Answers

Get Ready, pages 500–501

1. a) $5 > 2$ **b)** $7 < 20$ **c)** 5×3 **d)** $9 = \frac{18}{2}$

2. a) 4 is less than 8 **b)** 8 is greater than 2 **c)** 14 divided by 2 **d)** 4 is not equal to $\frac{8}{3}$

3. a) 4, 5 **b)** –1, 0, 1 **c)** 5, 6, 7 **d)** 0, 1, 2, 3
4. a) $1 < 7$ or $7 > 1$ **b)** $4 > -1$ or $-1 < 4$
5. a) 3, 2, 1, 0 **b)** 12, 13, 14, 15
6. $x = -4$

Math Link

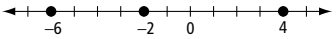
1. a) The number of people each gondola can hold is less than or equal to 60.

b) The number of people the Ferris wheel can carry is less than or equal to 2160.

2. Answers will vary. Examples: **a)** The Singapore Flyer is 541 ft tall. It holds a maximum of 784 people. **b)** The number of people the Singapore Flyer can carry is less than or equal to 784.

3. a) To keep the ride safe. **b)** *Words:* The most people allowed on this ride is 30. *Algebra:* $n \leq 30$, where n is the maximum number of people allowed on the ride.

9.1 Warm Up, page 503

1. 

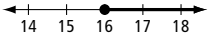
2. a) A: 4.2; B: 4.7 **b)** C: 138; D: 162 **c)** E: $-\frac{5}{9}$; F: $-\frac{8}{9}$

3. a) FALSE; –5 is less than –3. **b)** TRUE **c)** TRUE

d) FALSE; $\frac{3}{10}$ can be written as 0.3.

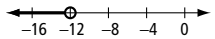
9.1 Representing Inequalities, pages 504–514

Working Example 1: Show You Know

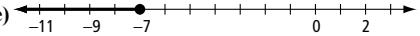
a) 

b) *Variable:* a, the age you must be to get a driver's licence; *Inequality:* $a \geq 16$

Working Example 2: Show You Know

a) x; $x > -136$ **b)** 

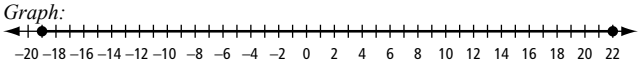
c) x; $x \leq 0.25$; The range in temperatures in January. **d)** ≤

e) 

Working Example 3: Show You Know

Words: greater, less

Graph:



Algebra: degrees; $t \geq -19$; $t \leq 22$

Communicate the Ideas

1. Answers may vary. Example: An open circle is used to show the boundary point is not included in the solution. A closed circle is used to show the boundary point is included in the solution.

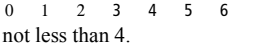
2. a) Anwers may vary. Example: 11, 12, 13 **b)** 10

Practise

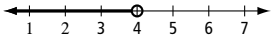
3.

Words	Inequality Sign	Example
a) at least	≥	$x \geq 2$
b) fewer than	<	$x < 2$
c) a maximum of	≤	$x \leq 3$
d) must exceed	>	$x > 3$

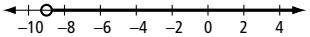
4. a) greater, 8; 11, 12 **b)** All values are less than –12; –13, –14, –15

5. a) is 

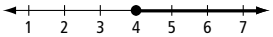
b) 4 is not less than 4.

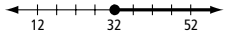


c) 4 is greater than –9.



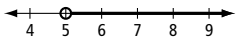
d) 4 is equal to 4.

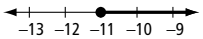


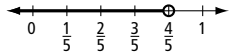
6. a) 

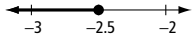
b) greater than or equal to 32 cm.

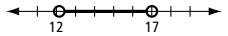
7. a) 4 **b)** $x \geq -13$ **c)** $x < 12.7$ **d)** $x \leq -24.3$

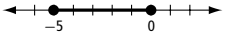
8. a) 

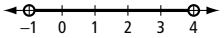
b) 

c) 

d) 

9. a) 

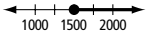
b) 

c) 

10. a) 20; 27 **b)** $x > -6$; $x < 2$

Apply

11. a) $m \geq 18\,000$ **b)** $d > 700$

12. a) 

b) $x \geq 1500$

13. a) Paul will beat the record if he finishes the race in less than 41.5 s.
b) $t < 41.5$

Math Link

Answers will vary. Examples:

1. a) Behemoth **b)** roller coaster

2.

Words	Algebra
a) Must be more than 10 years old to ride.	$a > 10$
b) Must be over 130 cm tall to ride.	$h > 130$
c) Must be less than 200 lbs to ride.	$w < 200$

3. Answers will vary.

9.2 Warm Up, page 515

1. a) $x = 8$ **b)** $y = 1.1$ **c)** $x = -30$ **d)** $x = 10.8$

2. a) ≥ **b)** ≥ **c)** < **d)** ≤ **e)** > **f)** ≠

9.2 Solving Single-Step Inequalities, pages 516–527

Working Example 1a): Show You Know

a) $x < 8$ **b)** $x < 2.5$

Working Example 1b): Show You Know

a) $x \geq -2$ **b)** $x \leq -4$

Working Example 1c): Show You Know

a) $x \leq 84$ **b)** $x < -24$ **c)** $-36 > x$ or $x < -36$ **d)** $x > 20$

Working Example 2: Show You Know

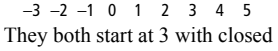
a) YES **b)** NO; $x > -6$

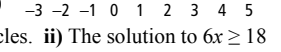
Working Example 3: Show You Know

a) $0.10n \geq 20$ **b)** $n \geq 200$; Yvonne must plant at least 200 trees per hour to make $20/h.

Communicate the Ideas

1. Answers will vary. Example: Ryan means that there is more than 1 number that can be multiplied by 2 and be greater than 10.

2. a) i) 

ii) 

b) i) They both start at 3 with closed circles. **ii)** The solution to $6x \geq 18$ includes numbers greater than 3.

3. d), e)

Practise

4. a) $x \geq 29$ **b)** $x > -7$ **c)** $y \geq 9$ **d)** $y > 6.25$ **e)** $x > 150$ **f)** $x \leq 36$

5. a) is **b)** –3 is a possible solution.

6. a) is **b)** The solution is not $x < 4$.

7. a) is **b)** The solution is not correct.

8. a) is not **b)** The solution $x \leq 12.4$ is correct.

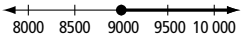
Apply

9. a) $85n \leq 1400$ **b)** $n \leq 16.47$ **c)** 16.47; NO; The boundary point needs to be a whole number since you can't buy part of a section of fence.

10. a) $x < -5$ **b)** $-6, -7, -8$ **c)** $-4, -3, -2$

11. a) -5 **b)** When you multiply or divide on both sides of an inequality by a negative number, you reverse the sign.

12. a) $0.03p \geq 270$ **b)** $p \geq 9000$ **c)** The owner must make at least \$9000 profit per month.

d) 

$0.03(9500) \geq 270$

$285 \geq 270$

Math Link

Answers will vary. Examples: **1. a)** \$2; It's not too much to pay per ride. **b)** \$35; If you go on a lot of rides, this is a better deal.

2. About 17 rides makes the single-ride ticket the same.

3. a) $35 < 2n$ **b)** $n > 17.5$; You have to go on more than 17.5 rides to make an all day pass a better deal.

9.3 Warm Up, page 528

1. a) $x < -13$ **b)** $y \leq 140$

2. a) -5 **b)** $x = 12$

3. a) 2 **b)** $x = -5$

9.3 Solving Multi-Step Equations, pages 529–543

Working Example 1a): Show You Know

a) $x > 6$ **b)** $x < 24$

Working Example 1b): Show You Know

a) $x < -2$ **b)** $x \leq 4$

Working Example 1c): Show You Know

a) $x \leq 4$ **b)** $x \geq -1$

Working Example 2: Show You Know

a) $15n < 42 + 8n$

b) Option B will be less expensive from 1– 6 hours.

Communicate the Ideas

1. a) Lindsay: $x < -6$; Victoria: $-6 > x$ **b)** YES. Even though they did different steps first, they still followed the order of operations.

Practise

2. a) $x < 11$ **b)** $x \geq 50$

3. a) $y \leq 10.4$ **b)** $y > -108$

4. a) correct **b)** correct

5. a) $x < 6$ **b)** $x < -2$ **c)** $x > 6$

6. a) *Variable:* number of jerseys; *Inequality:* $40n + 80 < 50n$
b) *Variable:* Let t = the number of text messages; *Inequality:* $0.12t < 15 + 0.05t$ **c)** *Variable:* Let b = the number of buckets of balls; *Inequality:* $1.50b + 98 < 6b$

7. a) $10 + 0.05n > 15 + 0.04n$ **b)** $n > 500$; John would have to deliver more than 500 papers to make Job A the better offer.

Apply

8. *Variable:* Let y = the number of yearbooks printed; *Inequality:* $300 + 12y > 900 + 9y$; *Solve:* $y > 200$; The council would have to print more than 200 yearbooks to make Company B the better choice.

9. a) Kevin works 40 h. **b)** Kevin would make \$320 per week at Store A. **c)** Kevin would make \$720 per week in Store B. **d)** *Variable:* Let s = Kevin's weekly sales; *Inequality:* $320 + 0.10s > 720$; *Solve:* $s > 4000$; Kevin would have to sell \$4000 per week to make Store A the better job.

Math Link

1.

Daily Expenses	
Variable operating expenses per visitor	\$15
Fixed expenses (\$5000 + \$1200 per ride)	*\$17 000*
Daily Revenues	
Admission (includes ride pass) per visitor	\$38
Food per visitor	\$25
Souvenirs per visitor	\$10
Parking per visitor	\$10
Total variable revenues per visitor	*\$83*
Fixed revenue from sponsorship	\$2500

2. a) \$15 **b)** \$17 000 **c)** $15v + 17\,000$

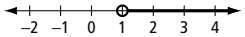
3. a) \$83 **b)** \$2500 **c)** $83v + 2500$

4. *Inequality:* $83v + 2500 > 15v + 17\,000$ *Solve:* $v > 213$; The park needs to have more than 213 visitors per day to make a profit.

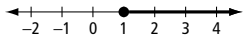
Graphic Organizer, page 544

Answers will vary, Examples:

Inequalities and Boundary Points:

a) 

$x > 1$

b) 

$x \geq 1$

Solve Single-Step Inequalities

a) $x > -4$ **b)** $x \geq -2$

Solving Multi-Step Inequalities

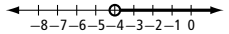
a) $x > 6$ **b)** $x \geq -2$

Chapter 9 Review, pages 545–548

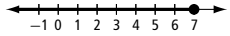
1. inequality **2.** algebra **3.** open circle **4.** solution **5.** boundary point **6.** closed circle

7. a) $\leq$ **b)** number of items on sale > 80

8. a) *Words:* greater, 13; *Algebra:* > 13 **b)** *Words:* a number less than or equal to $8\frac{6}{10}$; *Algebra:* $x \leq 8\frac{6}{10}$

9. a) 

Answers will vary. Example: Solution: –3, Non-solution: –5

b) 

Answers will vary. Example: Solution: 7, Non-solution: 8

10. a) incorrect; $x \leq 8$ **b)** correct

11. a) $d > -3$ **b)** $c < -16$

12. a) *Variable:* Let h = the hours Tim works. *Inequality:* $15h \geq 600$
b) $h \geq 40$; Tim needs to work at least 40 h to make \$600.

13. correct

14. a) $x < 45$ **b)** $x < -20$ **c)** $x \leq 0$

15. a) $450 + 24x < 2000$ **b)** $x < 64.6$; 64 people can attend the banquet and the cost will be under \$2000.

Key Word Builder, page 549

Across

2. graphically **3.** boundary point **5.** verify **6.** negative **8.** open **9.** inequality **10.** closed

Down

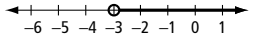
1. distributive **4.** variable **7.** solution

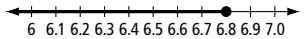
Chapter 9 Practice Test, pages 550–551

1. B **2.** D **3.** A **4.** B **5.** C

6. open, left

7. greater, –4

8. a) 

b) 

9. a) Check 0.

$8 - 5x < 23$

$8 - 5(0) < 23$

$8 < 23$

b) YES. When you substitute a number greater than –3, the inequality is true.

10. a) $x \geq 16$ **b)** $x > -1$

11. a) $p < 185$ **b)** *Variable*: Let p = pilot's age; *Inequality*: $p \geq 21$
c) *Variable*: Let e = how much Luke earns per item; *Inequality*: $4.75e > 50$

Math Link: Wrap It Up!, pages 552–553

Answers will vary. Examples: **1. a)** 5 **b)** 12 **c)** $4800

2.

Daily Expenses	
Total variable operating expenses per visitor	*$12*
Total fixed expenses ($5000 + $400 per ride)	*$7000*
Daily Revenues	
Admission (includes ride pass) per visitor	*$30*
Food per visitor	*$20*
Souvenirs per visitor	*$10*
Parking per visitor	*$10*
Total variable revenues per visitor	*$70*
Total fixed revenue from sponsorship	*$2000*

3. $12v + 7000$

4. $70v + 2000$

5. a) *Inequality*: $70v + 2000 > 12v + 7000$; *Solve*: $v > 86$; The park needs to have more than 86 visitors per day to make a profit.
b) Answers may vary. Example:
Check a greater value:

$70v + 2000 > 12v + 7000$

$70(\mathbf{87}) + 2000 > 12(\mathbf{87}) + 7000$

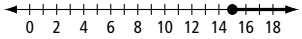
$6090 + 2000 > 1044 + 7000$

$8090 > 8044$

So, the solution $v > 86$ is correct.

Challenge, pages 554–555

1. a) 1 T-shirt; 10; $50(t - 10) \geq 250$ **b)** $t \geq 15$; You need to charge greater than or equal to $15 per T-shirt to make a profit.
c)



2. a) *Variable:* 1 poster; *Inequality:* $150p - 60p \geq 75$ **b)** $x > 0.8333\ldots$
c) You must sell each poster for at least $0.83 to make a profit of $75.
d) I will sell my posters for $1 each because this will make a profit and it's still a reasonable price.