**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.
2. **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. **Aligned standards:**

* **CCSS.**[**HSS.ID.B.6**](http://www.corestandards.org/Math/Content/HSS/ID/B/6/):Represent data on two quantitative variables on a scatter plot, and describe how the variables are related..
* **CCSS.**[**HSS.ID.B.6.C**](http://www.corestandards.org/Math/Content/HSS/ID/B/6/c/): Fit a linear function for a scatter plot that suggests a linear association.
* **CCSS.**[**HSS.ID.C.7**](http://www.corestandards.org/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.**[**HSA.CED.A.2**](http://www.corestandards.org/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. **Time/schedule requirements:**

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

1. **Materials/resources:**

* Student Instructions
* 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)
* SCALE Math Rubric
* SCALE Presentation Rubric

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. **Scoring:**

Student work can be scored using the SCALE Math Rubric and the SCALE Presentation Rubric

**Daily Breakdown of Activities:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Overview** | **Teacher Notes** | **CCSS** |
| 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. | [HSS.ID.B.6](http://www.corestandards.org/Math/Content/HSS/ID/B/6/) |
| 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) | [HSS.ID.B.6](http://www.corestandards.org/Math/Content/HSS/ID/B/6/)  [HSS.ID.B.6.C](http://www.corestandards.org/Math/Content/HSS/ID/B/6/c/)  [HSA.CED.A.2](http://www.corestandards.org/Math/Content/HSA/CED/A/2/) |
| 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). | [HSS.ID.B.6](http://www.corestandards.org/Math/Content/HSS/ID/B/6/)  [HSS.ID.B.6.C](http://www.corestandards.org/Math/Content/HSS/ID/B/6/c/)  [HSA.CED.A.2](http://www.corestandards.org/Math/Content/HSA/CED/A/2/)[HSS.ID.C.7](http://www.corestandards.org/Math/Content/HSS/ID/C/7/) |
| 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 …. | [HSS.ID.B.6](http://www.corestandards.org/Math/Content/HSS/ID/B/6/)  [HSS.ID.B.6.C](http://www.corestandards.org/Math/Content/HSS/ID/B/6/c/)  [HSA.CED.A.2](http://www.corestandards.org/Math/Content/HSA/CED/A/2/)[HSS.ID.C.7](http://www.corestandards.org/Math/Content/HSS/ID/C/7/) |
| 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. | SMP 3 |

***Rising Cost of College Tuition***

***STUDENT INSTRUCTIONS***

Students and families consider many variables when making a decision about which college to attend. Considerations include: what majors are available, proximity to home, family history with a college or university, athletic opportunities, as well as cost.

You and a friend are discussing which university or college is a better financial choice.

**To answer this question, you will:**

* Select two colleges/universities from the same category
  + Categories include:
    - Community or Technical College (Example: Central Ohio Technical College)
    - State College/University (Example: The Ohio State University)
    - Private College/University (Example: Stanford, Yale, Marietta College)
* Collect data regarding the cost of tuition for both colleges/universities for 15- 20 years
* Create a scatterplot from this data
* Write an equation for the line of best fit for each college/university
* Use the equation to predict the cost of tuition for the years in which you might attend college
* Compare each college to the National Average of tuition for this type of university (Your teacher will provide this data).

**You will summarize your decision and justification in class (3-5 minutes) and create presentation material by creating one of the following:**

* Power Point presentation
* Summary Report
* Movie or video

Your teacher will grade your class summary using the SCALE Oral Presentation Rubric and your presentation materials using the SCALE Math Rubric.

This task will be accomplished using the following process:

* **Day 1:** Collect and Research Data on the tuition for two colleges/universities (from the same category) and begin to create scatterplots.
* **Day 2:** Finalize scatterplots from the Data, draw a line of best fit, and write an equation for each line
  + For both colleges/universities selected
  + National Average for Tuition for the category you selected (Teacher provides data)
* **Days 3- 4:** Decide which of the two colleges/universities you selected is the better financial decision and create a class summary and a presentation material to share your decision and justification. Include in your justification what the slope for the line of best fit tells you about each college.
* **Day 5:** Class Presentations

***Final Product(s):***

* Summarize your decision and justification – short paragraph.
* Create a presentation or report to turn in to your teacher. The following information must be included in the presentation material:
  + Graph(s) showing scatterplots and line of best fit for each university/college and the national average
  + Equation for the line of best fit for both colleges/universities you selected and the national average
  + The predicted cost of tuition at both colleges/universities and the national average for the time period you might attend college.
  + Describe what the slope for the line of best fit tells you about each college.

***Answers to Some Questions You Might Have***

* ***What do I need to know or do to be successful on this task?*  
  On this task, you will show that you know these things:**
* Research and collect data
* Create a scatterplot
* Draw a line of best fit
* Write an equation to represent the line of best fit
* Use an equation to make predictions about future tuition costs

**On this task, you will show that you are able to do these things:**

* Research and synthesize information.
* Collaborate with peers
* Communicate ideas
* Provide justifications using mathematics
* ***What materials or links will help me complete this task?***

Materials: a 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.

* Links: www.CollegeCalc.org

Your teacher will provide data regarding the National Average of Tuition for the type of university/college you select.

* ***How long will I have to complete this task?***

This task as written is designed to take approximately 5 days. Your teacher may choose to make changes to the task or adjustments to the time.

* ***How will my work be scored?***

Your work will be scored using a rubric.

**List of Colleges/Universities by Category**

**Community College**

* Central Ohio Technical College
* Cincinnati State Technical and Community College
* Columbus State Community College
* Cuyahoga Community College
* Edison State Community College
* Lorain County Community College
* Marion Technical College
* Owens Community College
* Sinclair Community College
* Terra State Community College

**State College/University**

* Bowling Green State University (main campus)
* Cleveland State University
* Kent State University at Kent
* Miami University Oxford
* Ohio State University (main campus)
* University of Cincinnati (main campus)
* University of Toledo
* Wright State University (main campus)

**Private College/University**

* Denison College
* Franciscan University of Steubenville
* Harvard University
* John Carroll University
* Marietta College
* MIT
* Princeton University
* Stanford University
* University of Dayton
* University of Northwestern Ohio
* Xavier University