## Grade Level Expectations (Grade 6)
### Levers and Pulleys

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<tr>
<th>FOSS Investigations</th>
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| **Investigation 1:** Levers  
Part 1 – Introduction to Levers  
Part 2 – Lever Experiment A  
Part 3 – Lever Experiment B | *1.2.1 Analyze how the parts of a system interconnect and influence each other. W  
• Explain how the parts of a system interconnect and influence each other.  
*1.3.1 Understand factors that affect the strength and direction of forces. W  
• Observe and describe factors that affect the strength of forces.  
• Describe how forces acting on an object may balance each other.  
• Measure and describe how a simple machine can change the strength and/or direction of a force  
1.3.2 Understand how balanced and unbalanced forces can change the motion of objects.  
*2.1.1 Understand how to generate a question that can be answered through scientific investigation. W  
• Generate multiple questions based on observations.  
• Generate a question that can be investigated scientifically.  
• Generate a new question that can be investigated with the same materials and/or data as a given investigation.  
*2.1.2 Understand how to plan and conduct scientific investigations. W  
• Make predictions (hypothesize) and give reasons.  
• Generate a logical plan for, and conduct, a scientific controlled investigation with the following attributes: prediction (hypothesis); appropriate materials, tools, and available computer technology; controlled variables(kept the same); one manipulated (changed) variable; responding (dependent) variable; gather, record and organize data using appropriate units, charts, and/or graphs; multiple trials  
• Identify and explain safety requirements that would be needed in the investigation.  
*2.1.3 Apply understanding of how to construct a scientific explanation using evidence and inferential logic. W  
• Generate a scientific conclusion including supporting data from an investigation using inferential logic.  
• Describe a reason for a given conclusion using evidence from an investigation.  
• Generate a scientific explanation of an observed phenomenon using given data.  
• Predict what logically might occur if an investigation is changed.  
• Describe the difference between evidence (data) and conclusion.  
*2.1.4 Analyze how models are used to investigate objects, events, systems, and processes. W  
• Compare models of phenomena to the actual phenomena.  
• Explain how models are used to investigate and predict the behavior of objects.  
• Create a model to investigate and predict the behavior of objects, events, systems, or processes.  
*2.1.5 Apply understanding of how to report investigations, and explanations of objects, events, systems, and processes. W  
• Report observations of scientific investigations without making inferences.  
• Summarize an investigation by describing: reasons for selecting a investigative plan; materials used in the investigation; observations, data, results; explanations and conclusions in written, mathematical, oral, and information technology presentation formats; ramifications of investigations; safety procedures.  
• Describe the difference between an objective summary of data and an inference made from data.  
2.2.1 Apply curiosity, honesty, skepticism, and openness when considering explanations and conducting investigations.  
• Explain why an honest response to questionable results, conclusions, or explanations is important to the scientific enterprise.  
• Describe how scientists accurately and honestly record, report, and share observations and measurements without bias.  
• Explain why honest acknowledgement of the contributions of others and information sources are necessary.  
2.2.2 Understand that scientific theories explain facts using inferential logic. W  
• Describe how a principle or theory logically explains a given set of facts.  
2.2.3 Analyze inconsistent results from scientific investigations to determine how the results can be explained. W  
• Compare two or more similar investigations and explain why different results were produced (e.g. insufficient data could be interpreted as inconsistent results)  
• Explain whether sufficient information has been obtained to make a conclusion.  
• Explain why the results from a single investigation or demonstration are not sufficient to describe a phenomenon. |
| **Investigation 2:** More Leverage  
Part 1 – Lever Classes  
Part 2 – Lever Diagrams  
Part 3 – Real World Levers  
Part 4 – Lever Pictures |  |
| **Investigation 3:** Pulleys  
Part 1 – One-Pulley System  
Part 2 – Two-Pulley System  
Part 3 – Pulley Game |  |
| **Investigation 4:** Pulleys at Work  
Part 1 – Effort in Pulley Systems  
Part 2 – Measuring Distance  
Part 3 – Choosing Your Own Investigation |  |
## Grade Level Expectations

### Levers and Pulleys

#### 2.2.4 Understand how to make the results of scientific investigations reliable and how to make the methods of investigation valid. W
- Describe how the method of an investigation ensures reliable results.
- Describe how to increase the reliability of the results of an investigation (e.g. repeating an investigation exactly the same way increases the reliability of the results)

#### 2.2.5 Understand that increased comprehension of systems leads to new inquiry. W
- Describe how scientific inquiry results in new facts, evidence, unexpected findings, ideas, and explanations.
- Describe how results of scientific inquiry may change our understanding of the systems of the natural and constructed world.
- Describe how increased understanding of systems leads to new questions to be investigated.

#### *3.1.1 Analyze common problems or challenges in which scientific design can be or has been used to design solutions. W
- Describe how science and technology could be used to solve all or part of a human problem and vice versa.
- Describe the scientific concept, principle, or process used in a solution to a human problem
- Explain how to scientifically gather information to develop a solution.
- Describe an appropriate question that could lead to a possible solution to a problem.

#### *3.1.2 Apply the scientific design process to develop and implement solutions to problems or challenges.
- Propose, implement, and document a scientific design process used to solve a problem or challenge: define the problem; scientifically gather information and collect measurable data; explore ideas; make a plan; list steps to do the plan; scientifically test the solution; document the scientific design process.
- Explain possible solutions to the problem (e.g. use pulleys instead of levers to lift a heavy object).
- Explain the reason(s) for the effectiveness of a solution to a problem or challenge.

#### 3.1.3 Analyze multiple solutions to a problem or challenge. W
- Describe the criteria to evaluate an acceptable solution to the problem or challenge.
- Describe the reason(s) for the effectiveness of a solution to a problem or challenge using scientific concepts and principles.
- Describe the consequences of the solution to the problem or challenge.
- Describe how to change a system to solve a problem or improve a solution to a problem.

#### 3.2.1 Analyze how science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history.
- Explain how the contributions of diverse individuals have led to the development of science and technology.

#### 3.2.2 Analyze scientific inquiry and scientific design and understand how science supports technological development and vice versa. W
- Describe how scientific investigations and scientific research support technology.

#### 3.2.3 Analyze the use of science, mathematics, and technology within occupational/career areas of interest.
- Examine scientific, mathematical, and technological knowledge and skills used in an occupation/career.
- Research occupations/careers that require knowledge of science, mathematics, and technology.

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* GLE’s assessed in formative assessments found in WA Assessment Folio.
GLE’s in italics are not currently addressed in the investigations but could be addressed with extension activities, FOSS Science Stories, or other resources.

Rev 061605