

Discuss the ideas

- How is the solution of an inequality different from the solution of an equation?
- How do you know whether to use an open circle or a shaded circle in the graph of an inequality?

Practice

Check

3. Is each inequality true or false?

Explain your reasoning.

- | | |
|-----------------|--------------------------------|
| a) $5 < 8$ | b) $-5 < -8$ |
| c) $5 < -8$ | d) $5 < 5$ |
| e) $5 \leq 5$ | f) $0 \geq -5$ |
| g) $5.01 < 5.1$ | h) $\frac{1}{5} < \frac{1}{8}$ |
4. Use a symbol to write an inequality that corresponds to each statement.
- x is less than -2 .
 - p is greater than or equal to 6 .
 - y is negative.
 - m is positive.
5. Is each number a solution of $x < -2$? How do you know?
- | | | |
|---------|-----------|-------------------|
| a) 0 | b) -6.9 | c) -2.001 |
| d) -3 | e) -2 | f) $-\frac{1}{2}$ |
6. Write 4 numbers that are solutions of each inequality.
- | | |
|----------------|-----------------|
| a) $b > 5$ | b) $7 > x$ |
| c) $-2 \leq v$ | d) $w \leq -12$ |

Apply

7. Determine whether the given number is a solution of the inequality. If the number is not a solution, write an inequality for which the number is a solution.
- | | |
|--------------------------------|---------------------|
| a) $w < 3; 3$ | b) $-3.5 < y; 0$ |
| c) $m \geq 5\frac{1}{2}; 5.05$ | d) $a \leq -2; -15$ |

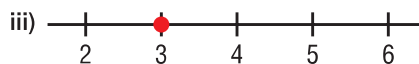
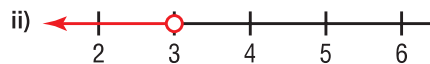
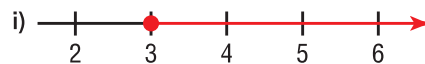
8. Define a variable and write an inequality to model each situation.

- A coffee maker can hold no more than 12 cups of water.
- You must be at least 15 years old to obtain a learner's permit to drive in Nunavut.
- The maximum seating capacity of a school bus is 48 students.
- Over 2500 people participate in the charity bike-a-thon each year.
- The shoe store sells sizes no larger than 13.

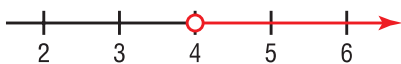
9. Match each equation or inequality with the graph of its solution below.

Justify your choice.

- | | |
|---------------|---------------|
| a) $m > 3$ | b) $p = 3$ |
| c) $k \leq 3$ | d) $t < 3$ |
| e) $v \geq 3$ | f) $3 < n$ |
| g) $3 \geq h$ | h) $3 \leq s$ |



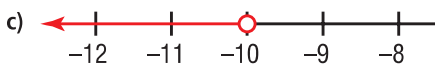
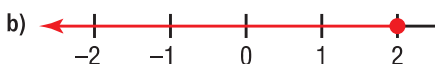
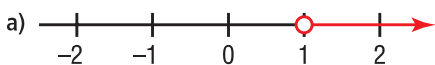
10. Tom and Stevie write the inequality whose solution is shown on this graph:



Tom writes $a > 4$. Stevie writes $4 < b$.
Can both of them be correct? Explain.

11. Assessment Focus

- a) For each situation, define a variable and write an inequality to describe the situation.
- In Canada, a child under 23 kg must ride in a car seat.
 - A silicone oven mitt is heat resistant to temperatures up to 485°C .
 - The minimum wage in Alberta is \$8.40 an hour.
- b) Graph the solution of each inequality on a number line.
12. Write an inequality whose solution is graphed on the number line. In each case, are 1 and -3 solutions of the inequality? Explain.



Reflect

An inequality can be described with words, symbols, or a graph.
Which representation do you find easiest to understand? Explain.
Include an example in your explanation.

13. Graph the solution of each inequality on a number line.

- | | |
|--------------------------|--------------------------|
| a) $w > 5.5$ | b) $x \leq -2$ |
| c) $z > -6$ | d) $a < 6.8$ |
| e) $b \leq 6.8$ | f) $c > \frac{2}{3}$ |
| g) $d \leq -\frac{2}{3}$ | h) $x \leq \frac{18}{5}$ |

Take It Further

14. Joel is producing a one-hour TV show. An advertiser wants at least 12 min of commercials, and the station will not allow more than 20 min of commercials. Graph the possible show times on a number line. Write two inequalities to describe the situation.



15. The words “over,” “under,” “maximum,” “minimum,” “at least,” and “no more than” can describe inequalities.
- Which symbol describes each word?
 - Give a real-world situation that could be described by each word. Write the situation as an inequality.
16. Use a symbol to write an inequality for this statement: y is not negative.
Justify your inequality.

19. a) $m = 8$ b) $t = \frac{20}{11}$
 c) $r = -\frac{1}{39}$ d) $x = \frac{67}{90}$

20. a) Dembe's method:

$$\begin{aligned} \frac{x}{3} + \frac{x}{4} &= x - \frac{1}{6} \\ 12\left(\frac{x}{3} + \frac{x}{4}\right) &= 12\left(x - \frac{1}{6}\right) \\ 4x + 3x &= 12x - 2 \\ 7x &= 12x - 2 \\ 7x - 12x &= 12x - 12x - 2 \\ -5x &= -2 \\ \frac{-5x}{-5} &= \frac{-2}{-5} \\ x &= \frac{2}{5} \end{aligned}$$

Bianca's method:

$$\begin{aligned} \frac{x}{3} + \frac{x}{4} &= x - \frac{1}{6} \\ 24\left(\frac{x}{3} + \frac{x}{4}\right) &= 24\left(x - \frac{1}{6}\right) \\ 8x + 6x &= 24x - 4 \\ 14x &= 24x - 4 \\ 14x - 24x &= 24x - 24x - 4 \\ -10x &= -4 \\ \frac{-10x}{-10} &= \frac{-4}{-10} \\ x &= \frac{4}{10} \\ x &= \frac{2}{5} \end{aligned}$$

b) Using the least common denominator saves the step of simplifying the final answer.

21. a) $x = -3\frac{2}{3}$ b) $x = 20$
 c) $x = 4$ d) $x = 5$

22. Marlene made 10 assisted blocks.

23. a) Let m represent the number of minutes.

$$28 + 0.45(m - 30) = 40 + 0.25m$$

b) The monthly costs for both plans are the same at 127.5 min.

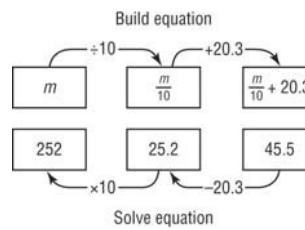
Unit 6: Start Where You Are, page 285

1. The price before the increase was \$1.28/L.

Unit 6 Mid-Unit Review, page 286

1. a) Divide by -3 . b) Add 2.
 c) Divide by 2. d) Subtract 9.

2. a)



b)

$$\begin{aligned} \frac{m}{10} + 20.3 &= 45.5 \\ \frac{m}{10} + 20.3 - 20.3 &= 45.5 - 20.3 \\ \frac{m}{10} &= 25.2 \\ \frac{m}{10} \times 10 &= 25.2 \times 10 \\ m &= 252 \end{aligned}$$

3. a) $2.5 + 1.2k = 27.7$; $k = 21$
 Sheila travelled 21 km.
4. a) Let s represent the length of the third side in centimetres: $2(2.7) + s = 7.3$, or $5.4 + s = 7.3$
 b) $s = 1.9$
5. a) $k = -4.5$ b) $b = 7\frac{2}{3}$
 c) $x = 10.1$ d) $b = 7$
 e) $n = 2.4$ f) $h = -23.2$
6. $6k + 1 = 2k + 9$; $k = 2$
7. a) $a = -16$ b) $w = 6.4$
 c) $z = 8.4$ d) $x = 6$
 e) $r = 7$ f) $y = -3$
 g) $m = -1$
8. a) Let t represent the time in hours. $15 + 3t = 12 + 4t$
 b) $t = 3$

6.3 Introduction to Linear Inequalities, page 292

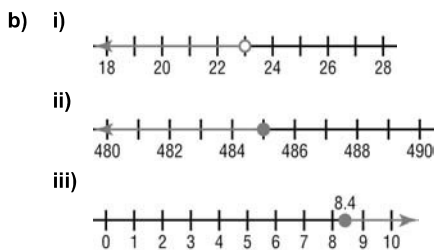
3. a) True b) False
 c) False d) False
 e) True f) True
 g) True h) False
4. a) $x < -2$ b) $p \geq 6$
 c) $y < 0$ d) $m > 0$
5. a) No, $0 > -2$ b) Yes, $-6.9 < -2$
 c) Yes, $-2.001 < -2$ d) Yes, $-3 < -2$
 e) No, $-2 = -2$ f) No, $-\frac{1}{2} > -2$
6. Answers will vary. For example:
 a) 5.01, 8, 10, 35 b) 6.9, 6, 0, -7
 c) -1.5, 0, 2, 2.01 d) -20, -15, -13, -12.25
7. a) No b) Yes
 c) No d) Yes

8. a) Let c represent the number of cups of water a coffee maker can hold. $c \leq 12$
 b) Let a years represent the age to obtain a learner's permit to drive in Nunavut. $a \geq 15$
 c) Let m represent the maximum seating capacity of a school bus. $m \leq 48$
 d) Let n represent the number of people participating in the charity bike-a-thon each year. $n > 2500$
 e) Let s represent the size of shoes in a shoe store. $s \leq 13$

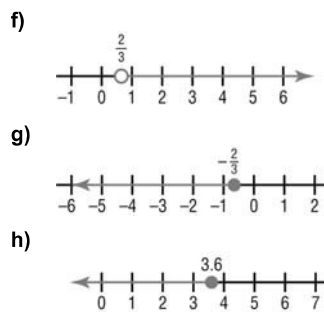
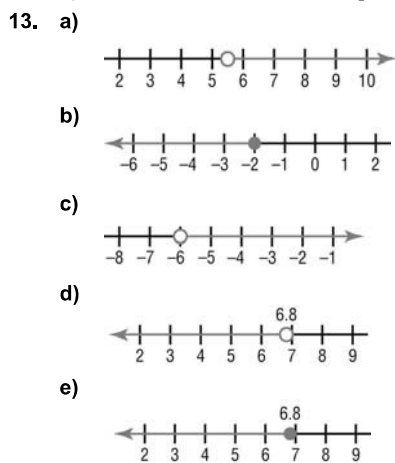
9. a) Graph v b) Graph iii
 c) Graph iv d) Graph ii
 e) Graph i f) Graph v
 g) Graph iv h) Graph i

10. Both are correct. They wrote the same inequality using a different variable.

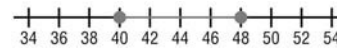
11. a) i) Let k represent the mass in kilograms of a child who must ride in a car seat in Canada. $k < 23$
 ii) Let t represent the temperature in degrees Celsius that a silicone oven mitt can resist. $t \leq 485$
 iii) Let w dollars represent the minimum hourly wage in dollars in Alberta. $w \geq 8.40$



12. a) $x > 1$; neither 1 nor -3 is part of the solution.
 b) $x \leq 2$; both 1 and -3 are part of the solution.
 c) $x < -10$; neither 1 nor -3 is part of the solution.



14. Let t represent the possible show time in minutes. $t \leq 48$ and $t \geq 40$



15. a) Over is $>$; under is $<$; maximum is \leq ; minimum is \geq ; at least is \geq ; no more than is \leq .
 16. $y \geq 0$

6.4 Solving Inequality by Using Addition and Subtraction, page 298

4. a) Subtract 4. b) Add $\frac{2}{3}$.
 c) Add 4. d) Add 4.5.
 e) Subtract $\frac{3}{10}$.
 f) Subtract 4.9.
5. a) Add 2. b) Subtract 4.2.
 c) Add $\frac{1}{2}$.
6. Answers will vary. For example:
 a) 5, 6.5, $\frac{15}{2}$ b) 10, 9.5, $\frac{3}{2}$
 c) $-5, -7.1, -8\frac{1}{4}$ d) 11, 11.2, $\frac{23}{2}$
7. a) $c > 4$ corresponds to graph iii; 3 is not a solution.
 b) $w \leq 13$ corresponds to graph ii; 3 is a possible solution.
 c) $r < -7$ corresponds to graph i; 3 is not a solution.
 d) $m \leq -9$ corresponds to graph iv; 3 is not a solution.
8. a) $x > -3$ b) $y \leq -6$
 c) $a \leq 4$ d) $x < -5$
 e) $k < -21$ f) $q < 6.4$
9. a) $t < 43$ b) $x < -11$
 c) $x < 11$ d) $a \leq -7$
 e) $p \geq -10.4$ f) $y \geq -37.4$
10. No, -9 is only one of the possible solutions. The solution of $-7 \geq b + 2$ is $-9 \geq b$.
11. a) $p = -10.2$ b) $p \geq -10.2$
 c) The processes are the same.