

## Chapter 1 Parent Guide

### Data and Linear Representations

**Algebra 2 will prepare your child for college level mathematics courses.** Equations will be more complex and the concepts will be more abstract. After this course, your child will be ready to study any entry level college mathematics course, including physics and calculus.

First degree functions will be studied in the first four chapters. Quadratic, logarithmic, polynomial, rational, and radical functions will be studied in chapters five through nine. Chapter 10 focuses on probability, Chapter 11 focuses on series and patterns, Chapter 12 focuses on statistics, and Chapters 13 and 14 focus on trigonometry. Though your child has studied each of these topics in Algebra 1, this course will include more detail and present more complex problems for the student to solve.

Most students who attain this level have already developed good homework and study habits. Students who do not do homework and study mathematics regularly will undoubtedly have trouble keeping up with their classmates in this course.

Here is where students will gain speed in solving problems and learn to store vast amounts of information in their memory. Homework will facilitate memory skills. Also, students with parents who take an interest in their mathematical studies tend to achieve more success in mathematics.

Chapter 1 begins with a refresher of linear equations. Lesson 1.1 summarizes tables and graphs of linear equations. Lesson 1.2 discusses slopes and intercepts. Lesson 1.3 focuses on linear equations in two variables. Lesson 1.4 is on direct variation and proportion. Lesson 1.5 shows scatter plots and fits a line to the data. In Lesson 1.6, students will write and solve equations in one variable. Lesson 1.7 involves solving inequalities. Lesson 1.8 reviews solving absolute-value equations and inequalities.

The following brief activity will enable you to do that as well as keep you informed as to what your child is learning. Read the following questions with your son or daughter, asking for clarification when appropriate. You will need a straightedge for this activity.

### PROBLEM FOR DISCUSSION (See textbook page 37)

The data on page 37 showing the number of reported cases of chicken pox in thousands in the United States is displayed in a table and in a scatter plot. The variable  $x$  represents the number of years after 1988 ( $x = 0$  represents 1988) and  $y$  represents the number of cases in thousands.

1. Discuss the advantages and disadvantages of each kind of display.

The data in the table shows the specific number of chicken pox cases in each year.

The scatter plot of the data shows how the number of cases relate to each other. You can see if the number of cases increased or decreased from 1989 to 1994.

2. Discuss which display shows a trend in the data. Discuss what that trend is.

The scatter plot shows a trend. The trend is that the number of cases of chicken pox decreased from 1989 to 1994.

3. Place the edge of a straightedge over the scatter plot in such a way that it represents the data as accurately as possible. Discuss why this representation does not necessarily go through every data point.

The straightedge does not go through every point because the data does not represent a perfect linear relationship. The line is only a mathematical model that can help determine or estimate how many cases of chicken pox there will be in 1995, 1996, etc.

4. If you were to write an equation for the line represented by the straightedge in Exercise 3, would it have a positive or negative slope?

A positive slope represents a line that is going up from left to right. A negative slope represents a line that is going down from left to right. Since the number of cases is decreasing as the number of years increase, this equation would have a negative slope.

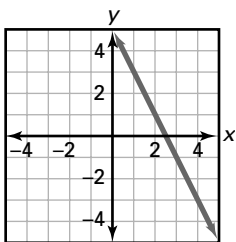
5. What have you learned about scatter plots from this activity?

Scatter plots show trends of the data and that those trends can be modeled mathematically by lines of best fit.

The following are complete worked out solutions to selected exercises in the student textbook. These solutions are provided to you so that you can help your child with their homework. Your child's classroom notes, example problems in the text, and these worked out solutions are all useful tools to help you and your child work through their assignment.

### Lesson 1.1

23.



34. This is not a linear relationship because the difference in consecutive  $x$ -values is  $-1$  and the difference in consecutive  $y$ -values is not constant.

40.

$x$	$y$
0	8
2	7
4	6
6	5
8	4

This is a linear relationship because the difference in consecutive  $x$ -values is 2, and the difference in consecutive  $y$ -values is  $-1$ .

49. a.

$x$	$y$
0	6
1	9
2	12
3	15

b. Using the equation  $y = 3x + 6$ , substitute 15 for  $x$ .  
 $y = 3(15) + 6$   
 $y = 45 + 6$   
 $y = 51$

c. Using the equation  $y = 3x + 6$ , substitute 27 for  $y$ .  
 $27 = 3x + 6$   
 $21 = 3x$   
 $x = 7$

d. The answers to parts b and c could also be found by continuing the table and graph until the desired ordered pairs are found.

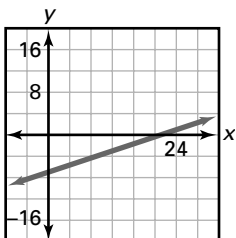
The total revenue is \$51.      7 videos were rented.

### Lesson 1.2

13.  $y = -3$

21.  $m = \frac{5 - (-2)}{4 - 3} = \frac{7}{1} = 7$

29.  $y = \frac{1}{3}x - 7$   
 $m = \frac{1}{3}, b = -7$



## Chapter 1

- 38.** The line crosses the  $y$ -axis at  $(0, 4)$ , therefore the  $y$ -intercept is 4.

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

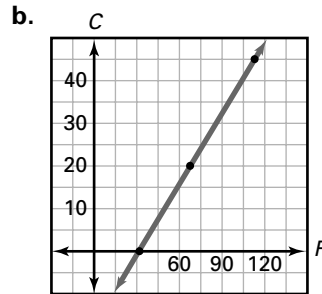
The equation is  $y = -\frac{1}{2}x + 4$ .

- 67. a.** Answers may vary.

Sample answers:

$$113^\circ\text{F} = 45^\circ\text{C}$$

$$32^\circ\text{F} = 0^\circ\text{C}$$



**c.**  $m = \frac{0 - 45}{32 - 113} = \frac{-45}{-81} = \frac{5}{9}$

To find the  $y$ -intercept, use

$$m = \frac{y_2 - y_1}{x_2 - x_1} \text{ with the point } (32, 0) \text{ and } m = \frac{5}{9}:$$

$$\frac{5}{9} = \frac{y - 0}{x - 32}$$

$$\frac{5}{9}(x - 32) = y - 0$$

$$y = \frac{5}{9}x - \frac{160}{9}$$

$$b = -\frac{160}{9}$$

**d.**  $C = \frac{5}{9}F - \frac{160}{9}$

## Lesson 1.3

**18.**  $m = \frac{\frac{1}{2} - 7}{-4 - (-\frac{1}{2})} = \frac{-\frac{13}{2}}{-\frac{7}{2}} = \frac{13}{7}$

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

$$y - \frac{1}{2} = \frac{13}{7}(x - (-4))$$

$$y - \frac{1}{2} = \frac{13}{7}x + \frac{52}{7}$$

$$y = \frac{13}{7}x + \frac{111}{14}$$

**28.**  $y - y_1 = m(x - x_1)$

$$y - (-3) = 4(x - 9)$$

$$y + 3 = 4x - 36$$

$$y = 4x - 39$$

**36.**  $m = 4$

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

$$y - (-3) = 4(x - 5)$$

$$y + 3 = 4x - 20$$

$$y = 4x - 23$$

## Chapter 1

48.  $m = \frac{1}{3}$

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

$$y - (-1) = \frac{1}{3}(x - 3)$$

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

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

57.  $l_2$  is not perpendicular to  $l_4$ .

63. a.  $m = \frac{90 - 60}{80 - 40} = \frac{3}{4}$

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

$$y - 60 = \frac{3}{4}(x - 40)$$

$$y = \frac{3}{4}x + 30$$

b.  $y = \frac{3}{4}(45) + 30$

$$y = 63.75$$

A score of 45 will become a 64.

c.  $84 = \frac{3}{4}(x) + 30$

$$54 = \frac{3}{4}x$$

$$x = 72$$

A score of 84 was originally a 72.

### Lesson 1.4

20.  $y = kx$

$$-2 = k(9)$$

$$k = -\frac{2}{9}$$

$$y = -\frac{2}{9}x$$

30.  $p = kq$

34.  $a = kb$

$$-5 = k(2.5)$$

$$k = -2$$

$$\text{So } a = -2b.$$

$$\text{when } a = 6:$$

$$6 = -2b$$

$$b = -3$$

46.  $\frac{x-1}{56} = \frac{x}{64}$

$$64(x-1) = 56x$$

$$64x - 64 = 56x$$

$$8x = 64$$

$$x = 8$$

67.  $V = IR$

$$110 = I(11)$$

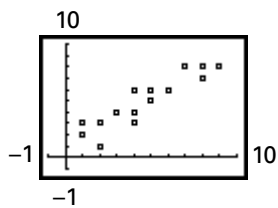
$$I = 10$$

The current is 10 amperes.

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## Lesson 1.5

13.



There is a fairly strong positive correlation.  
 $y \approx 0.8x + 1.36$

18.  $r \approx -0.84$

22. a.  $y \approx -0.6x + 23.7$

c.  $y \approx -0.6(27) + 23.7$   
 $y \approx 7.5$   
about 8 CDs

b.  $r \approx -0.8$

This value indicates there is a fairly strong negative correlation.

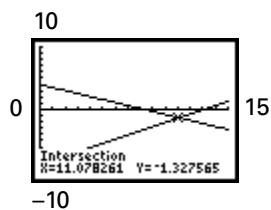
d.  $15 \approx -0.6x + 23.7$   
 $-8.7 \approx -0.6x$   
 $x \approx 14.5$   
14 or 15 years old

## Lesson 1.6

13.  $-2x - 7 = 9$   
 $-2x = 16$   
 $x = -8$

22.  $5x + 15 = 2x$   
 $3x + 15 = 0$   
 $3x = -15$   
 $x = -5$

45.



$x \approx 11.08$

## Chapter 1

49. 
$$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2}$$

$$(R \cdot r_1 \cdot r_2) \left( \frac{1}{R} \right) = (R \cdot r_1 \cdot r_2) \left( \frac{1}{r_1} + \frac{1}{r_2} \right)$$

$$r_1 r_2 = R r_2 + R r_1$$

$$r_1 r_2 - R r_2 = R r_1$$

$$r_2 (r_1 - R) = R r_1$$

$$r_2 = \frac{R r_1}{r_1 - R}, \text{ or } -\frac{r_1 R}{R - r_1}$$

68. a. Let  $m$  = number of months.  
 $40m = 800$   
 $m = 20$   
 20 months

b. Let  $m$  = number of months.  
 $20m = 500$   
 $m = 25$   
 25 months

c.  $800 - 40m = 500 - 20m$   
 $-20m = -300$   
 $m = 15$

After 15 months the balances will be equal.

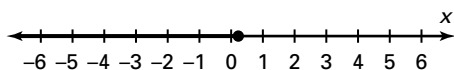
balance =  $800 - 40(15) = \$200$

## Lesson 1.7

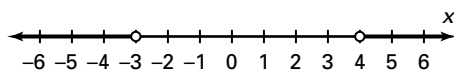
17.  $x \geq 2$

25.  $-35x > -70$   
 $x < 2$

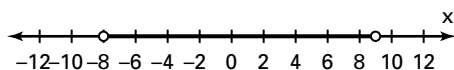
41.  $6 - (4x - 3) \geq 8$   
 $-(4x - 3) \geq 2$   
 $4x - 3 \leq -2$   
 $4x \leq 1$   
 $x \leq \frac{1}{4}$



55.  $x + 8 < 5$  or  $x - 1 > 3$   
 $x < -3$  or  $x > 4$



62.  $-9x > -81$  and  $2(x + 6) > -4$   
 $x < 9$  and  $x + 6 > -2$   
 $x > -8$



74. Let  $t$  = total calories.  
 $324 < 0.20t$   
 $t > 1620$   
 more than 1620 calories

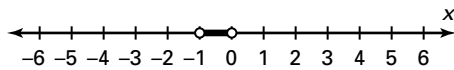
## Chapter 1

### Lesson 1.8

29.  $|x - 2| = 9$   
 $x - 2 = 9$       *or*       $x - 2 = -9$   
 $x = 11$                        $x = -7$

46.  $|2 + 5x| \leq 3$   
 $2 + 5x \leq 3$               *and*               $2 + 5x \geq -3$   
 $5x \leq 1$                        $5x \geq -5$   
 $x \leq -\frac{1}{5}$                        $x \geq -1$

There is no solution.



63. Let  $x$  = distance to the end of the rope.  
3 steps = 33 inches = 2.75 feet  
 $|10 - x| = 2.75$   
 $10 - x = 2.75$       *or*       $10 - x = -2.75$   
 $x = 7.25$                        $x = 12.75$   
He is either 7.25 feet or 12.75 feet away from the end of the rope.