# Populations Predictions

## TI-Nspire Activity – Finding Linear Regression Equations

Teacher Guide

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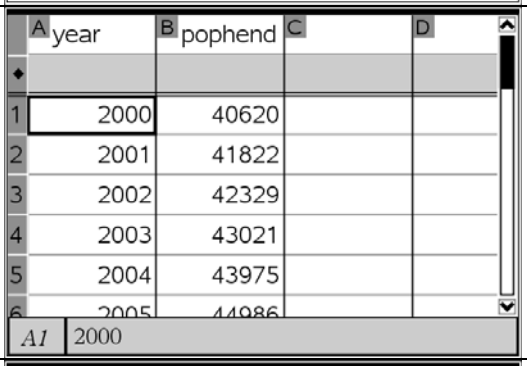
| Use this activity after you have taught how to find the line of best fit by hand.<br>Students should be familiar with slope-intercept form of an equation.<br>Reinforce the idea that slope is a rate of change. | **Finding Linear Regression Equations**<br><br>Making predictions based on popuation growth<br><br>Algebra I |
| You may change this page to reflect your own hometown. | We will start by looking at data charting the population of Hendersonville. |
| These statistics were taken from our city government's website. |  |
| Explain that the year is the independent variable and the population depends on the year. | On the next page, you see a scatter plot of the data related to the population of Hendersonville.<br><br>Make the independent axis the year and the dependent axis pophend.<br><br>Add a movable line and record the line of best fit.<br><br>Then find the linear regression equation. |

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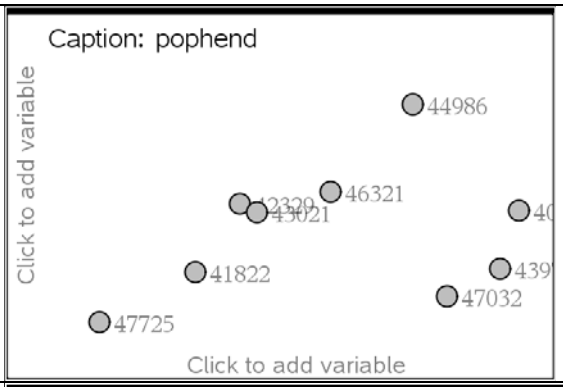
| To add a movable line: Menu, Analyze, Add Movable Line.<br>The student should place the line of best fit and record the equation on the next page.<br>To find the linear regression: Menu, Analyze, Regression, Show Linear (mx+b) |  |
| Students can type their answer in the answer box.<br><br>They will need to change the y-intercept from scientific notation to standard form. | **Question**<br>What is the equation of the movable line?<br>**Answer** |
| Students can type their answer in the answer box.<br><br>They will need to change the y-intercept from scientific notation to standard form.<br><br>y = 899.983 x – 1759360<br><br>Talk about the relevance of the y-intercept. | **Question**<br>What is the regression equation?<br>**Answer** |
| They should have similar slopes and y-intercepts.<br><br>The difference is due to the movable line being placed by the student and the regression equation being calculated by the Nspire.<br><br>You can discuss the different and correct answers found by placing a movable line. | **Question**<br>How are these equations similar?<br>How are they different?<br>**Answer** |

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| Correct answers: 49606, 55906, 67606<br><br>Encourage students to add a Calculator page: Home, Calculator<br><br>They may use the cut (ctrl C) and paste (ctrl V) feature to save time retyping the same expression. | **Question**<br>Using the linear regression equation, predict the population of Hendersonville in 2010, 2017, 2030.<br>**Answer** |
| | Now we will look at the population of the state of Tennessee. |
| Note that these numbers are in the millions. | |

| | A year | B poptn | C | D |
|---|---|---|---|---|
| 1 | 2000 | 5689283 | | |
| 2 | 2001 | 5748038 | | |
| 3 | 2002 | 5792297 | | |
| 4 | 2003 | 5845208 | | |
| 5 | 2004 | 5900962 | | |
| 6 | 2005 | 5983211 | | |

A1 2000

| | |
|---|---|
| See directions from Problem 1 on adding a movable line and finding the linear regression equation. | On the next page, you see a scatter plot of the data related to the population of Tennessee.<br>Make the independent axis the year and the dependent axis poptn.<br>Add a movable line and record the line of best fit.<br>Then find the linear regression equation. |

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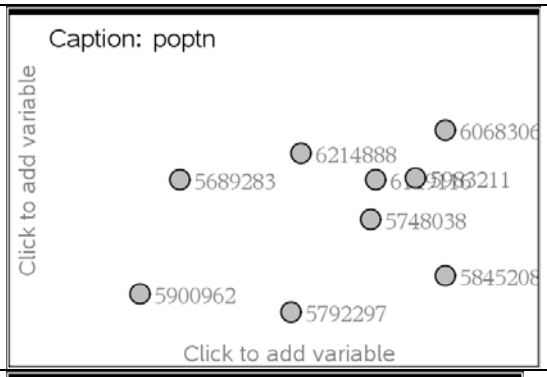
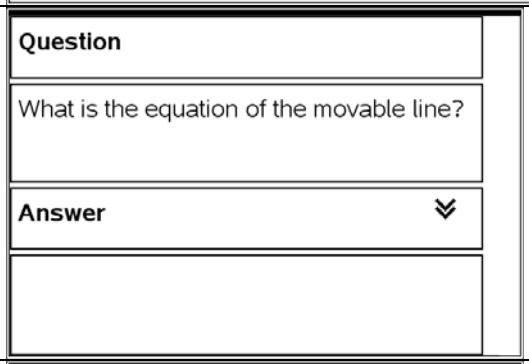
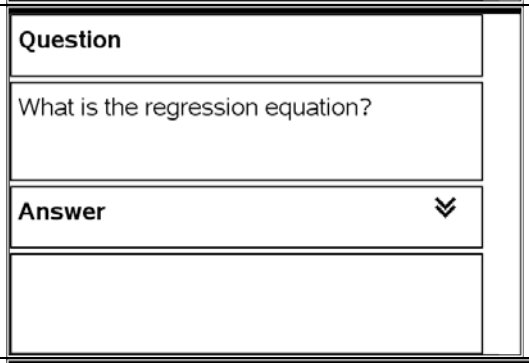
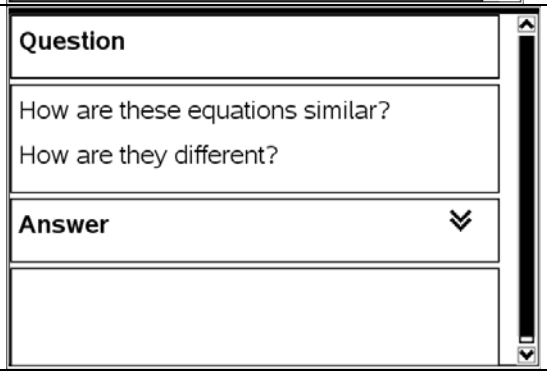
| |  |
| Answers will vary.<br><br>Talk about how the slopes and y-intercepts should be close to those of other students.<br><br>Have the students compare their equations with others. |  |
| y = 66594.6 x – 127523000<br><br>Ask: How close was your movable line to the regression equation? |  |
| Talk again about the slope representing the rate of change. In this situation, slope shows the population growth in people per year. |  |

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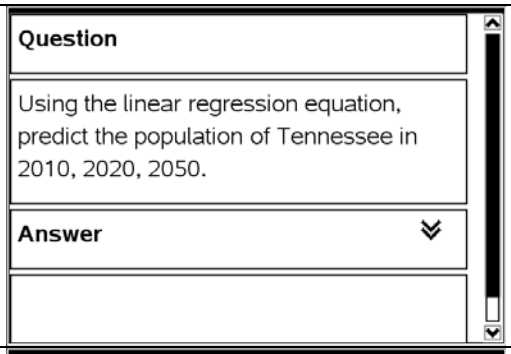
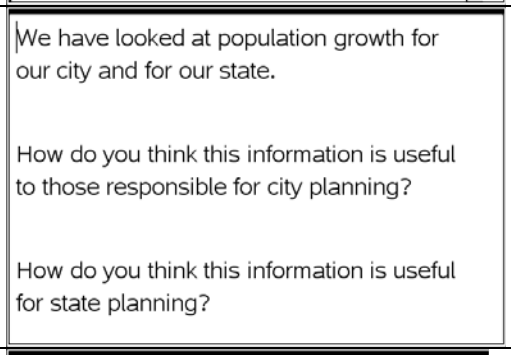
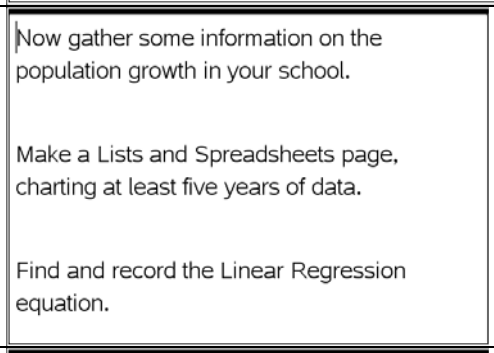
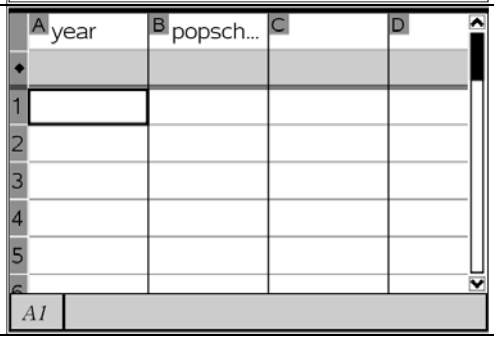
| Correct answers: 6332150, 6998090, 8995930<br><br>Answers were converted from scientific notation to standard form. |  |
| Possible correct answers: Deciding when new schools should be built. Determining if new roads or highways should be constructed. Many correct possibilities here. |  |
| You may make this data collection a homework or small group assignment. If your school does not have these records easily accessible, you may want to collect some yearbooks from the past. |  |
| After the students fill in the table, they will need to add a Data and Statistics page by choosing Home, Data and Statistics. Then fill in the year for the independent variable and the school's population for the dependent variable.<br>Follow previous directions to find the regression equation. |  |

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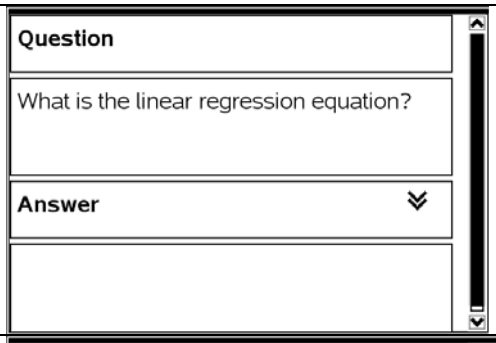
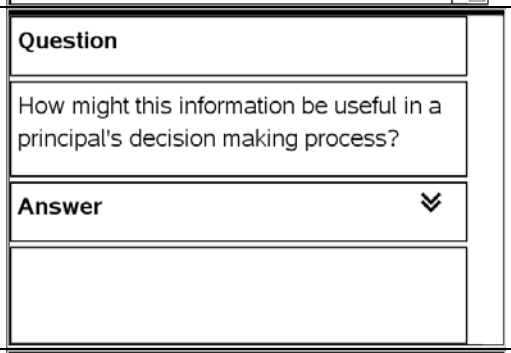
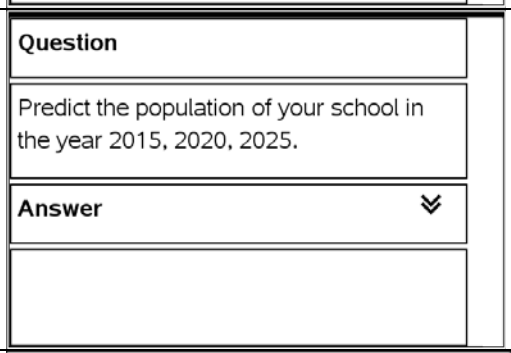
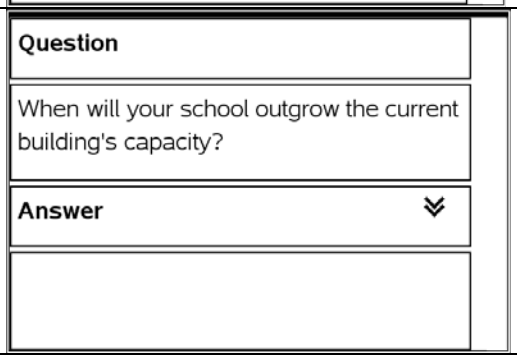
| Answer will depend on your data.<br><br>Talk about slope being the rate of change and whether it is an increase or decrease. |  |
| Hiring teachers, scheduling classes, ordering lunches, hiring staff, etc. |  |
| Use the regression equation and find x = 2015, 2020, 2025. |  |
| Know the capacity of your school building. Talk about what happens when your school reaches capacity. |  |