



Curriculum

Highlights

The process of students actively building, programming, investigating, writing, and communicating benefits their development in numerous ways. The opportunity to integrate subject matter across the curriculum in projects provides a range of contexts for applying concepts, learning new skills, and broadening interests. Specific subject matter is also addressed in the activities. Here are the highlights. For more information, see the Themes and Curriculum Grids sections.

Science

Trace the transmission of motion and transfer of energy through the machine. Identify the simple machines mechanisms at work in the models, including levers, gears, and pulleys. Become familiar with complex motion using a cam, worm gear, and crown gear. Understand that friction can affect the movement of the model. Understand and discuss criteria for a fair test. Consider the needs of living animals.

Technology

Program and create a working model. Interpret 2D and 3D illustrations and models. Understand that animals use parts of their bodies as tools. Compare natural systems with mechanical systems. Use software media to acquire information. Demonstrate the knowledge and operation of digital tools and technological systems.

Engineering

Build, program, and test the models. Modify a model's behavior by changing the mechanical system or by adding a sensor to provide feedback. Brainstorm to find creative alternative solutions. Learn to share ideas and work together.

Mathematics

Measure time in seconds and tenths of a second. Estimate and measure the distance in centimeters or inches. Understand the concept of randomness. Compare the diameter and rotational speed. Understand and use numbers to represent the type of sounds played and the amount of time the motor turns on. Understand and use the distance between an object and to activate the motion sensor. Understand how the position of the model is measured by the tilt sensor. Understand and use numbers to measure and score qualitative characteristics.

Language

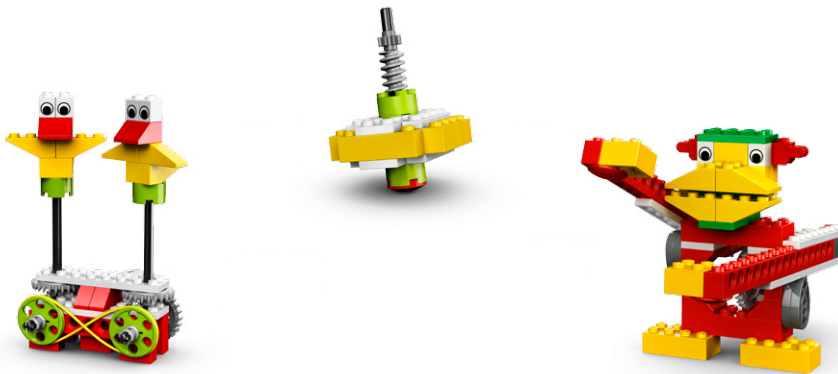
Communicate in spoken or written forms using appropriate vocabulary. Prepare and deliver a demonstration using a model. Use interview questions to find out information and write a story. Write a script with a dialogue. Write a logical sequence of events and create a story including main characters and dramatizing with visual and sound effects. Use technology to create and communicate ideas. Participate as knowledgeable, reflective members of the group and class.

Themes

The 12 activities have been organized around four themes with three activities in each theme. The themes use technology, the building and programming of the model, along with a project-oriented approach to integrate concepts across the curriculum. However, each theme does focus on one subject area more than others.

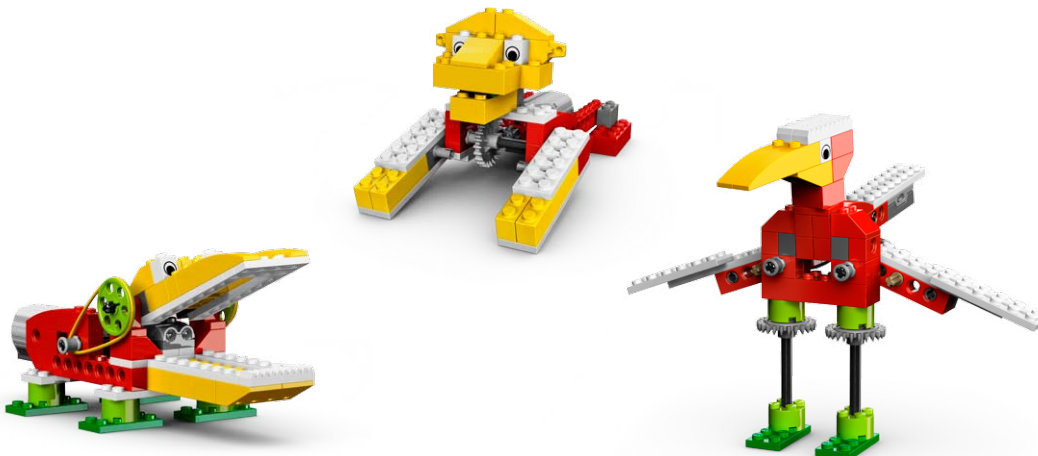
Amazing Mechanisms

The Amazing Mechanisms theme focuses on physical science concepts. In Dancing Birds, students learn about pulleys and belts, experimenting with the size of pulleys and the crossing and uncrossing of the belt. In Smart Spinner, students investigate the effect of smaller and larger gears on a spinning top. In Drumming Monkey, students learn about levers, cams, and patterns of movement. They experiment with the number and position of cams, using them as the effort causing the monkey's arms to drum up and down on a surface at different rates.



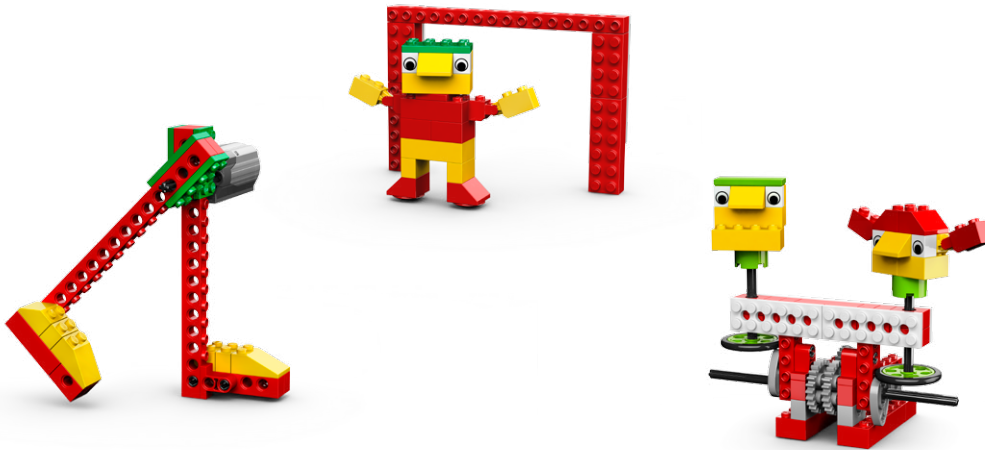
Wild Animals

The Wild Animals theme focuses on technology, emphasizing the concept of sensing and responding to external stimuli. In Hungry Alligator, students program the alligator to snap its jaw shut when the motion sensor sees something near its mouth. In Roaring Lion, students program the lion to sit up and then lie down and roar when it senses a bone. In Flying Bird, students program the tilt sensor to activate a flapping sound as they move the tail up and down, flapping the wings. They also program the motion sensor to activate a tweet sound when the bird tilts down to its feet.



Play Soccer

The Play Soccer theme focuses on mathematics. In Goal Kicker, students measure the distance the kicking leg model kicks paper balls. In Goal Keeper, students calculate the number of blocks, goals, misses as they try to flick paper balls past a mechanical goal keeper. They also learn to program an automatic score keeping system. In Cheerful Fans, students apply a numerical rating system to judging the best performance in three subjective categories.

**Adventure Stories**

The Adventure Stories theme focuses on language using the model to dramatize events. In Airplane Rescue, students learn important interview questions: Who, What, Where, Why, and How and report a story of Max the LEGO® minifigure's airplane ride. In Giant Escape, students act out the dialogue, role-playing as Mia and Max wake the sleeping giant and must escape the forest. In Sailboat Storm, students describe the sequence of events as Max endures a thunderstorm at sea.



For more details about the specific curriculum objectives covered by each activity, see the Curriculum Grids.

Curriculum Grids

	1. Dancing Birds	2. Smart Spinner	3. Drumming Monkey	4. Hungry Alligator	5. Roaring Lion	6. Flying Bird	7. Goal Kicker	8. Goal Keeper	9. Cheerful Fans	10. Airplane Rescue	11. Giant Escape	12. Sailboat Storm
Science												
Scientific inquiry												
Conduct investigation												
Use tools to gather information												
Communicate investigations and explanations												
Fair testing												
Observation												
Reasoning												
Teamwork												
Transmission of motion												
Transfer of energy												
Lever												
Pulley												
Gear												
Compound gearing												
Friction												
Needs of living animals												
Use evidence to support conclusions												
Technology												
Program and create a working model												
Interpret 2D and 3D illustrations and models												
Compare natural systems with mechanical systems												
Demonstrate the knowledge and operation of digital tools and technological systems												
Use software media to acquire information												
Understand that animals use parts of their bodies as tools												
Use feedback to adjust a programming system output												
Apply principles of motion and other concepts in physical science												

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Engineering												
Build, program and test models												
Modify a model's behavior by changing the mechanical system or by adding a sensor to provide feedback												
Brainstorm to find creative solutions												
Teamwork: Learn to communicate, share ideas and work together												
Mathematics												
Whole number relationships												
Use standard units												
Calculate using numbers with one or two place values												
Estimate												
Count												
Time in seconds and tenths of seconds												
Measure in centimeters or inches												
Measure "soft" qualitative variables												
Use simple counting variables												
Use random numbers between 1 and 10												
Use numbers to represent sounds, displays, distance, tilt value and other data												
Ratio of gear teeth and pulley diameter affects speed												
Cams affect frequency and timing of sound												
Relate numerical values to patterns of movement												
Organize lists or tables of information												
Organize and display data												
Analyze change in many contexts												
Language												
Communicate in spoken form using the appropriate vocabulary												
Use visual props to illustrate and dramatize your presentation												
Communicate in writing to explain information using the appropriate vocabulary												
Use interview questions to find out information												
Write a logical sequence of events												
Organize events to create a story, maintaining a focus on the characters and objects												
Write a script with a dialogue among three characters												
Use technology to create and communicate ideas												
Participate as knowledgeable, reflective members of the group and class												