Engineering and Design Using LEGOs

Content Area: **Undefined**
Course(s): **TAG Enrichment 1**
Time Period: **Trimester 1**
Length: **Approximately 12 weeks**
Status: **Published**

Unit Overview

The Early Simple Machines LEGO kitis what is used for this unit. It provides opportunities for young children to develop an understanding of science concepts through investigation and hands-on activities. In this unit, students will build the assigned object using a build card. They will answer teacher questions and make predictions. They will begin to learn the basics of some simple machines (pulleys and wheels/axles). Because there are only 4 assigned build cards, the teacher will supplement in between with various teacher-created "themes" for students to use their creativity, imagination, and engineering skills to make something that relates to the "theme." When doing these "themes," the teacher will take into consideration simple machines they have already learned and the types of objects already built from build cards. Teacher will also elicit responses to questions asked regarding these "themes."

Essential Questions

- Can you help "Sam" and "Sara" build a launcher that can launch the car back up the hill?

  What does the longer axle of the big launcher mean?

- Can you help "Sam" and "Sara" build a car that measures how far it travels?
- Can you predict whether the car will travel further down one ramp versus the other using different start lines?

  What is a wheel and axle? What does it do? Give examples of real life wheels and axles.

- Can you help "Sam" and "Sara" build a hockey player that is good at long shots?
- What target could be shot further? One brick or two bricks?
- What is a lever? What does it do?
- Can you help "Sam" and "Sara" make a dog look alike that its eyes can move?
- What pulley belt setting will make the eyes move in the same direction?
- What pulley belt setting will make the eyes move in the ooposite direction?
- What could you change about the pulley belt settings that make the eyes move at the same time or at different speeds?
- Can you name some rel life things thats use pulleys?

Content

- investigate pushes
- investigate friction
- investigate inclined plane
- investigating forces
- investigating gearing
- investigating pulley drive
- design and build accurately the object assigned
- name wheels/axles and pulleys as two types of simple machines

Skills

- estimating
- counting
- predicting
- discussing
- measuring
- compare and contrast
- identify
- recognize
- investigate
- design

  building

  exploring

  communicating

  measuring

  timing

Assessments

- teacher observation
- teacher inquiry through oral questions
- individual answers to teacher-directed questions
- problem-solving skills observed
- cooperatively working with partner to successfully achieve the task at hand
- ability to work independently at times

Lessons/Learning Scenarios

Car Launcher: Teacher will read scenerio to students and ask them Essential Question: Can you build a launcher that can launch the car back up the hill? Students will build the Car Launcher using Build Card #5. After teacher checks that the students have built the car launchers correctly, they will then use a ramp to predict which of the launchers will send the car far up the ramp and which one will send it even further up. Next, they will test how close they can launch their cars towards a wall without actually hitting it. They will compete against others in the class.

Measuring Car: Teacher will read scenerio to students and ask them Essential Question: Can you build a car that measures how far it travels? Students will build the Measuring Car using Build Card #6. Students will predict how far the Measuring Car will roll down from two different start lines. Next, the teacher will make the ramp 10 inches high and students will test how this makes a difference in the distance that their Measuring Car travels.

Ice Hockey Player: Teacher will read scenerio to students and ask them Essential Question: Can you build a hockey player that is good at long shots? Students will build the Hockey Player using Build Card #7. Teacher will make two different shooting lines and students will predict which shooting line would be the most difficult to "score" from. Students will then predict and test if they can shoot one or two bricks furthest.

Sam's New Dog: Teacher will read scenerio to students and ask them Essential Question: Can you make a dog with big eyes that move? Students will build Sam's New Dog using Build Card #8. Students will predict which pulley setting will make the dog's eyes move in the same direction and the opposite direction. Students will then change the pulley belt settings and predict which setting will make the dog's eyes rotate at the same speed or rotate at different speeds.

Standards

LA.1.CCSS.ELA-Literacy.CCRA.SL4	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
SCI.K-2.5.2.2.E.1	Investigate and model the various ways that inanimate objects can move.
SCI.K-2.5.2.2.E.2	Predict an object's relative speed, path, or how far it will travel using various forces and surfaces.
SCI.K-2.5.2.2.E.a	Objects can move in many different ways (fast and slow, in a straight line, in a circular path, zigzag, and back and forth).
SCI.K-2.5.2.2.E.b	A force is a push or a pull. Pushing or pulling can move an object. The speed an object moves is related to how strongly it is pushed or pulled. When an object does not move in response to a push or a pull, it is because another push or pull (friction) is being applied by the environment.
TEC.5-8.8.2.8.B.3	Solve a science-based design challenge and build a prototype using science and math principles throughout the design process.
TEC.5-8.8.2.8.G.2	Explain the interdependence of a subsystem that operates as part of a system.
CCSS.Math.Content.1.MD.A	Measure lengths indirectly and by iterating length units.
WORK.K-4.9.1.4	All students will demonstrate creative, critical thinking, collaboration and problem solving skills to function successfully as global citizens and workers in diverse ethnic and organizational cultures.
WORK.K-4.9.1.4.1	Collaboration and teamwork enable individuals or groups to achieve common goals with greater efficiency.
WORK.K-4.9.1.4.A.1	Recognize a problem and brainstorm ways to solve the problem individually or collaboratively.
WORK.K-4.9.1.4.A.5	Apply critical thinking and problem-solving skills in classroom and family settings.
WORK.K-4.9.1.4.C.1	Practice collaborative skills in groups, and explain how these skills assist in completing tasks in different settings (at home, in school, and during play).
WORK.K-4.9.1.4.F.2	Establish and follow performance goals to guide progress in assigned areas of responsibility and accountability during classroom projects and extra-curricular activities.
	The design process is a systematic approach to solving problems.

Resources

- Build cards
- LEGO Simple Machines kits
- "ramp"
- Electrical tape
- Timer
- "hockey rink"