AP Statistics
Unit 02 – Bivariate Data
Day 01 Notes: Scatterplots

Name key
Period _____

When examining relationships of 2 or more variables, ask:

1. What individuals do the data describe?
2. What are the variables? How are they measured?
3. Are all of the variables Quantitative? Or at least one categorical?
4. Are some of the variables explanatory and others response?

Explanatory Variable: attempts to explain or predict changes in observed outcomes (response variable)

- independent variables
- x-axis

Response Variable: measures an outcome of a study

- dependent variables
- y-axis

Steps for Exploring Bivariate Data:

1. Plot data and give numerical summaries
2. Look for patterns or deviations from the patterns
3. When overall pattern is regular, use a mathematical model to describe it (line).
   (we will do this soon! :)

Scatter plots:

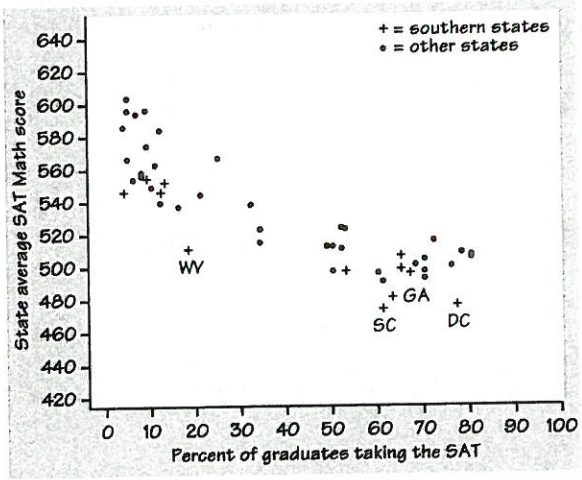
- displays relationship between 2 quantitative variables measured on the same individuals.
- each individual in the data set appears as a point in the plot that is fixed by the values of both variables for that individual.

Interpreting Scatterplots

1. Describe Form, Direction, and strength of relationship

2. Look for patterns or deviations from the pattern (outliers & influential points)

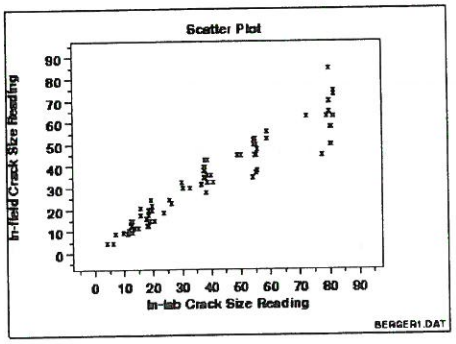
Sometimes the information that you are trying to gather includes categorical data. Notice the data points are still talking about the percent of graduates taking the SAT and the state average on the SAT Math. But also notice that we were able to make a different mark to represent the southern states so that we could see where the categorical data lies in the distribution.



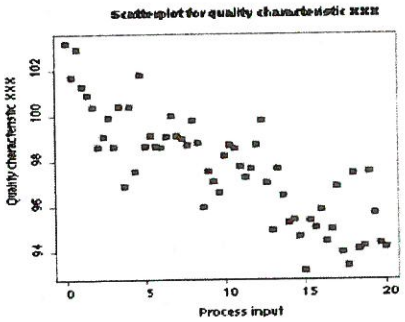
FORM: describes clusters, outliers, and if data is linear or curved

DIRECTION:

- Positive association: creates a pattern that has a positive slope



- Negative association: creates a pattern that has a negative slope



STRENGTH: a description of how closely the points follow a clear form
*will soon be described by correlation

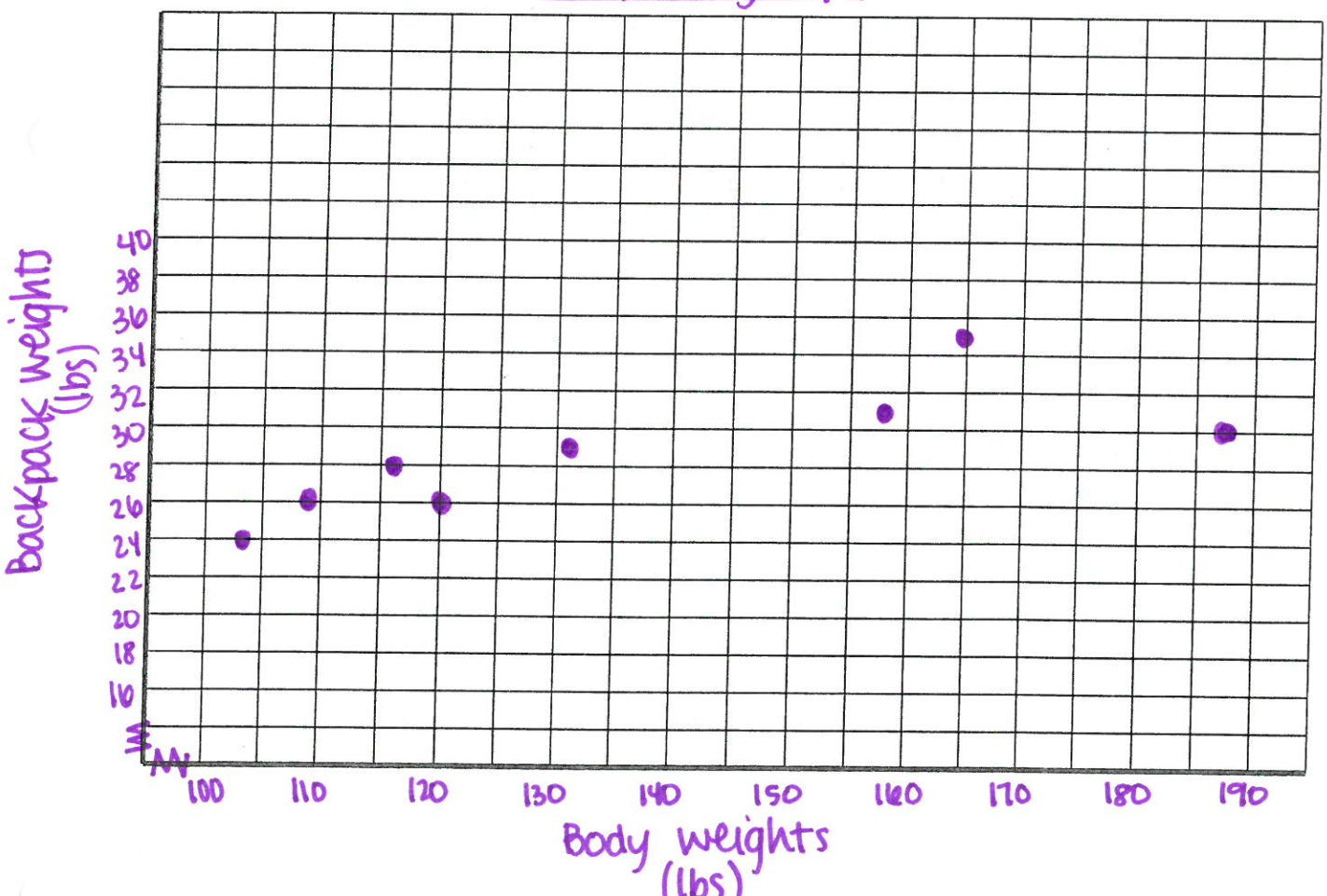
Drawing a Scatter Plot

1. Scale the x & y axes. Intervals must be uniform. Use ∿ to represent a gap in numbers if necessary.
2. Label both axes & include a title
3. Make a graph that is large enough to read, and then plot points.

Example: Ninth-grade students at BHS go on a backpacking trip each fall. Students are divided into hiking groups of size 8 by selecting names from a hat. Before leaving, students and their backpacks are weighed. Here are data from one hiking group in a recent year:

Body Weights (lbs)	120	187	109	103	131	165	158	116
Backpack Weight (lb)	26	30	26	24	29	35	31	28

Make a scatter plot of the relationship between body weight and pack weight and then interpret the scatter plot.



F: cluster on the left side with smaller numbers. Might be an outlier @ (187, 30).

D: seems to be positive Looks linear.

S: weak due to the fact that there are not many data points.

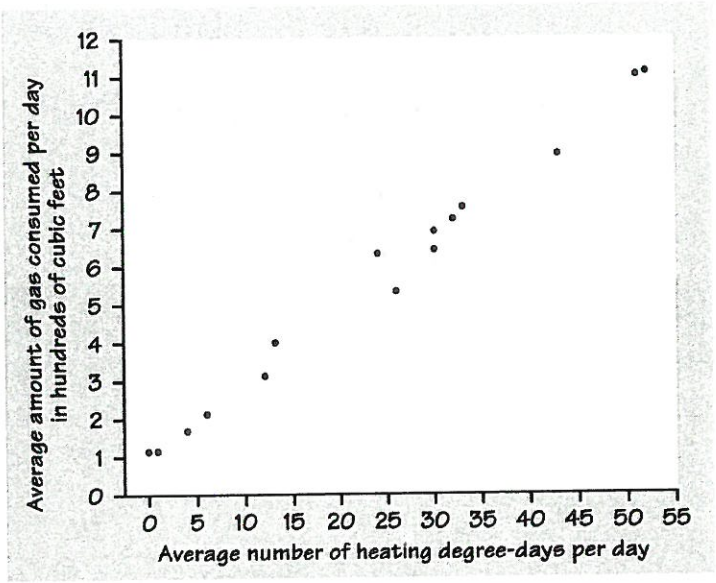
Example: Interpreting Scatter Plots

The following problem is dealing with the average degree-days and the natural gas consumption for the household. Interpret the graph and data in detail.

TABLE 3.1 Average degree-days and natural gas consumption for the Sanchez household

Month	Degree-days	Gas (100 cu. ft.)	Month	Degree-days	Gas (100 cu. ft.)
Nov.	24	6.3	July	0	1.2
Dec.	51	10.9	Aug.	1	1.2
Jan.	43	8.9	Sept.	6	2.1
Feb.	33	7.5	Oct.	12	3.1
Mar.	26	5.3	Nov.	30	6.4
Apr.	13	4.0	Dec.	32	7.2
May	4	1.7	Jan.	52	11.0
June	0	1.2	Feb.	30	6.9

Source: Data provided by Robert Dale, Purdue University.



FORM: 2 clusters (left side lower #s and middle). The graph seems to be linear and does not seem to have outliers.

DIRECTION: the data is going in a positive direction.

STRENGTH: because there are a decent # of points, the strength is fairly strong.

Scatter Plot in the Calculator

Using the data above:

1. Put the degree-days values in L1
2. Put the gas values in L2
3. Push 2nd y= (Stat Plot)
4. Enter and then make sure plot 1 is on
5. Go to the first type of graph and push ENTER
6. X-list should be degree-days
7. Y-list should be gas
8. Graph
9. To zoom in, push zoom and then click 9. ZoomStat