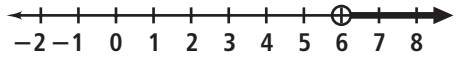
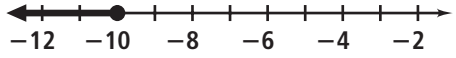
Chapter 3 Answers

Practice 3-1

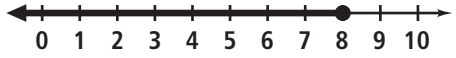
1a. yes **1b.** no **1c.** yes **2a.** no **2b.** yes **2c.** yes
3a. no **3b.** yes **3c.** no **4a.** yes **4b.** yes **4c.** yes
5a. no **5b.** yes **5c.** yes **6a.** no **6b.** yes **6c.** no
7a. no **7b.** yes **7c.** no **8.** $x > -5$ **9.** $x \leq -5$
10. $x < 3$ **11.** $x \geq -8$
12. x is greater than 6;



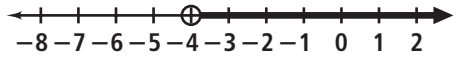
13. y is less than or equal to -10;



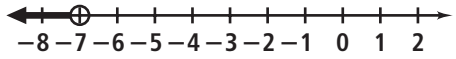
14. 8 is greater than or equal to b;



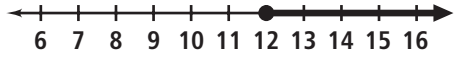
15. -4 is less than w;



16. x is less than -7;



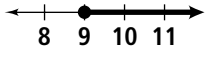
17. x is greater than or equal to 12;



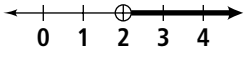
18. Let t = temperature (in degrees Fahrenheit); $t \leq 38$
19. Let w = weight (in lb); $w \leq 2000$
20. Let n = number of students; $n \geq 20$
21. Let n = number of people; $n \leq 250$
22. Let s = speed (in mi/h); $s \leq 55$
23. Let n = number of points; $450 \leq n \leq 500$
24. Let c = circumference (in in.); $c \geq 9.00$
25. C **26.** D **27.** B **28.** A

Practice 3-2

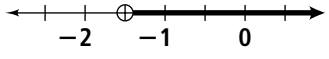
1. $n \geq 9$;



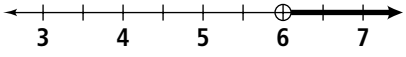
2. $y > 2$;



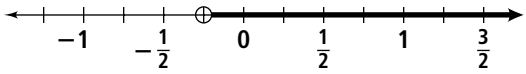
3. $r > -1.5$;



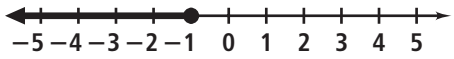
4. $b > 6$;



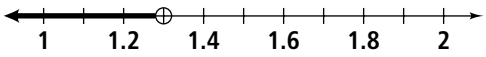
5. $n > -\frac{1}{4}$;



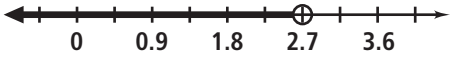
6. $c \leq -1$;



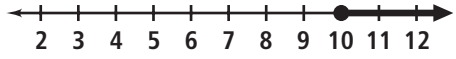
7. $g < 1.3$;



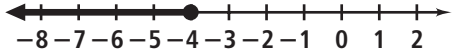
8. $d < 2.7$;



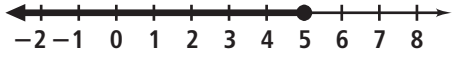
9. $f \geq 10$;



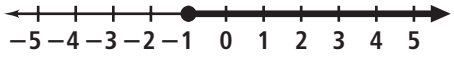
10. $x \leq -4$;



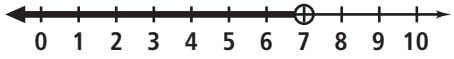
11. $d \leq 5$;



12 $m \geq -1$;

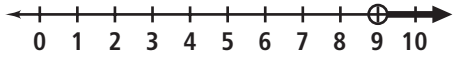


13. $v < 7$;

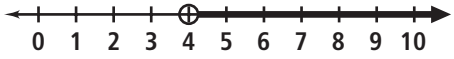


14. $t \geq -13$;

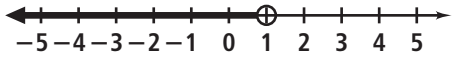
15. $y > 9$;



16. $a > 4$;

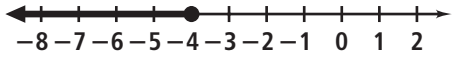


17. $d < 1$;

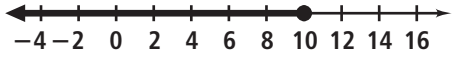


18. $s \leq 0$;

19. $h \leq -4$;

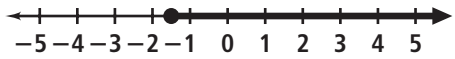


20. $t \leq 10$;

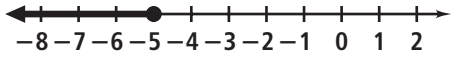


21. $n + 94 + 82 + 87 - 2 \geq 360$, where $n =$ number of points; at least 99 points **22.** $n + 125 \geq 140$, where $n =$ number of at-bats; at least 15 at-bats **23.** $s + 19 - 5 \geq 32$, where $s =$ average wind speed at 8 A.M.; 18 mi/h
24. $t + 13.5 \leq 25$, where $t =$ time in minutes; 11.5 min
25. $n + 3.5 \geq 5$, where $n =$ number of miles; at least 1.5 mi
26. $1058 + 44.50 - w \geq 1000$, where $w =$ amount of money withdrawn; \$102.50

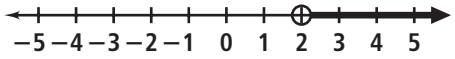
27. $z \geq -1\frac{1}{2}$;



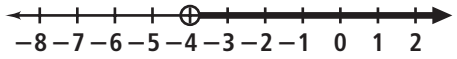
28. $d \leq -5$;



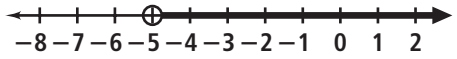
29. $v > 2$;



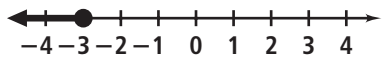
30. $m > -4$;



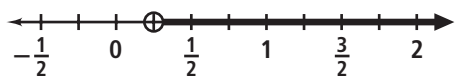
31. $f > -5$;



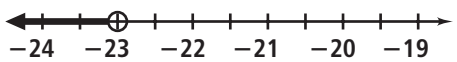
32. $w \leq -3$;



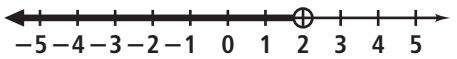
33. $b > \frac{1}{4}$;



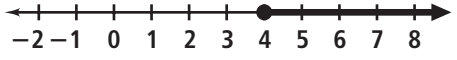
34. $t < -23$;



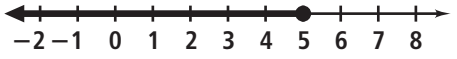
35. $u < 2$;



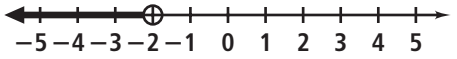
36. $z \geq 4$;



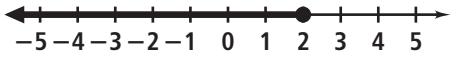
37. $b \leq 5$;



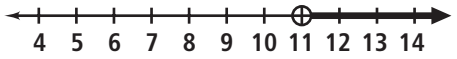
38. $k < -2$;



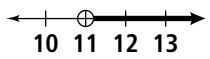
39. $a \leq 2$;



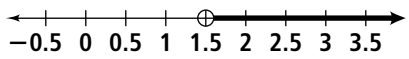
40. $b > 11$;



41. $k > 11$;

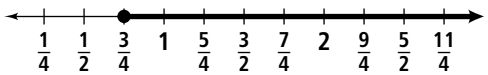


42. $j > 1.5$;

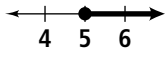


Practice 3-3

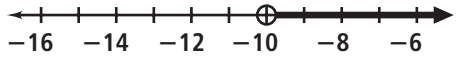
1. $s \geq \frac{3}{4}$;



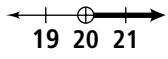
2. $b \geq 5$;



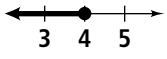
3. $r > -10$;



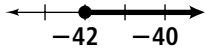
4. $n > 20$;



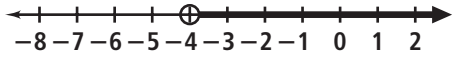
5. $n \leq 4$;



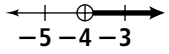
6. $n \geq -42$;



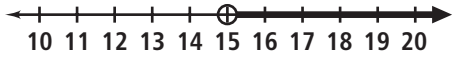
7. $c > -4$;



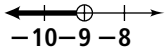
8. $d > -4$;



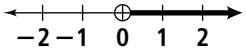
9. $t > 15$;



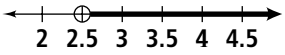
10. $k < -9$;



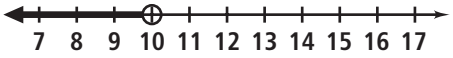
11. $w > 0$;



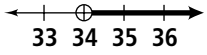
12. $v > 2.5$;



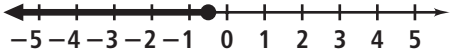
13. $m < 10$;



14. $p > 34$;

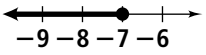


15. $v \leq -0.5$;

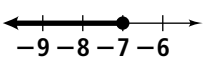


16. $x \leq 45$;

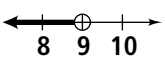
17. $d \leq -7$;



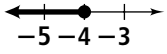
18. $x \leq -7$;



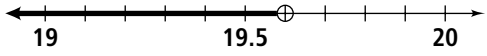
19. $c < 9$;



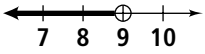
20. $a \leq -4$;



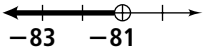
21. $8h \leq 40$, where h = number of hours; 5 hours
22. $7n \geq 28$, where n = number of vans; 4 vans
23. $.34n \leq 3.84$, where n = number of stamps; 11 stamps
24. $0.5n \leq 31$, where n = number of bricks; 62 bricks
25. $5.5s \geq 275$, where s = speed in mi/h; 50 mi/h
26. $h < 19.6$;



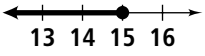
27. $x < 9$;



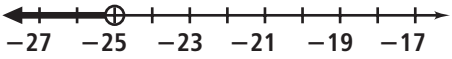
28. $a < -81$;



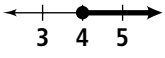
29. $b \leq 15$;



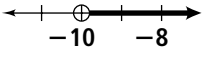
30. $q < -25$;



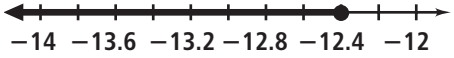
31. $b \geq 4$;



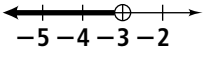
32. $c > -10$;



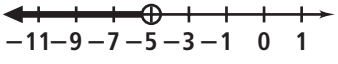
33. $b \leq -12.4$;



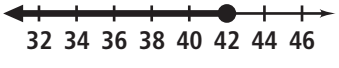
34. $p < -3$;



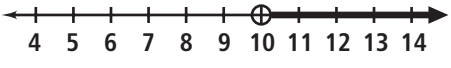
35. $z < -5$;



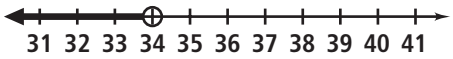
36. $y \leq 42$;



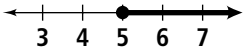
37. $k > 10$;



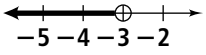
38. $y < 34$;



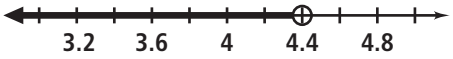
39. $b \geq 5$;



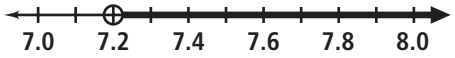
40. $k < -3$;



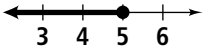
41. $d < 4.4$;



42. $v > 7.2$;

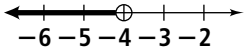


43. $n \leq 5$;



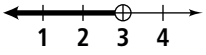
44. $y < 68$;

45. $k < -4$;

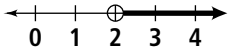


Practice 3-4

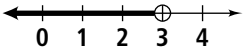
1. $z < 3$;



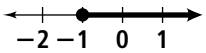
2. $k > 2$;



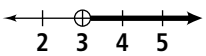
3. $y < 3$;



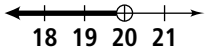
4. $h \geq -1$;



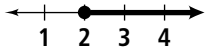
5. $r > 3$;



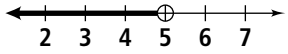
6. $u < 20$;



7. $g \geq 2$;

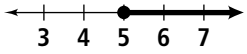


8. $h < 5$;

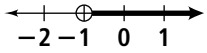


9. $p < 5$;

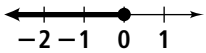
10. $m \geq 5$;



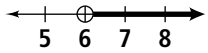
11. $a > -1$;



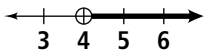
12. $t \leq 0$;



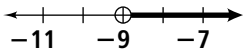
13. $x > 6$;



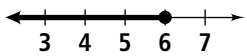
14. $f > 4$;



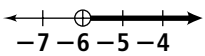
15. $t > -9$;



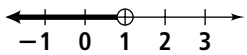
16. $c \leq 6$;



17. $t > -6$;



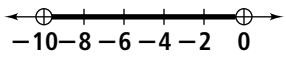
18. $v < 1$;



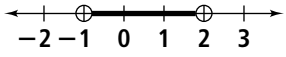
19. $150 + 35n \leq 850$, where n = number of boxes; at most 20 boxes **20.** $5(6) + 4n \leq 62$, where n = number of tables seating four people; no more than 8 tables
21. $5 + 1.25n \leq 15$, where n = number of rides; 8 rides
22. $19.50 + 0.25n \leq 44$, where n = number of miles; 98 mi
23. $3(200) + 5n \geq 1000$, where n = number of adults; at least 80 adults
24. $b < 7$ **25.** $n < -2$ **26.** $d < -0.5$ **27.** $t < -2$
28. $j < -12$ **29.** $x \geq 5$ **30.** $z > 1$ **31.** $b < 6$
32. $y \geq -8$ **33.** $f < 1$ **34.** $k < \frac{3}{4}$ **35.** $g \geq 5$
36. $g > -9$ **37.** $y < 0$ **38.** $t > -5$ **39.** $d > 3$
40. $n < 2$ **41.** $d \leq 4$

Practice 3-5

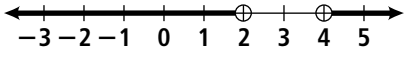
1. $-10 < s < 0$;



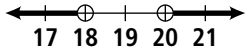
2. $-1 < x < 2$;



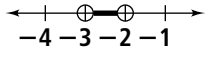
3. $k > 4$ or $k < 2$;



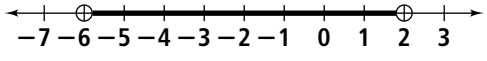
4. $b > 20$ or $b < 18$;



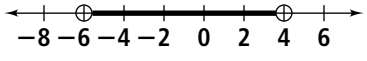
5. $-3 < d < -2$;



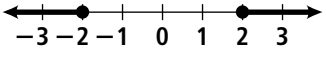
6. $-6 < t < 2$;



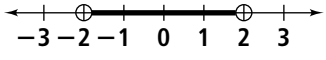
7. $-6 < s < 4$;



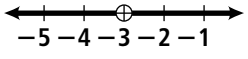
8. $j \geq 2$ or $j \leq -2$;



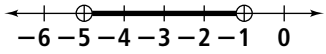
9. $-2 < x < 2$;



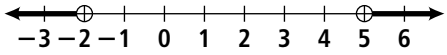
10. $g > -3$ or $g < -3$;



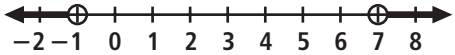
11. $-5 < y < -1$;



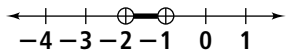
12. $f > 5$ or $f < -2$;



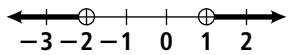
13. $d > 7$ or $d < -1$;



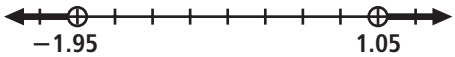
14. $-2 < h < -1$;



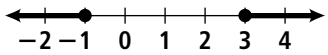
15. $a > 1$ or $a < -2$;



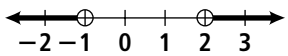
16. $z > 1.05$ or $z < -1.95$;



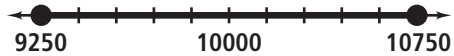
17. $c \geq 3$ or $c \leq -1$;



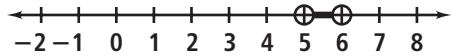
18. $h < -1$ or $h > 2$;



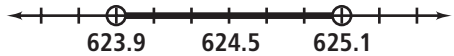
19. $-750 \leq n - 10{,}000 \leq 750$, where n = number of people; from 9250 to 10,750 people;



20. $25 < 5n < 30$, where n = number of miles; between 5 and 6 mi;

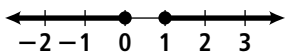


21. $629.4 < 5.5 + w < 630.6$, where w = weight in grams; more than 623.9 but less than 625.1g;

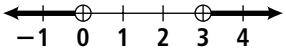


22. $500 < 395 + d < 600$, where d = dollar amount left to sell; between \$105 and \$205;

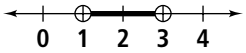
23. $n \geq 1$ or $n \leq 0$;



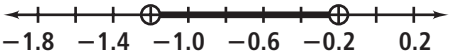
24. $k > 3$ or $k < 0$;



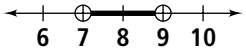
25. $1 < h < 3$;



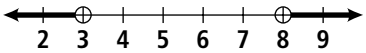
26. $-1.2 < p < -0.2$;



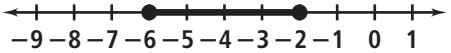
27. $7 < x < 9$;



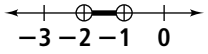
28. $m < 3$ or $m > 8$;



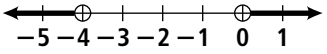
29. $-6 \leq x \leq -2$;



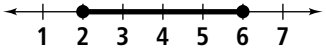
30. $-2 < x < -1$;



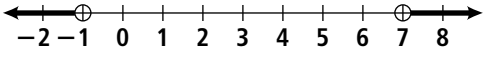
31. $x > 0$ or $x < -4$;



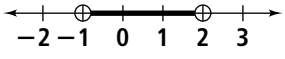
32. $2 \leq s \leq 6$;



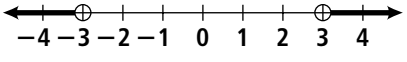
33. $w > 7$ or $w < -1$;



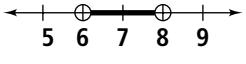
34. $-1 < x < 2$;



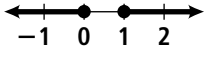
35. $t < -3$ or $t > 3$;



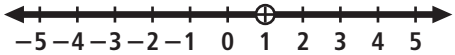
36. $6 < g < 8$;



37. $x \geq 1$ or $x \leq 0$;

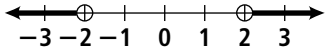


38. $y < 1$ or $y > 1$;

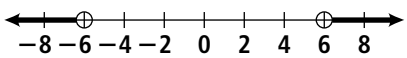


Practice 3-6

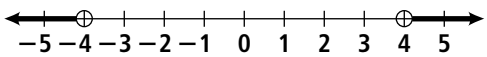
1. $d > 2$ or $d < -2$;



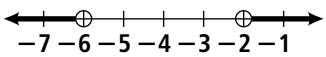
2. $h < -6$ or $h > 6$;



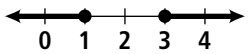
3. $k > 4$ or $k < -4$;



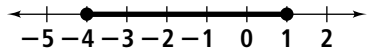
4. $s < -6$ or $s > -2$;



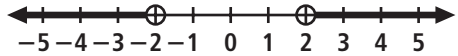
5. $c \geq 3$ or $c \leq 1$;



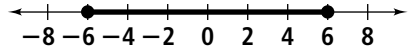
6. $-4 \leq n \leq 1$;



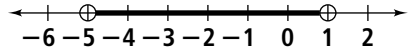
7. $z > 2$ or $z < -2$;



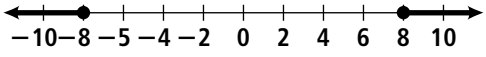
8. $-6 \leq x \leq 6$;



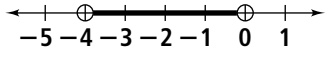
9. $-5 < t < 1$;



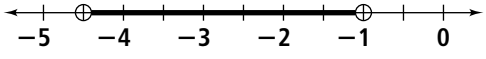
10. $j \geq 8$ or $j \leq -8$;



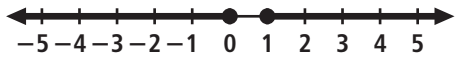
11. $-4 < v < 0$;



12. $-4.5 < y < -1$;

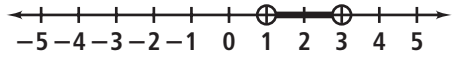


13. $n \geq 1$ or $n \leq 0$;

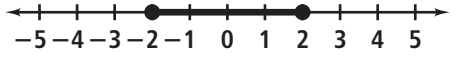


14. $x > 0$ or $x < -4$;

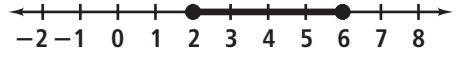
15. $1 < h < 3$;



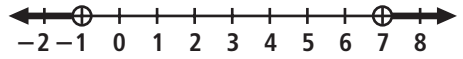
16. $-2 \leq x \leq 2$;



17. $2 \leq s \leq 6$;

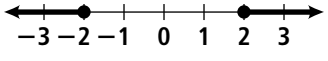


18. $w > 7$ or $w < -1$;



19. $x \geq 1$ or $x \leq 0$;

20. $j \geq 2$ or $j \leq -2$;



21. ± 9.5 **22.** no solution **23.** ± 12 **24.** ± 3 **25.** ± 9
26. ± 14 **27.** no solution **28.** $4, -18$
29. $|s - 25| \leq 3$; between 22 and 28 seeds, inclusive
30. $|d - 93| \leq 1.6$; between 91.4 and 94.6 million mi, inclusive
31. $|s - 72| \leq 2$; between 70 and 74, inclusive
32. $|a - 75| \leq 6.50$; between \$68.50 and \$81.50, inclusive
33. $|t - 58.2| \leq 6.4$; between 51.8 and 64.6 s, inclusive
34. $|l - 25.5| \leq 0.025$; between 25.475 and 25.525 cm, inclusive
35. $|w - 125.2| \leq 0.4$; between 124.8 and 125.6 lb, inclusive
36. $|r - 63| \leq 3.8$; between 59.2% and 66.8%, inclusive

Reteaching 3-1

1. yes **2.** yes **3.** yes **4.** yes **5.** no **6.** yes **7.** no **8.** no

Reteaching 3-2

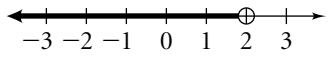
1. $y < 6$ **2.** $x < 5$ **3.** $w > 5$ **4.** $x > 16$ **5.** $y \geq 2$
6. $a < 4$ **7.** $h \leq 3$ **8.** $s > 5$ **9.** $b < 5$ **10.** $x < 15$
11. $a > 12$ **12.** $b < 14$ **13.** $c > 2$ **14.** $d < 5$
15. $f > 19$ **16.** $x + 35 \geq 75$; at least \$40

Reteaching 3-3

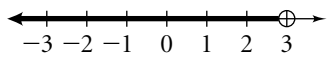
1. $<; >$ **2.** $<; >$ **3.** $>; <$ **4.** $>; <$ **5.** $<; >$
6. $>; <$ **7.** $a < 6$ **8.** $b < -7$ **9.** $c < 4$
10. $x < -14$ **11.** $y > -4$ **12.** $f > 7$ **13.** $d \leq -2.5$
14. $m \geq -15$ **15.** $x < 20$ **16.** $n \leq -20$ **17.** $k > -1.6$
18. $p \geq -15$ **19.** $t > -3.5$ **20.** $z > -10$ **21.** $w \geq 7.2$

Reteaching 3-4

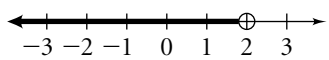
1. $x < 2$;



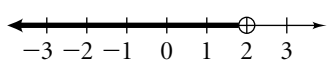
2. $x < 3$;



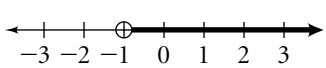
3. $x < 2$;



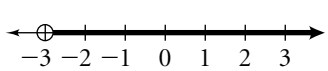
4. $x < 2$;



5. $x > -1$;

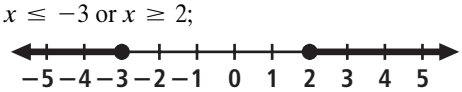


6. $x > -3$;

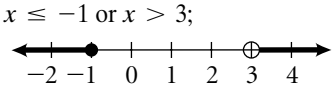


Reteaching 3-5

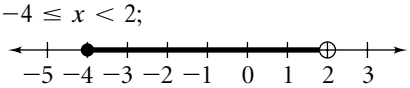
1. $x \leq -3$ or $x \geq 2$;



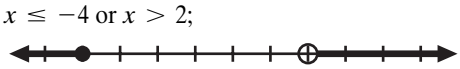
2. $x \leq -1$ or $x > 3$;



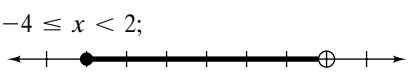
3. $-4 \leq x < 2$;



4. $x \leq -4$ or $x > 2$;



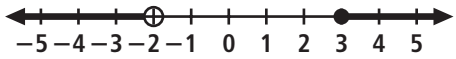
5. $-4 \leq x < 2$;



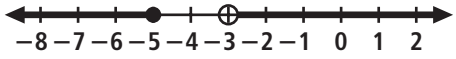
6. $-4 < x \leq 6$;

7. $-2 \leq x < 4$;

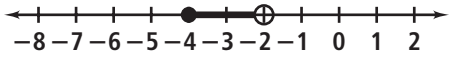
8. $x < -2$ or $x \geq 3$;



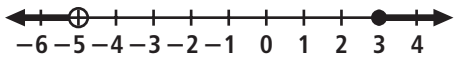
9. $x \leq -5$ or $x > -3$;



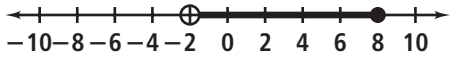
10. $-4 \leq x < -2$;



11. $x < -5$ or $x \geq 3$;



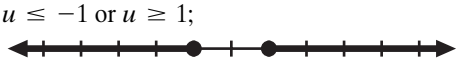
12. $-2 < x \leq 8$;



Reteaching 3-6

1. $-5 < c < 5$;

2. $u \leq -1$ or $u \geq 1$;



3. $-3 \leq a \leq 1$;

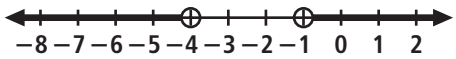
4. $m < \frac{1}{3}$ or $m > 1$;

5. $y \leq 5$ or $y \geq 7$;

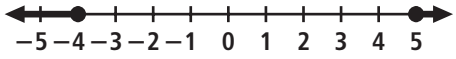
6. $-4 < n < 3$;

7. $-2 \leq u \leq 6$;

8. $g < -4$ or $g > -1$;



9. $y \leq -4$ or $y \geq 5$;



Enrichment 3-1

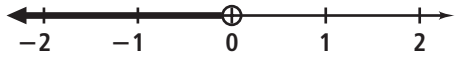
1. $10 < g < 20$ **2.** $A < K < J$ **3.** $J = \frac{T + A}{2}$

4. $J \neq 12, 14, 16, 18$ **5.** $S \neq$ oldest, $S \neq$ youngest
6. $K - A = T - S$; Karen: 14; Angela: 12; Janet: 15; Tamara: 18; Susan: 16

Enrichment 3-2

1. $x \leq 0$; If $w \geq y + z$ and $w + x = y + z$, then by substitution $w \geq w + x$. Applying the Subtr. Prop. of Inequ., subtract w from both sides to obtain $0 \geq x$. The original statement is true only if $x \leq 0$;

If $w + x = y + z$ and $x \leq 0$, then $w \geq y + z$.
2. none; Applying the Subtr. Prop. of Inequ. to $x + z > y + z$, subtract z from both sides to obtain $x > y$. Since this restriction is given, no additional restrictions are necessary.
3. $y < 0$; Applying the Add. Prop. of Inequ. to $x > 0$, add y to both sides to obtain $x + y > y$. Since $x + y = 0$, use substitution to obtain $0 > y$. The original statement is true only if $y < 0$;



If $x + y = 0$ and $y < 0$, then $x > 0$.
4. none; Applying the Add. Prop. of Inequ. to $x > y$, add x to both sides to obtain $2x > x + y$. Then, applying the Subtr. Prop. of Inequ. to $2x > x + y$, subtract y from both sides to obtain $2x - y > x$. Since this restriction is given, no additional restrictions are necessary.

Enrichment 3-3

1.

Statements	Reasons
1. $x + a > b$	1. Given
2. $x + a + (-a) > b + (-a)$	2. Add. Prop. of Eq.
3. $x + 0 > b + (-a)$	3. Inv. Prop. of Add.
4. $x > b + (-a)$	4. Identity Prop. of Add.
5. $x > b - a$	5. Def. of Subtr.

2.

Statements	Reasons
1. $ax > b$	1. Given
2. $\frac{ax}{a} > \frac{b}{a}$	2. Div. Prop. of Ineq.
3. $\frac{1}{a}(ax) > \frac{b}{a}$	3. Def. of Div.
4. $\left(\frac{1}{a} \cdot a\right)x > \frac{b}{a}$	4. Assoc. Prop. of Mult.

5. $(1)x > \frac{b}{a}$ — 5. Inv. Prop. of Mult.

6. $x > \frac{b}{a}$ — 6. Identity Prop. of Mult.

3.

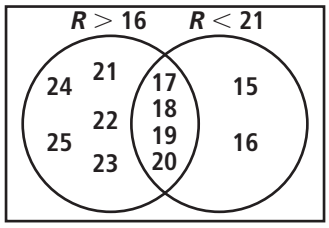
Statements	Reasons
1. $ax > b$	1. Given
2. $\frac{ax}{a} < \frac{b}{a}$	2. Div. Prop. of Ineq.
3. $\frac{1}{a}(ax) < \frac{b}{a}$	3. Def. of Div.
4. $\left(\frac{1}{a} \cdot a\right)x < \frac{b}{a}$	4. Assoc. Prop. of Mult.
5. $(1)x < \frac{b}{a}$	5. Inv. Prop. of Mult.
6. $x < \frac{b}{a}$	6. Identity Prop. of Mult.

Enrichment 3-4

1. B **2.** E **3.** N **4.** O **5.** I **6.** T **7.** M **8.** A **9.** N **10.** D **11.** E **12.** L **13.** B **14.** R **15.** O **16.** T; Benoit Mandelbrot

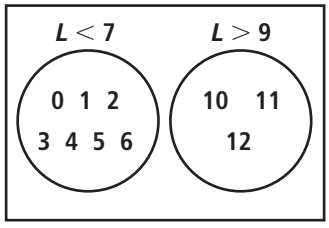
Enrichment 3-5

1.



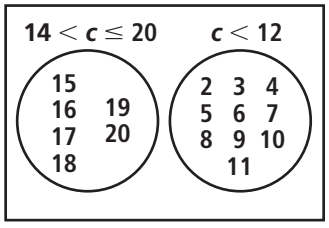
$16 < R < 21$

2.



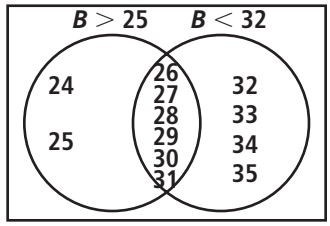
not possible

3.



not possible

4.



$25 < B < 32$

Enrichment 3-6

1. ≥; When x and y have the same sign, $|x| + |y| = |x + y|$. When x and y have different signs, $|x| + |y| > |x + y|$.

2. =; Whether x and y have the same sign or different signs, $|xy| = |x| \cdot |y|$.

3. ≤; When x and y have the same sign, $|x| - |y| = |x - y|$. When x and y have different signs, $|x| - |y| < |x - y|$.

4. =; Whether x and y have the same sign or different signs, $|x - y| = |y - x|$.

Chapter Project

Activity 1: Calculating

177.3 cal; Check students' work.

Activity 2: Researching

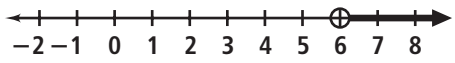
Check students' work; maximum since $P \leq 125$ for $a = 30$

Activity 3: Writing

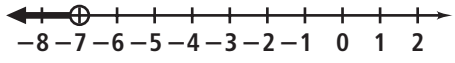
Check students' work; $143.50 \leq R \leq 174.25$; Check students' work.

✔Checkpoint Quiz 1

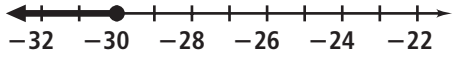
1. $x > 6$;



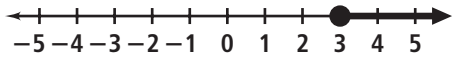
2. $x < -7$;



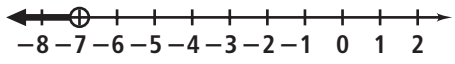
3. $x \leq -30$;



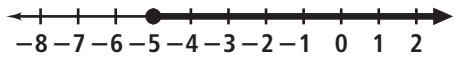
4. $x \geq 3$;



5. $x < -7$;



6. $x \geq -5$;



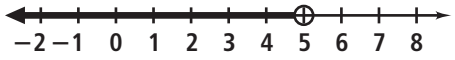
7a. yes **7b.** no **7c.** yes **7d.** no

8a. no **8b.** no **8c.** no **8d.** yes

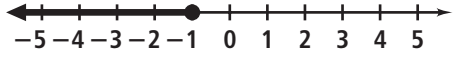
9. $24 < \frac{5}{8}x; x > \frac{192}{5}$ **10.** $x - 8 \geq 17; x \geq 25$

✔Checkpoint Quiz 2

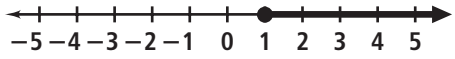
1. $x < 5$;



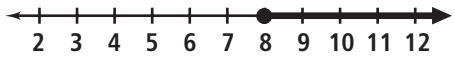
2. $x \leq -1$;



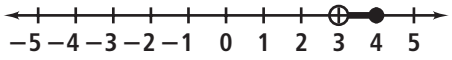
3. $x \geq 1$;



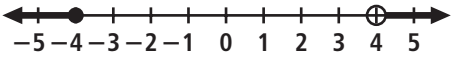
4. $x \geq 8$;



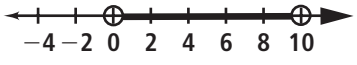
5. $3 < x \leq 4$;



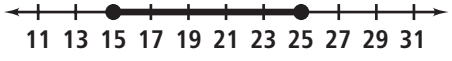
6. $x \leq -4$ or $x > 4$;



7. $0 < x < 10$;



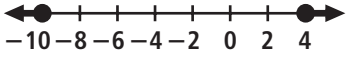
8. $15 \leq x \leq 25$;



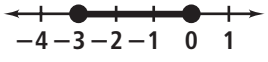
9. $x + x + x + 5 + x + 5 \leq 180$; at most 42.5 ft
10. $x \geq 7$

Chapter Test, Form A

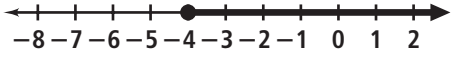
1a. yes **1b.** no **1c.** no **2a.** yes **2b.** yes **2c.** no
3. $x \geq 75$ **4.** $x \leq 28$ **5.** $x \leq 54$ **6.** $x > 25$
7. $x < -1$ **8.** $x \geq 2$ **9.** $x < 1.5$ **10.** $x \geq -3.5$
11. $r \geq 4$ or $r \leq -10$;



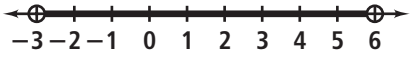
12. $-3 \leq q \leq 0$;



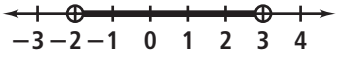
13. $y \geq -4$;



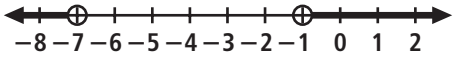
14. $-3 < n < 6$;



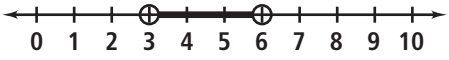
15. $-2 < c < 3$;



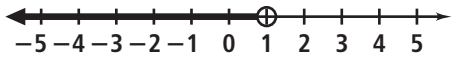
16. $b < -7$ or $b > -1$;



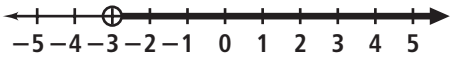
17. $3 < g < 6$;



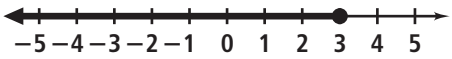
18. $x < 1$;



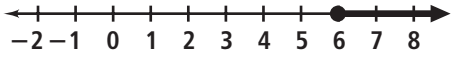
19. $m > -3$;



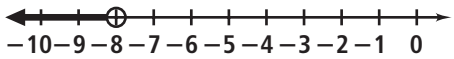
20. $y \leq 3$;



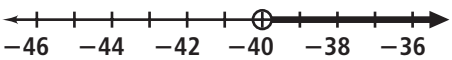
21. $f \geq 6$;



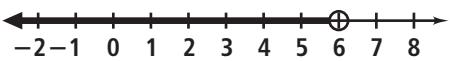
22. $a < -8$;



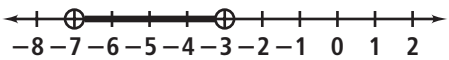
23. $x > -40$;



24. $x < 6$;



25. $-7 < d < -3$;

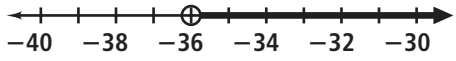


26. $x < -1$ **27.** $y < 0$ **28.** $x \leq 3$ **29.** $x < -3$
30. Subtract 3 from each side to get $|2d| < 4$. Remove absolute value signs by writing as the compound inequality $2d < 4$ and $2d > -4$. Divide each side of each inequality by 2. The answer is $-2 < d < 2$.
31. $-1 \leq x < 3$ **32.** $x \leq 2$ or $x \geq 4$ **33.** no solution
34. 11, 15 **35.** −7.5, 7 **36.** 2, 14 **37.** Check students' work.
38. $x + 2395 - 50 \geq 5000$; at least 2655 lb

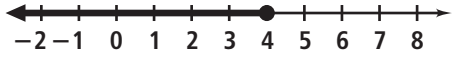
39. $100 \le \frac{100 + 105 + 91 + x}{4} \le 120$; between 104 and 184, inclusive **40.** $|x - 397| \le 10$; between 387 and 407 g, inclusive **41.** D

Chapter Test, Form B

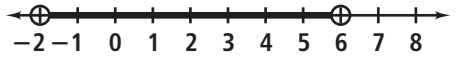
1a. yes **1b.** yes **1c.** no **2a.** no **2b.** yes **2c.** yes
3. $x < 25$ **4.** $x > 12$ **5.** $x \ge 3.50$ **6.** $x > 10$
7. $x > -2$ **8.** $x \le 3$ **9.** $x \ge -1.5$ **10.** $x > \frac{1}{2}$
11. $x > -36$;



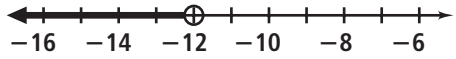
12. $y \le 4$;



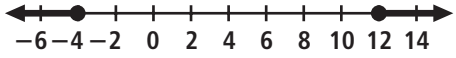
13. $-2 < h < 6$;



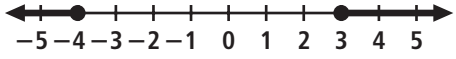
14. $a < -12$;



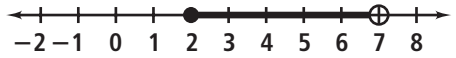
15. $a \ge 12$ or $a \le -4$;



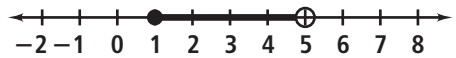
16. $m \le -4$ or $m \ge 3$;



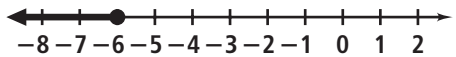
17. $2 \le t < 7$;



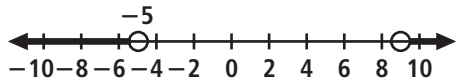
18. $1 \le x < 5$;



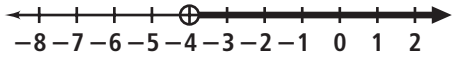
19. $y \le -6$;



20. $r > 9$ or $r < -5$;

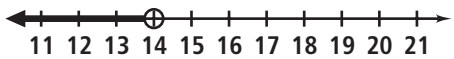


21. $k > -4$;

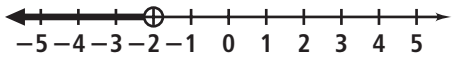


22. $z \ge 5$;

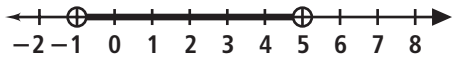
23. $x < 14$;



24. $y < -2$;



25. $-1 < d < 5$;



26. $y > 7$ **27.** $x \le -5$ **28.** $a > \frac{10}{3}$ **29.** $x \ge -1.2$
30. Subtract 4 from each side to get $|x| < 5$. Remove absolute values signs by writing as the compound inequality $x < 5$ and $x > -5$. **31.** $x \ge 1$ or $x \le -2$
32. $-3 < x < 1$ **33.** $x = 8$ or $x = -2$
34. $x = 4$ or $x = -\frac{4}{3}$ **35.** $c = 4$ or $c = -\frac{18}{5}$

36. $y = 2$ or $y = 14$
37. No such situation exists; inequality is false.
38. $15x - 30 \ge 40$; 5 lawns
39. $6x - 75 > 135$; 36 bird feeders
40. $|x - 13.05| \le 0.015$; between 13.035 and 13.065 mm, inclusive **41.** B

Alternative Assessment, Form C

TASK 1 Scoring Guide:

a. $-2 \le x \le 4$ and $1 \le y \le 4$

b. $-5 \le x \le -3$ and $-4 \le y \le 3$

3 Student shows a clear understanding of the concepts of writing inequalities and reading graphs.

2 Student shows an understanding of the concept of writing inequalities; may read the coordinates incorrectly.

1 Student shows an understanding of some of the concepts of writing inequalities.

0 No attempt is made, or no solution is presented.

TASK 2 Scoring Guide:

a. $x + 2(25) \leq 110$; no more than 60 ft

b. $|x - 125{,}000| \leq 12{,}500$; between \$112,500 and \$137,500, inclusive; Check students' work.

3 Student shows a clear understanding of the concepts of inequalities and absolute value. Computations are correct. Written explanation is exemplary.

2 Student shows an understanding of the concepts of inequalities and absolute value. Computations are mostly correct. Written explanations are adequate.

1 Student shows an understanding of most of the concepts of inequalities and absolute value. Computations may contain errors. Written explanation is satisfactory.

0 No attempt is made, or no solution is presented.

TASK 3 Scoring Guide:

a. $\frac{6 + x}{15 + 4} > .450$; at least three hits (9 hits in 19 at-bats) for an average above .450

b. Check students' work.

3 Student writes and correctly solves the inequality for finding the number of hits. Student writes two inequalities that use the properties of addition, subtraction, multiplication, and division at least once. Student correctly solves both inequalities and draws accurate graphs.

2 Student uses only some of the properties and makes minor errors in computation or in graphing. Student incorrectly calculates the number of hits needed or make errors in writing the inequality.

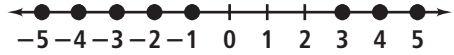
1 Student incorrectly calculates the number of hits needed and makes errors in writing inequalities. Student uses only one or two properties in the inequalities and has errors in the solutions and graphs.

0 Student makes no attempt, or no solution is presented.

TASK 4 Scoring Guide:

a. The word *and* used in a compound inequality implies that both conditions must be true. The word *or* used in a compound inequality implies that either condition is true. **b.** Check students' work. **c.** Check students' work. **d.** $\{-3, -1, 0, 1, 3\}$; Check students' work.

e.



3 Student makes a clear distinction between the use of the words *and* and *or.* Inequalities correspond to type requested and are solved correctly. Solution sets and graph are accurate.

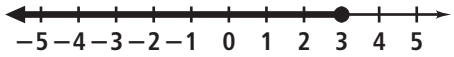
2 Student's explanation could be more complete. Inequalities are mostly correct with minor computational errors. Solution sets and graph are mostly accurate.

1 Student's explanation is incomplete. Inequalities are not the correct type and/or contain computational errors. Solution sets and graph are inaccurate.

0 Student makes no attempt, or no solution is presented.

Cumulative Review

1. D **2.** C **3.** B **4.** D **5.** B **6.** C **7.** 33 **8.** 7 **9.** D **10.** C
11. A **12.** between 350 and 650 calories, inclusive
13. The median is best since there is no mode and Friday's quantity is an outlier which artificially increases the mean.
14. $5n - 4 = 21$; 5
15. Answers may vary. Sample: $|x| < -4$
16. 2 **17.** -5 **18.** 3 **19.** -4 **20.** $-2, 3$
21. no solution **22.** $-1 \leq g \leq 7$
23. 90 **24.** $n < 3$
25. $c \leq 3$;



26. The dimensions of the two matrices are not the same.