financialalgebra

2.7 Scatter Plots and Linear Regression

Student Activity Packet

UNIT: CHECKING & LINEAR EQUATIONS

Name:

IN THIS LESSON, YOU WILL:

- Graph data point given in a table to create a scatter plot
- Use technology to find a linear regression equation
- Use a linear regression model to make predictions about the given data
- Explore minimum wage
- Explore cost of living and a living wage

INTRO

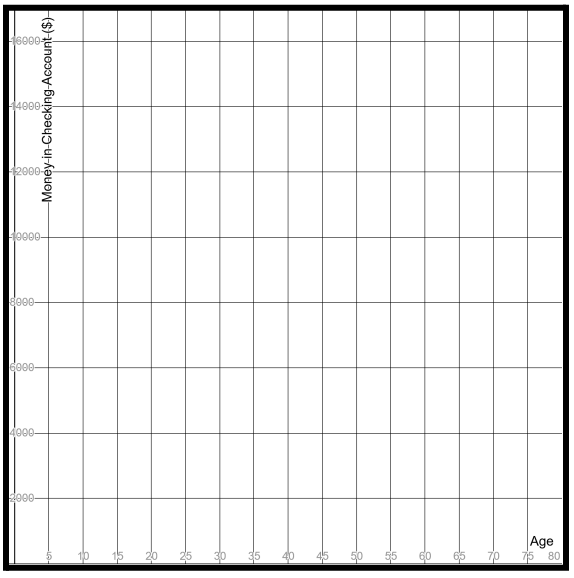
Checking Account Balance vs. Age

The following table represents the relationship between your age and how much you can expect to have in your checking account.

Age	Account Balance($)
35	9593
45	10337
55	11098
65	15752
75	15803

Source

1. **Plot these ordered pairs on the graph.**



2. **Is this data linear? How can you tell?**

3. **Does the data appear to have a pattern?**

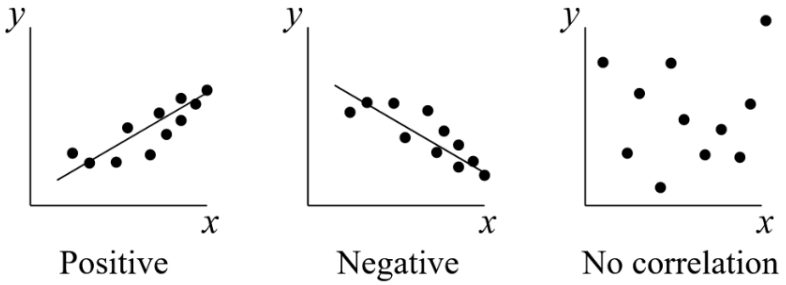
LEARN IT

Scatterplots and Correlation

A **scatter plot** is a type of graph used to compare two sets of data to see if they are related. The graph that you made in your intro is a scatter plot that relates **age** and **money in checking account**

If the data is related, it is said to have a **correlation.** There are three basic linear correlations:

1. If the data appears to be closely grouped around a line that trends **up** from left to right, then it has a **positive correlation** - as one piece of data goes up, so does the other.
2. If the data appears to be closely grouped around a line that trends **down** from left to right, then it has a **negative correlation** - as one piece of data goes up, the other goes down
3. If the data does not appear to be grouped around any line, then it has **no correlation** - the data has no useful linear relationship



Source

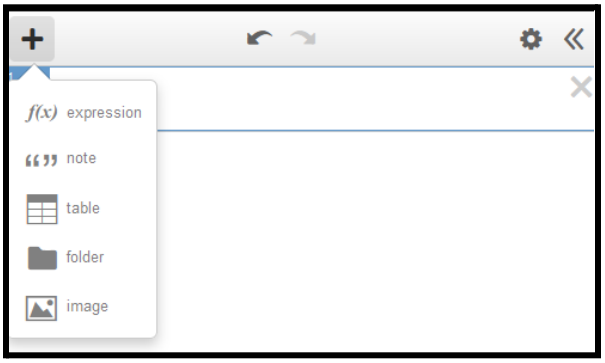
ACTIVITY: GRAPHING SCATTER PLOTS AND TREND LINES IN DESMOS

A **linear regression model** is an equation that tries to best represent the relationship between two sets of data that appear to have a linear correlation.

Before we do that, let's learn how to make a regression equation in Desmos.

Step 1: Launch the Desmos Graphing Calculator

Step 2: Click on the + sign and add a table, then input the following table of values at the top of the next page.



x	y
1	6
2	8
3	11
4	12
5	14

Step 3: We can't see all of our data points, so let's change the view. Click the magnifying glass in the bottom left corner of the table box 

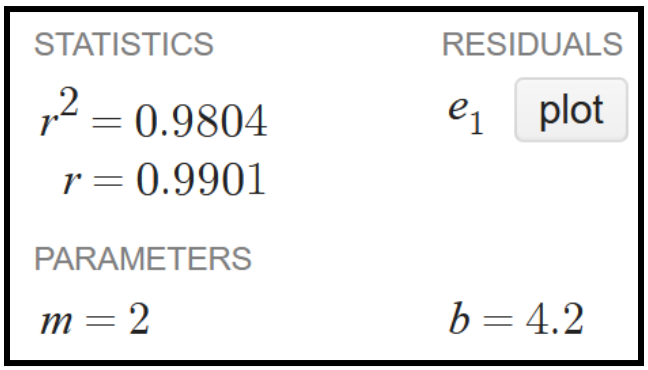
Step 4: Good! Now let's have Desmos write a linear equation that can best fit this data. In the next box below the table, type the following linear model:

$$y_1 \sim mx_1 + b$$

Helpful Hints

- To type y_1, type y1.
- The ~ key is next to the number 1 on the keyboard using the shift key
- You do not need to add any spaces to your entry

You should end up with information below box 2 that looks like this:



If we substitute the m and b values into our model, we can write an equation of:

y = 2x + 4.2

This is the linear model of our table of values!

If we wanted to estimate the output when x = 10, we can plug in.

y = 2(10) + 4.2
y = 24.2

PRACTICE IT

Use Desmos to Write a Linear Regression Model

This table shows the growth in mobile banking from 2013 to 2016.

Years since 2013	Percentage of individuals that used mobile banking as their primary method banking
0	5.7
2	9.5
4	15.6
6	34.0

Source

1. **Enter the data into Desmos**

2. **Does the data appear to have a positive, negative, or no linear correlation? Explain how you know.**

3. **Use Desmos to find the linear regression model for the data. Write the linear equation below.**

4. **Use your model to estimate the percentage of individuals that will use mobile banking as their primary banking method in 2025.**

APPLY IT

Follow your teacher's directions to complete the Application Problems.