## Earnings and unemployment rates by educational attainment

**Earnings and unemployment rates by educational attainment**

| Education attained | Unemployment rate in 2013 (Percent) | Median weekly earnings |
|---|---|---|
| Doctoral degree | 2.2 | $1,623 |
| Professional degree | 2.3 | 1,714 |
| Master's degree | 3.4 | 1,329 |
| Bachelor's degree | 4.0 | 1,108 |
| Associate's degree | 5.4 | 777 |
| Some college, no degree | 7.0 | 727 |
| High school diploma | 7.5 | 651 |
| Less than a high school diploma | 11.0 | 472 |

Note: Data are for persons age 25 and over. Earnings are for full-time wage and salary workers.
Source: Current Population Survey, U.S. Department of Labor, U.S. Bureau of Labor Statistics

The Bureau of Labor statistics share this data to describe the difference in earnings and unemployment rates by the amount of education attained.

(1) Take a look at this table, describe what you notice about both the Unemployment Rates and the Median Weekly Earnings.

(2) Display each set of data in a way that helps a viewer see some of the trends you noticed.

(3) Between each level of education, where is the greatest percent income?

(4) For a group of 1250 adults 25 or older who have a bachelor's degree, how many would you expect to be unemployed?

(5) Does it make sense to explore if either the Median Weekly Earnings or the Unemployment Rates are linear? Why or why not?

## MATH STANDARDS ALIGNMENT

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

**Personal Finance Big Ideas:**
*Value of Education, What is Money*
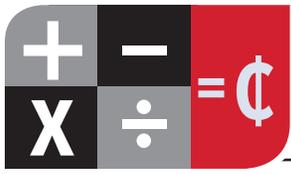
## METHOD 1: USING TECHNOLOGY (EXCEL)

(1) Looking at the data I noticed the following:

- The higher the amount or level of education, the less unemployment there is
- In general, the higher the amount or level of education, the higher the weekly income
- I was not sure if a professional degree or a doctorate was considered a higher level of income and I did notice, those with a professional degree have a slightly higher median weekly income
- The median weekly income for those with a professional/doctoral degree is almost 4 times as high as those with less than a high school diploma
- The median weekly income for those with a professional/doctoral degree is a little more than 2 times as high as those with an associates degree
- The unemployment rate for those with less than a high school diploma is about 4 times as high as those with a professional degree.

(2) I used excel to make bar graphs for the data. The unemployment data looked like this:
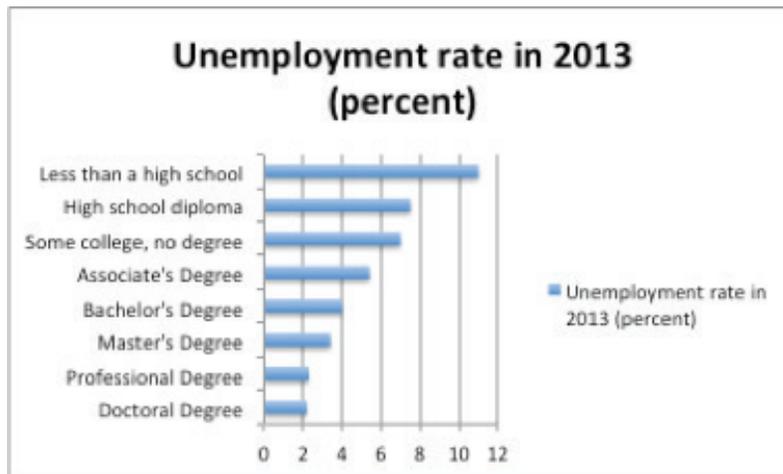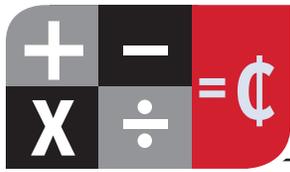


You can see that, in general, the longer you are in school (the bottom of this bar chart y-axes), the lower the unemployment rate.

The weekly median income data looked like this:
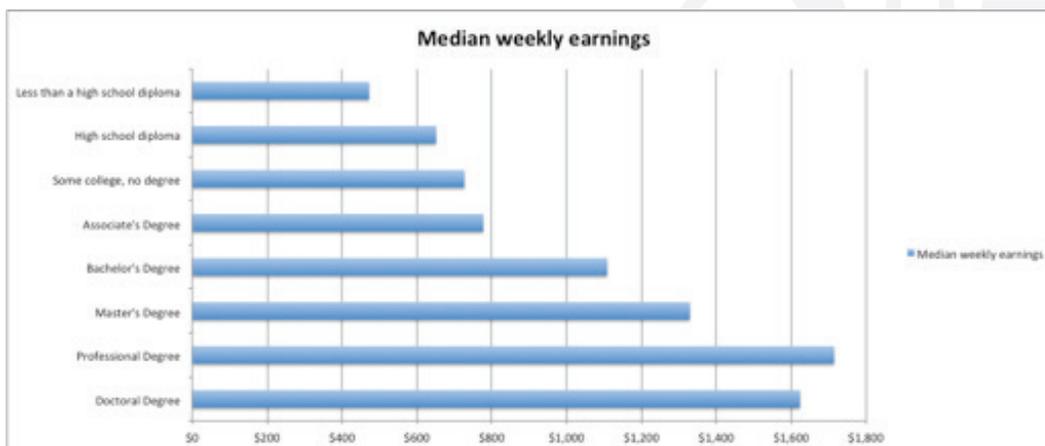


Here we can see that, in general, the longer you are in school the more income you make.

(3) I used excel to calculate the percent increase in incomes as well. I knew to calculate it I needed to use the following formula:

$$\frac{\text{(income at education level 2 – income at education level 1)}}{\text{income at education level 1}}$$

| Education attained | Median weekly earnings | Percent Increase in income |
|---|---|---|
| Doctoral Degree | $1,623 | -5% |
| Professional Degree | 1714 | 29% |
| Master's Degree | 1329 | 20% |
| Bachelor's Degree | 1108 | 43% |
| Associate's Degree | 777 | 7% |
| Some college, no degree | 727 | 12% |
| High school diploma | 651 | 38% |
| Less than a high school diploma | 472 | -- |

Using my table, I can see that the biggest jump is from associate's degree to bachelor's degree, with a 43% increase.

(4) Supposing there are 1250 adults over 25 with a bachelor's degree. The unemployment rate for that group is 4%. So, to find 4% of 1250, I would set up the following equations.

$$\frac{x}{1250} = \frac{4}{100}$$

$$\frac{x}{1250} = \frac{1}{25}$$

$$25x = 1250$$

$$x = \frac{1250}{25}$$

$$x = 50$$

I would expect 4% or 50 of those adults to be unemployed.

(5) It's a little hard to decide is the relationships are linear, because I am not entirely sure how to measure the education attained – I could count years of education or investment in education (how much it cost), but neither of those seem entirely consistent to me – not everyone completes college or high school in 4 years and some people work while they complete other degrees so it seemingly takes longer. To calculate the slope and explore if it were consistent across the two axis, I would need to be able to determine how to value the education numerically, and I do not know how to do that. It does seems that as one attains more education, income tends to go up and the unemployment rates go down.
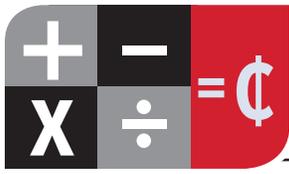
## METHOD 2: TABLES AND GRAPHS

(1) Looking at the data I noticed the following:
- As education increases, unemployment decreases
- As education increases, median weekly earnings increases
- Those with a professional degree have a slightly higher median weekly earnings than those with a doctorate
- The median weekly earnings for those with a professional/doctoral degree is a little more than 2 times as high as those with an associates degree
- The unemployment rate for those with less than a high school diploma is about 4 times as high as those with a professional degree.

(2) I used excel to make a area graph:
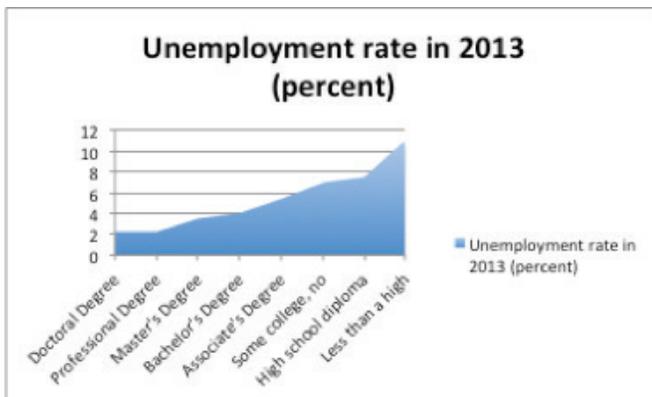


The graphs nicely illustrate the trends I noticed in (1) – income is increasing with more education and unemployment is decreasing.

(3) To find the greatest percent increase, I had to calculate the percent increase between each step up in education. I first calculated the I made a table to keep track of my calculations. For each percent increase, I subtracted weekly median earnings from the lower level form the higher level and divided that number by the lower level.

| Education attained | Median weekly earnings | Calculation | Percent Increase |
|---|---|---|---|
| Doctoral Degree | $1,623 | (1623 – 1714)/1714 | -5% |
| Professional Degree | 1714 | (1714 – 1329)/1329 | 29% |
| Master's Degree | 1329 | (1329 – 1108)/1108 | 20% |
| Bachelor's Degree | 1108 | (1108 – 777)/777 | 43% |
| Associate's Degree | 777 | (777 - 727)/727 | 7% |
| Some college, no degree | 727 | (727 – 651)/651 | 12% |
| High school diploma | 651 | (651 – 472)/472 | 38% |
| Less than a high school diploma | 472 | --- | |
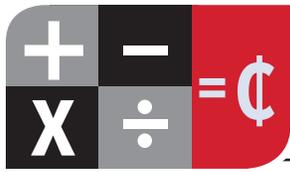
I can see that the largest percent increase is from the associate's degree to the bachelor's degree. I was also curious, so I calculate the percent increase across a couple bands and I noticed that from less than a high school diploma to some college, no degree, is a 64% increase!

$$\frac{(777\text{-}472)}{472} = 64.6\%$$

(4) To find the percent of 1250 adults with a bachelor's degree who are likely to be unemployed, I used the chart to see that I would expect 4% of them to be employed. Using logical reasoning, I figured that 10% would be 125 adults. So 1% would be 12.5 adults (not a reasonable number, but we'll see how 4% plays out). 4% would be 1% 4 times, so I added 12.5 + 12.5 + 12.5 + 12.5 = 25 + 25 = 50. So I would expect 50 adults to be unemployed.

(5) To decide if the relationships were linear, I would have to examine the data to see if the slopes were consistent throughout – or I would find the slope between two points and then graph the line and see if the other points landed on it. But, it's tough for me to do that because I am not entirely sure how to give a value to educational attainment that would allow me to graph it, so I would say with this data set, we can not determine if the relationships are linear.