5/6 G&T Unit A1: STEM

Content Area: **Gifted & Talented**
Course(s):
Time Period: **MP1**
Length: **30 days**
Status: **Published**

NJSLS

SCI.MS-PS2-3	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-3	Analyze 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.
SCI.MS-ETS1-4	Develop 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.

Rationale and Transfer Goals

We are surrounded by computers! In this unit, students will interrogate the basics of how computers “think” and apply their understanding to different puzzles. At their most basic level, computer processors are really just a series of switches that are flipped using electrical energy. Students will use gears and bits (actual mechanics, rather than energy) for this unit to simulate the computer processor and better understand the way computer systems work. The purpose of this unit is to develop creativity and problem solving, both independently and through collaboration.

Enduring Understandings

Students will understand the mechanics and logic of computer processors. The concept of scaffolding and building on prior knowledge is crucial to the success of the Touring Tumbles Unit. Students will learn to build on basic concepts (gates, ramps, crossovers, bits, interceptors, gears) and gradually build those basics into more complex structures. Students can’t skip ahead or their processors will not work. This pacing and use of scaffolding is part of the learning of the unit and can be applied to many different areas outside of the classroom.

Essential Questions

What is a system?

How do systems work?

How can different parts of a system work together efficiently?

What is collaboration?

How can we effectively collaborate to solve problems?

What careers are available related to computers?

Content - What will students know?

- Students will understand the concepts of systems, functions, and problem solving.
- Students will work to creatively solve problems based on mistakes and errors, using natural consequences to find what works.

Skills - What will students be able to do?

- Students will define the following terms related to the unit: Gravity, ignition, fusion, ramps, crossovers, interceptors, duality, inversion, symbiosis.
- Students will use puzzle pieces called “bits” to create and manipulate increasingly complicated systems.

Activities - How will we teach the content and skills?

- Small group hands-on practice with Touring Tumbles.
- Paired research of computers and computing systems.
- Independent practice at defining and manipulating systems.
- Whole class discussion of real-world applications for systems.

Evidence/Assessments - How will we know what students have learned?

- Students will select one project from the Touring Tumbles puzzle book to solve and present in class
- Students will identify and present an example of a system in real life and explore its connection to computing systems.

Key Resources

Touring Tumbles

21st Century Life and Careers

WRK.9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.

Career Readiness, Life Literacies, & Key Skills

TECH.9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
TECH.9.4.8.IML.7	Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).
TECH.9.4.8.IML.8	Apply deliberate and thoughtful search strategies to access high-quality information on climate change (e.g., 1.1.8.C1b).

Interdisciplinary Connections/Companion Standards

LA.RI.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RI.6.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.
LA.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.6.4	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).
LA.SL.6.5	Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.