

Skill Check

Evaluate the
function when
 $g(x) = 6x$

When $x =$
 $-3, 0$ and 4

Skill Check:

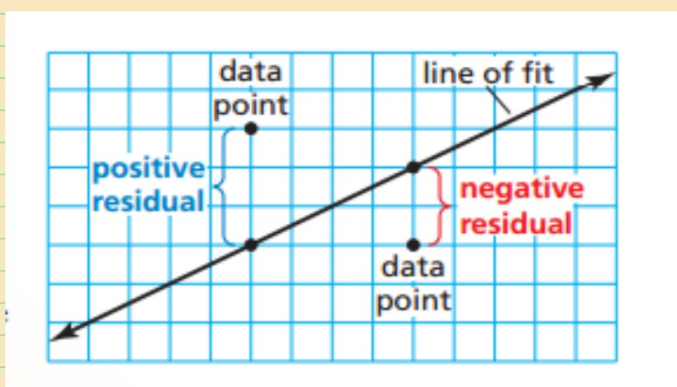
Give an example using causation

4-5 Analyzing lines of best fit

Vocabulary:

1.) Residual

Is the difference of the y-value of a data point and the corresponding y-value found using the line of best fit.



2.) Line regression

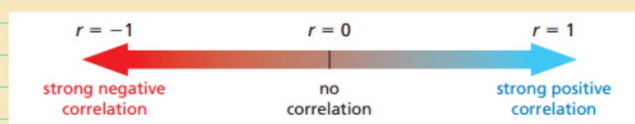
Used by graphing calculators

3.) Line of best fit

find a precise line

4.) correlation coefficient

Calculator will give you a value of r which will tell you if the values are positive, negative, and how closely the equation models the data. Values of r range from -1 to 1.



5.) Interpolation

Using a graph or its equation to approximate a value between two known values

6.) Extrapolation

Using a graph or its equation to predict a value outside the range of known values.

7.) Causation:

When a change in one variable causes a change in another variable. Produces a strong correlation between 2 variables

Example 1:
Using Residuals

Steps

1.) calculate the residuals & organize the results in a table

2.) Use the points to make a scatter plot

In Example 3 in Section 4.4, the equation $y = -2x + 20$ models the data in the table shown. Is the model a good fit?

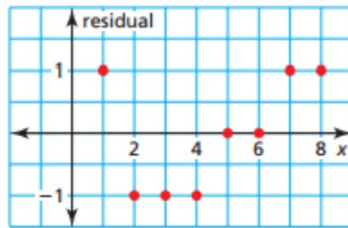
Week, x	Sales (millions), y
1	\$19
2	\$15
3	\$13
4	\$11
5	\$10
6	\$8
7	\$7
8	\$5

y Value Res

18
16
14
12
10
8
7
5

1
-1
-1
-1
0
0
0
-1
-1

x	y	y -Value from model	Residual
1	19	18	$19 - 18 = 1$
2	15	16	$15 - 16 = -1$
3	13	14	$13 - 14 = -1$
4	11	12	$11 - 12 = -1$
5	10	10	$10 - 10 = 0$
6	8	8	$8 - 8 = 0$
7	7	6	$7 - 6 = 1$
8	5	4	$5 - 4 = 1$



► The points are evenly dispersed about the horizontal axis. So, the equation $y = -2x + 20$ is a good fit.

Using residuals Practice

The table shows the ages x and salaries y (in thousands of dollars) of eight employees at a company. The equation $y = 0.2x + 38$ models the data. Is the model a good fit?

Age, x	35	37	41	43	45	47	53	55
Salary, y	42	44	47	50	52	51	49	45

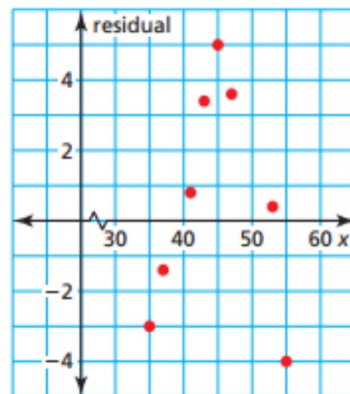
45

SOLUTION

Step 1 Calculate the residuals. Organize your results in a table.

Step 2 Use the points $(x, \text{residual})$ to make a scatter plot.

x	y	y -Value from model	Residual
35	42	45.0	$42 - 45.0 = -3.0$
37	44	45.4	$44 - 45.4 = -1.4$
41	47	46.2	$47 - 46.2 = 0.8$
43	50	46.6	$50 - 46.6 = 3.4$
45	52	47.0	$52 - 47.0 = 5.0$
47	51	47.4	$51 - 47.4 = 3.6$
53	49	48.6	$49 - 48.6 = 0.4$
55	45	49.0	$45 - 49.0 = -4.0$



► The residual points form a \cup -shaped pattern, which suggests the data are not linear. So, the equation $y = 0.2x + 38$ does not model the data well.

Example 3 finding a line of best fit

The table shows the durations x (in minutes) of several eruptions of the geyser Old Faithful and the times y (in minutes) until the next eruption. (a) Use a graphing calculator to find an equation of the line of best fit. Then plot the data and graph the equation in the same viewing window. (b) Identify and interpret the correlation coefficient. (c) Interpret the slope and y -intercept of the line of best fit.

Duration, x	2.0	3.7	4.2	1.9	3.1	2.5	4.4	3.9
Time, y	60	83	84	58	72	62	85	85

Algebra Nation:

Section 10

Topic 4, 5, 6, 7

