

StarrMatica and STEM

An Introductory Guide



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StarrMatica's library of K-6 digital content supports STEM initiatives in elementary schools with a digital content library containing 5,000 animations, simulations, activities, games, and assessments.

STEM is not a collection of separate subjects and topics to be taught but an integrated approach to these studies. STEM teaching encourages students to solve authentic problems and to collaborate with others to design, build, test, and re-tool until a solution is achieved.

StarrMatica supports this integrated vision of STEM learning with its library design which allows educators to choose content that complements and supports in class hands-on investigations. In this way, educators can integrate technology into instruction in flexible ways to teach foundational STEM skills and to encourage problem solving and group collaboration.



StarrMatica's library was designed to raise student achievement based on three research-based conclusions:

- a) *Students whose teachers are high level users of technology in the classroom score significantly better on standardized tests.* StarrMatica helps teachers integrate technology effectively into STEM lessons by providing flexible content choices.
- b) *Technology, specifically instructional software, has been proven most effective when integrated into classroom instruction. Students who experienced teacher-led standards-based instruction with technology showed higher overall gains than students who experienced the same curricula and technology in an isolated lab setting.* StarrMatica's digital content library leaves teachers in control of STEM content decisions based on their curriculum and their students' needs.
- c) *Engaging parents in learning activities with their children at home has the strongest effect on student achievement over any other form of parental involvement.* StarrMatica's at-home access allows parents to engage in STEM activities and discussions with their children to extend learning beyond the classroom.

StarrMatica's state standards and Common Core alignments allow teachers to ensure STEM content is standards based. And StarrMatica's content is closely aligned to the goals and standards of the National Council of Teachers of Mathematics. In addition to providing content

to help teachers meet every NCTM standard, StarrMatica's content has embedded process skills and research based teaching techniques including:

- Connecting new learning to a student's prior experiences and background knowledge
- Giving real-life examples to establish a purpose for learning
- Promoting on-task engaged learning with interactive animations, response required questions, and guided practice
- Using questioning strategies to focus student learning, requiring students to draw conclusions, and featuring more than one correct response
- Explaining the theory behind mathematical processes as well as demonstrating specific problem solving procedures with a variety of approaches for finding an answer
- Providing immediate feedback for practice activities
- Promoting differentiated instruction by providing teachers with tools to use with students at different skill levels
- Supporting learner choice by providing teachers with a method of instructional delivery and aligned practice that is appealing to students not engaged by traditional teaching methods

In consideration of NCTM's encouragement of the use of virtual manipulatives for students to explore and model mathematical concepts, StarrMatica has created and curated one of the largest collections of virtual manipulatives currently available. Virtual manipulatives are available for every NCTM standard.

StarrMatica's content also supports the new National Science Standards by providing digital content for every strand and by encouraging integrated process skills. Students are able to conduct online investigations and examine results, to run simulations to develop an understanding of complex events, and to use virtual manipulatives to visualize multi-faceted relationships. Teachers are also able to teach and assess foundational STEM concepts with instructional animations, activities, and tests.

The following documentation illustrates StarrMatica's support of STEM initiatives with concrete examples of digital content from our vast library, categorized by each STEM area. With StarrMatica, teachers have the ability to choose the content that blends best into their unique STEM instructional plans.



science

StarrMatica's library includes content that encourages students to engage in the scientific process and investigate scientific concepts in depth.

Earth and Space

Earth Quake Testing Zone

Students adjust the magnitude of an earthquake to test its effects on the surrounding area.



Moon Phases

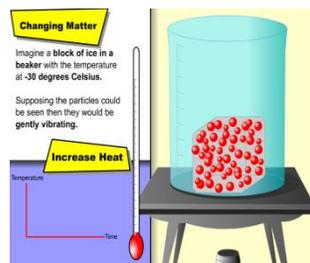
Students explore the phases of the moon with a split screen animation that shows the view from Earth simultaneously with its position as it rotates around our planet.



Physical

Changing Matter

Students use a burner to change matter from one state to another while taking note of the temperature and movement of the particles.



Hippovator

Students explore how levers work by experimenting to find out how much weight is needed to lift a 200kg hippo.



Life

Ecologization

Students use their knowledge of organisms to construct a bio-dome with a self sustaining food chain.



Keeping Healthy

Students control Ruby's actions to determine what effects sleeping, sitting, walking, and running have on Ruby's heart.



Engineering, Technology and Applications

Cool Careers

Students watch videos to learn about scientific career fields.



Search for Spinoffs

Students discover how some of NASA's inventions have resulted in everyday products.





Technology

StarrMatica's library includes web tools that help students use technology to collaborate with classmates, create content, and present their ideas.

Stage'd



Students become the writer and director to create their own online play. Students chose a set, characters, and costumes. They write dialog and animate their characters to set their play in motion.

Linoit

Students collaborate on a blank canvas by adding photos, video, weblinks, text, and notes.



Museum Box



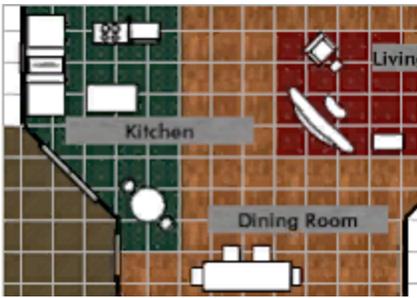
Students present their knowledge by creating a collection of artifacts related to a topic. Artifacts can include photos, text, documents, audio, video, and web links.



Engineering

StarrMatica's library includes content to stimulate an interest in the field of engineering and to build foundational skills for later career exploration. Students are encouraged to *design solutions* and *construct their creations*.

Design A Home



Students assume the role of an architect. They are asked to choose a client and design a home based on their client's needs. Students are walked through the entire process of designing a home. They consult with expert Frank Lloyd Wright and make decisions about the home's location and design. When complete, students have the ability to walk through a virtual representation of their design and to determine if their design meets their client's needs.

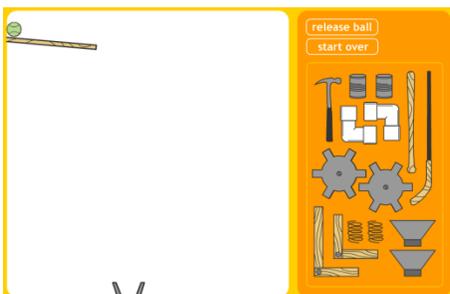
Students are challenged to work for a company that is designing a cell phone for senior citizens.

Students are tasked with choosing phone features they believe will best fit the needs of this population while keeping the cell phone within a specific price range. Students are able to receive feedback about their design and make adjustments until their customers are happy.

Design A Cell Phone



Design A Machine



Students choose from one of four challenging invention activities where they are asked to build a Rube Goldberg contraption to perform a specific task such as getting a ball to drop in a cup. Each activity provides different building materials and a differing degree of difficulty. Students are able to test their contraptions and adjust their machines until they achieve the desired results.

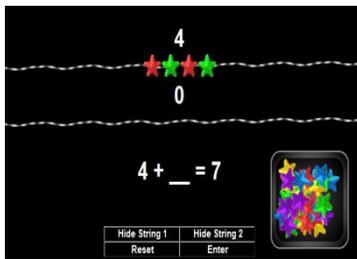
Math

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Number and Operations

Addition Stars

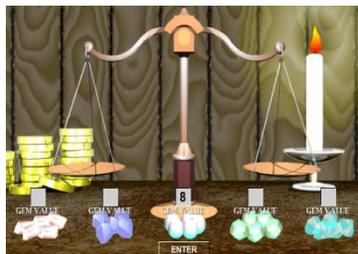
Students use star manipulatives to explore three types of addition problems.



Algebra

Valuable Jewels

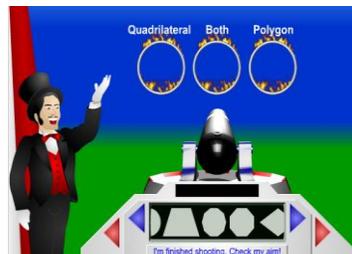
Students use a balance to discover the weight of five objects by comparing them to one another and by using logic.



Geometry

Flaming Cannonballs!

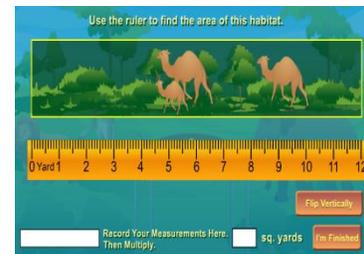
Students categorize 2-D shapes and draw conclusions about the relationships between categories.



Measurement

Areas for Animals

Students use a ruler to measure the perimeter of a shape in order to find its area.



Experimental Probability

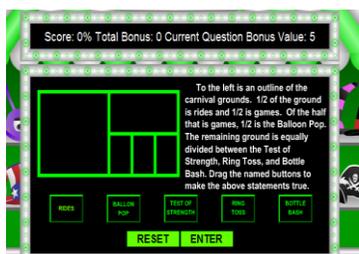
Students conduct probability experiments to explore the relationship between experimental probability and theoretical probability.

Data Analysis and Probability

How did the experimental results compare with the theoretical probabilities?

Possible Outcomes	Theoretical Probability (fraction)	Theoretical Probability (percent)	Experiment Results	
			Tally	Percent
red	$\frac{5}{12}$	42%	4	40%
yellow	$\frac{4}{12}$ or $\frac{1}{3}$	33%	4	40%
green	$\frac{2}{12}$ or $\frac{1}{6}$	17%	2	20%
orange	$\frac{1}{12}$	8%	0	0%

Process



The Wheel of Mystery

Students apply their knowledge of fractions to solve real-world problems.