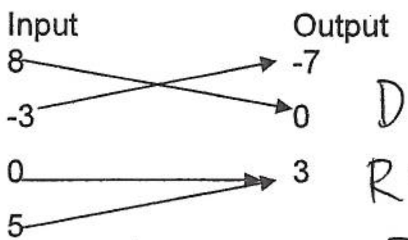
Algebra II **REVIEW 2.1 – 2.4** Name Key

Hour ______________

ECTION 2.1

Identify the domain and range of the given relation. Then tell whether the relation is a function.

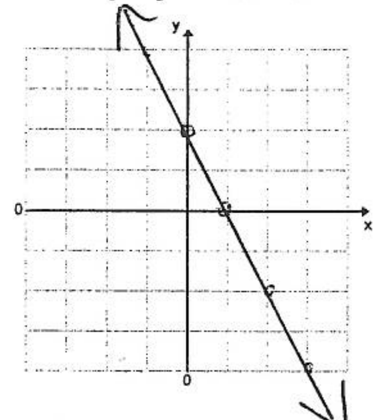


D: -3, 0, 5, 8

R: -7, 0, 3

Function

Graph y = -2x + 2



Tell whether the function $f(x) = -x^2 + 3$ is linear. Then evaluate the function for $x = -2$.

Not linear

-1

$f(-2) = -1$

The average daily income of a physical therapist can be modeled by the function $f(c) = 25c - 18$, where c is the number of daily customers. Assume that no more than 10 customers can be seen in 1 day. Determine a reasonable domain and range for f(c) in this situation.

D: $0 \le c \le 10$

R: $-18 \le f(c) \le 232$

SECTION 2.2

Find the slope of the line passing through the points. Then tell whether the line rises, falls, is horizontal, or is vertical.

(-3, 5), (5, -2)

$\frac{5-(-2)}{-3-5} = \frac{7}{-8} \rightarrow \boxed{-\frac{7}{8} \text{ Falls}}$

(7, 8), (-8, 8)

$\frac{8-8}{7-(-8)} = \frac{0}{15} = \boxed{0}$ $\boxed{\text{horizontal}}$

Tell whether the lines are parallel, perpendicular, or neither.

Line 1: through (5, -1) & (6, -2)
Line 2: through (-2, 3) & (4, 8)

$\boxed{\text{neither}}$

$\boxed{1}$ $\frac{-1+(+2)}{5-6} = \frac{1}{-1} = -1$

$\boxed{2}$ $\frac{8-3}{4-(-2)} = \frac{5}{6}$

Line 1: through (-9, 3) & (0, 4)
Line 2: through (3, -4) & (2, 5)

$\boxed{\text{perpendicular}}$

$\boxed{1}$ $\frac{4-3}{0-(-9)} = \frac{1}{9}$

$\boxed{2}$ $\frac{5-(-4)}{2-3} = \frac{9}{-1} = -9$

A handicap ramp has a run of 24 feet and a rise of 2 feet. What is the slope of the ramp? $\frac{1}{12}$

SECTION 2.3

Compare the graph of y = x + 2 with the graph of y = x.

Both has slope of 1, first graph has y-int of 2 while other y-int is 0.

Graph. **Look at other graphs in your notes!**

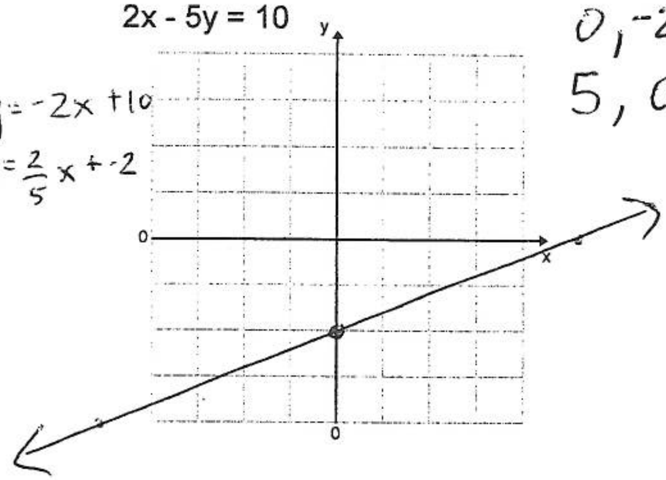
$2x - 5y = 10$

$5y = -2x + 10$

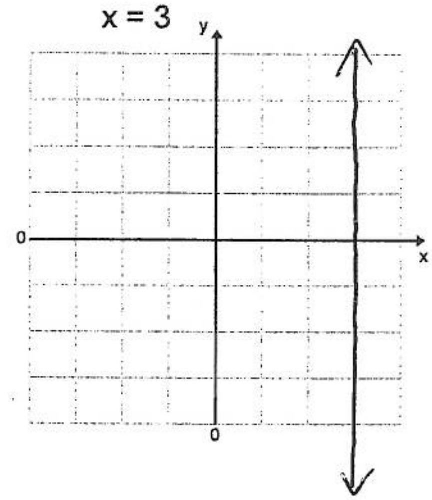
$y = \frac{2}{5}x + -2$

0, -2

5, 0



$x = 3$



SECTION 2.4

Write an equation of the line that satisfies the given conditions.

Passes through (3, 0) & (-5, 2)

$m = \frac{2-0}{-5-3} = \frac{2}{-8} = \frac{-1}{4}$

$0 = -\frac{1}{4}(3) + B$

$0 = \frac{-3}{4} + B$

$\frac{3}{4} = B$

$\boxed{y = \frac{-1}{4}x + \frac{3}{4}}$

Passes through (0, 9) and is perpendicular to

$y = -\frac{2}{3}x - 1$

$\perp m = \frac{3}{2}$

0, 9

$\boxed{y = \frac{3}{2}x + 9}$

m = 4, passes through (1, -8)

$-8 = 4(1) + B$

$-8 = 4 + B$

$-12 = B$

$\boxed{y = 4x - 12}$

Passes through (-2, 3) and is parallel to

$y = \frac{1}{4}x - 6$

$// m = \frac{1}{4}$

-2, 3

$3 = \frac{1}{4}(-2) + B$

$3 = -\frac{1}{2} + B$

$3.5 = B$

$\boxed{y = \frac{1}{4}x + \frac{7}{2}}$

Your jazz band can spend $1500 to sew members' names and instruments on their jackets. The sewing cost is $12 per instrument and $5 per letter. Write an equation that models this situation.

x = per instrument

y = per letter

$\boxed{12x + 5y = 1500}$

Name Key   Date ________

LESSON 2.5

Study Guide

For use with pages 107–111

GOAL **Write and graph direct variation equations.**

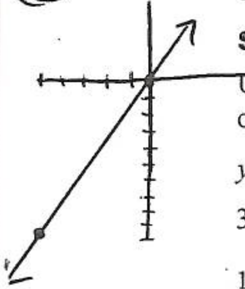
Vocabulary

The equation $y = ax$ represents **direct variation** between x and y, and y is said to vary directly with x.

The nonzero constant a in the direct variation equation $y = ax$ is called the **constant of variation.**

EXAMPLE 1 **Write and graph a direct variation equation**

1

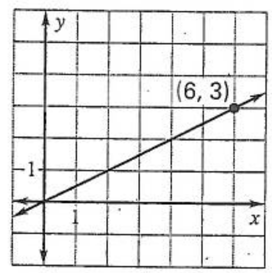


Write and graph a direct variation equation that has (6, 3) as a solution.

Solution

Use the given values of x and y to find the constant of variation.

$y = ax$	Write direct variation equation.
$3 = a(6)$	Substitute 3 for y and 6 for x.
$\frac{1}{2} = a$	Solve for a.



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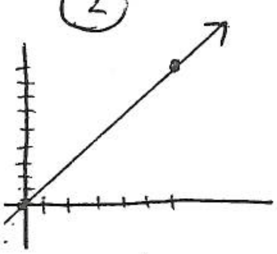


The direct variation equation is $y = \frac{1}{2}x$. Its graph is shown above.

Exercises for Example 1

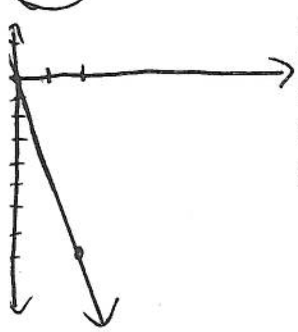
Write and graph a direct variation equation that has the given ordered pair as a solution.

1. $(-5, -10)$ $\boxed{y = 2x}$
$-10 = a \cdot -5$
$2 = a$

2. $(6, 9)$ $\boxed{y = \frac{3}{2}x}$
$9 = a \cdot 6$
$3/2 = a$

3. $(2, -8)$ $\boxed{y = -4x}$
$-8 = a \cdot 2$
$-4 = a$

3



EXAMPLE 2 **Write and apply a model for direct variation**

An employee's paycheck varies directly with the number of hours worked. An employee who is paid *a* dollars per hour works $x = 30$ hours and earns $y = \$240$. (a) Write an equation that relates *x* and *y*. (b) How much would the employee earn if he worked 35 hours?

Solution

a. Use the given information to find the constant of variation, a.

$y = ax$	Write direct variation equation.
$240 = a(30)$	Substitute 240 for y and 30 for x.
$8 = a$	Solve for a.

An equation that relates x and y is $y = 8x$.

b. If the employee worked 35 hours, he would earn $y = 8(35) = 280$ dollars.

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Name Key Date

LESSON 2.5

Study Guide *continued*

For use with pages 107–111

Exercises for Example 2

$d = rt$

The distance d (y) a vehicle travels varies directly with time traveled t (x). The rate of speed r (a) is the constant of variation.

4. Write a direct variation equation that relates d, r, and t. $d = r \cdot t$

5. Use the equation from Exercise 4 to find d when $r = 55$ mi/h and $t = 10$ hours. $55 \cdot 10$ $\boxed{550\ \text{m}}$

6. Use the equation from Exercise 4 to find t when $r = 60$ mi/h and $d = 90$ miles.

$90 = 60 \cdot t$

$\frac{3}{2} = t$ $\boxed{1.5 \text{ hours}}$

EXAMPLE 3 Use ratios to identify direct variation

The width and length of each photo is given. Tell whether width and length show direct variation. If so, write an equation that relates the quantities.

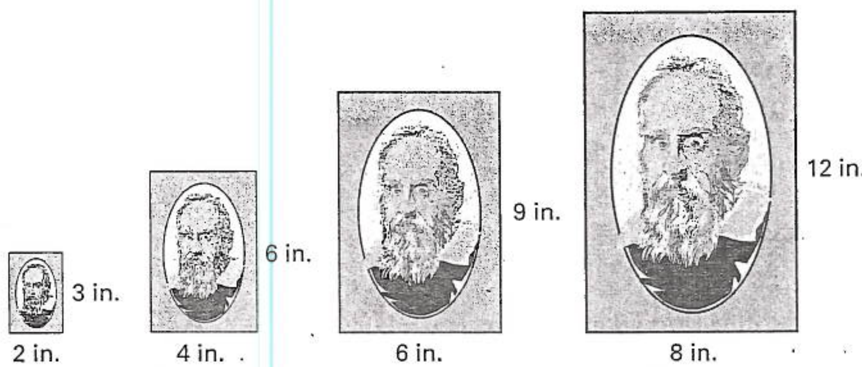

Photo 1 Photo 2 Photo 3 Photo 4

Solution

Find the ratio of the width to the length for each photo.

Photo 1 $\frac{y}{x}$ $\frac{\text{width}}{\text{length}} = \frac{2}{3}$ ← a

Photo 2 $\frac{\text{width}}{\text{length}} = \frac{4}{6} = \frac{2}{3}$

Photo 3 $\frac{\text{width}}{\text{length}} = \frac{6}{9} = \frac{2}{3}$

Photo 4 $\frac{\text{width}}{\text{length}} = \frac{8}{12} = \frac{2}{3}$

Because the ratios are equal, the data show direct variation. An equation relating width and length is $\frac{w}{\ell} = \frac{2}{3}$, or $3w = 2\ell$. or $y = ax$

$w = \frac{2}{3}\ell$

Exercises for Example 3

Tell whether the data in the table show direct variation. If so, write an equation relating x and y.

7.

x	2	4	6	8
y	1	2	3	4

$\frac{y}{x}$: $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

$\boxed{y = \frac{1}{2}x}$

8.

x	1	2	3	4
y	1	4	9	16

$\frac{1}{1}$ $\frac{4}{2}$

$\boxed{\text{NO}}$

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Name Key Date

LESSON 2.6
Study Guide
For use with pages 112–120

GOAL **Fit lines to data in scatter plots.**

Vocabulary

A **scatter plot** is a graph of a set of data pairs (x, y).

If y tends to increase as x increases, then the data have a **positive correlation.**

If y tends to decrease as x increases, then the data have a **negative correlation.**

A **correlation coefficient,** denoted by r, is a number from -1 to 1 that measures how well a line fits a set of data pairs (x, y).

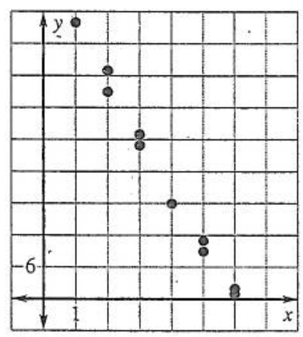
The **best-fitting line** is the line that lies as close as possible to all the data points.

EXAMPLE 1
Describe and estimate correlation coefficients

Describe the data as having a *positive correlation*, a *negative correlation*, or *approximately no correlation*. Tell whether the correlation coefficient for the data is closest to -1, -0.5, 0, 0.5, or 1.

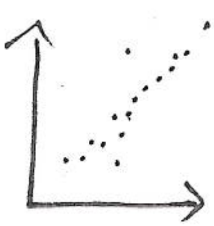
Solution

The scatter plot shows a strong negative correlation. So the best estimate given is $r = -1$.

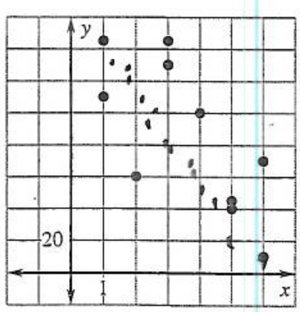


Exercises for Example 1

For each scatter plot, (a) tell whether the data have a *positive correlation*, a *negative correlation*, or *approximately no correlation*, and (b) tell whether the correlation is closest to -1, -0.5, 0, 0.5, or 1.



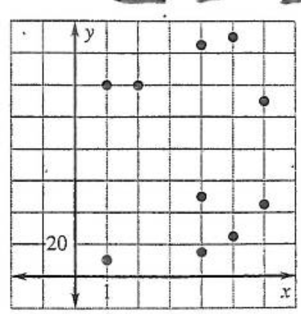
1.



negative correlation

-0.5

2.



approximately no correlation

0

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Name Key Date

LESSON 2.6

Study Guide *continued*

For use with pages 112–120

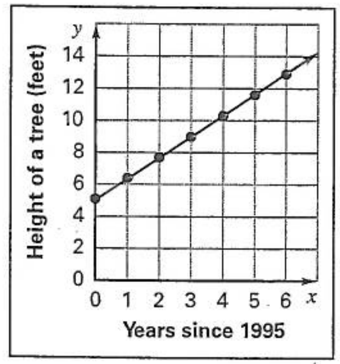
EXAMPLE 2 Approximate a best-fitting line

The ordered pairs (x, y) give the height y in feet of a young tree x years after 1995. Approximate the best-fitting line for the data.

(0, 5.1), (1, 6.4), (2, 7.7), (3, 9), (4, 10.3), (5, 11.6), (6, 12.9)

STEP 1 **Draw** a scatter plot of the data.

STEP 2 **Sketch** the line that appears to best fit the data. One possibility is shown.



STEP 3 **Choose** two points on the line. For the line shown, you can choose (0, 5), which is not an original data point, and (5, 11.6) which is an original data point.

STEP 4 **Write** an equation of the line. Find the slope using the points (0, 5) and (5, 11.6).

$$m = \frac{11.6 - 5}{5 - 0} = \frac{6.6}{5} = 1.32$$

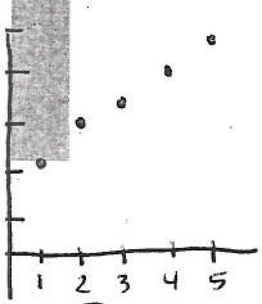
Use point-slope form to write the equation.

$y - y_1 = m(x - x_1)$	Point-slope form
$y - 5 = 1.32(x - 0)$	Substitute for m, x_1, and y_1.
$y = 1.32x + 5$	Simplify.

An approximation of the best-fitting line is $y = 1.32x + 5$.

3

EXAMPLE 3 Use a line of fit to make predictions



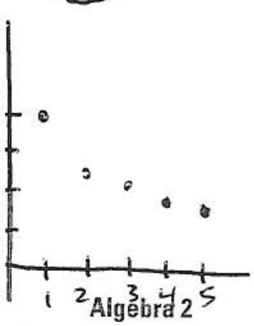
Use the equation of the line of fit from Example 2 to predict the height of the tree in feet in 2005.

Because 2005 is 10 years after 1995, substitute 10 for x in the equation $y = 1.32x + 5$.

$y = 1.32(10) + 5 = 13.2 + 5 = 18.2$

You can predict the height of the tree to be 18.2 feet in 2005.

4



Exercises for Examples 2 and 3

Given the following data, (a) draw a scatter plot of the data, (b) approximate the best-fitting line, (c) estimate y when $x = 6$.

3

x	1	2	3	4	5
y	22	30	33	39	45

B $y = 5.5x + 17.3$

4

x	1	2	3	4	5
y	20	13	11	8	7

B $y = -3.1x + 21.1$

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