**Subject area/course**: Mathematics/Algebra 1

**Grade level/band**: 8

**Task source**: Virtual Learning Academy Charter School; Adapted by Theresa Morris

**Rising Cost of College Tuition**

**TEACHER'S GUIDE**

1. **Task overview**:

Students will analyze the rising cost of tuition to make a recommendation of which university/college is a better financial decision.

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

CCSS.Math.Content.HSS.ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

CCSS.Math.Content.HSS.ID.B.6.C Fit a linear function for a scatter plot that suggests a linear association.

CCSS.Math.Content.HSS.ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

CCSS.Math.Content.HSA.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

1. **Critical Abilities**

* **Research** - Conduct sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, and demonstrate understanding of the subject under investigation. Gather relevant information from multiple authoritative print and digital sources, use advanced searches effectively, and assess the strengths and limitations of each source in terms of the specific task, purpose, and audience.
* **Analysis of information** - Integrate and synthesize multiple sources of information (e.g., texts, experiments, simulations) presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to address a question, make informed decisions, understand a process, phenomenon, or concept, and solve problems while evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
* **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. **Other standards**

*Performance Outcomes*

* Students will research and synthesize information.
* Students will reason abstractly to make informed decisions.
* Students will collaborate with peers and communicate ideas
* Students will support mathematical arguments and justifications using appropriate sources and evidence.

1. **Time/schedule requirements:**

This task will take approximately five days to complete (Days 1-4 student work, Day 5 is for the presentations).

1. **Materials/resources:**

* Computer graphing program such as grapher (found on all Macs), sketchpad, Geogebra or Logic Pro, word processing software, a graphing calculator like TI-83/84 or N-spire or a graphing calculator simulator on their computer
* Internet access for research (www.CollegeCalc.org)
* Data for sample universities/colleges in Ohio and National Averages (for teacher use)
* Graphs and linear equations for sample universities/colleges in Ohio and National Averages (for teacher use)

1. **Prior knowledge:**

* Experience collecting data and create a scatter plot
* Fit a line to a scatter plot
* Calculate the average rate of change
* Interpret slope in the context
* Use an equation for the line of best fit to make predictions

1. **Connection to curriculum:**

*Rising Cost of College Tuition* is designed to be students’ opportunity to apply knowledge and skills related to data collection and writing and using linear equations to make decisions in a real life situation that requires problem solving, communication, reasoning, and analysis of information.

1. **Teacher instructions:**

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|  | **Overview** | **Teacher Notes** |
| Day 1 | Class discussion regarding task. Share the Culminating Project outline, rubric, and overview with students. Establish student teams. Overview final product. Teams collect data and begin to create scatterplots for selected universities | * Review & Establish classroom protocols regarding group work and class discussions. * Data and graphs are provided for teacher. Feel free to differentiate or scaffold for some students. Perhaps, provide the data for some students or the graph without the line of best fit or equation. |
| Day 2 | * Teams create Scatterplots from the Data, draw a line of best fit, and write an equation for each line * Share with teacher, then teacher provides National Average Tuition for the type of university/college team has researched. | * Teams check in with teacher either end of day 1 or middle of day 2 to share which category of college/university they are researching. * Be alert for the common error of allowing the domain to be from year 0 instead of assigning year 0 to represent the first year of data. * For this project the categories include: * Community/Technical College * State University/College (Public) * Private University/College (This includes IVY league Colleges) |
| Day 3 | * Students analyze scatterplots, line of best fit and equations for both universities/colleges and the national average * Use the equation for the line of best fit to determine the cost of tuition when student may attend either college. * Compare the total cost of tuition from each university/college to that of the national average * Describe what the slope for the line of best fit tells you about each college. * Decide which university/college researched is the better financial decision. * Begin to create presentation with justification. | * Continue to monitor for the common errors * May decide to have a short warm-up this day if you notice students having common issues. * Share the SCALE Math rubric and SCALE Oral Presentation Rubric with the students. * Note that the presentation material will be scored using the SCALE Math Rubric. * The Oral Summary the students provide will be scored using two domains of the SCALE Oral Presentation Rubric (Evidence and Organization). |
| Day 4 | * Students finalize presentation material and decide how to summarize this information for the class presentation. | * Provide students with expectations for presentation: * Presentation is a summary and should only last 3-5 minutes. What universities, conclusions, and short justification. The mathematical evidence for student understanding is included in the presentation documents the students turn in. It is not necessary or recommended that every group explain how they found the line of best fit, equation …. |
| Day 5 | * Class presentation/summaries | * Remind or set class protocols for presentations * Remind students that they will be scored using the SCALE Oral Presentation Rubric on two domains: Evidence and Organization. |

1. **Student support:**

Not included.

1. **Extensions or variations:**

Not included.

1. **Scoring:**

Student work can be scored using the SCALE Mathematics Performance Assessment Rubric and the SCALE Effective Communication Oral Presentation Rubric.