

# Lesson 3.2 Line of Best Fit

## Relationships Summary

A **scatter plot** is a graph that shows the \_\_\_\_\_ between **two** variables.

The points in a scatter plot often show a pattern, or \_\_\_\_\_.

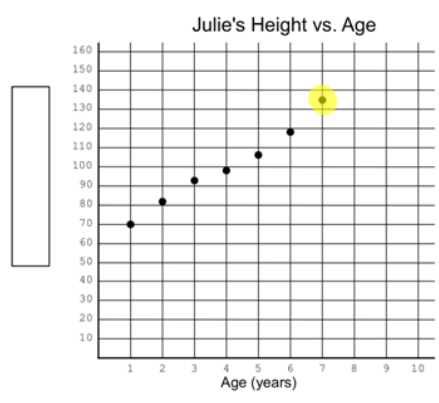
From the pattern or trend you can describe the \_\_\_\_\_.

Example 1:

Julie gathered information about her age and height from the markings on the wall in her house.

Age (years)	1	2	3	4	5	6	7	8
Height (cm)	70	82	93	98	106	118	127	135

- a) Label the vertical axis.
- b) Describe the trend in the data.
- c) Describe the relationship.



## Variables

The *independent variable* is located on the \_\_\_\_\_ axis.

This variable does not depend on the other variable.

The *dependent variable* is located on the \_\_\_\_\_ axis.

This variable depends on the other variable.

Note:  
The independent variable comes *first* in the table of values.

Independent variable: \_\_\_\_\_

Dependent variable: \_\_\_\_\_

## Line of Best Fit

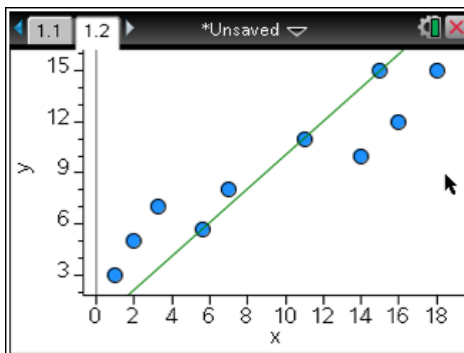
<https://www.explorelarning.com/index.cfm?method=cResource.dspView&ResourceID=308>

To be able to make predictions, we need to model the data with a line or a curve of best fit.

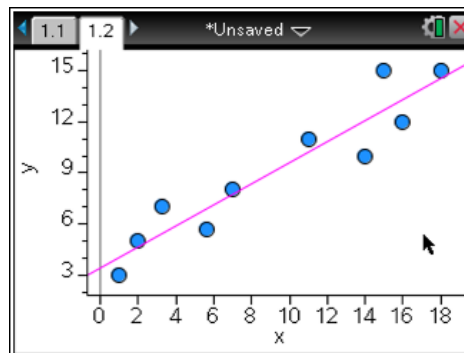
**Rules** for drawing a line of best fit:

1. The line must follow the \_\_\_\_\_.
2. The line should \_\_\_\_\_ through as many points as possible.
3. There should be \_\_\_\_\_ of points above and below the line.
4. The line should pass through points all along the line, not just at the ends.

Bad LoBF



Good LoBF



## Making Predictions

Use your line of best fit to **estimate** the following:

Question	Answer	Method of Prediction
How tall was Julie when she was 5 years old?		
How tall will Julie be when she is 9 years old?		
How old was Julie at 100 cm tall?		
How tall was Julie when she was born?		

## Interpolate

When you interpolate, you are making a prediction \_\_\_\_\_ the data.

These predictions are usually \_\_\_\_\_.

Hint:

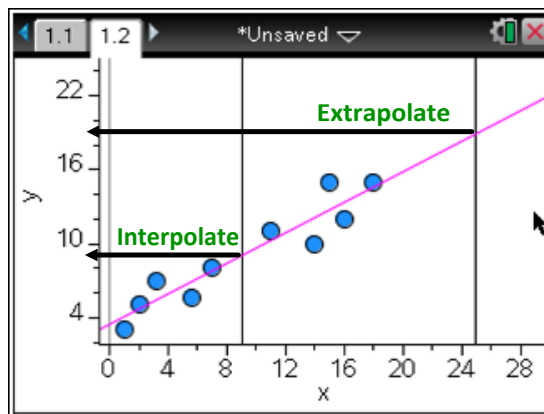
You are interpolating when the value you are finding is somewhere between the first point and the last point.

## Extrapolate

When you extrapolate, you are making a prediction \_\_\_\_\_ the data.

It often requires you to \_\_\_\_\_ the line.

These predictions are less reliable.



You are extrapolating when the value you are finding is before the first point or after the last point. This means you may need to extend the line.

### Continuous Data

- Can have an infinite number of possible values within a given range.

\* Often MEASURED.

\* Can have part of a whole (ex. can have half).

\* Connect points with a SOLID LINE.

### Discrete Data

- Can only have certain values within a given range.

\* Often COUNTED.

\* Can't have part of a whole (ex. Can't have half).

\* Connect points with a DASHED LINE.

### **QUESTION**

Should the scatter plot showing Julie's age and height be connected with a solid line or a dotted line?

### How can you figure out a good scale?

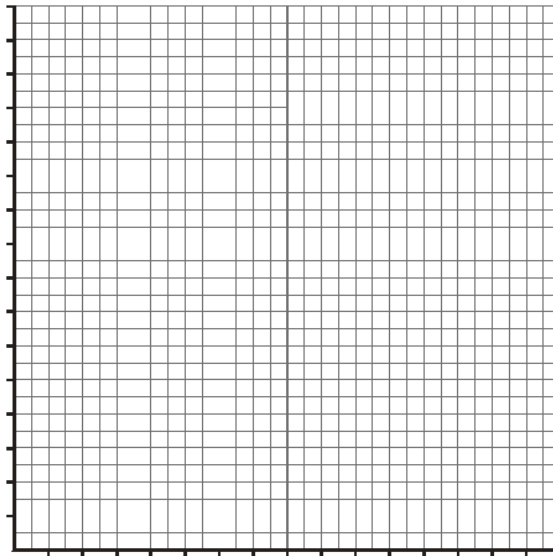
- \* Determine the highest & lowest data points.  
---> Subtract (This is the RANGE).
- \* Count the number of grid marks to label.  
---> Divide the RANGE by this number.

#### Example 2: Creating Scatter Plots and Lines of Best Fit

Test the hypothesis: The older you are, the more money you earn.

Plot the data on the scatter plot below, choosing appropriate scales and labels.

Age	Earnings (\$)
25	22000
30	26500
35	29500
37	29000
38	30000
40	32000
41	35000
45	36000
55	41000
60	41000
62	42500
65	43000
70	37000
75	37500



**Note:** The symbol \_\_\_\_\_ is used to signal a “break” in the axis when the scale does not start at zero to avoid a large empty space in one corner of the graph.

- 1) Draw a line of best fit. Describe the trend in the data.
- 2) Does the data support the hypothesis? Give reasons to support your answer. (Refer to the scatter plot.) Describe the relationship.
- 3) Explain why the data for ages over 65 do not correspond with the hypothesis.
- 4) Explain what the point (41, 35000) represents.
- 5) Use the line of best fit to predict earnings when you are 50 years old. Did you interpolate or extrapolate?
- 6) Use the line of best fit to predict your age when you earn \$28000. Did you interpolate or extrapolate?