Lesson 3.1 • Linear Equations and Arithmetic Sequences

Name _____ Period _____ Date _____

1. Find an explicit formula for each recursively defined arithmetic sequence.

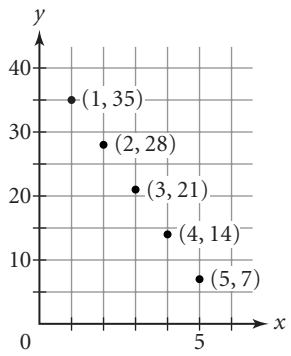
a. $u_0 = 5$
$u_n = u_{n-1} + 8$ where $n \geq 1$

b. $u_0 = 4.5$
$u_n = u_{n-1} + 3.2$ where $n \geq 1$

c. $u_0 = 18.25$
$u_n = u_{n-1} - 4.75$ where $n \geq 1$

d. $u_0 = 0$
$u_n = u_{n-1} + 100$ where $n \geq 1$

2. Refer to the graph of the sequence.



a. Write a recursive formula for the sequence. What is the common difference? What is the value of u_0?

b. What is the slope of the line through the points? What is the y-intercept?

c. Write the equation of the line that contains these points.

3. For each sequence, find n so that u_n has the specified value.

a. $u_n = 4 + 5n$
$u_n = 79$

b. $u_0 = 88$
$u_n = u_{n-1} - 7.5$ where $n \geq 1$
$u_n = -84.5$

4. Find the slope of each line.

a. $y = 5 + 3x$

b. $y = 10 - x$

c. $y = 0.6x - 0.8$

d. $y = \frac{2}{5} - \frac{4}{5}x$

e. $y = 12.5$

f. $y = 7 + x$

5. Write an equation in the form $y = a + bx$ for each line.

a. The line that passes through the points of an arithmetic sequence with $u_0 = 11$ and a common difference of 9

b. The line that passes through the points of an arithmetic sequence with $u_0 = -7.5$ and a common difference of -12.5

Lesson 3.2 • Revisiting Slope

Name _____ Period _____ Date _____

1. Find the slope of the line containing each pair of points.

a. (2, 6) and (4, 12)

b. (−5, 2) and (2, −5)

c. (0, 7) and (5, 0)

d. $\left(\frac{1}{3}, \frac{2}{3}\right)$ and $\left(\frac{5}{6}, -\frac{1}{6}\right)$

e. (8, 12) and (−3, 12)

f. (−9, 8) and (−9, −8)

2. Find the slope of each line.

a. $y = 4x - 5$

b. $y = 1.6 - 2.5x$

c. $7x - 6y = 42$

d. $3x + 5y = 15$

e. $y = -4(x - 7) + 12$

f. $y = 14.5 - 0.3(x - 30)$

3. Solve.

a. $y = 6 - 2x$ for y if $x = -4$.

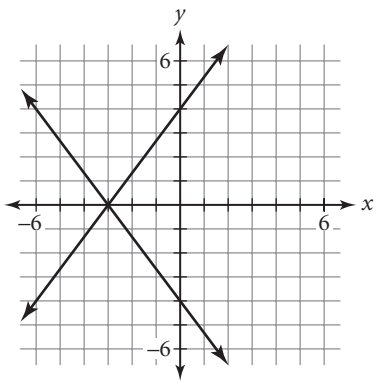
b. $y = 32 + 5x$ for x if $y = 8$.

c. $y = a - 0.4x$ for a if $x = 600$ and $y = 150$.

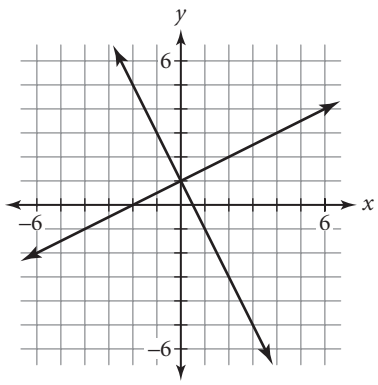
d. $y = 375 + bx$ for b if $x = 20$ and $y = 500$.

4. Find the equations of both lines in each graph.

a.



b.



5. Consider the equations and graphs of Exercise 4.

a. What do the equations in 4a have in common? What do you notice about their graphs?

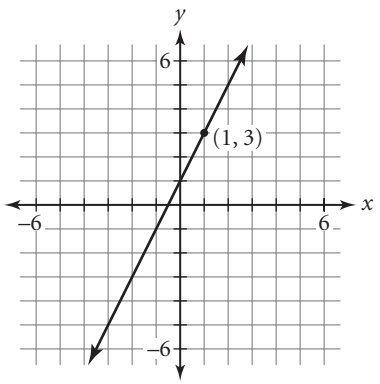
b. What do the equations in 4b have in common? What do you notice about their graphs?

Lesson 3.3 • Fitting a Line to Data

Name _____ Period _____ Date _____

1. Write an equation in point-slope form for each line.

a.



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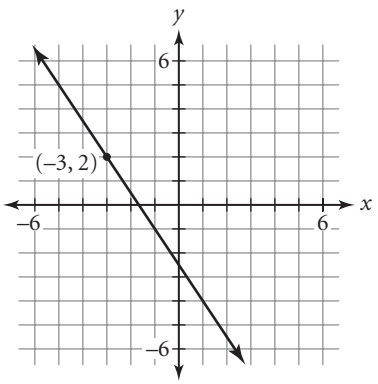


2. Write an equation in point-slope form for each line.

a. Slope -3 and passing through $(2, 5)$

b. Slope 0.75 and passing through $(-4, 10)$

c. Parallel to $y = 5 + 3x$ and passing through $(-4, 2)$

d. Parallel to $y = 7 - 4x$ and passing through $(2, -5)$

3. Solve.

a. $u_n = 8 + 6(n - 2)$ for u_n if $n = 10$.

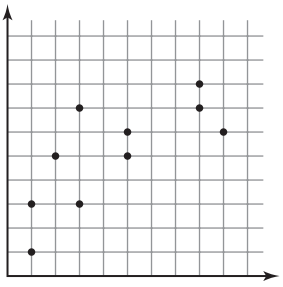
b. $d = 9 - 4(t + 5)$ for d if $t = 20$.

c. $y = 500 - 20(x - 5)$ for x if $y = 240$.

d. $u_n = -3.5 + 0.4(n - 12)$ for n if $u_n = 2.9$.

4. For each graph, use your ruler to draw a line of fit. Explain how your line satisfies the guidelines on page 128 of your book.

a.



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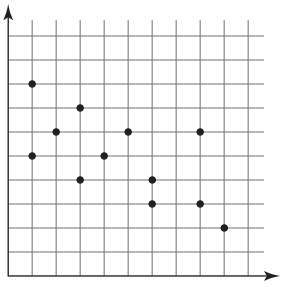

Lesson 3.4 • The Median-Median Line

Name _____ Period _____ Date _____

1. How should you divide the following sets into three groups for the median-median line?

a. Set of 33 elements

b. Set of 44 elements

c. Set of 64 elements

d. Set of 57 elements

2. Find the point with coordinates (*median x, median y*) for each group of points.

a. (3, 4), (5, 8), (11, 9), (13, 10)

b. (0, 3), (2, 6), (3, 4), (5, 1), (7, 5)

c. (14, 20), (11, 11), (17, 13), (15, 19), (16, 22), (20, 18)

d. (2.5, 5.0), (4.1, 3.8), (1.6, 7.5), (5.9, 2.6)

3. Find an equation in point-slope form for the line passing through each pair of points.

a. (5, 8) and (8, 2)

b. $(-1, 6)$ and $(9, -4)$

c. $(20, -14)$ and $(-30, 16)$

d. $(44.2, -22.8)$ and $(25.2, 34.2)$

4. Find an equation for each line described. Write your answer in the same form as the given line or lines.

a. Line one-third of the way from $y = 2x + 6$ to $y = 2x + 15$

b. Line one-third of the way from $y = 5 - x$ to $y = 11 - x$

c. Line one-third of the way from $y = 16.4 + 3.8x$ to the point (9, 50)

d. Line one-third of the way from $y = 0.8x + 12.6$ to the point (9, 48)

Lesson 3.5 • Residuals

Name _____ Period _____ Date _____

1. Determine whether the given point lies above or below the given line.

a. $y = 4x + 5$; (1, 8)

b. $y = -2x + 6$; (3, 1)

c. $y = 3.6x - 18.8$; (10, 16.9)

d. $y = -0.1x + 4.4$; (5, 4.2)

2. Each of the equations below represents the median-median line for a set of data. The table gives the x-value and the residual for each data point. Find the y-value for each data point.

a. $\hat{y} = 4x - 5$

***x*-value**	0	1	3	10
Residual	1	−1	2	−3

b. $\hat{y} = 3.2x + 6.7$

***x*-value**	3	5	10	22
Residual	−1.3	2.3	0.3	−3.1

3. This table gives the number of students enrolled in U.S. public schools for various years.

School year	Public school enrollment
1909–10	17,814
1919–20	21,578
1929–30	25,678
1939–40	25,434
1949–50	25,111
1959–60	35,182
1969–70	45,550
1979–80	41,651
1989–90	40,543
1999–2000	46,812

(*The World Almanac and Book of Facts 2001*)

a. Find the median-median line for the data. Round all answers to one decimal place. Does the y-intercept make sense for the data?

b. Calculate the residuals.

c. Calculate the root mean square error for the median-median line.

d. What is the real-world meaning of the root mean square error?

e. The *World Almanac* predicts that the public school enrollment in the 2009–10 school year will be 47,109 students. Use your median-median line to predict enrollment in 2009–10 and calculate the residual of the *Almanac*'s prediction.

4. Each list of numbers below represents the residuals for a data set. Find the root mean square error for each set of residuals. (Round your answers to the nearest hundredth.)

a. 3, −2, 1, 0, −3, −2, 4

b. 5, −3, −4, 6, 1, 2, −2

Lesson 3.6 • Linear Systems

Name _____ Period _____ Date _____

1. Identify the point of intersection listed below each system of linear equations that is the solution of that system.

a. $\begin{cases} 2x + 5y = 10 \\ x - 3y = -6 \end{cases}$

(5, 0); (0, 2); (3, 1)

b. $\begin{cases} 4x + 3y = 4 \\ 3x - 2y = -14 \end{cases}$

$(-2, 4); \left(0, \frac{4}{3}\right); (0, 7)$

c. $\begin{cases} 6x - 5y = 0 \\ x - y = -1 \end{cases}$

(0, 0); (−5, −6); (5, 6)

2. Write a system of linear equations that has each ordered pair as its solution.

a. (5, 4) **b.** (−3, 8) **c.** (3, 10.5)

3. Write an equation for each line described.

a. Perpendicular to $y = 2x - 3$ and passing through the point (5, −4)

b. Perpendicular to $y = 1.5 + 0.25x$ and passing through the point (5, −2)

4. Solve.

a. $8 - 3(x - 2) = 5 + 6x$ **b.** $120 - 5.5(x - 45) = 75 - x$

c. $3.8t - 16.2 = 12 + 2.8(t + 3)$ **d.** $7.5 - 0.8t = 18.5 + 3.2(t - 4)$

5. Use substitution to find the point (x, y) where each pair of lines intersect. Use a graph or table to verify your answer.

a. $\begin{cases} y = 3 - 2x \\ y = 5 + 2x \end{cases}$ **b.** $\begin{cases} y = -2.5x + 8 \\ y = 1.5x - 4 \end{cases}$ **c.** $\begin{cases} y = 0.45x - 2 \\ y = -0.45x + 2 \end{cases}$

d. $\begin{cases} y = 9 + 4(x - 3) \\ y = 15 - 2x \end{cases}$ **e.** $\begin{cases} y = -2x + 7.5 \\ y = 3x - 15 \end{cases}$ **f.** $\begin{cases} y = 4.8 - 2(x + 3.1) \\ y = 13.6 + 3x \end{cases}$

Lesson 3.7 • Substitution and Elimination

Name _____ Period _____ Date _____

1. Solve for the given variable.

a. $r - s = 20$, for s

b. $2w + z = 8$, for w

c. $3x + 4y = 12$, for y

d. $5x - 8y = -10$, for x

e. $0.2m - 0.5n = 1$, for n

f. $250x + 400y = -50$, for y

2. Find a multiplier for the first equation so that the sum of the resulting new equation and the second original equation will eliminate y. (Do not solve the system.)

a. $\begin{cases} 4x - 5y = 2 \\ x + 10y = -2 \end{cases}$

b. $\begin{cases} 5.5x + 2.5y = 4 \\ 2.0x + 7.5y = -1 \end{cases}$

c. $\begin{cases} 1.6x - 3.2y = 0 \\ 5x + 16y = 8 \end{cases}$

3. Graph each system and find an approximate solution. Then choose a method and find the exact solution. List each solution as an ordered pair.

a. $\begin{cases} x + y = 1 \\ 2x - 2y = 1 \end{cases}$

b. $\begin{cases} 3x - 2y = 6 \\ -2x + 3y = 0 \end{cases}$

c. $\begin{cases} 5x + 4y = 16 \\ 4x - 3y = 12 \end{cases}$

4. Solve each system of equations.

a. $\begin{cases} 3x - 4y = 8 \\ y = x - 1 \end{cases}$

b. $\begin{cases} 2x + 3y = 0 \\ 3x + 2y = -10 \end{cases}$

c. $\begin{cases} 5x - 8y = 8 \\ -10x + 4y = -7 \end{cases}$

d. $\begin{cases} 0.5x + 1.5y = 5 \\ x + y = -10 \end{cases}$

e. $\begin{cases} -4x + 15y = 8 \\ 6x - 5y = -5 \end{cases}$

f. $\begin{cases} 5x - 9y = 8.5 \\ 3x + 7y = -1.1 \end{cases}$

g. $\begin{cases} 0.3x + 0.8y = 3.6 \\ 0.7x + 0.3y = -5.7 \end{cases}$

h. $\begin{cases} 0.9x - 0.4y = 21 \\ 0.2x + 0.6y = -16 \end{cases}$

i. $\begin{cases} 0.6x + 0.5y = 6.4 \\ 1.4x - 0.7y = -44.8 \end{cases}$