Hands-On Standards® STEM in Action™ Summary Chart

PreK: ADVENTURE Series: Helping an animal friend				
STEM in Action Module Title	**Engineering Challenge**	**Science Topics**	**Math Topics**	**ELA Topics**
Ron's Ramp Adventure	Children design and build a ramp that allows Ron, a skateboarding armadillo, to go far—but not too far.	PHYSICAL—Motion & Stability: Forces on objects, graphing, properties of materials, friction, ramps, slope, analyze data	Measurement & Data: Graphing, compare quantities	Participate in collaborative conversations, ask and answer questions, relationship between illustration and story
Pam's Camping Adventure	Children design and figure out how to fit Pam the Raccoon, her friends, and their backpacks into the tent and what to do when the tent poles are lost.	PHYSICAL—Matter & Its Interactions: Building structures, graphing, properties of materials, stability, analyze data	Geometry: Using models, comparing quantities	Participate in collaborative conversations, ask and answer questions
Pam & Ava's Mapping Adventure	Children help Pam the Raccoon and Ava the Owl plan and design a new bike path through a mountain landscape.	EARTH—Earth's Systems: Earth characteristics, topography, mapping	Geometry: Slope, perspective, flat and solid shapes, grid lines	Participate in collaborative conversations, ask and answer questions, describe connection between two individuals
Gus & Nia's Shaking Adventure	Children help Gus the Frog and Nia the Squirrel design and test a clubhouse that is safe from the rumbling of a nearby train.	EARTH—Earth & Human Activity: Force, stability, balance, structures, shapes	Geometry: Decomposing shapes, data, graphing, comparing quantities	Participate in collaborative conversations, ask and answer questions, describe connection between two individuals
Ron's Habitat Adventure	Children design and test a patch that will help an injured turtle heal.	LIFE—Molecules to Organisms: Patterns of living things (plants and animals), survival, food webs, habitats	Geometry: Patterns of shapes	Participate in collaborative conversations, ask and answer questions, describe relationship between illustrations and text

Primary Grades K–2: EXPLORATION Series: Helping a friend				
STEM in Action Module Title	**Engineering Challenge**	**Science Topics**	**Math Topics**	**ELA Topics**
Sunny Sandbox Exploration	STRUCTURAL— Students explore the warming effects of the sun and learn about the engineering design process as they help design and build a covering to block the sun.	PHYSICAL—Energy: Effects of sunlight, heating, cooling	Geometry: Comparing shapes, 2-D and 3-D shapes, counting in an array	Participate in collaborative conversations, participate in a shared research and writing project
Sidewalk Safety Exploration	CIVIL—Students explore slopes and speed as they help study a real-world example to design safe ways to slow down a bicycle.	PHYSICAL—Motion & Stability: Pushes and pulls (forces), slope affect speed and direction, analyze data	Data: Organizing data, counting, graphing	Asking questions, participating in a collaborative discussion
Little Footprint Exploration	INDUSTRIAL—Students help design an efficient delivery route that saves gas and creates less pollution.	EARTH—Earth & Human Activity: Pollution, human impact on air	Data: Organize data, counting, measure on a map, use spatial relationships	Asking questions, participating in a collaborative discussion
Wild Feet Exploration	BIOLOGICAL—Students explore the connection between nature and the human-made world by designing hiking shoes that use nature for inspiration.	LIFE—Molecules to Organisms: Mimicry of animal characteristics to survive, use of external body parts to move, adaptation	Geometry: Composing shapes, slope and angles, interpreting and comparing data	Describe the connection between two pieces of information, write and illustrate sentences
Sound Bite Exploration	COMMUNICATIONS—Students learn about sound waves and vibrations to develop a phone that helps friends talk over a distance.	PHYSICAL—Waves & Their Application: Sound waves, vibration, devices to communicate	Number & Data: Comparing two-digit numbers, collecting and analyzing data	Write informative texts, describe events with detail, write rules
Shadow Box Theater Exploration	THEATER—Students build an understanding of translucent and opaque while they plan, test, and redesign scenery for a shadow box theater.	PHYSICAL—Waves: Light, illumination, shadow, understand transparency, translucency, opacity	Geometry: Combine shapes to form new shapes, define attributes, collect and analyze data	Write opinion pieces with supporting reasons, describe events with detail, write script
Muddy Mats Exploration	MATERIALS—Students explore the properties of materials while they design an absorbent, non-slippery mat to protect the house from muddy paws.	PHYSICAL—Matter & Its Interactions: Properties of materials, properties of water (solid, liquid, gas), absorbency, analyze data	Number & Operations: Skip count by 5s (tally marks), find the difference	Build on others' talk, write a descriptive radio commercial

Shrinking Shore Exploration	COASTAL/CIVIL—Students explore the power of ocean waves and design a model to protect the beach from erosion.	EARTH—Earth's Systems: Water and erosion, ocean waves, beach habitat and features	Data: Generate measurement data and bar graphs, partitioning rectangle (geometry)	Recall information from experiences, participate in collaborative conversations, write a plan
Seed Rescue Exploration	BIOLOGICAL—Students find a way to pollinate the plants in a greenhouse by designing a model plant pollinator.	LIFE—Ecosystems: Flowers, seed dispersal, pollination by animals, life cycle	Data: Generate measurements and calculate budget data, adding two-digit numbers	Recall information from experiences, participate in collaborative conversations, write a short story

Intermediate Grades 3–5: CHALLENGE Series: Working as an engineer for a client				
STEM in Action Module Title	**Engineering Challenge**	**Science Topics**	**Math Topics**	**ELA Topics**
Farmer Grady's Challenge	STRUCTURAL—Students learn about weather-related hazards and design a system to protect Farmer Grady's crops from a hailstorm.	EARTH—Earth & Human Activity: severe weather, natural hazards, properties of materials, tensile strength, reduce human impact	Data: Generate measurement data, budgeting, multiplication	Use domain-specific words, recount an experience, write a newspaper article, make a claim
Squeaky Clean Magnets Challenge	MECHANICAL—Students explore the power of magnets and use them to make, test, and redesign a way to clean fish tanks without putting hands into the water.	PHYSICAL—Motion & Stability: magnetic force, buoyancy, physical properties	Measurement & Data: Measuring in quarter inches, creating bar graphs, area	Write opinion pieces, use information from illustrations, write a proposal
Wildlife Corridors Challenge	CIVIL—Students study animal needs, habitats, and ranges and then plan, build, and test a model of a wildlife corridor that will help animals safely cross a busy road.	LIFE—Unity & Diversity: habitats, organism survival, environmental change (plants and animals), populations, human impact	Fractions: Compare fractions, create bar graphs	Write opinion pieces, use information from illustrations (maps), make an informational poster
Solar House Design Challenge	MATERIALS—Students learn about energy conservation and design a successful passive solar house.	PHYSICAL—Energy: energy conversion from one form (thermal) to another, solar energy, energy transfer	Measurement: Apply area formula to real world, fractions, budgeting, word problems	Engage in collaborative discussions, write a design recommendation letter
Earthquake Technologies Challenge	STRUCTURAL—Students learn about earthquakes, compare technologies and then design a building that is more earthquake-resistant, while keeping in budget.	EARTH—Earth & Human Activity: reduce impact of Earth processes (earthquakes), natural hazards; earthquake-resistant technologies	Number & Operations: Budgeting, solve word problems involving money	Recount an experience in an organized manner, write an opinion piece, research technologies

Digital Relay Challenge	TELECOMMUNICATION/ELECTRICAL—Students learn how to use codes to protect information. Then they design, build, and test a code transmission system.	PHYSICAL—Waves & Their Application: codes, communication, patterns to transfer information, interpret data from maps, transmit digitized information	Operations & Algebraic Thinking: Create a pattern/code that follows a rule, use addition, subtraction, multiplication, division	Recount an experience in an organized manner, write an opinion piece (newspaper article), research Braille
The Great Toy Design Challenge	CHEMICAL—Students identify materials based on their properties, evaluate competitors' toys, and design a superior toy to sell.	PHYSICAL—Matter & Its Interactions: properties of solids and fluids, viscosity, conservation of mass, measurement of properties, liquefaction	Fractions: Compare the size of a product to one factor, solve real-world fractions with multiplication, volume, measurement	Use precise language, engage in collaborative discussions, write a food critic review
Food Deserts Challenge	AGRICULTURAL—Students investigate their own dietary needs and design and test systems for growing fresh produce without soil.	LIFE—Molecules to Organisms & Ecosystems: plants get nutrients from air and water, pH, energy flow, hydroponics	Data: Volume, analyzing data, place value	Support claims with evidence, use precise language, write an information sheet with instructions, diagrams, and data
Rainwater Runoff Design Challenge	ENVIRONMENTAL—Students investigate sources and types of water pollution. Then they design, build, and test a model of subsoil that filters water through a rain garden.	EARTH—Earth & Human Activity & Earth's Systems: effects of water pollution (Earth's resources), understand properties of matter, (permeable, impermeable soil) filtration, protection of resources	Fractions: Compute with fractions, convert measurements for use in real-world problems	Write opinion pieces (proposal to school board), use precise language, summarize