You Are What You Eat! – ID: 9478

Time required
45 minutes

By Lauren Jensen

Activity Overview

In this activity, students are introduced to modeling linear data through an investigation of comparing grams of fat and calories in fast food hamburgers. Students will use multiple representations to explore aspects of the linear equation that models the data.

Concepts

Data representation and interpretation
Transformational graphing
Linear equations and regressions

Teacher Preparation

This investigation offers opportunities for review and consolidation of key concepts related to scatter plots and linear functions. Care should be taken to provide ample time for all students to engage actively with the requirements of the task, allowing some who may have missed aspects of earlier work the opportunity to build a new and deeper understanding.

- *At the Algebra 1 level, this activity can serve to consolidate earlier work on graphing data, finding equations of lines, and modeling data with linear functions. It offers a suitable introduction to exploring linear data, model fitting using transformation of linear functions, and interpretation of graphs.*
- *Begin by reviewing with students finding lines to model data and the slope/intercept form of a linear equation.*
- *The screenshots on pages 2 and 3 (top) demonstrate expected student results. Refer to the screenshots on pages 3 (bottom) and 4 for a preview of the student TI-Nspire document (.tns file).*
- ***To download the student and solution .tns files, go to education.ti.com/exchange and enter "9478" in the quick search box.***

Classroom Management

- *This activity is intended to be **teacher-led** with students in **small groups**. You should seat your students in pairs so they can work cooperatively on their handhelds. You may use the following pages to present the material to the class and encourage discussion.*
- *You may have students record their answers on separate sheets of paper or in the .tns file itself. Alternatively, you may wish to use the questions posed to engage a class discussion.*
- *The TI-Nspire solution document Alg1Act31_YouAreWhatYouEat_Soln_EN.tns shows the expected results of working through the activity (fit lines shown and answers recorded).*
- *Suggestions for optional extension questions are provided at the end of this activity.*

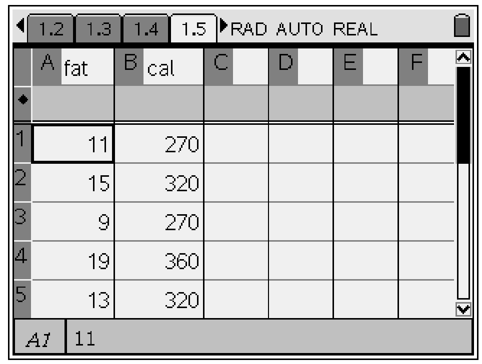
TI-Nspire™ Applications

Calculator, Graphs & Geometry, Lists & Spreadsheet, Notes, Data & Statistics

This investigation asks students to explore the relationship between the number of calories and the number of grams of fat in different fast food hamburgers. Ultimately, they will model the data and find the linear relationship between calories and fat grams. Pages 1.2 and 1.3 provide questions that may be used to engage students in a whole-class discussion.

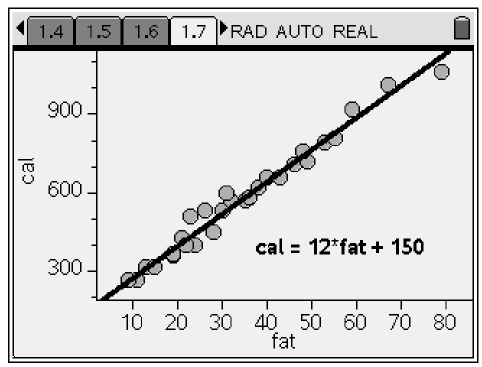
Page 1.3 displays a table of calories and grams of fat for different hamburgers from three fast food restaurant chains.

Students should look at the data and record any observations about patterns in the data.

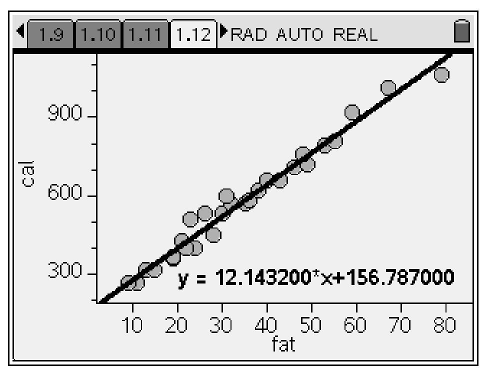


On page 1.7, students will create a scatter plot of the data using the *Data & Statistics* application. Be sure they select **fat** as the independent variable and **cal** as the dependent variable.

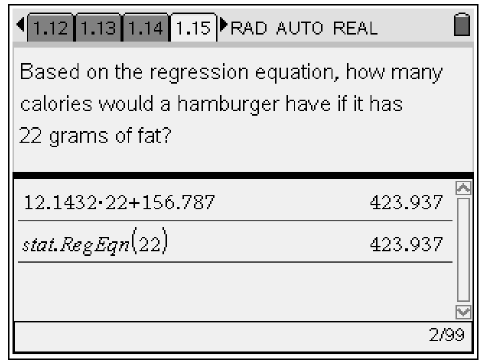
Selecting **Add Movable Line** from the Actions menu, students can drag and rotate a line until they have an appropriate linear model of the data. One possible such line is shown to the right.



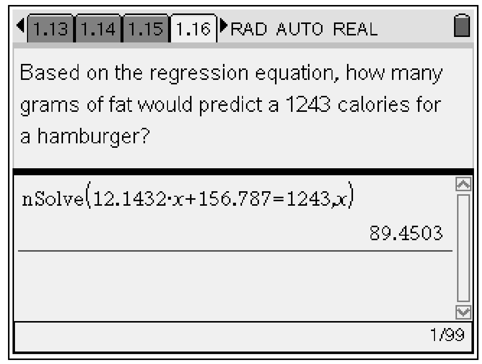
Students are asked a short series of questions about the scatter plot and their linear models before proceeding to page 1.12 and performing a linear regression. Again from the Actions menu, have them select **Regression > Show Linear (mx+b).** Students will then compare the resulting regression equation to their movable line.



Students have two different options to solving the question on page 1.15. They can use the variable **sata.RegEqn** that was generated by the linear regression, or they can just type in the regression equation substituting 22 grams of fat in for *x*. Both methods are shown in the screenshot to the right.



For page 1.16, you may choose to have the students find the answer by hand, solving for *x*, and then use the **nSolve(** command to check their answers as shown below to the right.



From these exercises, students should conclude that as the number of grams of fat increases, the number of calories also increases; that is, there is a positive association between the two variables.

Extensions

- Students can find nutritional data on other fast food hamburgers and compare them to the results they obtained in this activity.
- Students can find nutritional data on various other types of food (ice cream, candy, chips, pop, French fries, etc) and find the relationship of sugar grams and calories.

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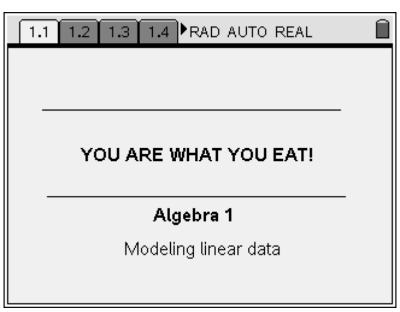
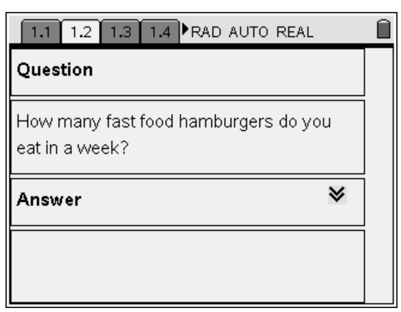
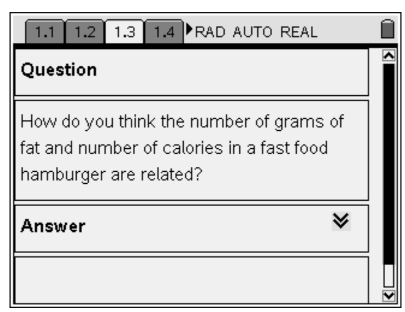
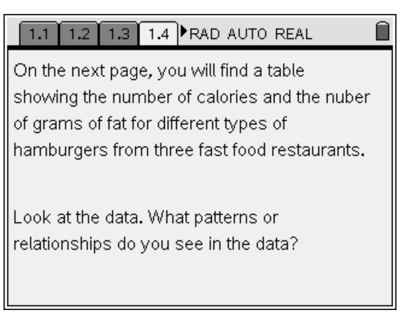
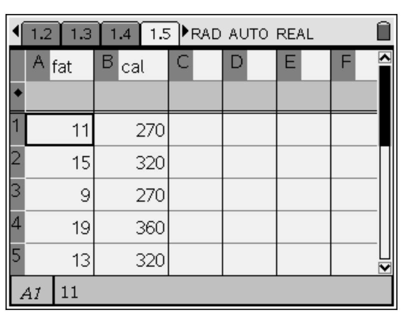
(Student)TI-Nspire File: *Alg1Act31_YouAreWhatYouEat_EN.tns*

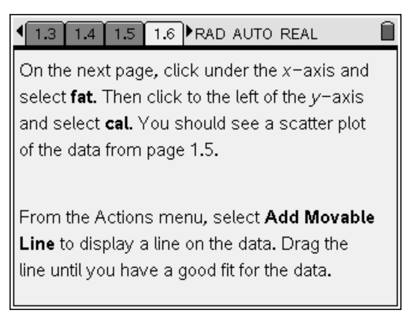


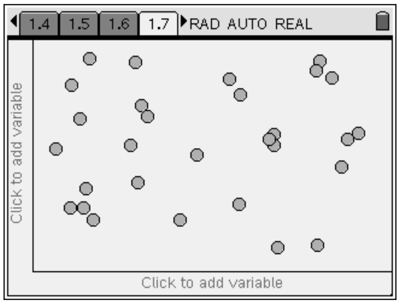












1.5 1.6 1.7 1.8 RAD AUTO REAL

Question

What is the equation of your fit line?

Answer

1.6 1.7 1.8 1.9 RAD AUTO REAL

Question

Why does it make sense that the number of grams of fat is used as the independent variable?

Answer

1.7 1.8 1.9 1.10 RAD AUTO REAL

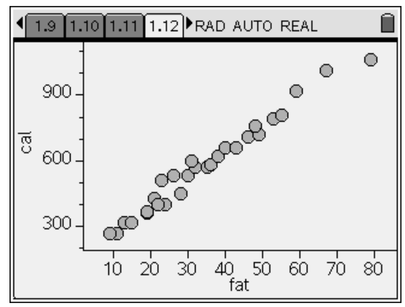
Question

What does the slope mean in terms of grams of fat and calories?

Answer

1.8 1.9 1.10 1.11 RAD AUTO REAL

On the next page, you will see another graph of the data. From the Actions menu, select **Regression > Show Linear (mx+b).**



1.10 1.11 1.12 1.13 RAD AUTO REAL

Question

Compare the equation of your movable line to the regression equation. How are the equations alike? How are they different?

Answer

1.11 1.12 1.13 1.14 RAD AUTO REAL

Question

What does the y-intercept mean in the context of this problem?

Answer

1.12 1.13 1.14 1.15 RAD AUTO REAL

Based on the regression equation, how many calories would a hamburger have if it has 22 grams of fat?

0/99

1.13 1.14 1.15 1.16 RAD AUTO REAL

Based on the regression equation, how many grams of fat would predict a 1243 calories for a hamburger?

0/99

1.14 1.15 1.16 1.17 RAD AUTO REAL

Question

Which of these statements is true about the relationship between the number of grams of fat and the number of calories:

a) As the number of fat grams increases, the number of calories decreases.

b) As the number of fat grams increases, the number of calories increases.

1.15 1.16 1.17 1.18 RAD AUTO REAL

For situations in which one variable increases in value as the other variable increases, we say there is a **positive association** between the variables.

Similarly, when one variable decreases as the other variable decreases, that too represents a positive association.

1.16 1.17 1.18 1.19 RAD AUTO REAL

For situations in which one variable decreases in value as the other variable increases, we say there is a **negative association** between the variables.

Similarly, when one variable increases as the other variable decreases, that also represents a negative association.

1.17 1.18 1.19 1.20 RAD AUTO REAL

Question

Is the relationship between the number of grams of fat and the number of calories a positive or negative association?

Answer

