

SPECIFIC STEM CATEGORIES: 12+ YEARS

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

RATING CRITERIA

| Area | Criteria | Example Toy |
|---|---|---|
| Science  | <p>Scientific Practices</p> <ul style="list-style-type: none"> Investigating and evaluating the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation <p>Organisms</p> <ul style="list-style-type: none"> Understanding that living things are made of cells; either one cell or many different numbers and types of cells Understanding the functions of a cell as a whole and how parts of cells contribute to the function, and how the body is a system of interacting subsystems composed of groups of cells Understanding how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively Understanding how environmental and genetic factors influence the growth of organisms Understanding the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms Understanding how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism Understanding that that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories | <p>Abacus Brands Professor Maxwell's 4D Galaxy</p> <p>A science kit that allows children to carry out experiments and explore space through augmented and virtual reality, learning about the solar system, gravity, and magnetism.</p>  |

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|---|---|
| Science  | <p>Ecosystems</p> <ul style="list-style-type: none"> Understanding the effects of resource availability on organisms and populations of organisms in an ecosystem Predicting patterns of interactions among organisms across multiple ecosystems (e.g. competitive, predatory, and mutually beneficial) Understanding the cycling of matter and flow of energy among living and non-living parts of an ecosystem Understanding how changes to physical or biological components of an ecosystem affect populations <p>Evolution, Heredity, and Genetics</p> <ul style="list-style-type: none"> Explaining why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects Describing why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation Analyzing patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth Comparing the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships Comparing patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy Describing how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment Understanding the technologies that have changed the way humans influence the inheritance of desired traits in organisms (e.g. genetic modification, animal husbandry, gene therapy) Using mathematical representations to explain how natural selection may lead to increases and decreases of specific traits in populations over time |



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| Science  | <p>Matter</p> <ul style="list-style-type: none"> Describing the atomic composition of simple molecules and extended structures Analyzing the properties of substances before and after interaction to determine if a chemical reaction has occurred Understanding that synthetic materials come from natural resources Predicting and describing changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed Understanding that the total number of atoms does not change in a chemical reaction Understanding that the change in an object's motion depends on the sum of the forces on the object and the mass of the object <p>Forces, Energy, and Waves</p> <ul style="list-style-type: none"> Determining the factors that affect the strength of electric and magnetic forces Understanding that gravitational interactions are attractive and depend on the masses of interacting objects Understanding that fields exist between objects exerting forces on each other even though the objects are not in contact Describing the relationships of kinetic energy to the mass of an object and to the speed of an object Understanding that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system Understanding that when the kinetic energy of an object changes, energy is transferred to or from the object Understanding that the amplitude of a standard repeating wave is related to the energy in a wave, and that waves are reflected, absorbed, or transmitted through various materials | <p>See example on page 32.</p> |

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|---|--|--|
| Science  | <ul style="list-style-type: none"> Understanding that digitized signals are a more reliable way to encode and transmit information than analog signals <p>Earth and Astronomy</p> <ul style="list-style-type: none"> Using the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons Describing the role of gravity in the motions within galaxies and the solar system Determining scale properties of objects in the solar system (e.g. crust and atmosphere) Understanding how the geologic time scale is used to organize Earth's 4.6-billion-year-old history <p>Earth's Systems and Human Activity</p> <ul style="list-style-type: none"> Understanding the cycling of Earth's materials and the flow of energy that drives this process (e.g. melting, crystallization, weathering) Understanding how geoscience processes have changed Earth's surface at varying time and spatial scales, and how these have led to uneven distributions of Earth's mineral, energy, and groundwater resources Exploring the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions Describing the cycling of water through Earth's systems driven by energy from the sun and the force of gravity Understanding how the motions and complex interactions of air masses results in changes in weather conditions Understanding how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates Interpreting data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects |  |

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| Science (Continued)  | <ul style="list-style-type: none"> Understanding how increases in human population and per-capita consumption of natural resources impact Earth's systems Exploring the factors that have caused the rise in global temperatures over the past century | <p>See example on page 32.</p> |
| Technology  | <p>Digital Tools</p> <ul style="list-style-type: none"> Building networks through online connections (e.g. email) 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 <p>Digital Citizenship</p> <ul style="list-style-type: none"> Cultivating and managing their digital identity (e.g. social media posts, public comments/reviews) Understanding the permanence of their actions in the digital world Engaging in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices Understanding the rights and obligations of using and sharing intellectual property Managing personal data to maintain digital privacy and security and being aware of data-collection technology used to track their navigation online | <p>SmartLab Toys Archi-Tech Electronic Smart House</p> <p>A construction kit that allows children to build working models with lights, sounds, and motion in the context of a miniature house.</p>  |

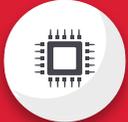
RATING CRITERIA

| Area | Criteria |
|--|---|
| Technology  | <p>Information Gathering</p> <ul style="list-style-type: none"> Using effective research strategies to locate information and other resources through digital tools (e.g. using multiple sources, video and audio clips) Evaluating the accuracy, perspective, credibility and relevance of information, media, data or other resources 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 <p>Innovation and Creation</p> <ul style="list-style-type: none"> 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 Choosing appropriate digital platforms (e.g. blog, video) and tools (e.g. digital camera) for meeting the desired objectives of their creation or communication Creating original works or responsibly repurposing or remixing digital resources into new creations Communicating complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations Customizing content to suit the intended audience |



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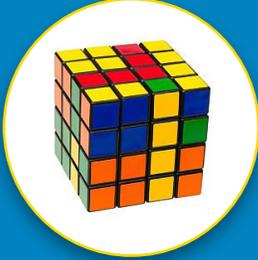
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|--|---|--------------------------------|
| Technology  | <p>Computational Thinking</p> <ul style="list-style-type: none"> Identifying problems that can benefit from technology-assisted methods such as data analysis, abstract models, and algorithmic 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 <p>Global Collaboration</p> <ul style="list-style-type: none"> Using digital tools (e.g. virtual conferencing, multiplayer online games) to connect and engage with others from a variety of backgrounds and cultures Using collaborative technologies (e.g. digital project sites, collaborative schedulers) to work with others, examine issues and problems from multiple viewpoints Exploring local and global issues and using collaborative technologies to work with others to investigate solutions | <p>See example on page 36.</p> |

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| Engineering  | <p>Applied Science</p> <ul style="list-style-type: none"> Constructing, testing, and modifying a device that either releases or absorbs thermal energy by chemical processes Applying Newton's Third Law to design a solution to a problem involving the motion of two colliding objects Designing, constructing, and testing a device that either minimizes or maximizes thermal energy transfer Evaluating design solutions for maintaining biodiversity and ecosystem services (e.g. water purification, nutrient recycling, and prevention of soil erosion) Designing a method for monitoring and minimizing a human impact on the environment (e.g. reducing water usage, land usage, and pollution) Defining the criteria and constraints of a design problem with enough precision to ensure a successful solution, considering relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions <p>General Engineering</p> <ul style="list-style-type: none"> Evaluating competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem Analyzing data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success Developing a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. | <p>Ravensburger GraviTrax Starter Set</p> <p>A construction kit that allows children to build their own working designs, exploring the effect of gravity and magnets.</p>  |

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| <p>Mathematics</p>  | <p>Numbers, Operations, and Algebra</p> <ul style="list-style-type: none"> Using ratios and proportions to solve problems Using linear equations Solving problems using scale drawings Recognizing the link between fractions, decimals, and percents Using negative numbers in everyday contexts (e.g. temperature) Adding, subtracting, multiplying and dividing with negative numbers, and rational numbers Understanding, comparing and using functions <p>Shapes and Measurements</p> <ul style="list-style-type: none"> Solving problems using the area, surface area, volume, and circumference of 3D shapes Understanding congruence and similarity using physical geometric models Using Pythagorean Theorem <p>Analysis</p> <ul style="list-style-type: none"> Comparing populations in data Understanding and using random sampling Identifying patterns of association in bivariate data | <p>Winning Moves Rubik's Cube</p> <p>A 3D puzzle game that encourages children to think mathematically, using patterns and algorithms.</p>  |

