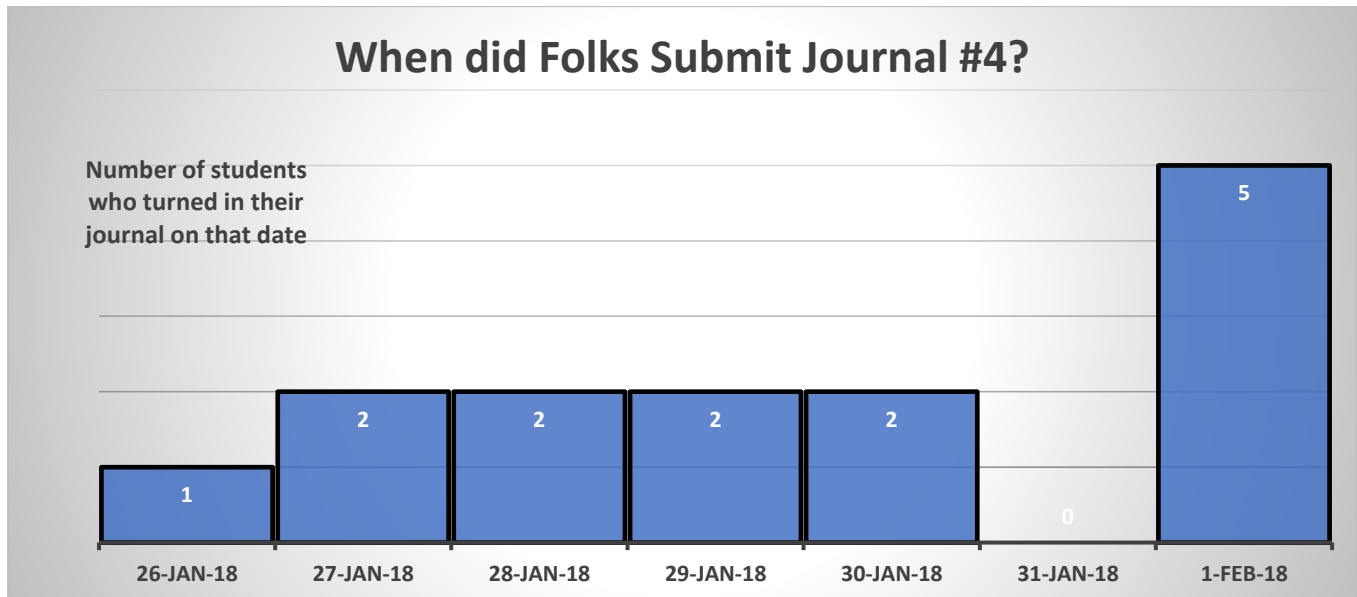


CLASS NOTES 3: CREATING AND INTERPRETING GRAPHS

Part 1: Bar Graphs



In this graph, you see some data that a MTH 58 instructor collected at the end of January 2018. Take a glance over it, and make sure it all makes sense.

The dates along the horizontal are examples of what are called an **independent variable**. Independent variables are the “unfettered” type of data; by that, I mean that the **dependent variable** (in this case, how many students turned in their journal **on** that date) doesn’t control them. Time is usually a pretty good independent variable; it marches on, pretty oblivious to everyone and everything.

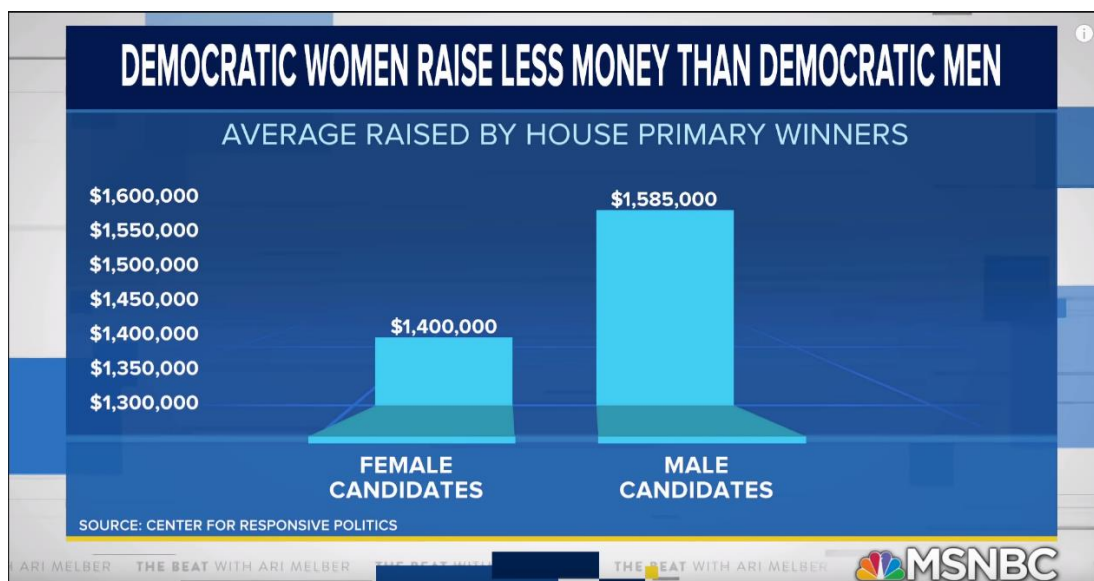
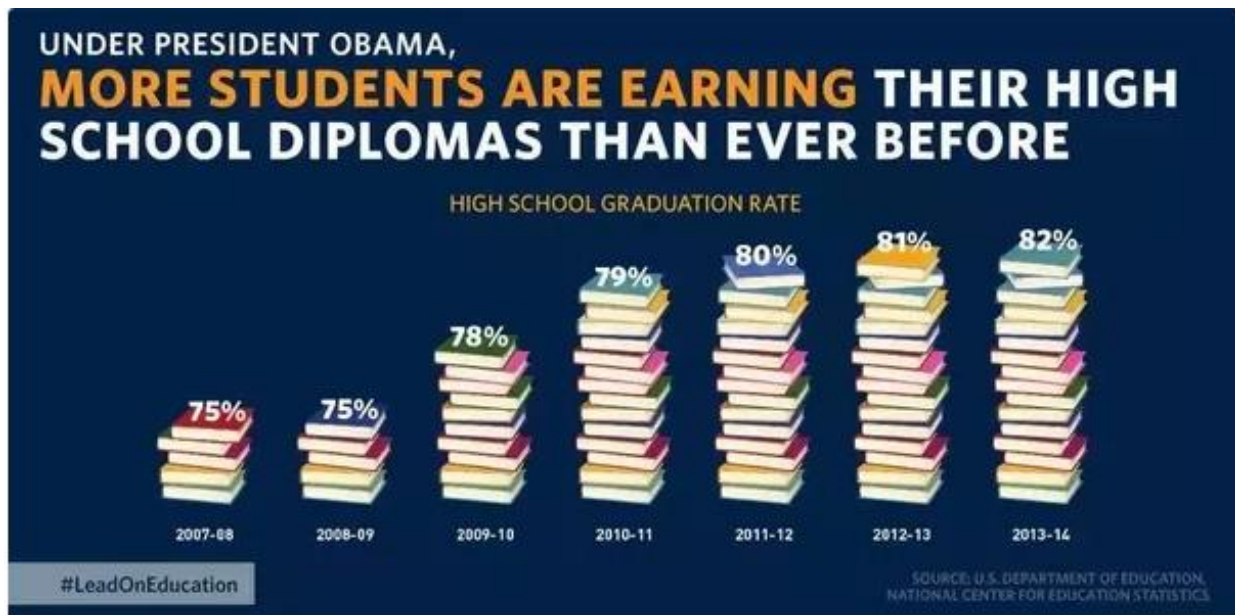
Answer the following questions.

1. How many students turned in Journal #4?
2. What percent turned in the Journal on January 26th?
3. What percent turned in the Journal on January 31st?
4. What percent turned in the Journal in January?
5. What percent turned in the Journal in February?

6. If you had to pick a “typical” turn-in date for this journal (that is, pick one date that would represent the behavior of the class as a whole), which date would you pick and why?

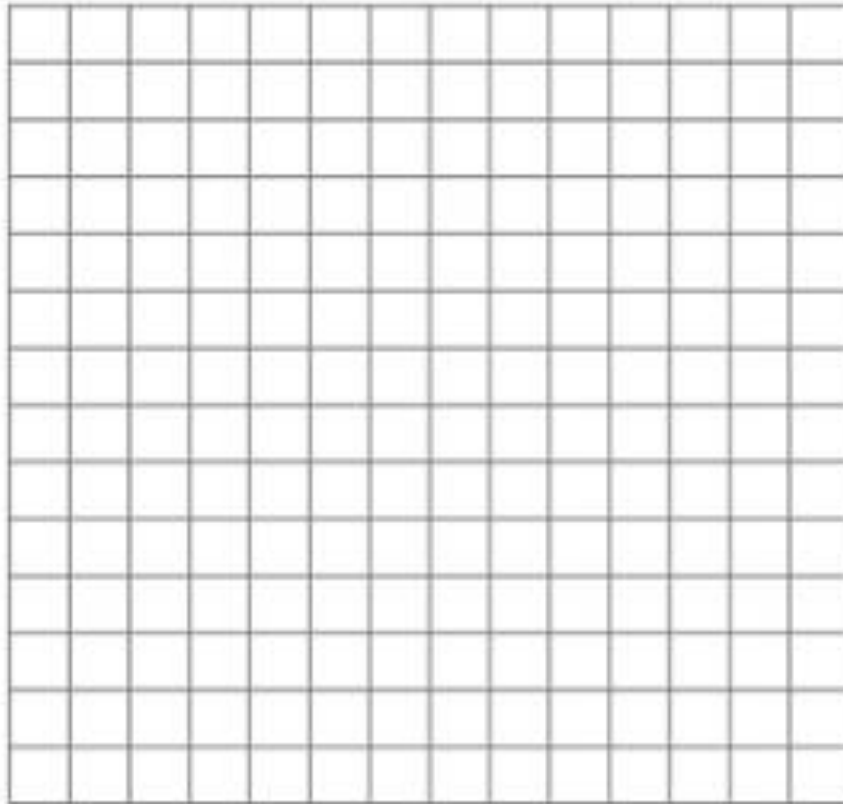
(let's regroup with a check-in video!)

Here are two graphs (of many!) that showed up in the media over the past several years:



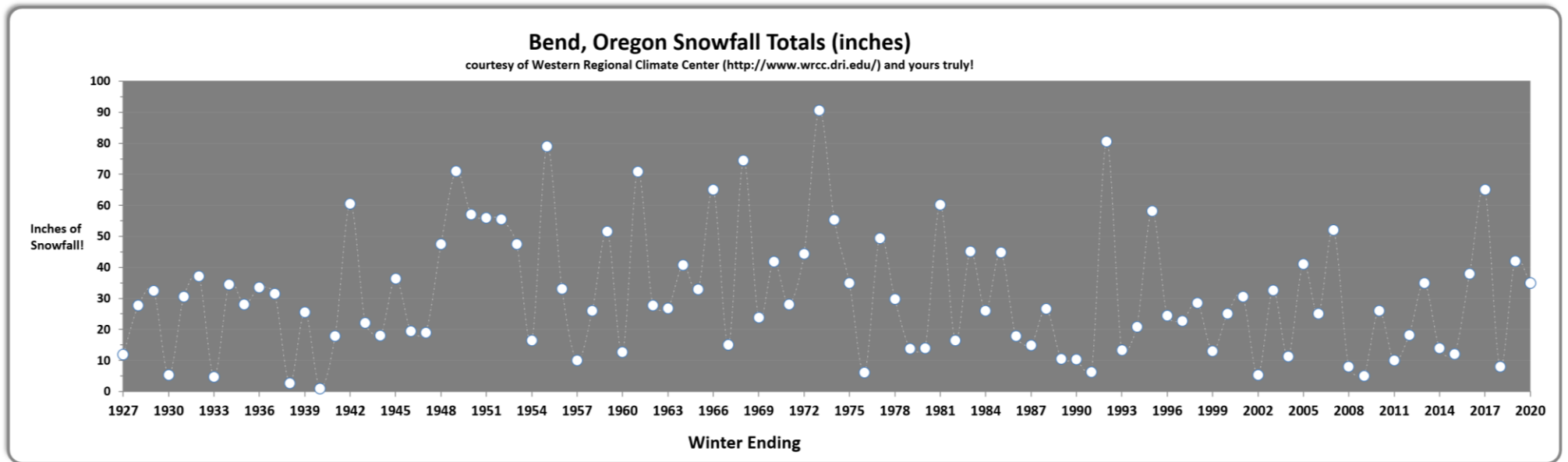
7. What is misleading about both of these graphs? In particular, what conclusions might you draw if you didn't look carefully at each graph's vertical axis?
8. Let's re-create the second graph (since it's a bit simpler) in a better way! In the check-in video below, we'll learn how to do a bar graph in Google Sheets! (ignore the graph paper below; I'll mention it in the video. 😊)

(let's regroup with a check-in video!)



Part 2: Line Graphs and Scatterplots

Here's some data that has been collected by Sean Rule (for the last several years) and the Western Regional Climate Center (prior to that).



This is an example of a **time series line chart**. The “time series” part is simply due to the horizontal axis: the graph starts counting at a certain year, and continues until it hits the last year available. The “line chart” part is because the points that rise and fall in the chart are connected by straight lines.

Each point on the graph has two values: its horizontal value (measured against the horizontal axis) and its vertical value (measured against the vertical axis). For example, the leftmost point on the graph has a horizontal value of “1927” and a vertical value of about 11 or 12. Thus, we can say that “in the winter ending in 1927, it snowed about 11 or 12 inches, cumulatively, over the season.”

9. Find the rightmost point on the graph. Interpret its horizontal and vertical components in a sentence.

10. How many years are represented in the graph above? Why do you think not every year is printed along the horizontal axis of this graph?

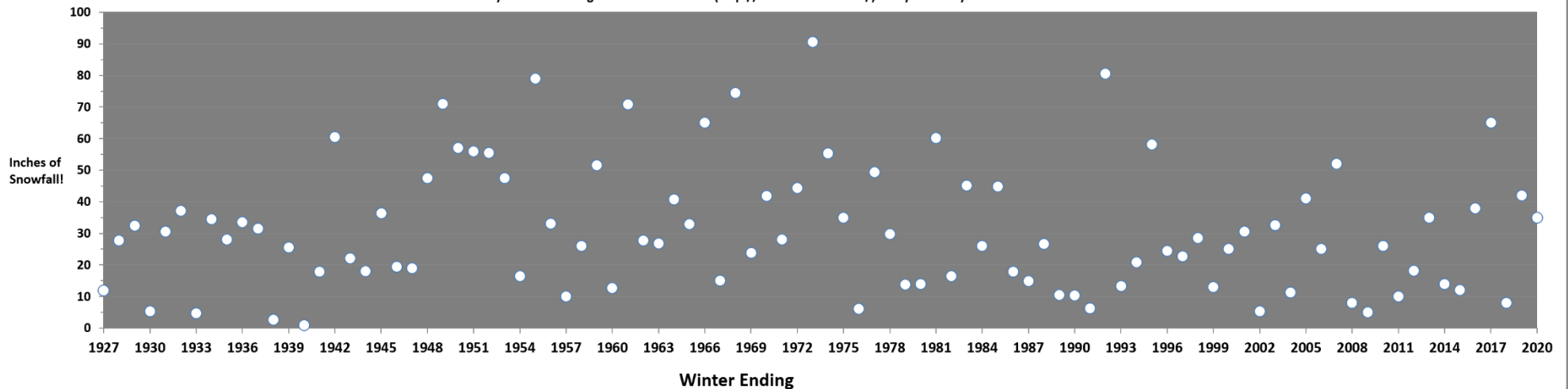
11. What was the least amount of Bend snowfall in any given season? You’ll have to approximate it – use a straightedge. In what year did that winter end?

12. What was the **greatest** amount of Bend snowfall in any given season, and in what year did that winter end?

Here's another look at the same data without the lines (technically, this is called a **scatterplot**; we'll discuss those much more, later on in this course).

Bend, Oregon Snowfall Totals (inches)

courtesy of Western Regional Climate Center (<http://www.wrcc.dri.edu/>) and yours truly!



13. Sean started working in COCC in 2004, so the first data he collected is represented under the “2005” winter. Use both graphs (with and without lines) to approximate how much snow fell in total over his first winter here.
14. Which of the two graphs did you prefer to use, and why?
15. Give one reason having the lines connecting the points helps you to locate the data better.
16. Can you think of a reason why having the lines on the first graph could be misleading? If so, put it here! If not, don't worry!

(let's regroup with a **check-in video**!)

Now for a few more questions about Bend snowfall!

17. What percent of years listed had snowfall that was 60 inches or less?

18. What percent of years listed had snowfall that was 48 inches or less?

19. What percent of years listed had snowfall that was 24 inches or less?

The following paragraph is from the VisitBend.com website (<https://www.visitbend.com/plan-a-trip/weather/>):

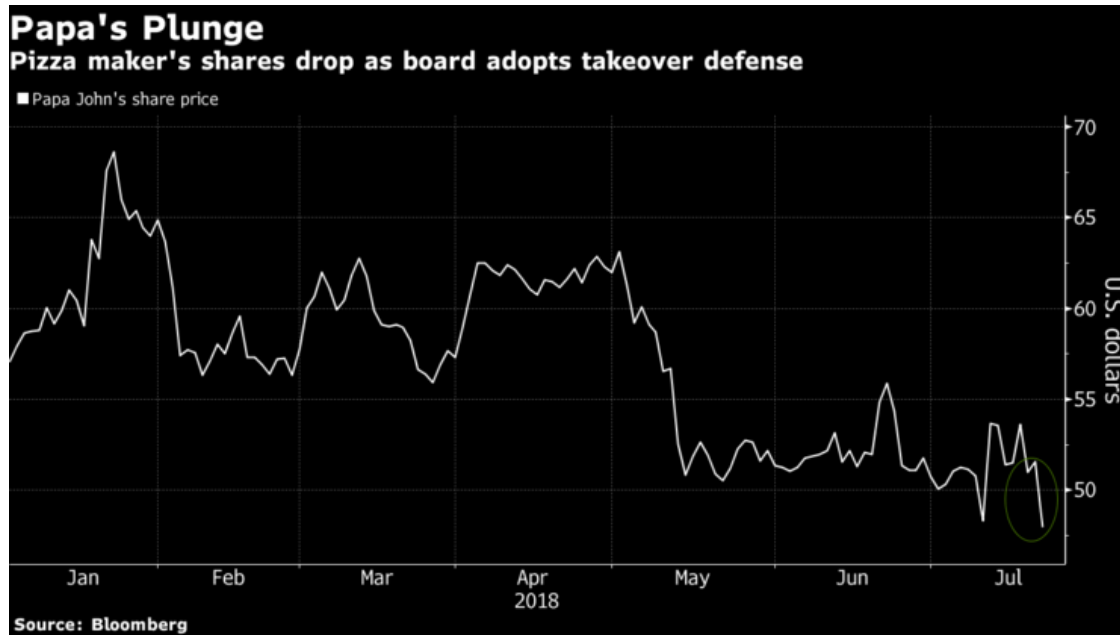
Precipitation

The average annual precipitation in Bend is less than 12 inches, over half falls between November and February, often as snow. Brief thunderstorms usually provide most of the light summer rain. The average annual snowfall is 33.8 inches. Snow depth in Bend exceeds 24 inches in only one winter out of twenty. At Mt. Bachelor, the ski resort 22miles southwest of Bend snow normally reaches depths of 160 to 180 inches.

20. Based on your analysis above and your observation of the graph, what does and does not make sense in this paragraph? In particular, do you agree with their sentence about “one winter out of twenty”? Why or why not?

(let's regroup with a check-in video!)

In summer 2018, the Papa John's Pizza company suffered quite a financial blow when its founder, John Schnatter, used an awful racial slur on a conference call with some employees in 2018 (he's since resigned as CEO). Its stock value dropped fairly quickly as people responded with their wallets. The graph below shows the price of one share of Papa John's stock in the first half of 2018. We'll use that graph to analyze its fall in price.



21. What was Papa John's stock price, in dollars, at its highest valued point in 2018 on this graph?
22. How about at its **lowest**?
23. What percentage is the lowest value of the highest?
24. By what percentage would PJ stock need to increase to get this lowest value back to its highest? Remember, in the last question you were using the high price as the base of your percentage – in this one, you're basing off the lowest.

Looking at this graph, I notice that the price in late April was about \$63 (red line), and then, in later May, had fallen to about \$53 per share (yellow line) – but, if you look at the graph, the points appear to fall **way** more than that!

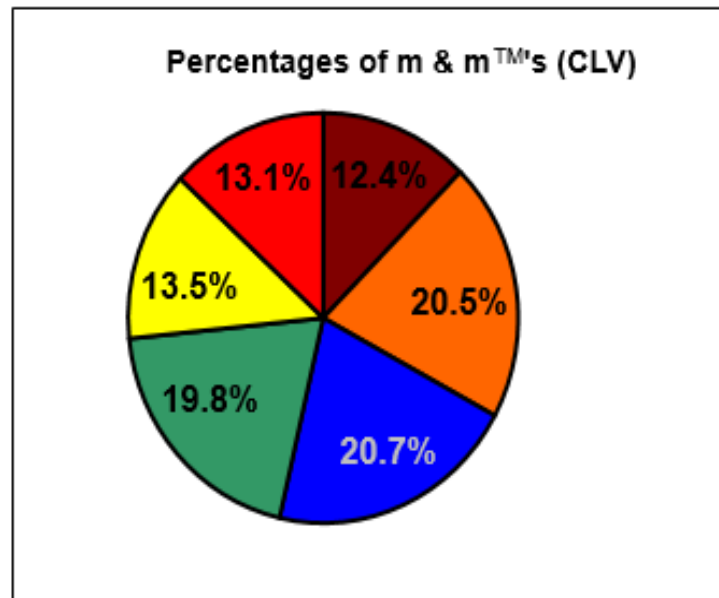


25. By what percentage did the stock price actually fall between the two indicated dates?
26. But...by what percentage do you have to decrease the length of the red bar to get the length of the yellow bar?
27. So what about the creation of the graph caused this discrepancy to happen? And why did the creator choose to do that?

(let's regroup with a check-in video)

Part 3: Pie Charts

When you are dealing with data involving categories that are described as percentages of a total, a pie chart can be a great tool to use. This one shows the percentages of M&M's from the Mars company's Cleveland plant that fall into each color category. Usually the "slices" of a pie chart will be labeled, but here they're just color-coded.



28. Pick your favorite M&M color (out of brown, orange, blue, green, yellow, and red). If you have a bag containing 55 M&M's (a typical size) from this plant, how many would you expect to find of your color?
29. If you have a huge bag of M&M's from this plant and count 47 yellow ones, then about how many M&M's are there likely to be in the whole bag?
30. If you wanted to divide up a pile of M&M's into three piles, each pile consisting of two colors, how could you split them up so that the piles were as equal as possible in size?

(let's regroup with a check-in video!)

Now let's create our own pie chart! I stumbled upon a [fun data set](#) the other day that did a nationwide survey and figured out which vegetable was most popular in each state (Oregon picked "broccoli". 😊). I've placed the data in the chart below; you complete the second column now! Also check to make sure you get 50 states (don't count DC!). To do this, you can go to the link above and expand the map image (if you get tired of counting "broccoli states" (it's pretty annoying), they tell you the answer below the graph on the website...but subtract 1, because they incorrectly count DC. 😊)

Once you have your data, head over to [this Google Sheet](#). Then, please [watch this video](#) where we'll show you some basic spreadsheet math, and also show you how to create a pie chart in Sheets!

(we'll learn how to make other types of graphs as we go)