START to STEM

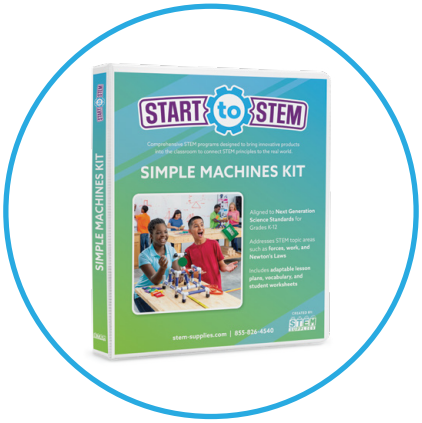
A turn-key solution to STEM!

What is Start to STEM?

Start to STEM is a comprehensive STEM program designed to bring innovative products into the classroom to connect STEM principles to the real world. You have the option to customize your program to create the best solution for your school. We offer:

Engaging STEM Products

- Equipment for a class size of 24
- Centralized around a core STEM topic area
- Reusable for years to come



Day-by-Day Lesson Plans

- Aligned to national education standards
- Scalable across different grade levels
- Includes lessons, vocabulary, equipment instructions, student worksheets, and more

Virtual Professional Development

- Live virtual training with a STEM expert
- Expanded overview of equipment and activities
- Opportunity to learn best practices in using the equipment and teaching real-world applicable STEM lessons

Ready to start your STEM journey?

Whether you're a STEM veteran or new to STEM teaching, we're here to help. The Start to STEM program was designed as a turn-key solution that focuses on real-world applications of STEM fields through hands-on and inquiry-based methods. We're here to provide you the best teaching and learning experience for classrooms, makerspaces, and everything in-between.

Contact Us Today!

stem-supplies.com/start-to-stem | orders@stem-supplies.com | (855) 826-4540

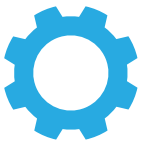
SIMPLE MACHINES

START to STEM
Comprehensive Curriculum Packages

Simple machines are all around us, from the wheels on our cars to the handicap ramp on a building. Through Start to STEM Simple Machines Kits, students will learn real-world applications of simple and complex machines by studying each type of machine using hands-on and inquiry-based methodologies. Throughout ten days of coursework, students will explore the physical science concepts behind simple machines such as forces, work, and mechanical advantage. At the end of the program, students will engage in a culminating activity where they build their own Rube Goldberg contraption, a complex machine incorporating smaller simple machines to achieve a task.

The Start to STEM Simple Machines Complete Kit includes hands-on equipment for 24 students, a comprehensive curriculum manual aligned to the Next Generation Science Standards, and a three-hour virtual professional development training. You also have the option to purchase the equipment or the manual alone, as well as the equipment and the manual without the training.

Top Subject Areas Covered:



Simple and Complex Machines

Engineering Design Process

Measurement

Ratios and Relationships

Lesson Objectives:

Daily Instruction Topics	Example Learning Objective
What is a Simple Machine?	Understand that a simple machine is a tool that helps accomplish work.
What is a Lever?	Be able to locate the fulcrum on a lever.
What is an Inclined Plane?	Observe the effects of adding angles to a plane for mechanical advantage.
What is a Pulley?	Understand a pulley is used to change an object's direction.
What is a Wheel and Axle?	Identify a gear as a type of wheel and axle.
Complex Machines	Define a complex machine as a combination of two or more simple machines.
Simple Machines Wrap Up	Name all six types of simple machines and provide a real-world example of each.

Learning Objectives

- Identify a catapult as a type of lever.
- Understand the meaning of accuracy and precision.

Equipment List

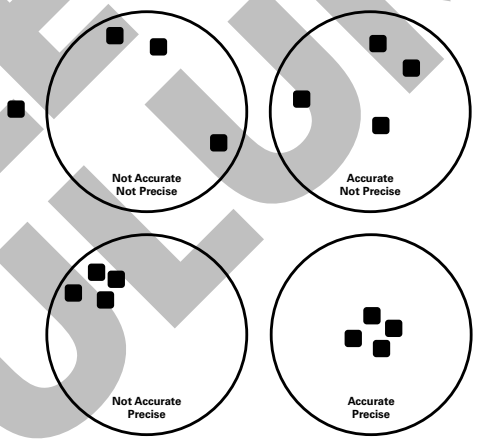
- LearnLauncher™ Mini Catapults Class Set
  - 4 LearnLauncher™ Mini Catapults
  - Heavy-Duty Rubber Bands
  - 24 Mini Beanbags
- Floor Tape
- 4 Yard Sticks

Suggested Timing

- 30+ minutes

SET UP

- Split students into four groups.
- Each group will be given a LearnLauncher™ Mini Catapult, rubber bands, and 6 beanbags.
- Place the LearnLauncher™ Mini in the desired location within the group.
- Identify one student as the launcher. This student will be the only one to touch the catapult at the time of launching. All other students observe the experiment from a safe distance.
- When launching, the student places the beanbag on the launching pad and pulls back on the launching arm.
- Ensure all observers stand to the side of the launcher.
- The student announces the launch, counts down from 3, and releases the launching arm.



TEACH

- Place 1 rubber band onto the launch arm of the LearnLauncher™ Mini.
- Complete 2 test launches to determine the launching distance.
- Create a square out of floor tape on the floor at the previously tested launching distance.
- Launch 6 beanbags (1 at time).
- Record the landing location of each beanbag using the "Accuracy and Precision" worksheet in the appendix section.

REFLECTION QUESTIONS

- Does the beanbag land in the square every time?
- Is the launcher accurate?
- Is the launcher precise?
- Can the launcher be accurate and precise? Or neither?

NGSS Alignment

PS2.A: Forces and Motion
Pushes and pulls can have different strengths and directions.
Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

ETS1.C: Optimizing the Design Solution
The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

Vocabulary

- **Accuracy** – how close measurements are to true value (e.g. center of a target)
- **Precision** – how close measurements are to each other

Worksheets

- Accuracy and Precision, p34

TEACHING SUGGESTIONS

- Only one student should use the launcher at a time. Have students take turns using the launcher.
- Encourage students to shout out a fun phrase when they're about to launch. This will help to warn other students that a projectile will be entering the air so they can safely move out of the way.
- Limit the number of rubber bands that students can use in order to curb the distance the beanbag travels.

ADDITIONAL LESSON OPTIONS

- Using graph paper, have students create a coordinate grid and mark the locations where the beanbags landed. Determine the coordinates of each beanbag according to the grid.
- Replicate this lesson by having students toss the beanbags by hand. Discuss if throwing the beanbags is more accurate/precise than the lever. Explain how their arm acts like a lever in this example.

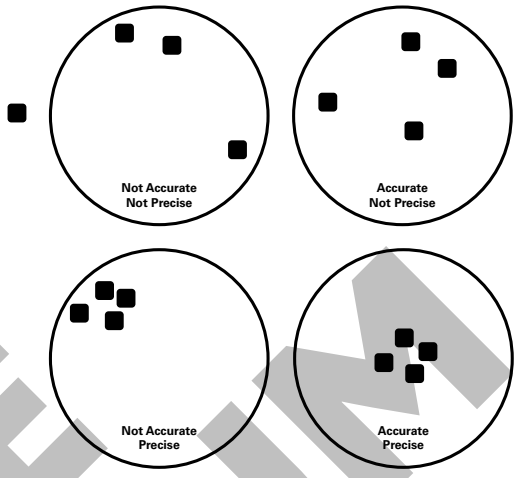
TEACHER REFLECTION

ACCURACY AND PRECISION

Name: _____

Instructions:

1. Launch a beanbag.
2. Mark its landing spot relative to the square on the floor on the square on this page.
3. Repeat five more times.
4. Determine if the launcher is accurate, precise, both, or neither.



Is the launcher accurate and/or precise? Explain your answer below.