

Graphing in Math and Science: Linear and Non-linear Data & Forces and Motion Grade 8



Graphing in Math and Science

Unit Overview

In this unit, students will develop their understanding of graphing linear relationships and connecting graphing to forces and motion through a series of hands-on investigations. These investigations will support students as they collect, analyze, and interpret data; as well as provide multiple opportunities for collaboration, critical thinking, and creative problem solving.

Content Area Connections

- Science
- Math
- English Language Arts (as support for Science and Math)

Alignment to Standards

Science content standards:

- 8.P.2A.1
- 8.P.2A.2
- 8.P.2A.3
- 8.P.2A.5
- 8.P.2A.6
- 8.P.2A.7

Math content standards:

- 8.F.1
- 8.F.2
- 8.F.3
- 8.GM.7

Connections

Active Learning Strategies (for Purposeful Reading, Meaningful Writing, and Productive Dialogue)

Specific strategies will be utilized with each lesson within the unit and outlined in the lesson plan.

Computational Thinking

**NOTE: Specific connections to Computational Thinking will be outlined in the Unit/Lesson document(s).*

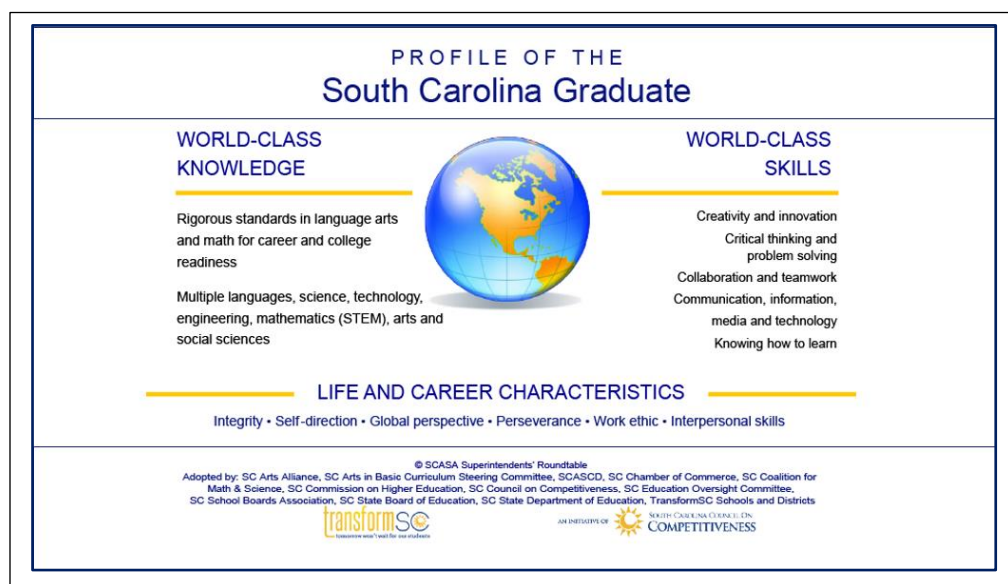
Computational Thinking (CT) is a problem-solving process that includes (but is not limited to) the following characteristics:

- Formulating problems in a way that enables us to use a computer and other tools to help solve them.
- Logically organizing and analyzing data
- Representing data through abstractions such as models and simulations
- Automating solutions through algorithmic thinking (a series of ordered steps)

- Identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- Generalizing and transferring this problem solving process to a wide variety of problems

These skills are supported and enhanced by a number of dispositions or attitudes that are essential dimensions of CT. These **dispositions or attitudes** include:

- Confidence in dealing with complexity
- Persistence in working with difficult problems
- Tolerance for ambiguity
- The ability to deal with open ended problems
- The ability to communicate and work with others to achieve a common goal or solution



The lessons contained in this unit of study are intentionally designed to support students as they strive to meet the standards described in the Profile of the South Carolina Graduate. Students work collaboratively, communicate information, and actively engage in critical thinking and problem solving as they dive into this exploration of the connections between genetics and probability.

Other information on the standards and indicators in this unit can be found in the support documents/resources on the SC State Department website.

www.ed.sc.gov (Instruction → Standards and Learning → Science → Support Documents and Resources)

Active Learning strategies and descriptions can be found on the S2TEM Centers SC website in the Disciplinary Literacy Virtual Library:

s2temsc.org (Resources → Disciplinary Literacy Virtual Library → Strategy Warehouse)

Computational Thinking Reference:

<https://csta.acm.org/Curriculum/sub/CurrFiles/CompThinkingFlyer.pdf>

<https://csta.acm.org/Curriculum/sub/CompThinking.html>

The lessons contained within this unit are intended to be used for interdisciplinary instruction. The timeline on the following pages suggests an order of instruction for both the science and mathematics lessons. Time for quizzes, tests, and possible reteaching are not included in the outline.

NOTE: Teachers may also decide to begin the Science content in this unit plan on Day 6 of the Math instruction, rather than beginning both sets of lessons at the same time.

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
<p>SCIENCE</p> <p>Marshmallow Shooters</p> <ul style="list-style-type: none"> Hands-on investigation <p>Science content standard:</p> <ul style="list-style-type: none"> 8.P.2A.1 		<p>SCIENCE</p> <p>Inertia Tower</p> <ul style="list-style-type: none"> Hands-on investigation <p>Science content standard:</p> <ul style="list-style-type: none"> 8.P.2A.3 		<p>SCIENCE</p> <p>May the Force be With You</p> <ul style="list-style-type: none"> Hands-on investigation <p>Science content standards:</p> <ul style="list-style-type: none"> 8.P.2A.1 8.P.2A.2 8.P.2A.5 8.P.2A.6 8.P.2A.7
<p>MATH</p> <p>Get in Line!</p> <p>Lessons 1 A & B</p> <ul style="list-style-type: none"> Linear data experiments <p>Math content standards:</p> <ul style="list-style-type: none"> 8.F.1 8.F.3 		<p>MATH</p> <p>Get in Line!</p> <p>Lessons 2 A & B</p> <ul style="list-style-type: none"> $y=mx$ $y=mx+b$ Guess My Function Lines of Best Fit <p>Math content standards:</p> <ul style="list-style-type: none"> 8.F.1 8.F.3 		

DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
<p>SCIENCE</p> <p>May the Force be With You</p> <ul style="list-style-type: none"> Hands-on investigation <p>Science content standards:</p> <ul style="list-style-type: none"> 8.P.2A.1 8.P.2A.2 8.P.2A.5 8.P.2A.6 8.P.2A.7 				
<p>MATH</p> <p>Pythagorean Football</p> <ul style="list-style-type: none"> Application of Pythagorean Theorem using a football simulation <p>Math content standard:</p> <ul style="list-style-type: none"> 8.GM.7 <p>Science content standard:</p> <ul style="list-style-type: none"> 8.P.2A.7 		<p>MATH</p> <p>Dueling Runners</p> <ul style="list-style-type: none"> Time Distance Applet <p>Math content standard:</p> <ul style="list-style-type: none"> 8.F.3 <p>Science content standard:</p> <ul style="list-style-type: none"> 8.P.2A.6 	<p>MATH</p> <p>Motion Graphs</p> <ul style="list-style-type: none"> How Far? Investigation <p>Math content standards:</p> <ul style="list-style-type: none"> 8.F.2 8.F.3 <p>Science content standards:</p> <ul style="list-style-type: none"> 8.P.2A.6 8.P.2A.7 	<p>MATH</p> <p>Motion Graphs</p> <ul style="list-style-type: none"> Motion Detectives <p>Math content standards:</p> <ul style="list-style-type: none"> 8.F.2 8.F.3 <p>Science content standards:</p> <ul style="list-style-type: none"> 8.P.2A.6 8.P.2A.7

DAY 11	DAY 12	DAY 13	DAY 14	DAY 15
<p>MATH ●</p> <p>Motion Graphs</p> <ul style="list-style-type: none"> • Motion Detectives <p>Math content standards:</p> <ul style="list-style-type: none"> • 8.F.2 • 8.F.3 <p>Science content standards:</p> <ul style="list-style-type: none"> • 8.P.2A.6 • 8.P.2A.7 	<p>Motion Graphs</p> <ul style="list-style-type: none"> • Velocity Stories <p>Math content standards:</p> <ul style="list-style-type: none"> • 8.F.2 • 8.F.3 <p>Science content standards:</p> <ul style="list-style-type: none"> • 8.P.2A.6 • 8.P.2A.7 			