SPECIFIC STEM CATEGORIES: 10-12 YEARS

The toy supports one or more learning goals in at least two STEM subjects.

RATING CRITERIA

Area	Criteria	Example Toy
Science	**Scientific Practices** • Investigating to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered **Organisms** • Understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction • Understanding that that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways • Understanding that plants get the materials they need for growth chiefly from air and water **Ecosystems** • Understanding the movement of matter among plants, animals, decomposers, and the environment (matter that is not food - air, water, decomposed materials in soil - is changed by plants into matter that is food) **Matter** • Understanding that matter is made of particles too small to be seen • Understanding that the weight of matter doesn't change when heating, cooling, or mixing substances • Identifying materials based on their properties through observing and measuring • Experimenting with missing two or more substances, to understanding whether this results in new substances	**Thames & Kosmos Sensors Alive** A connected toy that lets children measure sound, light, and temperature in the real world then use the measurements to create and care for virtual pets. 

RATING CRITERIA

Area	Criteria
Science	**Forces, Energy, and Waves** • Understanding that the gravitational force exerted by Earth on objects is directed down • Understanding how the speed of an object links to its energy (faster objects have more energy) • Understanding how energy can be transferred from place to place by sound, light, heat, and electric currents; and changes in energy when objects collide • Understanding that the energy in animals' food was once energy from the sun • Describing patterns in terms of amplitude and wavelength and that waves can cause objects to move • Understanding how light reflects from objects into the eye, so that objects can be seen **Earth and Astronomy** • Identifying patterns in rock formations and fossils in layers to understand changes in landscape over time • Understanding that the apparent brightness of the sun and stars is due to their relative distances from the Earth • Exploring patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky **Earth's Systems and Human Activity** • Exploring the effects of weathering or the rate of erosion by water, ice, wind, or vegetation • Describing Earth's features using maps (e.g. land and ocean floor, mountains, earthquakes) • Describing ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact (e.g. the influence of the ocean on ecosystems) • Understanding the distribution of water and fresh water on Earth using graphs (in oceans, lakes, rivers, glaciers, ground water, and polar ice caps) • Understanding that energy and fuels are derived from natural resources and their uses affect the environment • Exploring ways individual communities use science ideas to protect the Earth's resources and environment

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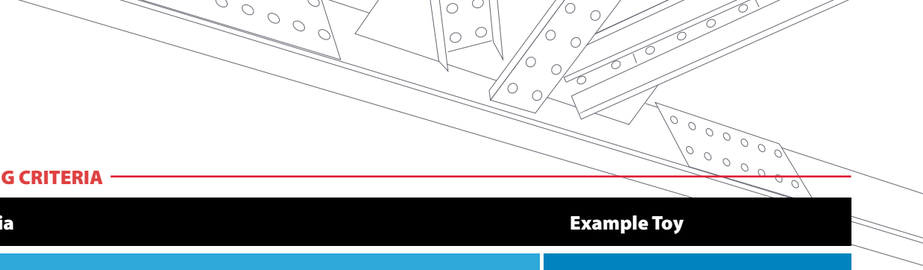
RATING CRITERIA

Area	Criteria	Example Toy
Technology	**Digital Tools** • Using technology tools to support their learning (e.g. text to speech, audio, video, highlighting) • Using technology to seek feedback to inform learning (e.g. spellcheck, online search) • Using technology to demonstrate learning (e.g. digital posters, blogs) • Using basic devices and software applications • Solving technical problems (e.g. restarting a device, installing updates) and transferring this knowledge to new technologies **Digital Citizenship** • Understanding the permanence of their actions in the digital world • Engaging in positive, safe, legal and ethical behavior when using technology • Managing personal data to maintain digital privacy and security and being aware of data-collection technology used to track their navigation online **Information Gathering** • Using effective research strategies to locate information and other resources through digital tools (e.g. using multiple sources, video and audio clips) • Curating information from digital resources using a variety of tools (e.g. note taking, citation tools) • Actively exploring real-world issues and problems using digital tools	**LEGO BOOST Creative Toolbox** A construction set that lets children build working models and use drag-and-drop coding via an app to programme them, including movement, input control and sound. 



RATING CRITERIA

Area	Criteria	Example Toy
Technology	**Innovation and Creation** • Using a deliberate design process for generating ideas, testing theories, creating innovative artifacts (e.g. 3D printing, computer programs, robotics, simulations, virtual representations, prototypes) or solving authentic problems using technology • Using digital tools to plan and manage a design process that considers design constraints and calculated risks • Developing, testing and refining prototypes as part of a cyclical design process • Creating original works or responsibly repurposing or remixing digital resources into new creations • Customizing content to suit the intended audience **Computational Thinking** • Identifying problems that can benefit from technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions • Collecting (e.g. surveys) or identifying (e.g. big data) relevant data sets and using digital tools to analyze and represent the data to facilitate problem-solving and decision-making • Understanding how technology can be used for repetitive tasks (automation) and using algorithmic thinking to develop a sequence of steps (e.g. coding) to create and test automated solutions	*See example on page 28.*
Engineering	**Applied Science** • Designing, testing, and refining a device that converts energy from one form to another • Generating and comparing multiple solutions that use patterns to transfer information (e.g. using Morse code to send text) • Generating and comparing multiple solutions to reduce the impacts of natural Earth processes on humans (e.g. designing an earthquake resistant building)	**The Learning Journey Techno Gears Marble Mania Extreme 4.0** A construction set that allows children to build working models, including gears and an Archimedes screw.

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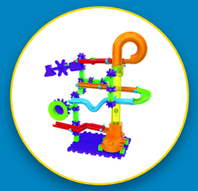
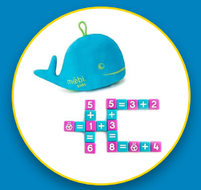
RATING CRITERIA

Area	Criteria	Example Toy
Engineering	**General Engineering** • Defining a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost • Generating and comparing multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem • Planning and carrying out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**The Learning Journey Techno Gears Marble Mania Extreme 4.0** 
Mathematics	**Numbers, Operations, and Algebra** • Ordering negative rational numbers • Writing and evaluating numerical expressions involving whole-number exponents, and in which letters stand for numbers (e.g. express the calculation "Subtract y from 5" as $5 - y$) • Performing operations with multi-digit whole numbers • Performing operations with fractions • Understanding and using ratios, and connecting these with fractions • Dividing by two-digit numbers • Using whole number and decimal operations • Understanding and using the relationship between decimals and fractions	**Möbi Games Numerical Tile Game** A mathematics-based game in which children make equations as quickly as possible using addition, subtraction, multiplication, and division, with the opportunity to practice the order of operations (PEDMAS). 

RATING CRITERIA

Area	Criteria
Mathematics	**Shapes and Measurements** • Recognizing volume as an attribute of 3D space and understanding how to measure this • Decomposing 3D shapes to find volume, by viewing them as layers of 1x1x1 unit cubes • Classifying 2D shapes based on their properties (e.g. all rectangles have four right angles, and squares are rectangles, so all squares have four right angles) • Converting like measurement units **Analysis** • Representing and interpreting data in a line plot • Using operations to solve problems using information from line plots • Understanding and using data distribution, median and mean • Describing and summarizing statistical data, identifying clusters, peaks, gaps, and symmetry