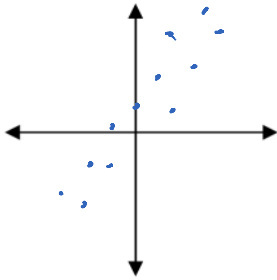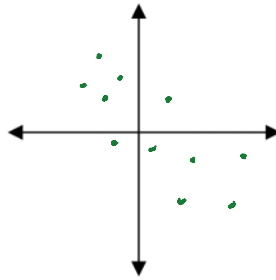*Honors Algebra 1*
5.6 Fit a Line to Data

Name:
Period: Key
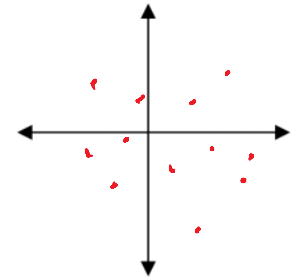
Scatter Plots:

Positive Correlation   Negative Correlation   Relatively No Correlation

Independent and Dependent Variables:

the dependent variable DEPENDS on the independent variable
(y)   (x)

Example 1: The number of minutes spent driving and the miles you have left to your destination.

Correlation = negative correlation

Independent = # of minutes spent driving

Dependent = # of miles

# of miles ↓ ↘ # of min

Example 2: The size of your shoe and your favorite TV show.

Correlation = no correlation

Independent = _____
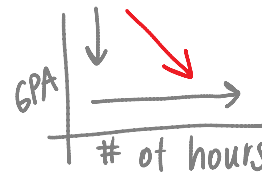
Dependent = _____

Example 3: Your grade point average and the number of hours you spend on Facebook.

Correlation = negative correlation

Independent = # of hours spent on FB (x)

Dependent = GPA (y)

GPA ↓ ↘ # of hours

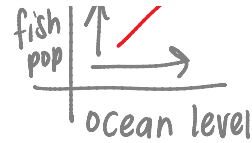**Challenge:** As the Ocean Levels fall the fish population decreases

Correlation = Positive correlation

Independent = ocean level (x)

fish pop ↑ ↗

Independent = _ocean level (x)_

Dependent = _fish population (y)_

fish pop ↑ / → ocean level

Line of Best Fit:

- When data shows a positive or negative correlation, you can model the trend in the data using a _line of best fit_ (linear regression)

- There should be approximately half the points _above_ and half the points _below the line_

Example 5: The table below shows the fat content and calories for various burgers.

x Fat (g)	19	31	34	35	39	39	43
y Calories	410	580	590	570	640	680	660

a) Identify the independent and dependent variables.

Independent: _fat (g)_

Dependent: _Calories_

b) Label your axes and then make a scatter plot.

c) Describe the correlation of the data:

As the number of grams of fat... _increase, the_

Calories also increase

d) Write the equation of the line of best fit.

Slope: (19,410) (43,660)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{660 - 410}{43 - 19} = \frac{250}{24} = 10.42$$

(19,410)

$y - y_1 = m(x - x_1)$

$y - 410 = 10.42(x - 19)$

$y - 410 = 10.42x - 197.98$
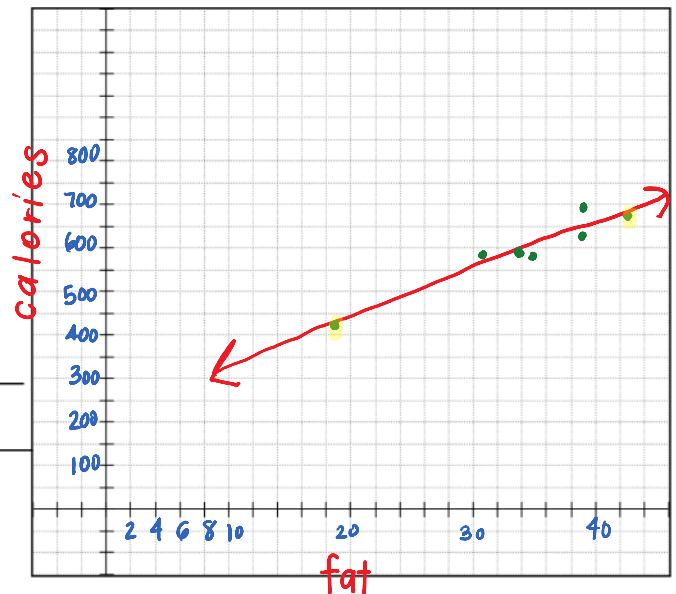 $+410$ $+410$

$y = 10.42x + 212.02$

e) Explain the meaning of the y-intercept.

(0, 212.02)

For 0g of fat, there are

f) Explain the meaning of the slope.

For every 1 g of fat added, there are 10.42cal added

For 0g of fat, there are 210.95 calories in a burger

...there are 10.42cal added

g) A new burger containing 28 grams of fat is being introduced. What would you expect the number of calories to be?

$$y = 10.42(28) + 212.02$$
$$y = 503.78 \text{ calories}$$

Example 6: The table shows the number of hours students spent playing video games and the score they received on their tests.

y

x

Scores on Tests	85	77	75	75	80	65
Hours Spent Playing Video Games	6	7	9	5	8	10

a) Identify the independent and dependent variables.

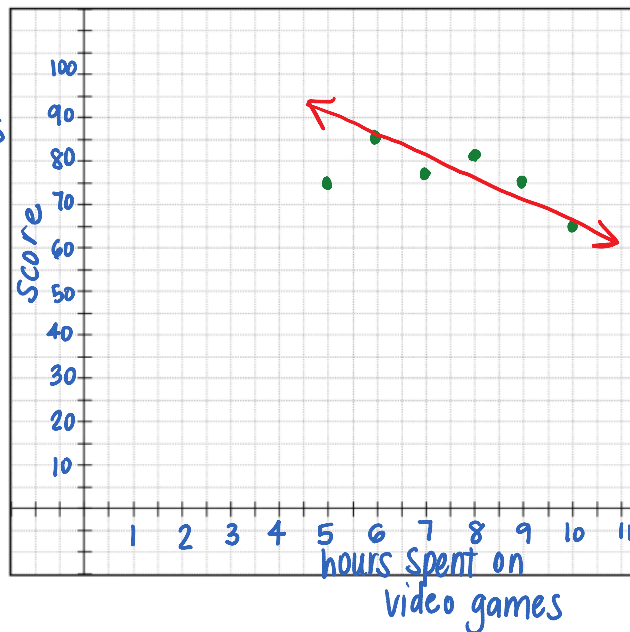Independent: hours spent playing video games

Dependent: scores on test

b) Label your axes and then make a scatter plot.

c) Describe the correlation of the data:

As the number of hours of playing video games... _____

increases, our scores decrease

Score

hours spent on video games

d) Write the equation of the line of best fit.

$$y = -2.2x + 92.67$$

e) Explain the meaning of the y-intercept.

If a student spends 0 hours playing video games, they'll earn a 92.6% :)

f) Explain the meaning of the slope.

a student's score will decrease by 2.2% for every hour they play video games

g) Predict a reasonable test score for playing video games for 12 hours.

$$y = -2.2(12) + 92.67$$

g) Predict a reasonable test score for playing video games for 12 hours.

$$y = -2.2(12) + 92.67$$
$$66.27\%$$

h) If Brian received a 50 on his test, what is a reasonable number of hours he played video games for?

$$50 = -2.2x + 92.67$$
$$-92.67 \qquad -92.67$$
$$\frac{-42.67}{-2.2} = \frac{-2.2x}{-2.2}$$

19.40 hours

Example 7: The table shows results of a study on obesity in America. The data shows the percentage of Americans, aged 18-29 who are classified as obese during the years 2000 – 2010. (Let x = 0 be 2000).

0 = 2000

Year (x)	Percent (y)
1 2001	7.1
3 2003	10.1
7 2007	12.1
9 2009	12.1
10 2010	13.5

a) Identify the independent and dependent variables.

Independent: __year__

Dependent: __percent__

b) Label your axes and then make a scatter plot.
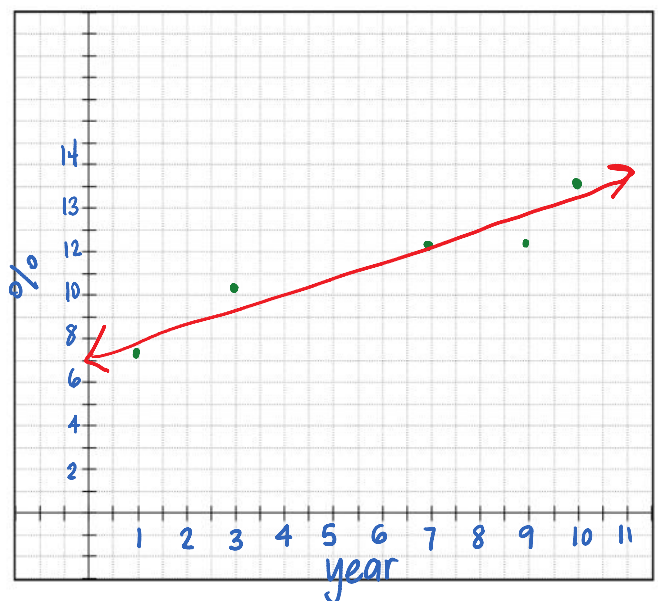
c) Describe the correlation of the data:

as the # of years since 2000 increases, so does the % of obesity

d) Write the equation of the line of best fit.

$$y = 0.61x + 7.32$$

e) Explain the meaning of the y-intercept.

In 2000, 7.32% of

f) Explain the meaning of the slope.

the % of people w/ obesity

e) Explain the meaning of the y-intercept.

In 2000, 7.32% of Americans ages 18-29 were considered obese

f) Explain the meaning of the slope.

the % of people w/ obesity increased by .61% each year after 2000

g) Predict the percentage of 18-29 year olds who will be classified as obese in 2017.

$$y = 0.61(17) + 7.32$$
$$y = 17.69\%$$

$$X = 17$$

$$\begin{array}{r} 2017 \\ -2000 \\ \hline 17 \end{array}$$

h) If the percentage of 18-29 year olds is 22%, what year is it based off of the line of best fit?

$$22 = 0.61X + 7.32$$
$$\underline{-7.32 \qquad -7.32}$$
$$\frac{14.68}{0.61} = \frac{0.61X}{0.61}$$

$$X = 24.06$$

$$\begin{array}{r} 2000 \\ + 24.06 \\ \hline \boxed{2024} \end{array}$$

Example 8: This table shows pizza size (cheese only) compared to the cost for a few different pizza places. [Dominos, Pizza hut, Homemade Pizza Co]

Size(in)	10	12	14	16	10	12	12	14
Cost($)	7.99	9.69	11.69	13.69	8.00	10.00	10.95	12.95

a) Identify the independent and dependent variables.
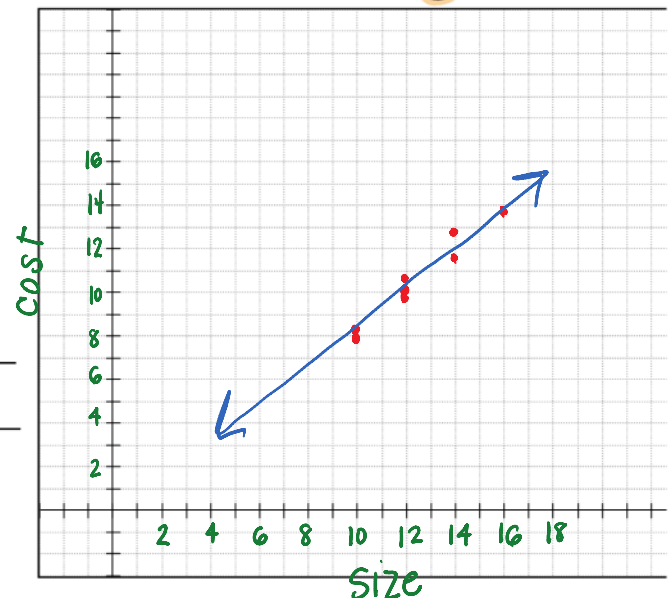
Independent: Size (in)

Dependent: Cost ($)

b) Label your axes and then make a scatter plot.

c) Describe the correlation of the data:

as the size of pizza increases, so does the cost

d) Write the equation of the line of best fit.

$$y = 0.99X - 1.71$$

e) Explain the meaning of the y-intercept.

f) Explain the meaning of the slope.

e) Explain the meaning of the y-intercept.

Cost of a 0-inch pizza
is -$1.71

(means nothing in the
real world)

f) Explain the meaning of the slope.

for every added inch, the
pizza costs 99¢ more

g) If you wanted to buy a 20 in pizza, what would the cost of the pizza be?

$$y = .99(20) - 1.71$$

$18.09

h) If you spent $11.11, what size pizza did you buy?

$$11.11 = .99x - 1.71$$
$$+1.71 \qquad +1.71$$
$$\frac{12.82}{.99} = \frac{.99x}{.99}$$

$$12.95 = x$$

≈ 13 inch pizza

Example 9: Brian threw a rock down from a very high cliff. The speed of the rock and various times are given in this table:

Speed(ft/s)	71	103	135	199
Time(sec)	2	3	4	6

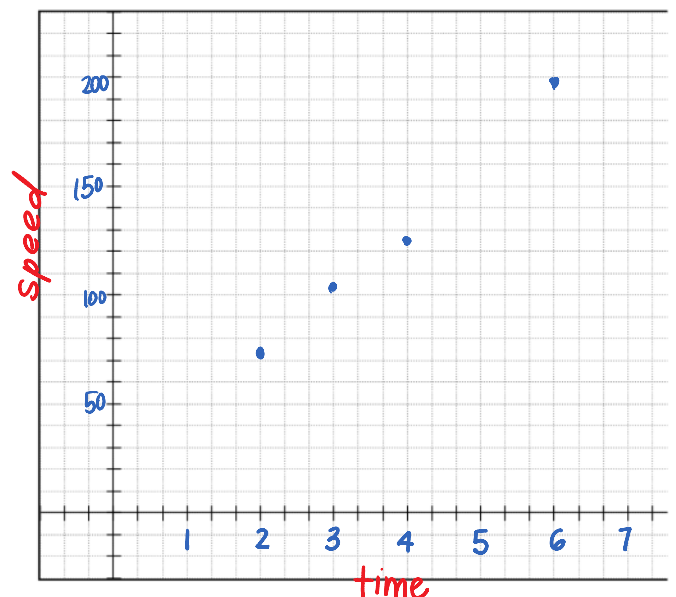a) Identify the independent and dependent variables.

Independent: __time (x)__
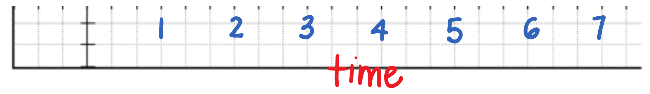
Dependent: __speed (y)__

b) Label your axes and then make a scatter plot.

c) Describe the correlation of the data:

__time ↑, the speed also increases__

d) Write the equation of the line of best fit.

$$\begin{array}{c|ccccccccc} & | & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ \hline & & & & & & & & \end{array}$$

time

e) Explain the meaning of the y-intercept.

f) Explain the meaning of the slope.

g) When was the speed 210 ft/s?

h) How fast was the rock going when it hit the ground at t = 7 seconds?