Algebra 1B - Linear Regression Equations

Name________________________________ Period_____

Regression Line Worksheet

1. The table gives the Olympic pole vault records in the twentieth century.

Year	Height (m)
1900	3.30
1904	3.50
1906	3.50
1908	3.71
1912	3.95
1920	4.09
1924	3.95
1928	4.20
1932	4.31
1936	4.35
1948	4.30
1952	4.55
1956	4.56
1960	5.10
1964	5.64
1968	5.40
1972	5.64
1976	5.64
1980	5.78
1984	5.75
1988	5.90
1992	5.87
1996	5.92
2000	5.90

(a) Find the regression line for the data

Equation:_______________________________________

(b) Make a scatter plot of the data on your calculator and graph the regression line. Does the regression line appear to be a suitable model for the data?

Yes or No

(c) Use the model to predict the record pole vault height for the 2004 Olympics. Find the actual record height and by whom. Is this a good prediction?

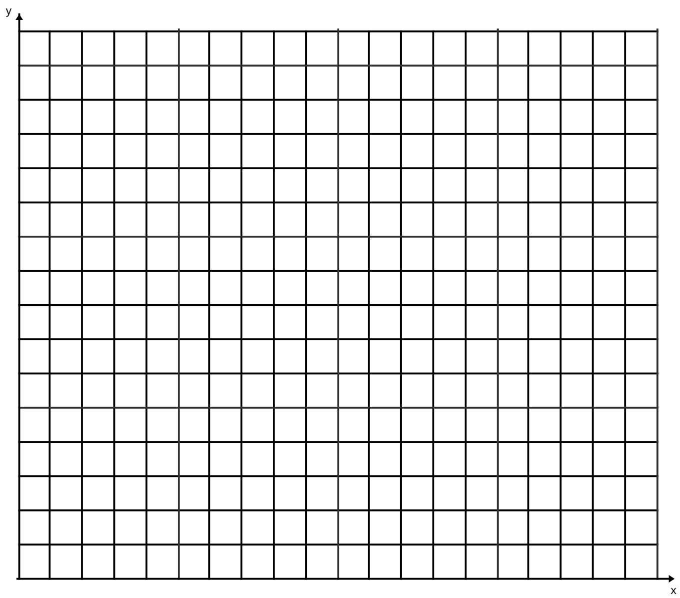
(d) Use the model to predict the record pole vault height for the 2008 Olympics. What was the actual gold metal height and by whom? Is this a good prediction?

(e) Use the model to predict the record pole vault height for the 2012 Olympics. Do you think the actual record in 2012 will be higher or lower than this prediction? Why?

2. Anthropologists use a linear model that relates femur length to height. The model allows an anthropologist to determine the height of an individual when only a partial skeleton (including the femur) is found. In this problem we find the model by analyzing the data on femur length and height for the ten males given in the table.

Femur Length (cm)	Height (cm)
50.1	178.5
48.3	173.6
45.2	164.8
44.7	163.7
44.5	168.3
42.7	165.0
39.5	155.4
38.0	155.0

(a) Make a scatter plot of the data.



(b) Find and graph a linear regression equation that models the data.

Equation:____

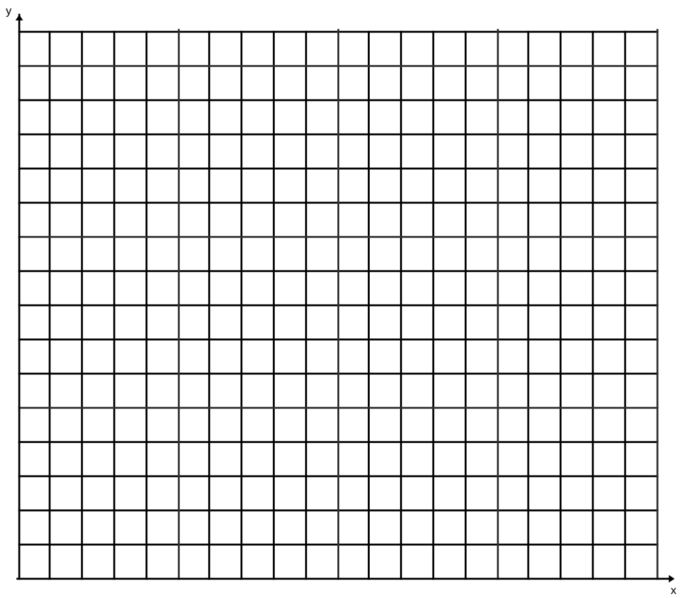
(c) An anthropologist finds a femur of length 58 cm. How tall was the person?

(d) If a person is 151cm tall, what does the model predict for their femur length?

3. A convenience store manager notices that sales of soft drinks are higher on hotter days, so he assembles the data in the table.

High Temperature (°F)	Number of cans sold
55	340
58	335
64	410
68	460
70	450
75	610
80	735
84	780

(a) Make a scatter plot of the data.



(b) Find and graph a linear regression equation that models the data.

Equation:____

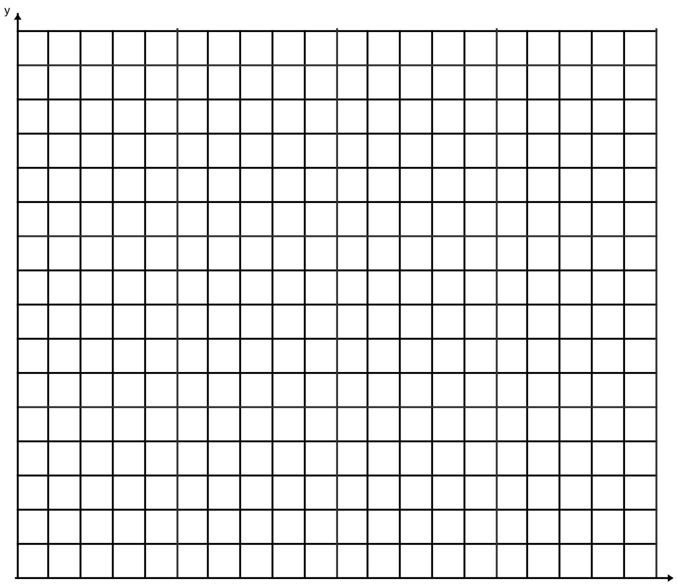
(c) Use the model to predict soft-drink sales if the temperature is 95°F.

(d) What does the model predict for the temperature if the number of cans sold was only 95?

Flying Start Machine 200 m - Race World Record Times

The following data chart shows the world record times for the 200 m race for flying start machines (a kind of bicycle)

Year	Record Time (sec)
1974	10.4
1975	10.0
1976	9.4
1977	9.1
1979	8.8
1985	7.2
1986	6.8
1992	6.5



4. How would you describe the correlation between Year and World Record Times?

5. What is the equation of the line of best fit?

6. What is the slope of the line of best fit?

7. Why is the slope a negative slope?

8. Using the equation of the line, calculate the actual world record time set in 1988.

For each of the following, write the prediction equation and then solve the problem.

9. A student who waits on tables at a restaurant recorded the cost of meals and the tip left by single diners.

Meal Cost	\$4.75	\$6.84	\$12.52	\$20.42	\$8.97
Tip	\$0.50	\$0.90	\$1.50	\$3.00	\$1.00

If the next diner orders a meal costing \$10.50, how much tip should the waiter expect to receive?

Equation____________________________ Tip expected____________________

10. The table below gives the number of hours spent studying for a science exam (x) and the final exam grade (y).

X	2	5	1	0	4	2	3
Y	77	92	70	63	90	75	84

Predict the exam grade of a student who studied for 6 hours.

Equation____________________________ Grade expected___________________

11. The table below shows the lengths and corresponding ideal weights of sand sharks.

Length	60	62	64	66	68	70	72
Weight	105	114	124	131	139	149	158

Predict the weight of a sand shark whose length is 75 inches.

Equation____________________________ Weight expected__________________

12. The table below gives the height and shoe sizes of six randomly selected men.

Height	67	70	73.5	75	78	66
Shoe size	8.5	9.5	11	12	13	8

If a man has a shoe size of 10.5, what would be his predicted height?

Equation____________________________ Height expected__________________