Algebra I
5.1 Worksheet #3
Lines of Best Fit

NAME:_____
DATE:_____ HOUR:____

Objectives: Determine if a scatterplot approximates a linear relationship.
Find the slope of a line of best fit using graphed data.
Use a line of best fit to make predictions.

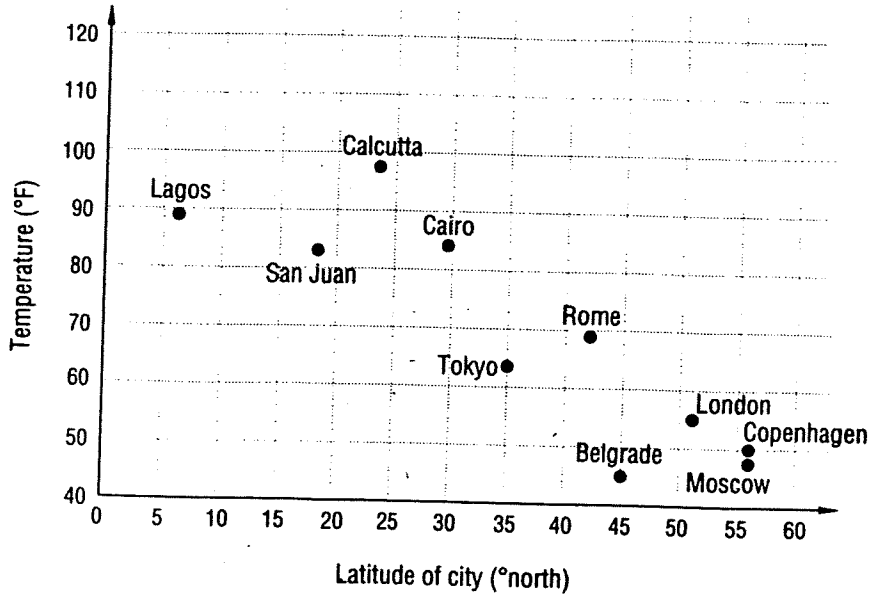
Fitting a Line to Data

In the table below are the latitude and mean high temperatures in April, for selected cities in the Northern Hemisphere. (The mean high temperature is the mean of all the high temperatures for the month.) Although in all of these cities temperature is measured in degrees Celsius, we have converted the temperatures to Fahrenheit for you.

Latitude and Temperature in Selected Cities

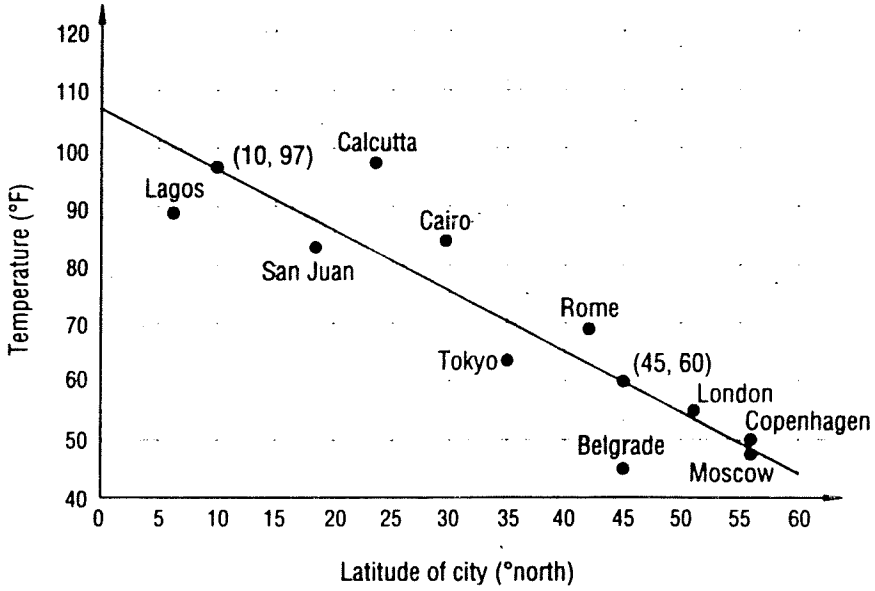
City	North Latitude	April Mean High Temperature (°F)
Lagos, Nigeria	6	89
San Juan, Puerto Rico	18	84
Calcutta, India	23	97
Cairo, Egypt	30	83
Tokyo, Japan	35	63
Rome, Italy	42	68
Belgrade, Yugoslavia	45	45
London, England	52	56
Copenhagen, Denmark	56	50
Moscow, USSR	56	47

Here is the scattergram. Does the data APPROXIMATE a linear relationship? _____



The points on the graph suggest that the higher the latitude, the lower the temperature. What does the data suggest for a city like Quito, Ecuador, at the equator (0° latitude)? What would you predict for the temperature at a city at 19° latitude, like Mexico City or Bombay?

To answer these questions, it helps to "fit a line" to the data. No line will pass through all the data points, but you can find a line that describes the trend of higher latitude, lower temperature. The simplest way is to take a ruler and draw a line that seems closest to all the points. This is called "fitting a line by eye," and one such line is graphed below.



Two data points are ON the line of best fit. Use those two points to approximate the <u>slope</u> of the line of best fit.

slope = _____ = _____

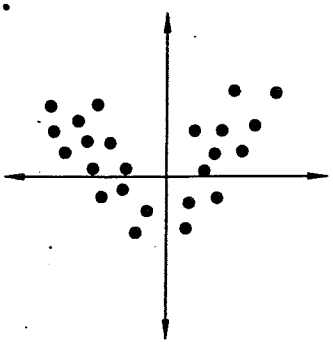
Use the line of best fit to predict the April Mean High Temperature for:

Quito, Ecuador	0° latitude	_____° F
Mexico City, Mexico	19° latitude	_____° F

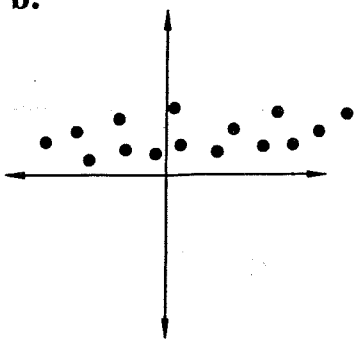
Not all scatterplots approximate linear relationships.

For which of the set of points below is fitting a line appropriate?

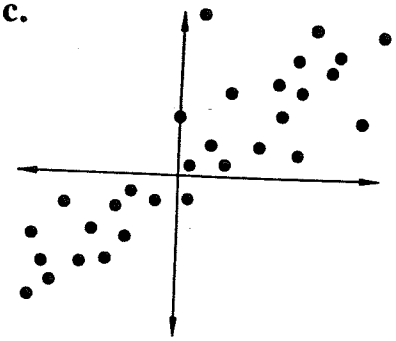
a.



b.



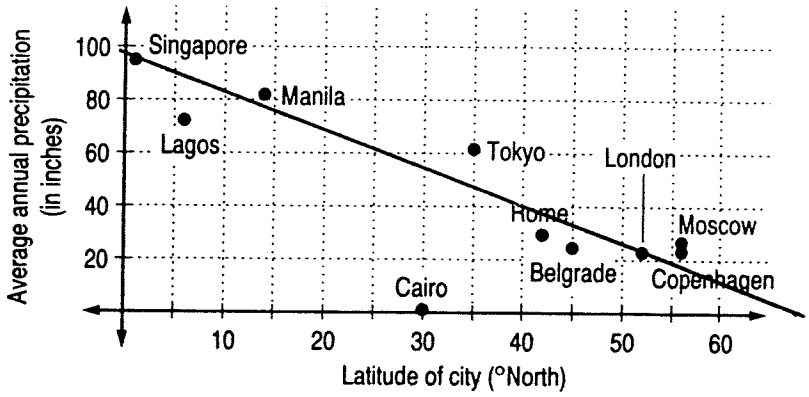
c.



Draw a line of best fit for the scatterplot(s) that approximate a linear relationship.

1. Use the following information:

City	North latitude	Average annual precipitation
Belgrade	45	24.6
Cairo	30	1.1
Copenhagen	56	23.3
Lagos	6	72.3
London	52	22.9
Moscow	56	24.8
Rome	42	29.5
Tokyo	35	61.6
Manila	14	82
Singapore	1	95



Sam drew the line containing the points for Singapore and London on the graph. Circle the data points in the table.

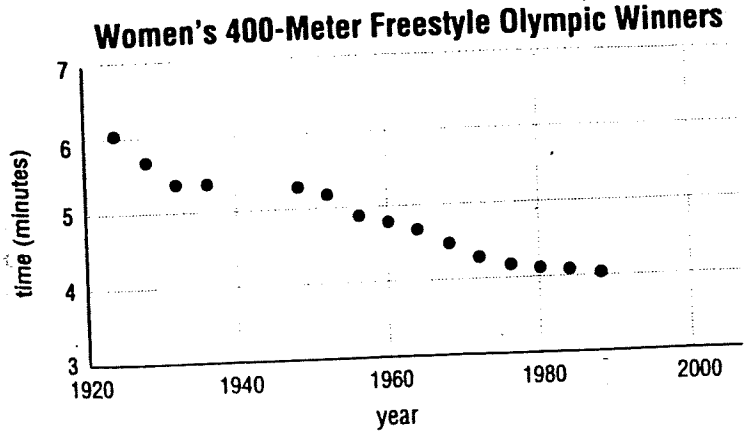
a. Does his line fit the data? **a.** _____

b. Identify the coordinates of two points on Sam's line. **b.** _____

c. Use the two points from part b. to estimate the slope of Sam's line. **c.** _____

d. Predict the average annual precipitation for Hong Kong at 22° north latitude. **d.** _____

2. Olympic swimmers get faster and faster. The scattergram below shows the times for the winners of the Women's 400-meter freestyle for the years 1924 to 1988.



Year	Winner	Time
1924	Martha Norelius, U.S.	6.04
1928	Martha Norelius, U.S.	5.71
1932	Helene Madison, U.S.	5.48
1936	Hendrika Mastenbroek, Netherlands	5.44
1948	Anne Curtis, U.S.	5.30
1952	Valerie Gyenge, Hungary	5.20
1956	Lorraine Crapp, Australia	4.91
1960	Chris von Saltza, U.S.	4.84
1964	Virginia Duenkel, U.S.	4.72
1968	Debbie Meyer, U.S.	4.53
1972	Shane Gould, Australia	4.32
1976	Petra Thümer, E. Germany	4.17
1980	Ines Diers, E. Germany	4.15
1984	Tiffany Cohen, U.S.	4.12
1988	Janet Evans, U.S.	4.06

a. Graph a line of best fit that goes through at least **two** data points.

b. Find the coordinates of **two** data points on your line from the table.

(year, time)

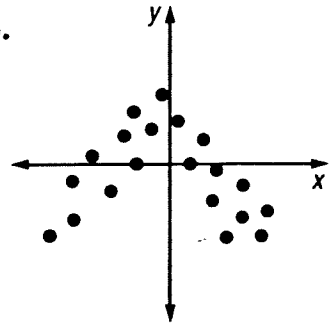
Circle the data points in the table.

c. Estimate the slope of your line of best fit using your two data points.

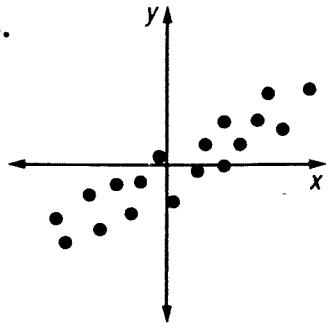
d. Predict the winning time for 1992 from your line of best fit.

In 3 and 4, decide a. whether it would be appropriate to fit a line to the data in the scatterplot, and b. if so, whether the line would have a positive or negative slope.

3.



4.



3. a. _____

4. a. _____

4. b. _____