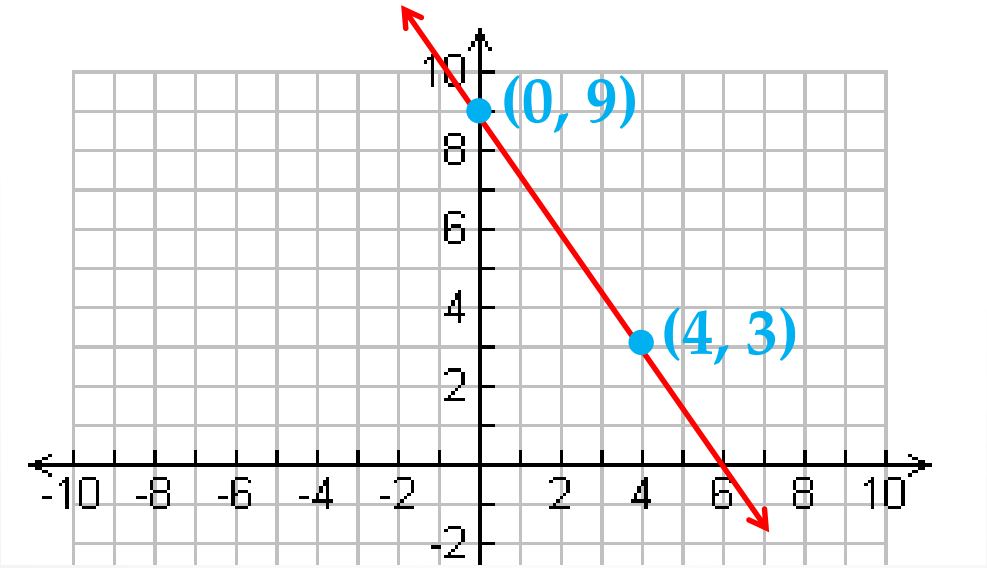
Created by: Mr. Lischwe

Warmup 4/(3! – 25?)

1) On the post-it note, write down your height (feet and inches is fine) your shoe size (say whether it's a men's or women's size). No name necessary.
2) Remember, the "!" symbol is "factorial" and it means to take $3 \cdot 2 \cdot 1$. Based on today's date, guess what you think the "?" symbol does.
3) Write an equation in slope-intercept form.



BAND AND STRINGS STUDENTS:

- **Please come during PLT to take your volume quiz!!!**

Table of Contents (2nd Semester)

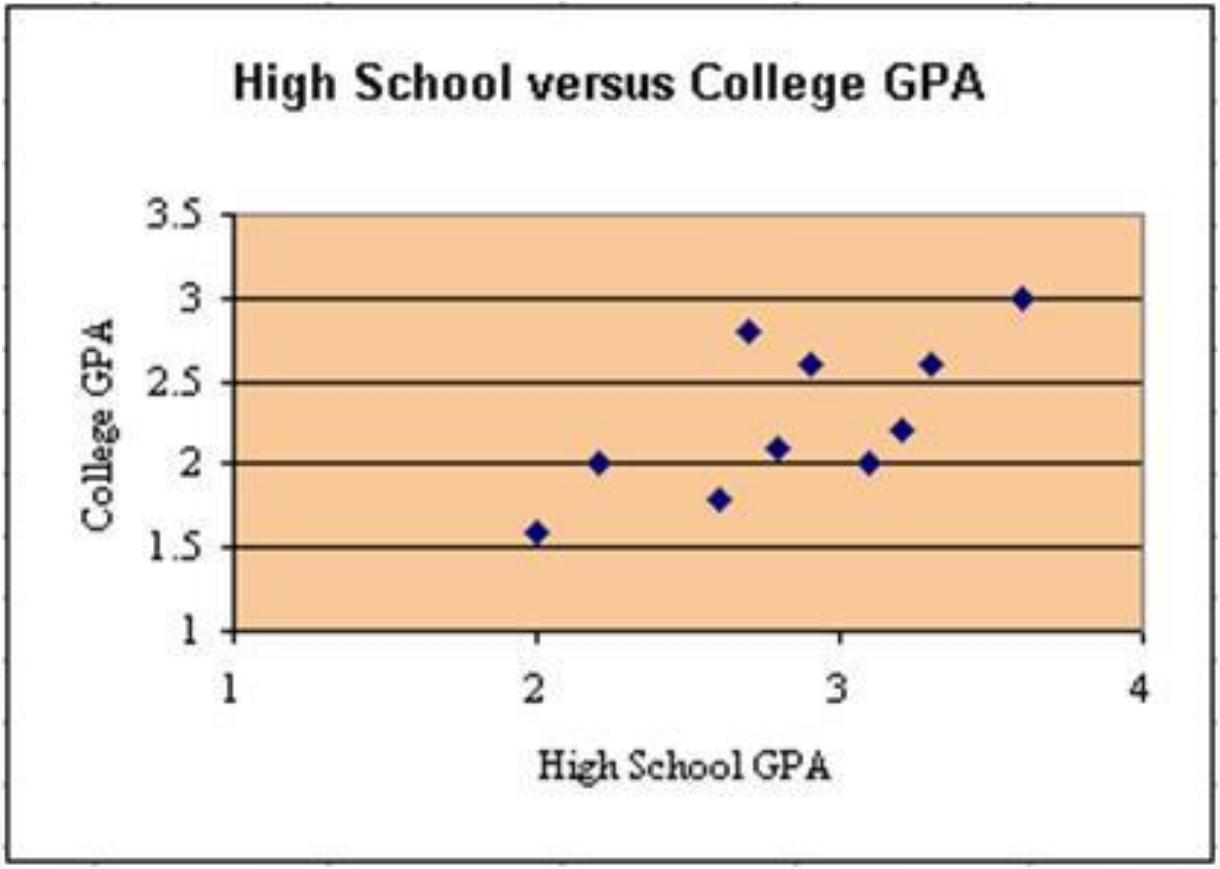
Scatter Plots & Lines of Best Fit

Objective:

- Use scatter plots and lines of best fit to analyze the relationship between two sets of data.

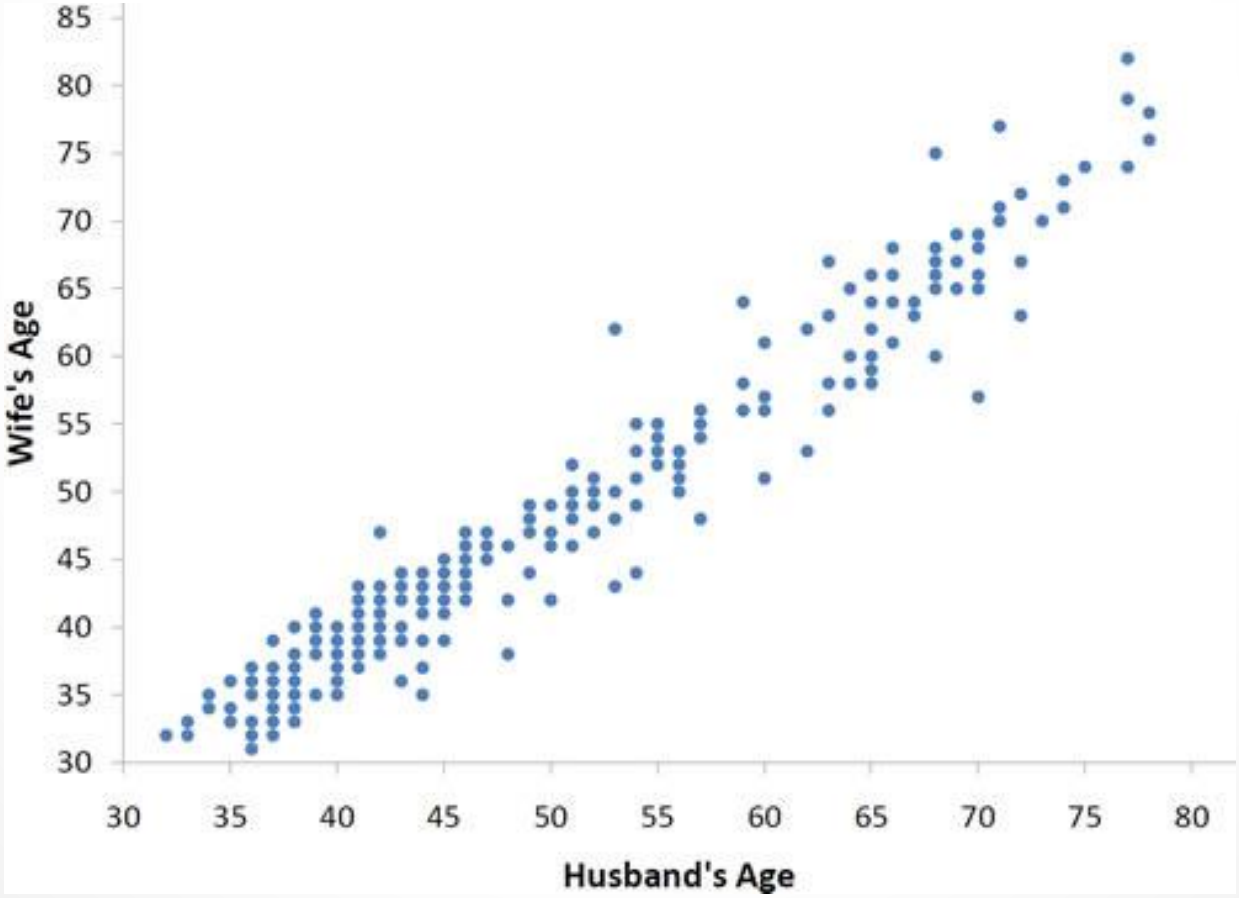
Do you think there is a relationship between…

- A person's **high school GPA** and their **college GPA???**



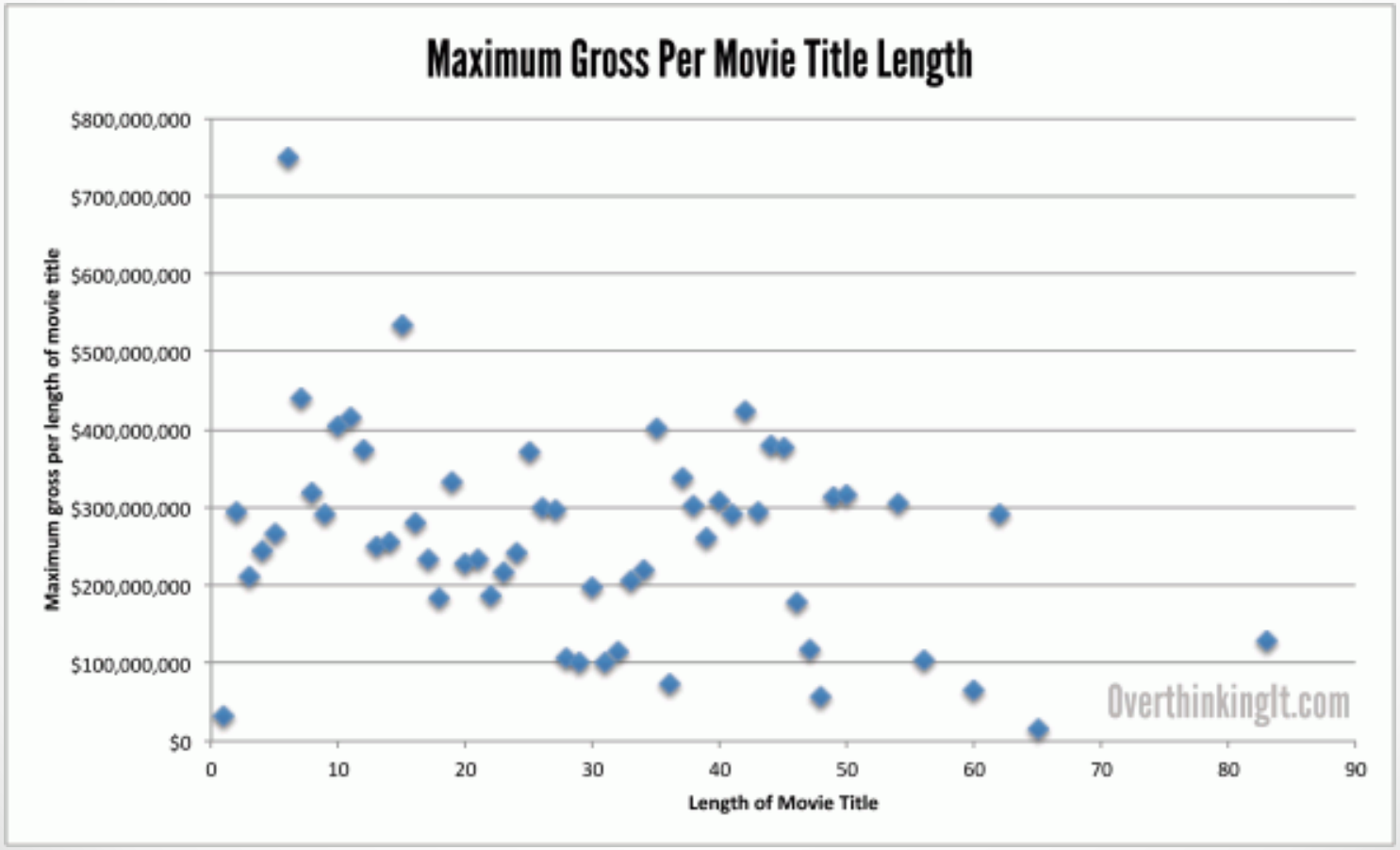
Do you think there is a relationship between…

- A husband's age and a wife's age?



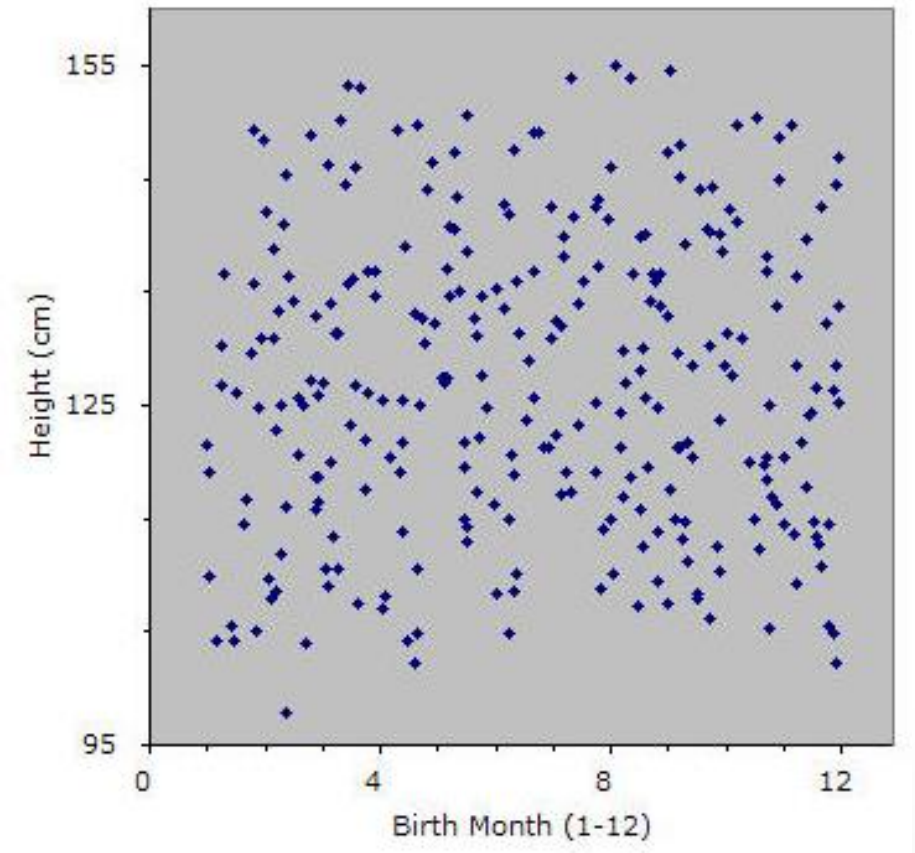
Do you think there is a relationship between…

- The length of the title of a movie and the amount of money it made?



Do you think there is a relationship between…

- The birth height of a boy and the month they were born?



Do you think there is a relationship between…

- People's height and shoe size?

- **I WILL MAKE A SCATTER PLOT AND SHOW YOU TOMORROW!!!**

- **Scatter Plot** – Shows the relationship between 2 variables
  - Each "dot" is 1 piece of data

- The more dots you have, the more reliable conclusions you can draw from it!!!

- Examples – height vs shoe size

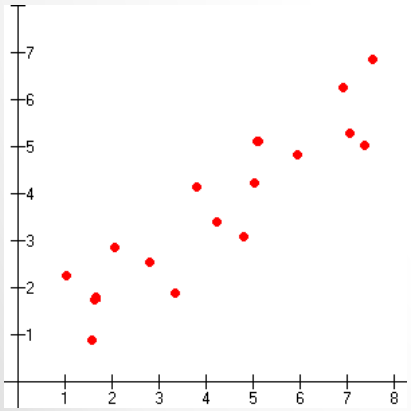
  -Amount of time studying vs. test grade

  -# of hours of sleep and GPA

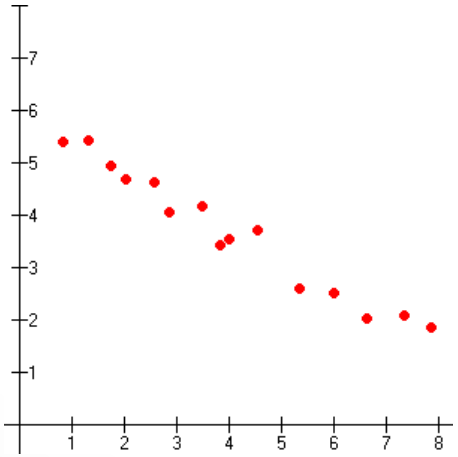
  -Days left in school and temperature outside

- **Types of Correlations**
- **Positive** – the dots mostly increase from left to right
- **Negative** – the dots mostly decrease from left to right
- **No correlation** – there is no pattern

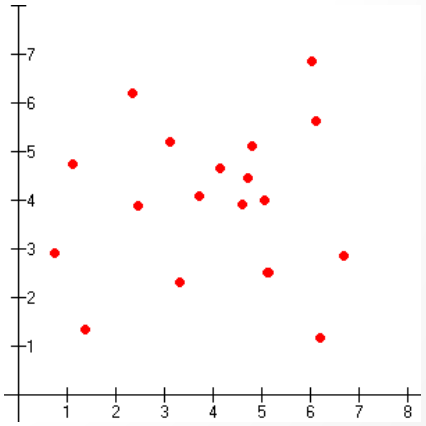
Positive



Negative



No Correlation



Positive – If one increases, the other increases. If one goes decreases, the other decreases.

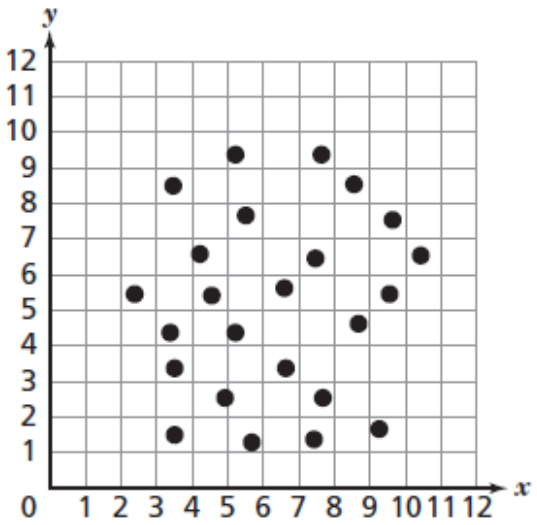
(looks like a positive slope)

Negative – If one increases, the other decreases.

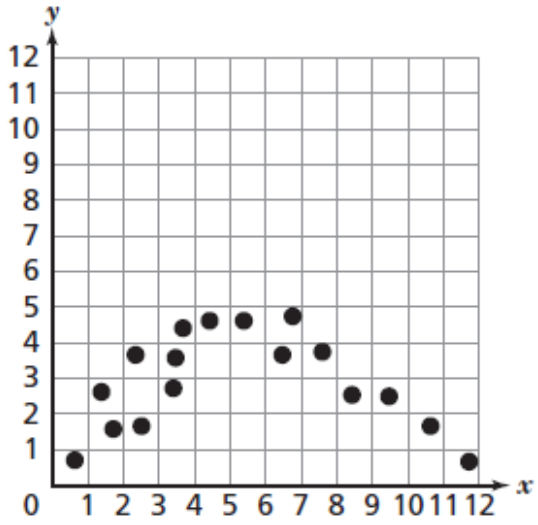
(looks like a negative slope)

17 Which scatterplot displays a negative relationship over the entire set of data?

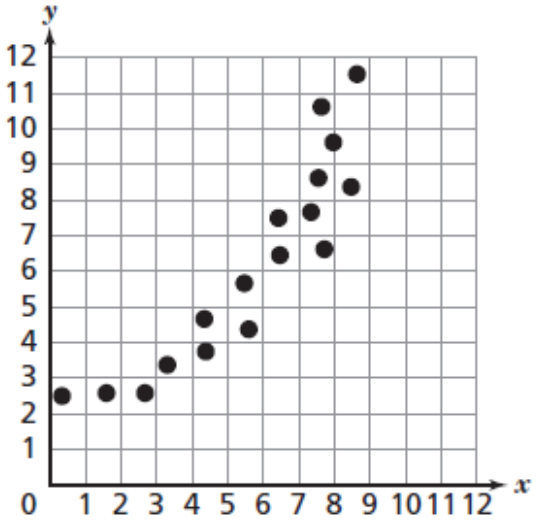
A



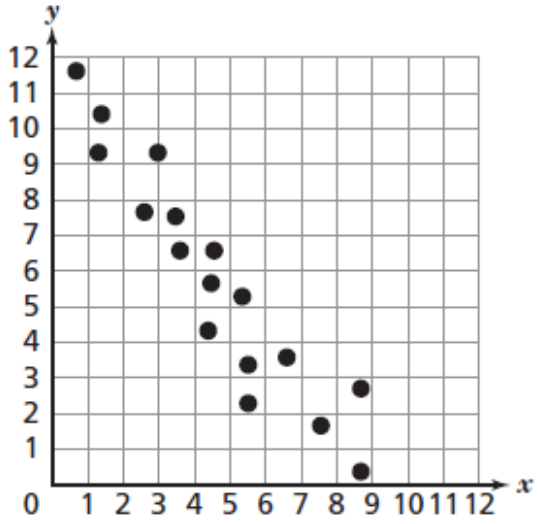
C



B

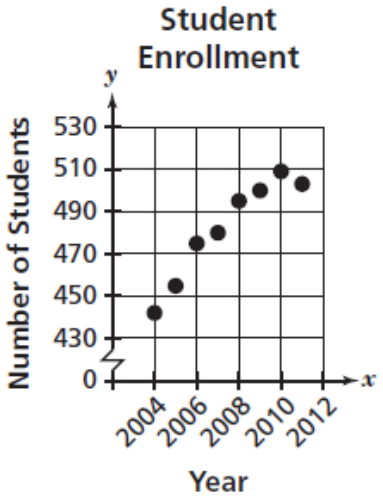


D

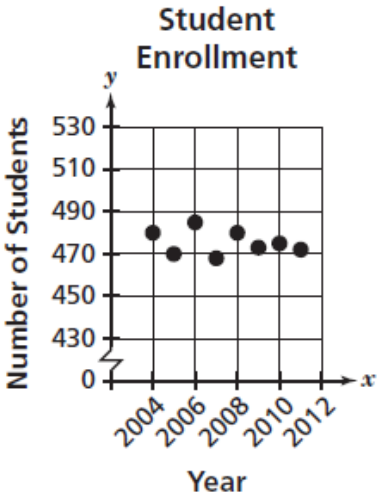


38 The graphs show the student enrollment at a school from 2004 through 2011. Which graph best shows a negative correlation between the number of students and the years from 2004 through 2011?

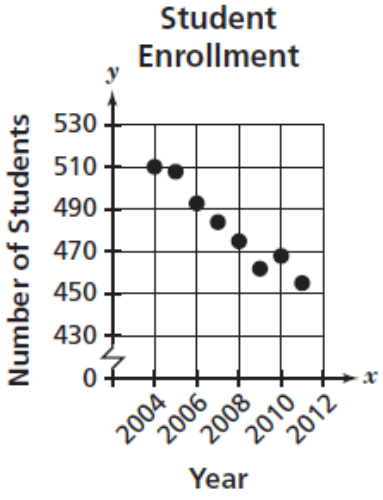
F



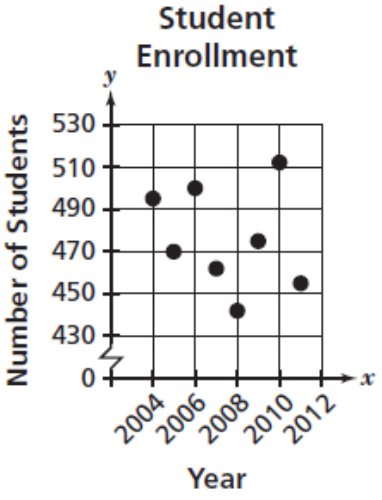
H



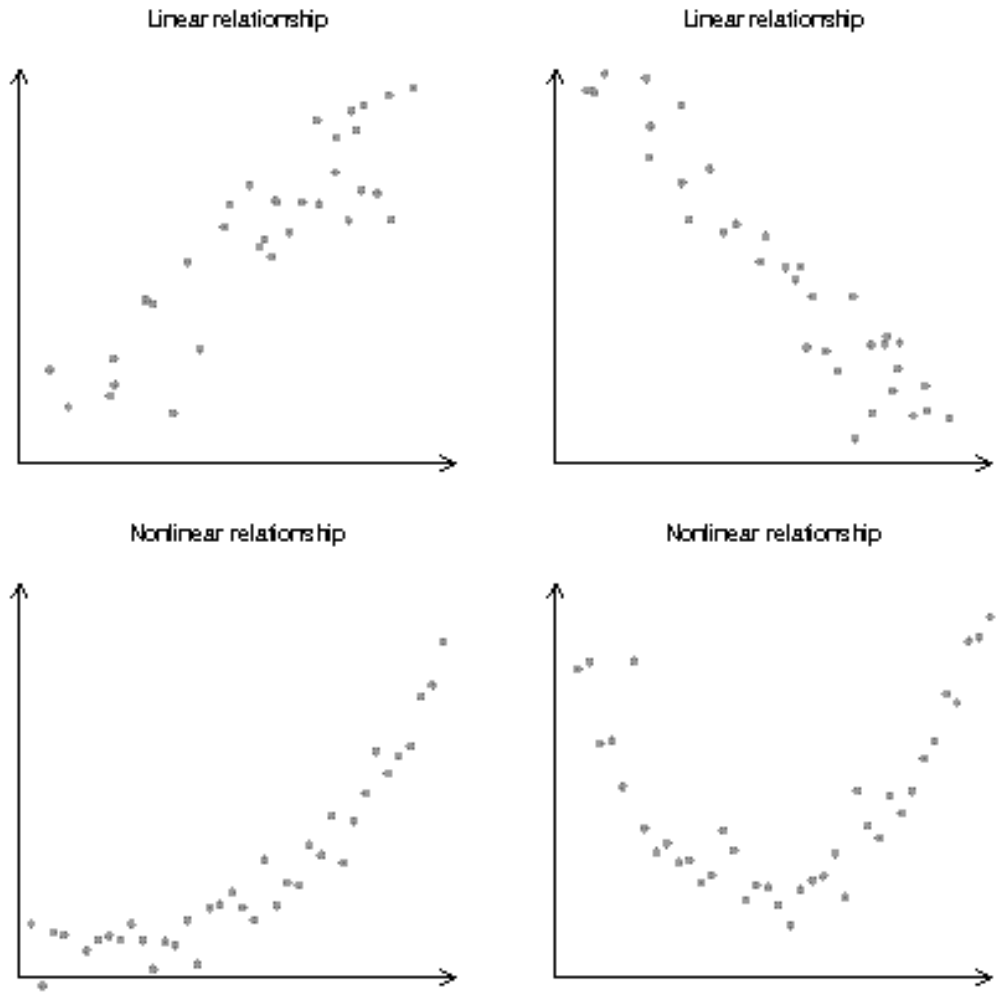
G



J



"Shapes" of correlations



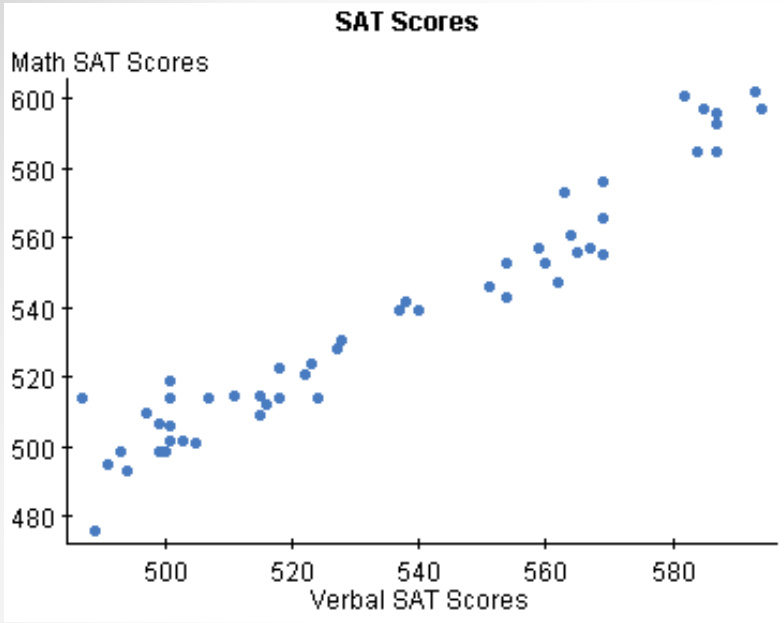
Linear

(NOTE: the dots don't make a perfect straight line, but the overall pattern is straight)

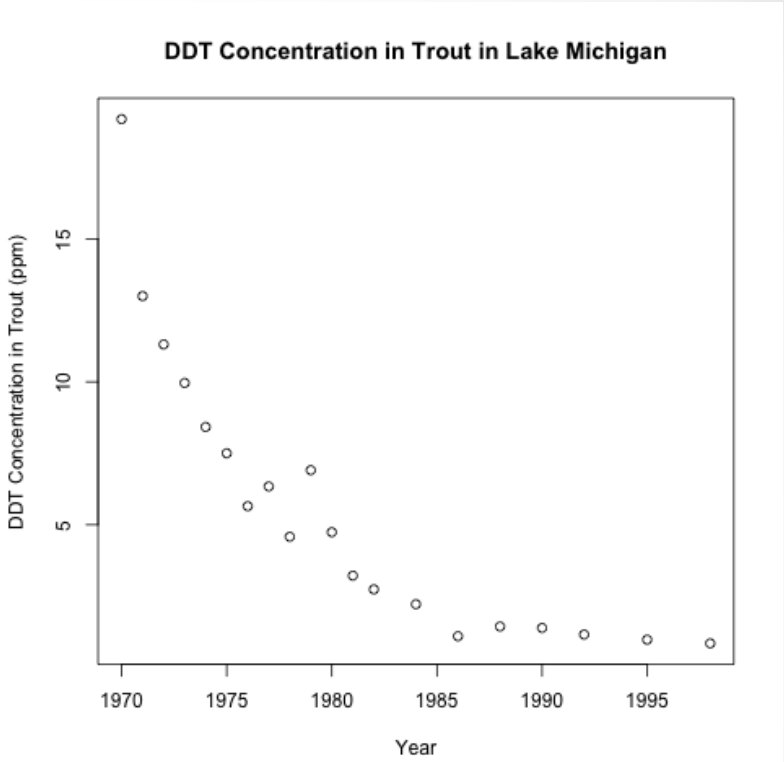
Nonlinear

(left: exponential, right: quadratic)

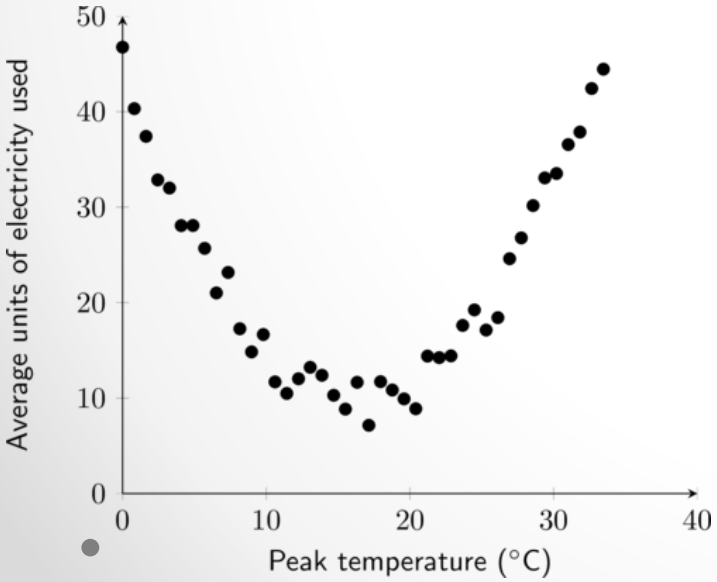
Linear



Exponential



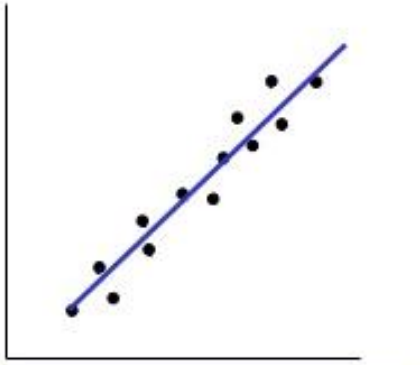
Quadratic



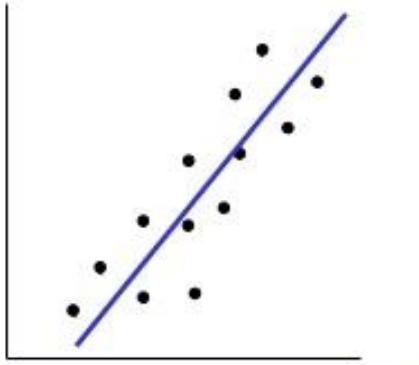
STRONG vs. WEAK Correlation…

- Besides positive/negative, you can also judge a scatter plot based on how **strong** the correlation is.

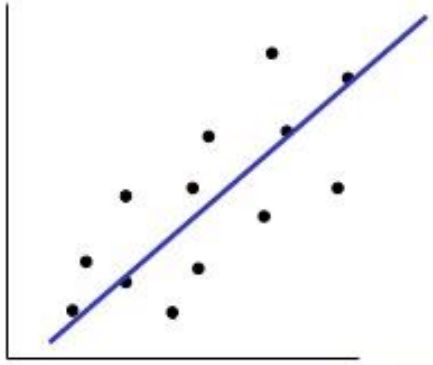
A positive or negative correlation is characterised by a straight line with a positive /negative gradient. The strength of the correlation depends on the spread of points around the imagined line.



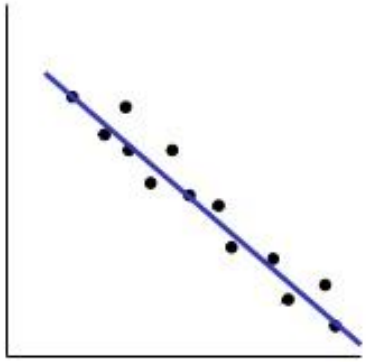
Strong Positive



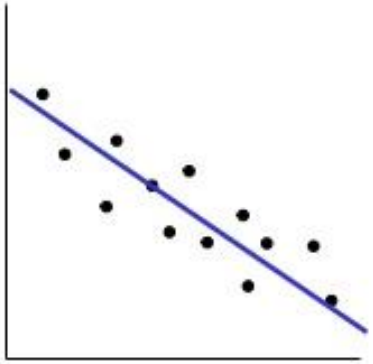
Moderate Positive



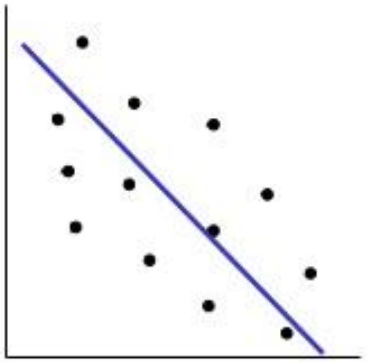
Weak Positive



Strong negative



Moderate Negative



Weak negative

What kind of correlation would you expect?

- height vs shoe size
- Amount of food you have eaten and how hungry you are
- # of hours of sleep and GPA
- Days left in school in the springtime and temperature outside
- # of letters in your first name and # of letters in your last name
- Amount of time studying vs. test grade

Predicting Correlations

WRONG WAY TO THINK ABOUT CORRELATIONS:

- **"But…you could study for 100 hours and still do really bad!!!"**

RIGHT WAY TO THINK ABOUT CORRELATIONS:

- **What would be the overall pattern if we asked a million people???**

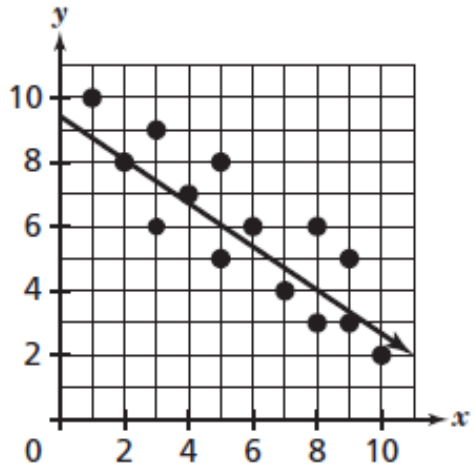
Yes, there can always be outliers. But you should not focus on the outliers. Focus on the overall pattern instead.

Line of Best Fit

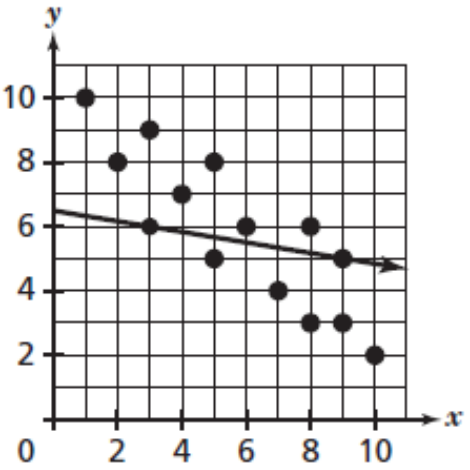
- A line that represents the "average" of the data – shows the overall pattern
- Should have approximately the same number of dots above and below it

50 Which graph shows the most accurate line of best fit for the given data?

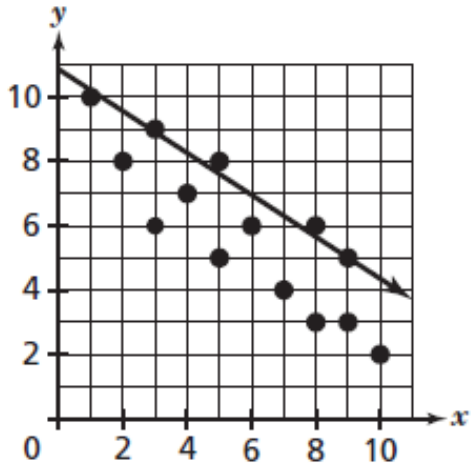
F



H



G



J