**Subject area/course**: Mathematics/Calculus

**Grade level/band**: 11-12

**Task source**: Summit Public Schools

**Book of Limits**

**TEACHER'S GUIDE**

1. **Task overview**:

Students will create a function that will demonstrate mastery of limits and continuity in multiple representations.

1. **Aligned standards:**
2. **Primary Common Core State Standards**

Note: The focal mathematical topic of this task is beyond the mathematics in the CCSS

[CCSS.Math.Content.HSF.IF.A.1](http://www.corestandards.org/Math/Content/HSF/IF/A/1/) Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).

[CCSS.Math.Content.HSF.IF.A.2](http://www.corestandards.org/Math/Content/HSF/IF/A/2/) Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

[CCSS.Math.Content.HSF.IF.C.7.B](http://www.corestandards.org/Math/Content/HSF/IF/C/7/b/) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

[CCSS.Math.Practice.MP6](http://www.corestandards.org/Math/Practice/MP6/) Attend to precision.

1. **Critical Abilities**

Communication in Many Forms:Use oral and written communication skills to learn, evaluate, and express ideas for a range of tasks, purposes, and audiences. Develop and strengthen writing as needed by planning, revising, editing, and rewriting while considering the audience.

Use of Technology:Present information, findings, and supporting evidence, making strategic use of digital media and visual displays to enhance understanding. Use technology, including the Internet, to research, produce, publish, and update individual or shared products in response to ongoing feedback, including new arguments or information.

Modeling, Design, and Problem Solving:Use quantitative reasoning to solve problems arising in everyday life, society, and the workplace, e.g., to plan a school event or analyze a problem in the community, to solve a design problem or to examine relationships among quantities of interest. Plan solution pathways, monitoring and evaluating progress and changing course if necessary, and find relevant external resources, such as experimental and modeling tools, to solve problems. Interpret and evaluate results in the context of the situation and improve the model or design as needed.

1. **Time/schedule requirements:**

This task will take approximately two weeks to complete.

1. **Materials/resources:**

Documents:

* Item A. Book of Limits Performance Task Instructions
* Item B. Entry Event
* Item C. We Belong Together Lab
* Item D. We Belong Together Student Document
* Item E. Exploring Limits Algebraically and Graphically
* Item F. Exploring Limits through Graphing

Limits at Infinity Resources:

* *Mean Girls* hook: <https://www.youtube.com/watch?v=oDAKKQuBtDo>
* *Toy Story* hook: <https://www.youtube.com/watch?v=ejwrxGs_Y_I>
* *NOVA* readings: <http://www.pbs.org/wgbh/nova/physics/contemplating-infinity.html>; <http://www.pbs.org/wgbh/nova/physics/working-with-infinity.html>
* *Khan Academy* video: <https://www.khanacademy.org/math/differential-calculus/limits_topic/limits-infinity/v/limits-and-infinity>

1. **Prior knowledge:**

None provided.

1. **Connection to curriculum:**

*Book of Limits* was designed to be students’ introduction to the world of calculus and the first performance task they complete in calculus.

1. **Teacher instructions:**
2. We Belong Together Lab
3. Graphical Limits Lab
4. Algebraic Limits Lab
5. Peer Editing and Reflection
6. Final Project
7. **Student support:**

None provided.

1. **Extensions or variations:**

None provided.

1. **Scoring:**

Student work can be scored using the Summit Public Schools Book of Limits rubric.