

Correlation: A \_\_\_\_\_ to determine if a \_\_\_\_\_ between two variables exists.

Examples:

Hours of training and # of accidents

Shoe size and height

Cigarettes smoked per day and lung capacity

Score on the SAT and grade point average

Height and IQ

The questions we have to answer are: Does a correlation exist? If so – what type and how strong is it?

A graphical way to see if there is a correlation or not is with a SCATTERPLOT. We are going to plot one by hand – and then see how to do it on the calculator later.

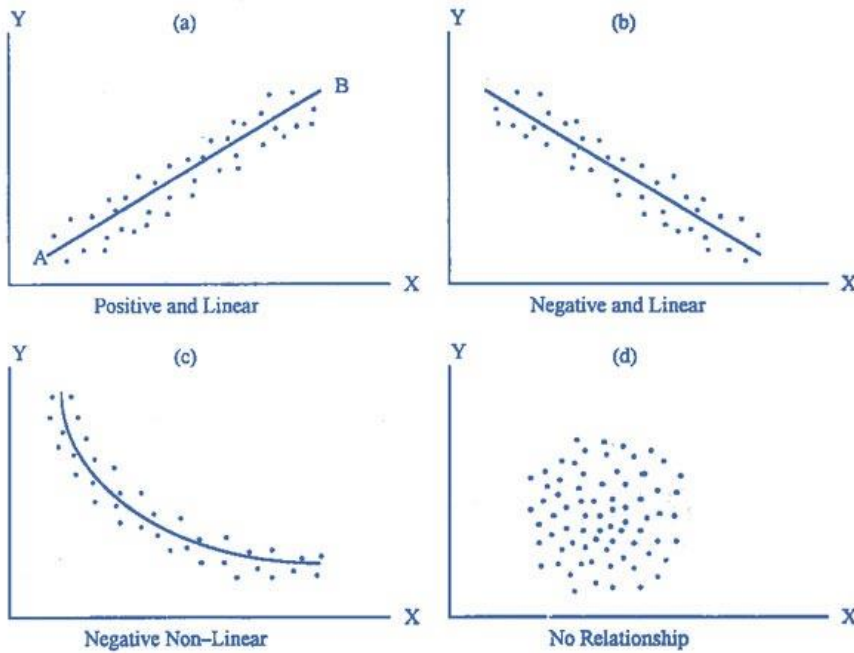
Example:

|            |  |  |  |  |  |  |  |  |
|------------|--|--|--|--|--|--|--|--|
| Height     |  |  |  |  |  |  |  |  |
| Arm length |  |  |  |  |  |  |  |  |



A correlation is described by its shape and strength.

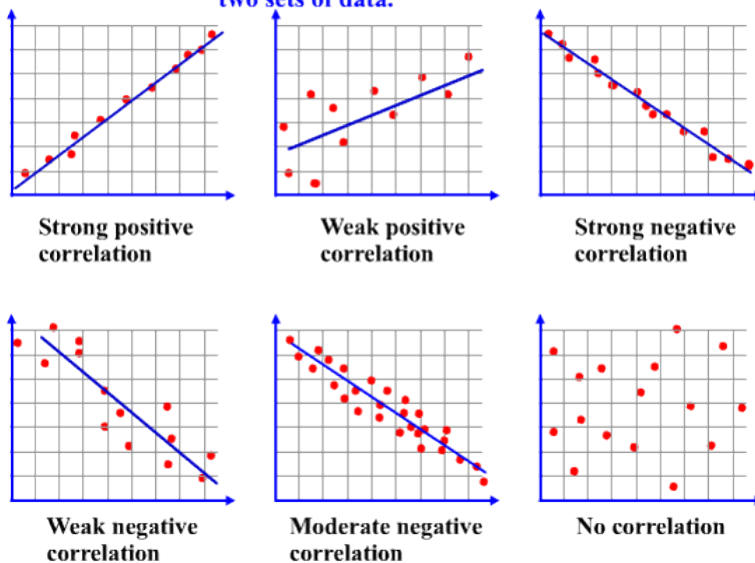
The options for shape are (a) positive linear (b) negative linear (c) non-linear or (d) no correlation



The “strength” of the correlation can be described as (a) strong (b) weak (c) moderate

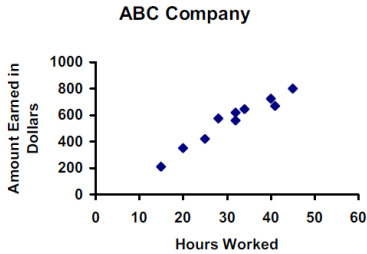
### SCATTERPLOTS & CORRELATION

Correlation - indicates a relationship (connection) between two sets of data.



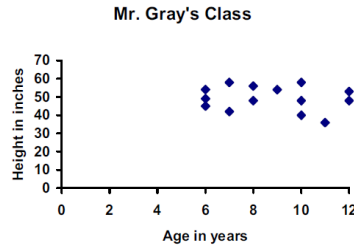
Student Practice: Match the following graphs to their correlations.

- 1) The scatter plot below shows a relationship between hours worked and money earned. Which best describes the relationship between the variables?



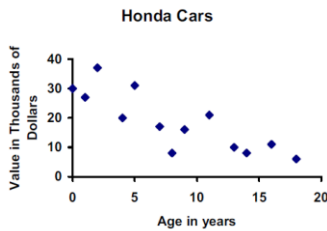
- A) Strong positive correlation
- B) Weak positive correlation
- C) Strong negative correlation
- D) Weak negative correlation

- 2) This scatter plot shows a relationship between age and height. Which best describes the relationship between the variables?



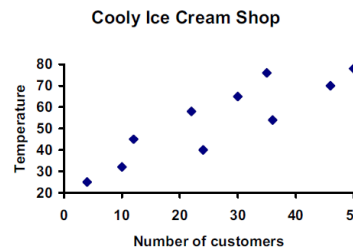
- A) Strong positive correlation
- B) Weak positive correlation
- C) Strong negative correlation
- D) No correlation

- 3) This scatter plot shows the relationship between the age of a car and its value. Which best describes the relationship between the variables?



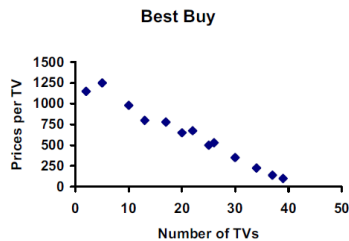
- A) Strong positive correlation
- B) Weak negative correlation
- C) Strong negative correlation
- D) No correlation

- 4) This scatter plot shows a relationship between the outdoor temperature and number of customers in an ice cream store. Which best describes the relationship between the variables?



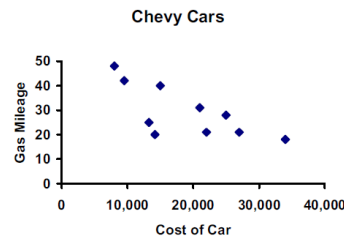
- A) Strong positive correlation
- B) Weak positive correlation
- C) Weak negative correlation
- D) No correlation

- 5) This scatter plot shows a relationship between the TVs purchased and prices. Which best describes the relationship between the variables?



- A) Strong positive correlation
- B) Weak positive correlation
- C) Strong negative correlation
- D) Weak negative correlation

- 6) This scatter plot shows a relationship between the cost of Chevy cars and their gas mileage. Which best describes the relationship between the variables?



- A) Strong positive correlation
- B) Weak positive correlation
- C) Weak negative correlation
- D) No correlation

7) come up with your own example of a positive linear correlation.

8) come up with your own example of a negative linear correlation.

As you can see – it is sometimes tricky to decide if a correlation is strong, moderate, or weak. The good news is - there is a value called the \_\_\_\_\_ that helps us determine the \_\_\_\_\_ of a correlation. It also tells us if the correlation is \_\_\_\_\_ or \_\_\_\_\_.

The letter used for the correlation coefficient is \_\_\_\_\_.  $r$  can range from \_\_\_\_\_ to \_\_\_\_\_.

A positive  $r$  value means: \_\_\_\_\_ A negative  $r$  value means: \_\_\_\_\_

General guidelines:

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Broken down further:

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Categorize the following  $r$  values:

$r = -.89$

$r = .12$

$r = .98$

$r = .35$

$r = -.03$

$r = -.61$

$r = .65$

$r = -.58$

$r = .21$

Example: (copy height and arm length from before)

|            |  |  |  |  |  |  |  |  |  |
|------------|--|--|--|--|--|--|--|--|--|
| Height     |  |  |  |  |  |  |  |  |  |
| Arm length |  |  |  |  |  |  |  |  |  |

How to find the r value on the calculator and see the scatterplot

1. Type the data into \_\_\_\_\_ by pressing \_\_\_\_\_
2. Find R by pressing \_\_\_\_\_ scroll to \_\_\_\_\_ pick \_\_\_\_\_
3. To see the scatter plot- turn your plot on by pressing \_\_\_\_\_ and scroll up to \_\_\_\_\_ and hit enter.
4. Hit \_\_\_\_\_ and then \_\_\_\_\_ to see the scatterplot in a good viewing window.

\*if r does not appear on your screen – you may need to turn your diagnostic on. This only needs to be done once unless you switch calcs or your calc is re-set\*

Examples: Find r, state the type of correlation. Confirm by looking at the scatterplot.

|               |    |    |    |    |     |    |    |    |     |
|---------------|----|----|----|----|-----|----|----|----|-----|
| Hours Studied | 1  | 2  | 2  | 3  | 3.5 | 4  | 4  | 5  | 5.5 |
| Test score    | 65 | 80 | 73 | 82 | 81  | 87 | 90 | 88 | 92  |

r = \_\_\_\_\_ describe correlation: \_\_\_\_\_

|             |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |    |
|-------------|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|
| Absences    | 17 | 0  | 5  | 10 | 18 | 5  | 0  | 0  | 2  | 3   | 6  | 9  | 19 | 18 | 0  | 2  | 3  | 18 | 6  |
| Class grade | 73 | 90 | 90 | 92 | 68 | 89 | 94 | 97 | 86 | 100 | 92 | 68 | 71 | 65 | 94 | 89 | 84 | 76 | 63 |

r = \_\_\_\_\_ describe correlation: \_\_\_\_\_

|                                 |    |    |    |    |    |    |    |    |    |
|---------------------------------|----|----|----|----|----|----|----|----|----|
| # of miles house is from school | 5  | 8  | 12 | 3  | 3  | 4  | 8  | 10 | 1  |
| Test score                      | 85 | 72 | 98 | 97 | 82 | 73 | 68 | 75 | 81 |

r = \_\_\_\_\_ describe correlation: \_\_\_\_\_