAGSE4W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

ELAGSE4W4: Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

ELAGSE4W7: Conduct short research projects that build knowledge through investigation of different aspects of a topic.

MGSE4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

MGSE4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express $\frac{3}{10}$ as $\frac{30}{100}$, and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$.

MGSE4.NF.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. MGSE4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of the comparisons with the symbols $>$, $=$, or

STEM:

[Discovery Education STEM Project Starters](#) - Slippery Design Challenge, The Effect of Unbalanced Forces on Motion

Discovery Education Science Techbook – (Log into your DE account using your Google credentials to access DE links) You will find station rotation activities such as leveled reading passages, interactives, hands-on labs, virtual labs, video clips, and more on the **Explore** page in each Techbook unit.

[About Force](#)

[About Force Constructed Response](#)

[Gravity](#)

[Changing Direction](#)

[Types of Simple Machines Exploration](#)

[About Simple Machines Exploration](#)

Hands-on Activities

[Pulling Your Weight](#)

[Hands-On Lab: Slippery Design](#)

[Hands-On Activity: Shooting Marbles](#)

[Hands-On Activity: Shooting More Marbles](#)

[Hands-On Activity: Universal Gravity](#)

[Hands-On Lab: Comparing Liquids](#)

[Hands-On Activity: Universal Gravity](#)

[Hands-On Activity: Play Ball](#)

[Hands-On Lab: Pendulum Motion](#)

Essential Questions

Factual—

What is the difference between a balanced force and an unbalanced force?

<p>How does gravitational force affect the motion of an object?</p> <p>Inferential—</p> <p>Explain how the use of simple machines changes force.</p> <p>What are the negative and positive implications of using machines?</p> <p>Critical Thinking-</p> <p>If you were the first to invent a simple machine, what would you construct first and why?</p>	
Tier II Words- High Frequency Multiple Meaning	Tier III Words- Subject/ Content Related Words
force, push, pull, motion, machine, work	gravity, friction, mass, inclined plane, screw, wedge, pulley, lever, wheel and axle, acceleration, balanced force, unbalanced force

Objective or Content	Learning Experiences	Differentiation Considerations
<p>CLE 1-3: S4P3. Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces.</p>	<p>GaDOE Force and Motion Instructional Segment This instructional segment will engage students in the study of machines, the effects of balanced and unbalanced forces, and the way gravity affects motion.</p> <p>The Art of Forces and Motion PBS Activity Students learn about Forces and Motion by creating art that helps them to visualize, identify and explain these phenomena.</p>	<p>Student Choice Performance Tasks Reflection and Goal Setting Learning Stations Choice Boards Formative Probes Science Journaling Multi-sensory activities Assistive Technology Flexible Grouping Multiple Means of Representation</p>
<p>Recommended High Quality Complex Text By Lexile Band</p>		

Changing Direction By Natalie Hyde

Science Lab: Motion and Forces By Rebecca Hirsch

What Are Newton's Laws of Motion? By Denyse O'Leary

Balanced and Unbalanced Forces By Jenna Winterberg

Explore Simple Machines! By Anita Yasuda

Forces and Motion Through Infographics By Rebecca Rowell