

Algebra 2 Worksheet

Name: Key

Section 2.7 - Curve Fitting with Linear Models

Per:

The problems on this worksheet come from your book, p.146-148 #2-6, 12, and 14.

1. **Driving.** Use your graphing calculator to make a scatter plot for this data set using gallons as the independent variable. Identify the correlation and find the equation of the line of best fit.

Distance Traveled							
Gallons x	11.2	9.8	10.6	10.1	12.3	8.7	10.1
Distance (mi) y	338	296	332	324	368	263	305

$$r \approx 0.97$$

$$y \approx 28.83x + 18.12$$

Strong positive correlation

2. **Home Economics.** Use the data relating the average temperature in a month to the heating bill at Claire's house that month.

Claire's Heating Bills							
Mean Temperature ($^{\circ}F$) x	38	42	44	36	42	49	38
Heating Bill (\$) y	93	79	75	83	74	67	86

- (a) Make a scatter plot using mean temperature as the independent variable.
 (b) Find the correlation coefficient and the equation of the line of best fit. Draw the line of best fit on your scatter plot.

$$r \approx -0.864$$

negative correlation

$$y \approx -1.68x + 148.88$$

- (c) Predict the heating bill for a month in which the average temperature is $40^{\circ}F$. How accurate do you think your prediction is? $x = 40$

$$y \approx -1.68(40) + 148.88$$

$$y \approx 81.68$$

$$\approx \$81.68$$

since r is pretty close to -1 , the prediction is somewhat close to actual value

3. **School.** Here are the number of teachers and the number of students at a randomly selected sample of high schools in a city.

Teachers and Students at Selected Schools								
Teachers x	92	52	114	49	110	62	76	84
Students y	1050	653	753	381	1312	813	496	910

- (a) Make a scatter plot of the data using teachers as the independent variable.
 (b) Find the correlation coefficient and the equation of the line of best fit. Draw the line of best fit on your scatter plot.

$$r \approx 0.679$$

positive correlation

$$y \approx 8.20x + 140.69$$

- (c) Predict the number of teachers in a high school that has 600 students. How accurate do you think your prediction is? $y = 600$

$$600 \approx 8.20x + 140.69$$

$$8.20x \approx 459.31$$

$$x \approx 56$$

$$\approx 56 \text{ teachers}$$

since r is not very close to 1, the # of teachers is not a good predictor for # of students

4. **Chemistry.** Driving. Use your graphing calculator to make a scatter plot for this data set using gallons as the independent variable. Identify the correlation and find the equation of the line of best fit.

Selected Chemical Elements														
Atomic # x	89	13	95	51	18	33	85	56	97	4	83	104	5	35
Atomic Mass y	227	27	243	122	40	75	210	137	247	9	209	264	11	80

$$r \approx 0.999$$

Strong positive correlation

$$y \approx 2.59x + -6.30$$

$$\approx y \approx 2.59x - 6.30$$

6. **Biology.** Hummingbird wing beat rates are much higher than those in other birds. Estimates for various species are given in the table.

Hummingbird Wing Beats							
Mass (g) x	3.1	2.0	3.2	4.0	3.7	1.9	4.5
Wing Beats (per second) y	60	85	50	45	55	90	40

(a) Make a scatter plot using mean temperature as the independent variable.

(b) Find the correlation coefficient and the equation of the line of best fit. Draw the line of best fit on your scatter plot.

$$r \approx -0.961$$

Strong negative correlation

(c) Predict the wing beat rates for a Giant Hummingbird with a mass of 19 g. How accurate do you think your prediction is?

$$y \approx -19.14(19) + 121.97$$

$$y \approx -241.69$$

$$y \approx -19.14x + 121.97$$

$$\approx -242 \text{ beats/second}$$

NOT POSSIBLE

7. **Aviation.** Use your graphing calculator to make a scatter plot for the lengths and wingspans in the American Airlines fleet. Identify the correlation and find the equation of the line of best fit.

Lengths and Wingspans of Planes in the American Airlines Fleet						
Length (ft) x	130	148	155	178	180	209
Wingspan (ft) y	113	108	124	147	156	200

$$r \approx 0.957$$

Strong positive correlation

$$y \approx 1.17x - 54.16$$

8. **Athletics.** Use the data set relating the number of steps per second to speed for a group of top female runners at different speeds. Predict the number of steps per second taken by a runner going 18 feet per second. How accurate is your prediction? Explain.

$$x = 18$$

Steps Taken by Distance Runners							
Speed (ft/s) x	15.86	16.88	17.5	18.62	19.97	21.06	22.11
Steps per second y	3.05	3.12	3.17	3.25	3.36	3.46	3.55

$$r \approx 0.999$$

very strong positive correlation

$$y \approx 0.08x + 1.77$$

$$y \approx 0.08(18) + 1.77$$

$$y \approx 3.21$$

$$\approx 3.21 \text{ steps/sec}$$

Very accurate since r is extremely close to 1