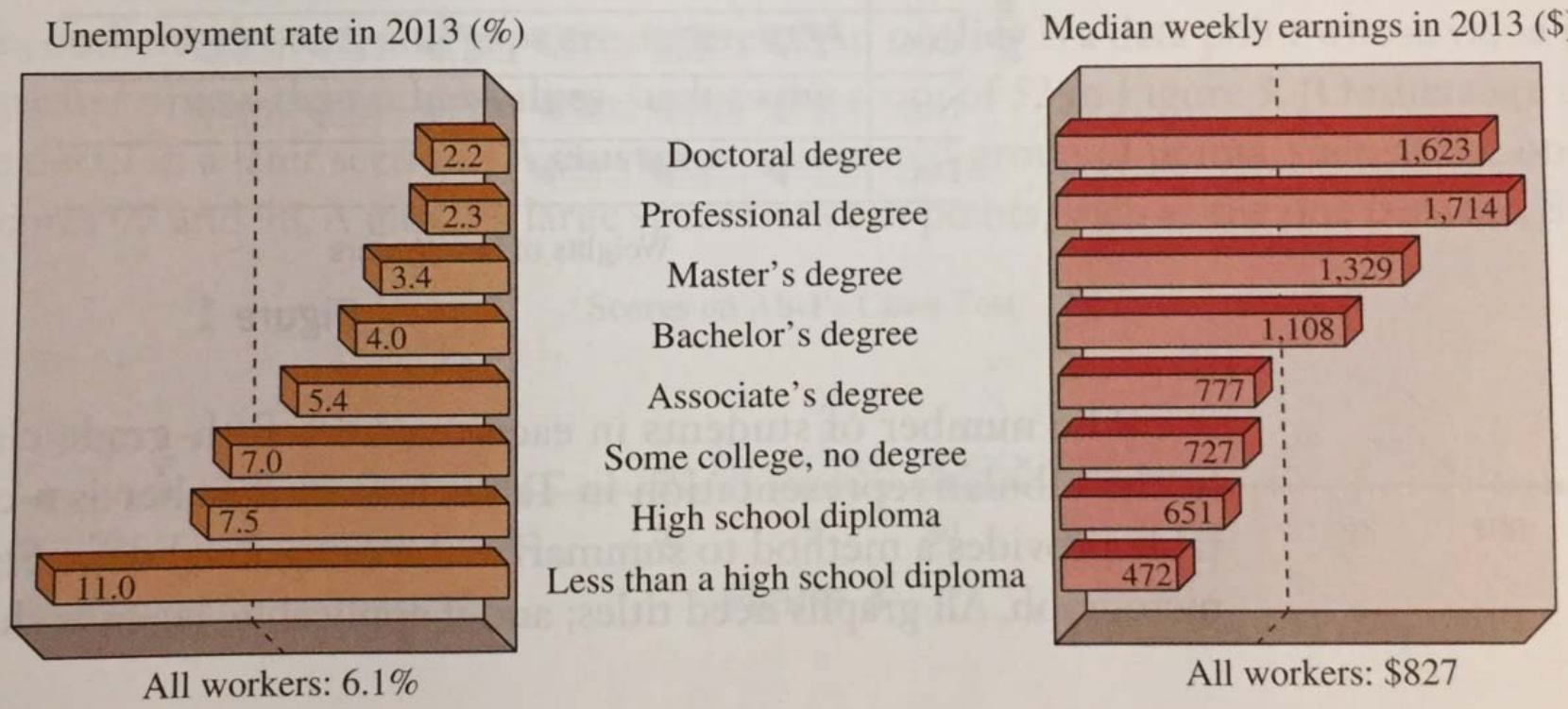
Tables, Charts, and Graphs

with Examples from History, Economics, Education, Psychology, Urban Affairs and Everyday Life

REVISED: MICHAEL LOLKUS 2018

Earnings and Unemployment Rates by Educational Attainment



Source: Bureau of Labor Statistics, 2014.

Tables, Charts, and Graphs Basics

- We use charts and graphs to visualize data.
- This data can either be generated data, data gathered from an experiment, or data collected from some source.
- A picture tells a thousand words so it is not a surprise that many people use charts and graphs when explaining data.

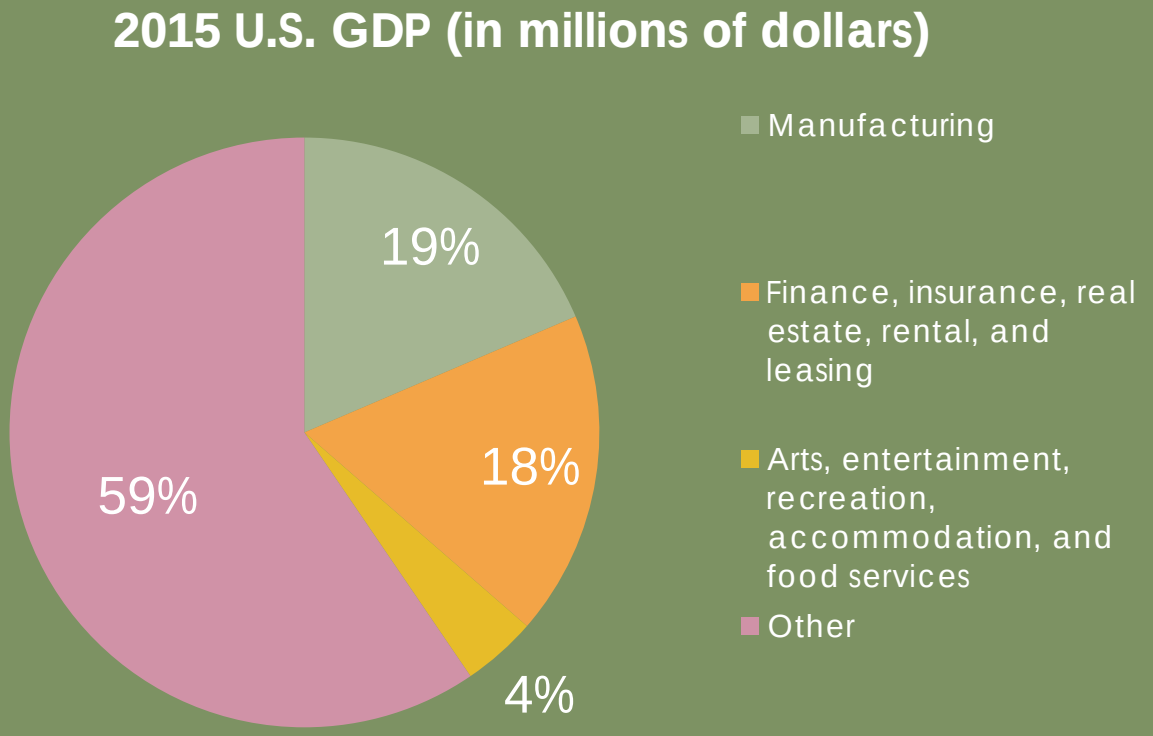
Types of Visual Representations of Data

Table of Yearly U.S. GDP by Industry (in millions of dollars)

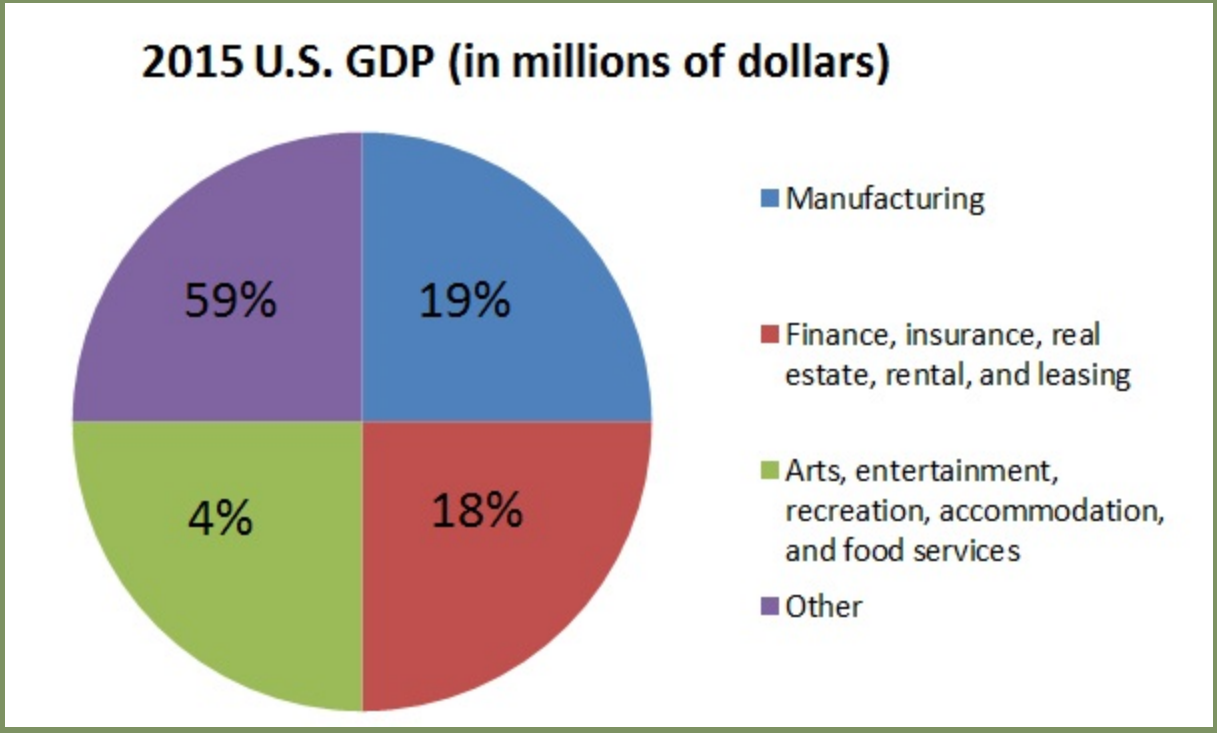
Source: U.S. Bureau of Labor Statistics

Year	2010	2011	2012	2013	2014	2015
All Industries	26093515	27535971	28663246	29601191	30895407	31397023
Manufacturing	4992521	5581942	5841608	5953299	6047477	5829554
Finance, Insurance, Real Estate, Rental, Leasing	4522451	4618678	4797313	5031881	5339678	5597018
Arts, Entertainment, Recreation, Accommodation, and Food Service	964032	1015238	1076249	1120496	1189646	1283813
Other	15614511	16320113	16948076	17495515	18318606	18686638

- The chart below is called a pie chart. It shows what percent "of the pie" a particular category occupies out of the whole.
- If total GDP in 2015 is the entire pie, then manufacturing makes up 19% of that pie and finance makes up 18%. Notice that visually speaking, since 19% and 18% are so close to each other in value, their respective slices of the pie are similarly sized.

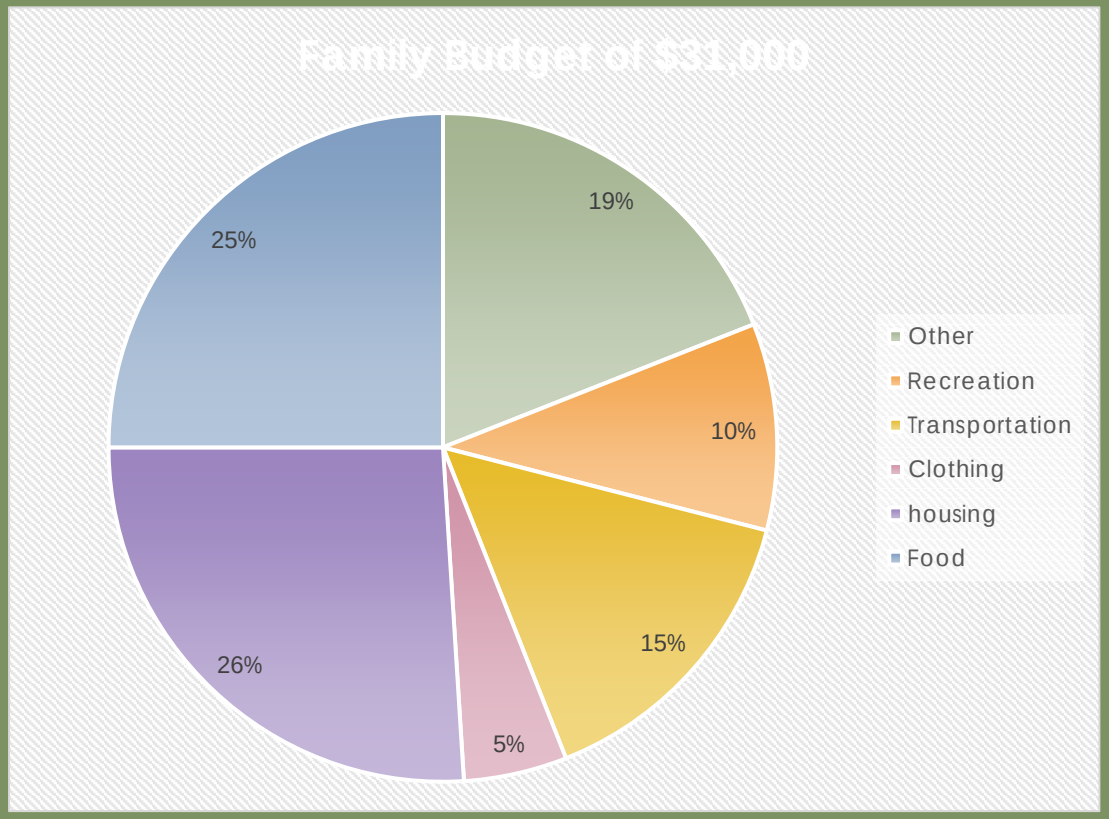


- Pie charts can be misleading when the slices do not correspond with the percent contribution to the whole pie.
- Notice the pie chart below is not very intuitive.



Example from Everyday Life

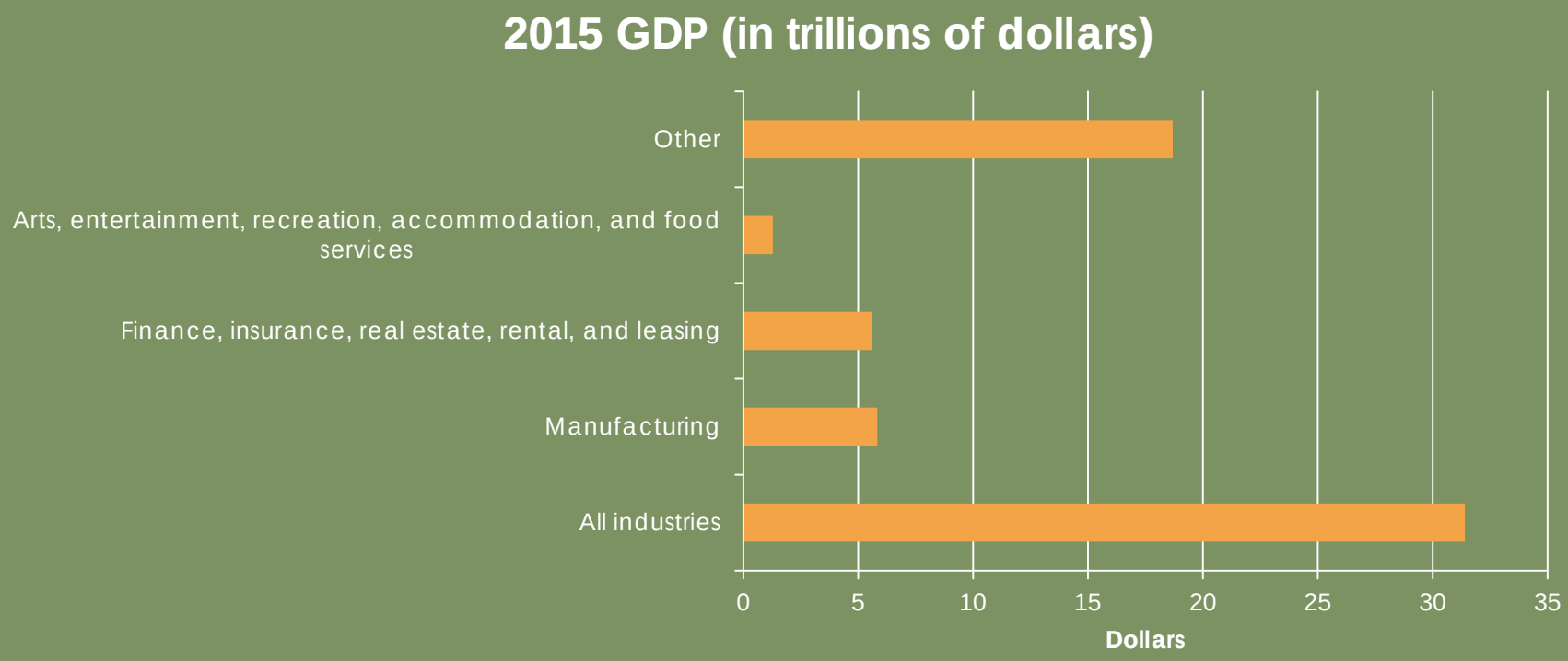
The following chart shows how a family spends its yearly income of $31,000.
How much money does this family spend on transportation?



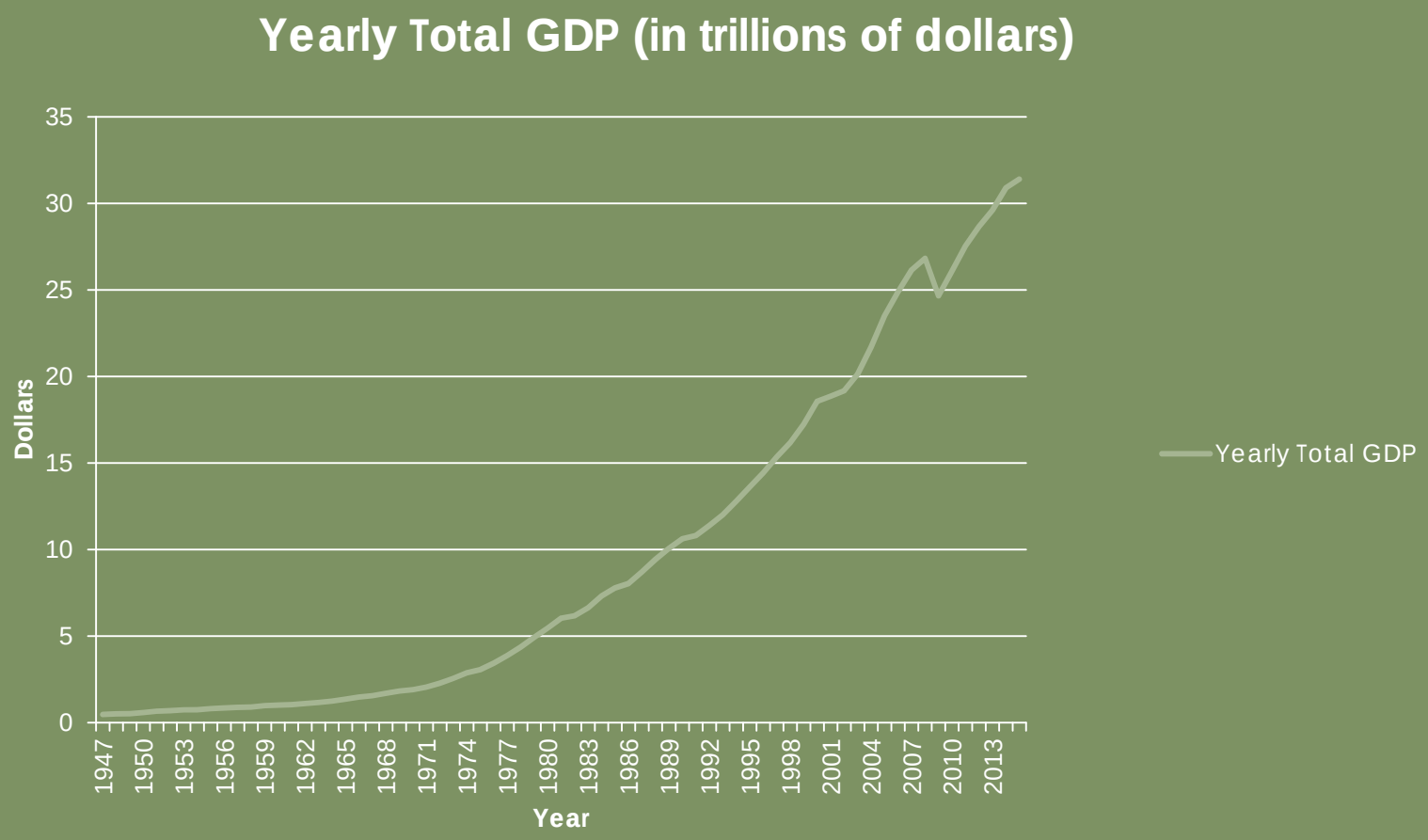
Solution

- The chart indicates that 15% of the income is spent on transportation. We must answer the question: 15% of $31,000 is what?
- Writing as an equation and solving, we get
- n = 0.15 x 31,000 = 4650
- So the family spends $4650 on transportation yearly.

- The graph below is called a bar graph.
- It shows each of the variables independent of each other, each with its own bar.
- 2015 GDP for all industries was $31.397023; looking at the graph, the bar for all industries is just above $30.
- One is still be able compare each variable with the other by comparing bars.



- The graph below is called a line graph. It shows how a variable evolves with respect to another variable. In the line graph below, we show how GDP has evolved by year.



When to use a Line Graph, Pie Chart, or Bar Graph?

- We use the pie chart here to compare parts of a whole. In our example, we compared components of US GDP.

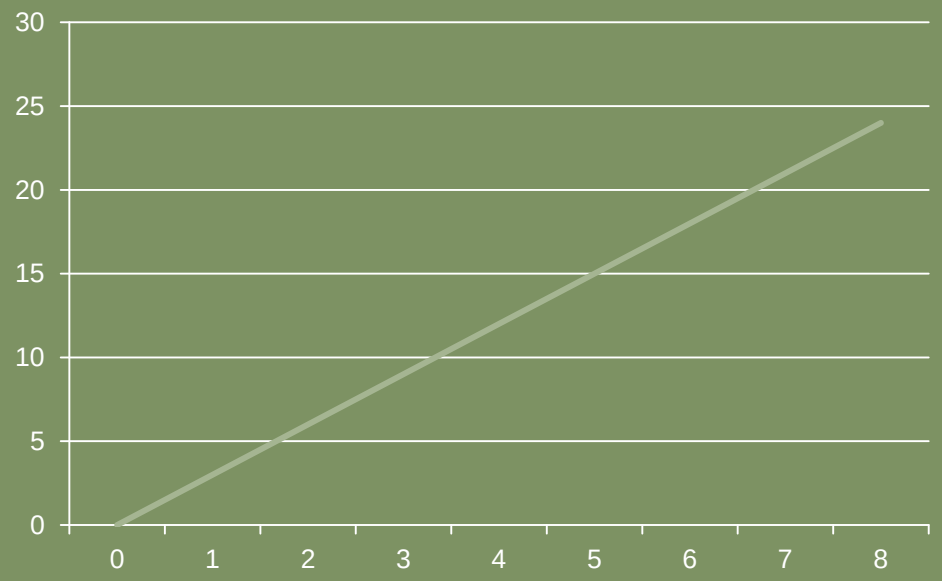
- The line chart is useful when you want to show how a variable changes over time. For our purposes, we used it show how GDP changed over time.

- Bar graphs are good for comparing different groups of variables. We used it to compare different components of US GDP. We did the same with the pie chart; depending on your purposes you may choose to use a pie chart or a bar graph.

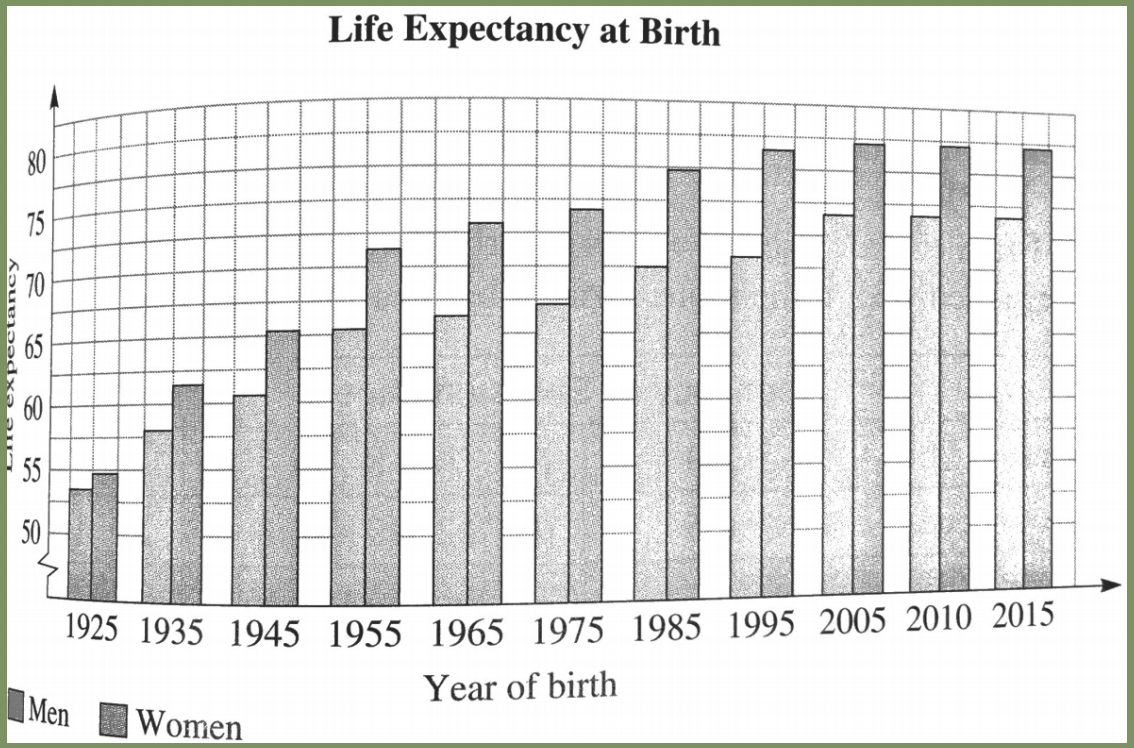
- If given a table of data, we should be able to plot it. Below is some sample data; plot the data with x on the x-axis and y on the y-axis.

x	y
0	0
1	3
2	6
3	9
4	12
5	15
6	18
7	21
8	24

- Below is a plot of the data on the table from the previous slide. Notice that this plot is a straight line meaning that a linear equation must have generated this data.
- What if the data is not generated by a linear equation? We can fit the data using a linear regression and use that line as an approximation to the data. Regressions are beyond the scope of this workshop.

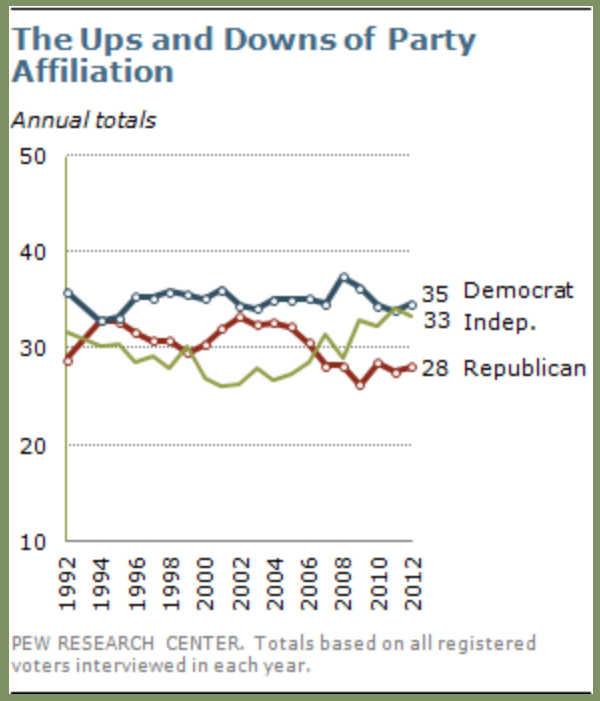


Example from Urban Affairs



- What kind of bar graph is this?
- Whose life expectancy has changed the most since 1925?
- In 1925, about how much longer was a woman expected to live than a man?

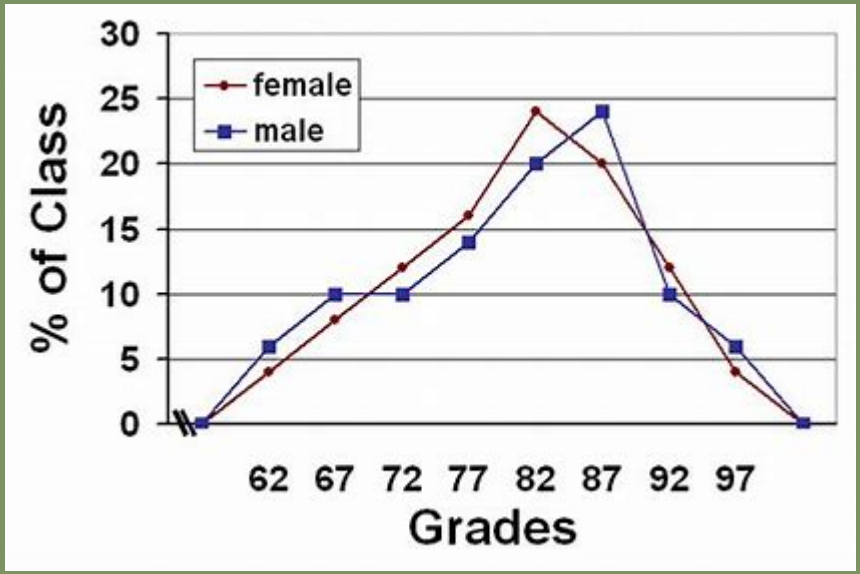
Example from History



In what years were the affiliations for Republicans and Independents the same?

During what time period did the party affiliations have the most change?

Example from Education

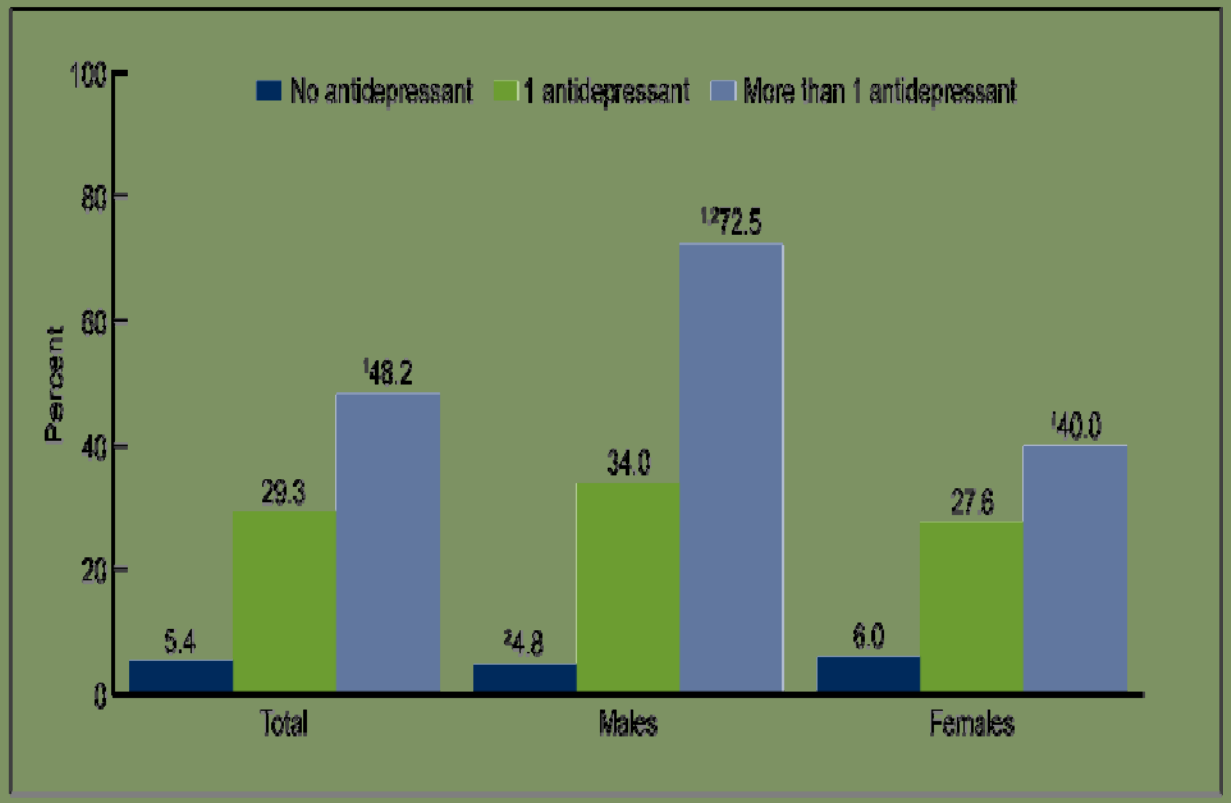


What percent of the total class received grades of 72 or 77?

Which grade showed the largest difference between males and females?

Example from Psychology

Figure 5. Percentage of persons aged 12 and over who have seen a mental health professional in the past year, by number of antidepressants taken and sex: United States, 2005–2008



[1]Statistically significant trend.
[2]Significantly different from females.
NOTE: Access data table for Figure 5 at: http://www.cdc.gov/nchs/data/databriefs/db78_tables.pdf#5.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 2005–2008.

What do you notice is different in this graph than the others reviewed so far?