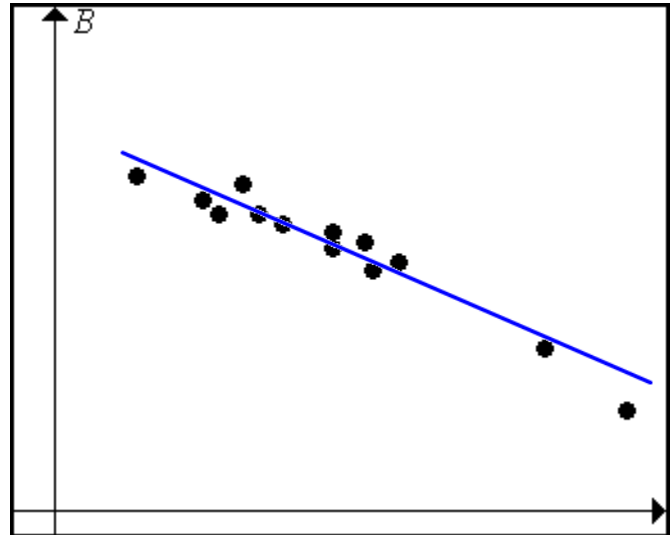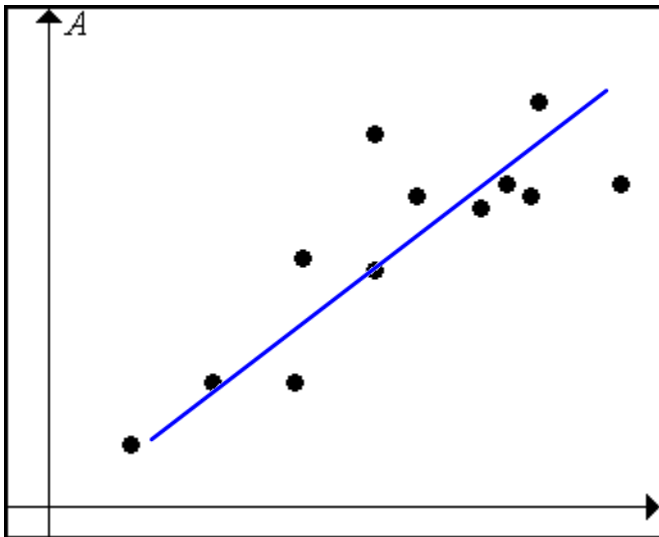The Line of Best Fit

The **line of best fit** is a line that approximates the pattern for the data shown in a scatter plot. The line of best fit should be as close as possible to as many of your data points as possible. One purpose of the line of best fit is to help make predictions.

Use scatter plots A and B below to complete questions 1 to 4.

1. Use a straightedge (clear, if possible) to draw the line of best fit (this assumes the pattern is linear).

2. Describe how you estimated the line of best fit for each scatter plot.

    I tried to include as many dots as possible.

3. State the type of correlation for each graph.

    ① Positive weak   ② Negative strong

4. Compare your line of best fit with a classmate. Is it important that all your classmates have lines of best fit that are identical?
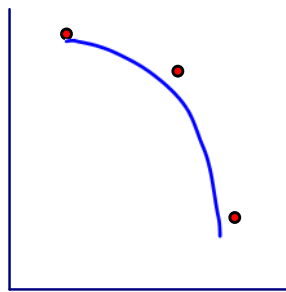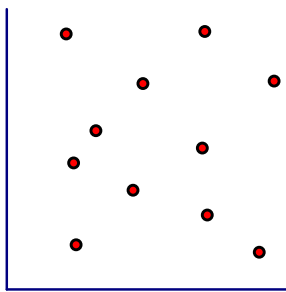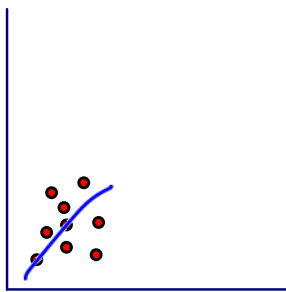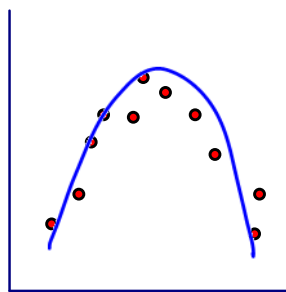
5. Describe a situation where you could not draw a line of best fit.

    When the data is scattered all over the place on the graph.

    no correlation.

1. Draw a line of best fit for each of the following scatter plots, if possible.
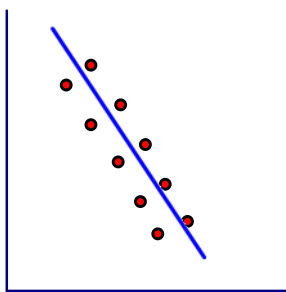
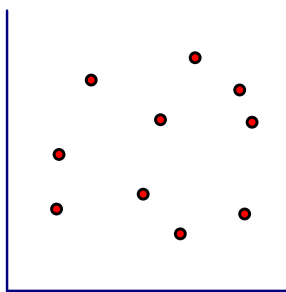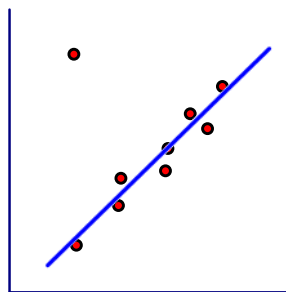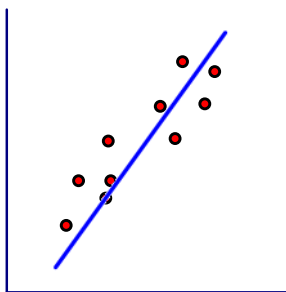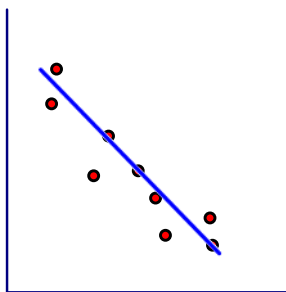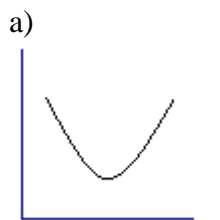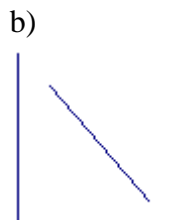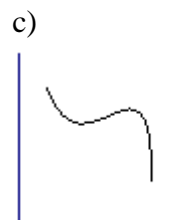2. Classify each of the following graphs as Linear or Non-Linear:

a)

non linear

b)

linear

c)

non-linear

Application of the Line of Best Fit - Problem A

We don't just draw the line of best fit 'just' for the fun of it. This line describes the general relationship of the data and can be used to determine unknown values.

Interpolate – to estimate a value between (within) two known values.
Extrapolate – to predict a value by following a pattern beyond known values.

Several students were recording the temperature of boiling water that sat in a cup. Their results were combined and used to create this scatter plot graph. Use the graph to answer the following questions:

1. What type of correlation is this relationship?

   Strong negative linear

2. Draw a line of best fit.

3. What was the temperature at 27 minutes? Use your line of best fit to find this missing data.

   Around 41°C

4. At what time did the temperature reach 30 degrees C? Use your line of best fit to *interpolate* this data.
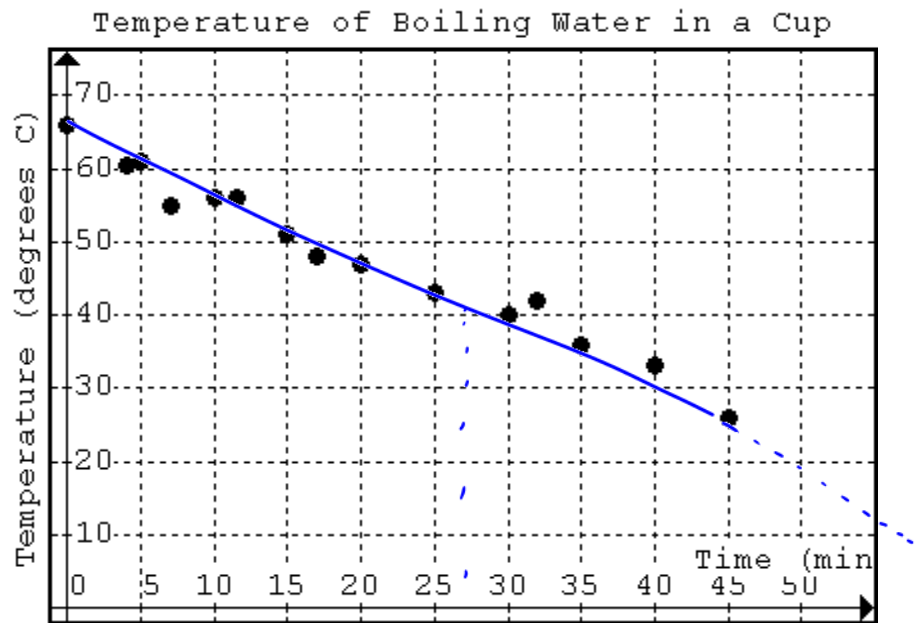
   Around 40 min.

5. At what time did the water reach a temperature of 10 degrees C? Extend your line of best fit to *extrapolate* this data.

   Around 60 min.

6. What was the temperature at 50 minutes? Extend your line of best fit to *extrapolate* this data.
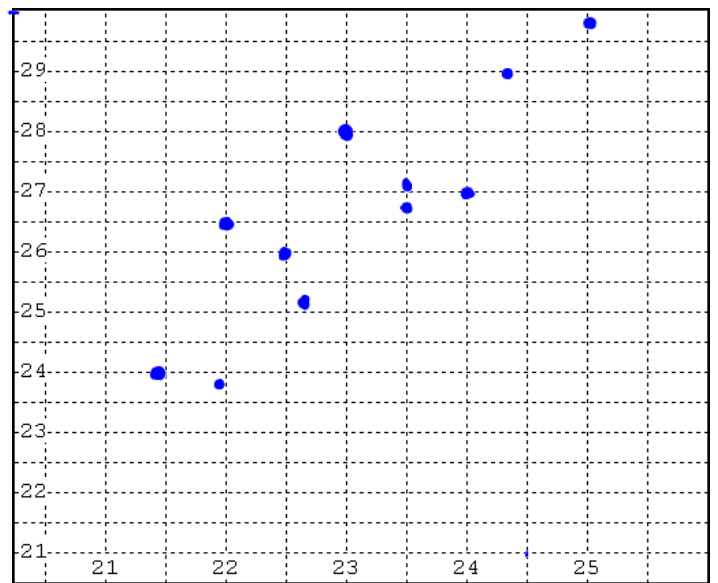
   Around 20°

Application of the Line of Best Fit – Problem B

Anthropologists and forensic scientists use data to help them determine information about people. Often only a few bones are available or the evidence is inconclusive. In spite of these difficulties, by accessing the information in large databases and investigating relationships between data scientists can determine information about the height, age, and sex of the person they are examining. In this problem we are going to look at the relationship between the humerus bone "the funny bone" which is the bone of the upper arm and the radius bone.

Phalanges
Metacarpals
Carpals
Radius
Ulna
Humerus

Upper Extremity
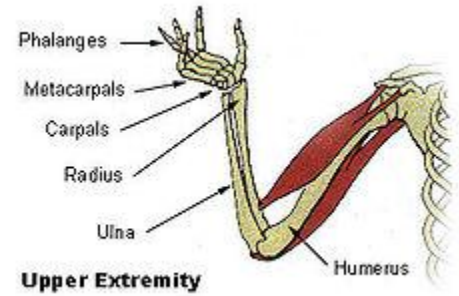
Radius (cm)	Humerus (cm)
25	29.7
22	26.5
23.5	27.1
22.5	26
23.	28
22.6	25.2
21.4	24
21.9	23.8
23.5	26.7
24.3	29
24	27

humerus bone to the length of the bone.

1. Construct a graph that compares the radius of the

2. What type of correlation is this relationship?

Positive weak linear

3. Circle the point on the graph that represents the data for a humerus that is 27.1cm long. How long is the radius? _23.5_

4. Underline the statement that describes the direction of the plotted points in the graph?
   - The plotted points rise upward from left to right. ✓
   - The plotted points fall downward from left to right. ✗
   - The plotted points are scattered across the graph.
   - The plotted points lie flat along the horizontal. ✗

5. As the length of the radius gets longer, what happens to the length of the humerus?
   It gets longer

6. Do you think that you can use the length of the radius to predict the length of the humerus? Explain.
   Yes, because the graph tells us as the radius bone gets longer so does the humerus bone.