

4. Refer to Example 4. Suppose that after salary negotiations, Uptown Fashions offers a salary of \$1800 per month, plus a commission of 3% of sales, and Ergo Designs offers a salary of \$1900 per month, plus a commission of 5% of sales in excess of \$15,000. If sales always exceed \$15,000, for what amount of sales would Ergo Designs provide higher pay?

3. **Carry out.** We solve the inequality:

$$1500 + 0.04S > 1700 + 0.06(S - 10,000)$$

$$1500 + 0.04S > 1700 + 0.06S - 600$$

$$1500 + 0.04S > 1100 + 0.06S$$

$$400 > 0.02S$$

$$20,000 > S, \text{ or } S < 20,000.$$

4. **Check.** The above steps indicate that income from Uptown Fashions is higher than income from Ergo Designs for sales less than \$20,000. In the *Familiarize* step, we saw that for sales of \$12,000, Uptown pays more. Since $12,000 < 20,000$, this is a partial check.

5. **State.** When monthly sales are less than \$20,000, Uptown Fashions provides the higher pay (assuming sales are greater than \$10,000).

Using the distributive law
Combining like terms
Subtracting 1100 and 0.04S
from both sides
Dividing both sides by 0.02

YOUR TURN

9.1

EXERCISE SET

FOR EXTRA HELP

MyMathLab[®] MathXL

PRACTICE



WATCH



READ



REVIEW

Answers to exercises marked with \square appear in the Additional Instructor's Answers at the back of the book.

Vocabulary and Reading Check

Choose the word from the following list that best completes each statement. Not every word will be used.

above negative
below on
equation positive
inequality solution

- A(n) inequality is a sentence containing $<$, $>$, \leq , \geq , or \neq .
- Because $-8 < -1$ is true, -8 is a(n) solution of $x < -1$.
- We reverse the direction of the inequality symbol when we multiply both sides of an inequality by a(n) negative number.
- When $f(x) > g(x)$, the graph of f lies above the graph of g .

Concept Reinforcement

Classify each of the following as equivalent inequalities, equivalent equations, equivalent expressions, or not equivalent.

- $5x + 7 = 6 - 3x$, $8x + 7 = 6$ Equivalent equations
- $2(4x + 1)$, $8x + 2$ Equivalent expressions

- $x - 7 > -2$, $x > 5$ Equivalent inequalities
- $-4t \leq 12$, $t \leq -3$ Not equivalent
- $\frac{3}{5}a + \frac{1}{5} = 2$, $3a + 1 = 10$ Equivalent equations
- $-\frac{1}{3}t \leq -5$, $t \geq 15$ Equivalent inequalities

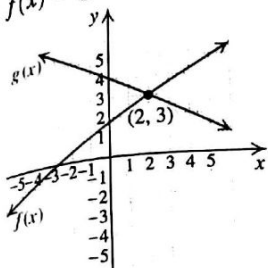
Solving Inequalities

Solve algebraically.

- $3x + 1 < 7$ \square
- $3 - x \geq 12$ \square
- $\frac{2x + 7}{5} < -9$ \square
- $\frac{3t - 7}{-4} \leq 5$ \square
- $3 - 8y \geq 9 - 4y$ $\{y | y \leq -\frac{3}{2}\}$, or $(-\infty, -\frac{3}{2}]$
- $4m + 7 \geq 9m - 3$ $\{m | m \leq 2\}$, or $(-\infty, 2]$
- $5(t - 3) + 4t < 2(7 + 2t)$ $\{t | t < \frac{29}{5}\}$, or $(-\infty, \frac{29}{5})$
- $2(4 + 2x) > 2x + 3(2 - 5x)$ $\{x | x > -\frac{2}{17}\}$, or $(-\frac{2}{17}, \infty)$
- $5[3m - (m + 4)] > -2(m - 4)$ $\{m | m > \frac{7}{3}\}$, or $(\frac{7}{3}, \infty)$
- $8x - 3(3x + 2) - 5 \geq 3(x + 4) - 2x$ \square
- $2x - 5 \geq 9$ \square
- $8 - x < 15$ \square
- $\frac{5y + 13}{4} > -2$ \square
- $\frac{2t - 9}{-3} \geq 7$ \square

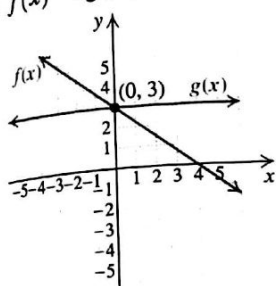
Solve each inequality using the given graph.

25. $f(x) \geq g(x)$



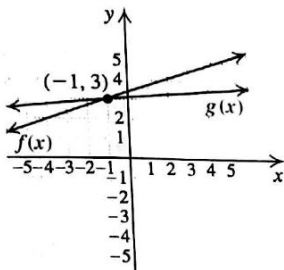
$\{x|x \geq 2\}$, or $[2, \infty)$

27. $f(x) < g(x)$



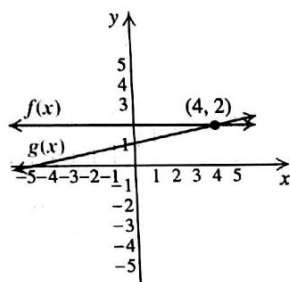
$\{x|x > 0\}$, or $(0, \infty)$

26. $f(x) < g(x)$



$\{x|x < -1\}$, or $(-\infty, -1)$

28. $f(x) \geq g(x)$



$\{x|x \leq 4\}$, or $(-\infty, 4]$

Solve graphically.

29. $x - 3 < 4$ $\{x|x < 7\}$, or $(-\infty, 7)$

30. $x + 4 \geq 6$ $\{x|x \geq 2\}$, or $[2, \infty)$

31. $2x - 3 \geq 1$ $\{x|x \geq 2\}$, or $[2, \infty)$

32. $3x + 1 < 1$ $\{x|x < 0\}$, or $(-\infty, 0)$

33. $x + 3 > 2x - 5$ $\{x|x < 8\}$, or $(-\infty, 8)$

34. $3x - 5 \leq 3 - x$ $\{x|x \leq 2\}$, or $(-\infty, 2]$

35. $\frac{1}{2}x - 2 \leq 1 - x$ $\{x|x \leq 2\}$, or $(-\infty, 2]$

36. $x + 5 > \frac{1}{3}x - 1$ $\{x|x > -9\}$, or $(-9, \infty)$

37. Let $f(x) = 7 - 3x$ and $g(x) = 2x - 3$.
Find all values of x for which $f(x) \leq g(x)$.

$\{x|x \geq 2\}$, or $[2, \infty)$

38. Let $f(x) = 2x + 1$ and $g(x) = -\frac{1}{2}x + 6$.
Find all values of x for which $f(x) < g(x)$.

$\{x|x < 2\}$, or $(-\infty, 2)$

Applications

Solve.

39. **Photography.** Eli will photograph a wedding for a flat fee of \$900 or for an hourly rate of \$120. For what lengths of time would the hourly rate be less expensive? Lengths of time less than $7\frac{1}{2}$ hr

40. **Truck Rentals.** Jenn can rent a moving truck for either \$99 with unlimited mileage or \$49 plus 80¢ per mile. For what mileages would the unlimited mileage plan save money?

Mileages greater than 62.5 mi

41. **Exam Scores.** There are 80 questions on a college entrance examination. Two points are awarded for

each correct answer, and one-half point is deducted for each incorrect answer. How many questions does Tami need to answer correctly in order to score at least 100 on the test? Assume that Tami answers every question. At least 56 questions correct

42. **Insurance Claims.** After a serious automobile accident, most insurance companies will replace the damaged car with a new one if repair costs exceed 80% of the NADA, or "blue-book," value of the car. Lorenzo's car recently sustained \$9200 worth of damage but was not replaced. What was the blue-book value of his car? \$11,500 or more

43. **Wages.** Toni can be paid in one of two ways:

Plan A: A salary of \$400 per month, plus a commission of 8% of gross sales;

Plan B: A salary of \$610 per month, plus a commission of 5% of gross sales.

For what amount of gross sales should Toni select plan A? Gross sales greater than \$7000

44. **Wages.** Eric can be paid for his masonry work in one of two ways:

Plan A: \$300 plus \$15.00 per hour;

Plan B: Straight \$17.50 per hour.

Suppose that the job takes n hours. For what values of n is plan B better for Eric?

Values of n greater than 120 hr

45. **ATM Rates.** The Intercity Bank offers two account plans. Their Local plan charges a \$5 monthly service fee plus \$3.00 for each ATM (automated teller machine) transaction beyond 4 transactions per month. Their Anywhere plan charges a \$15 monthly service fee plus \$1.75 per ATM transaction. For what number of ATM transactions per month will the Anywhere plan cost less?

For more than 17 transactions

46. **Checking Accounts.** North Bank charges \$10 per month for a student checking account. The first 8 checks are free, and each additional check costs \$0.75. South Bank offers a student checking account with no monthly charge. The first 8 checks are free, and each additional check costs \$3. For what numbers of checks is the South Bank plan more expensive? (Assume that the student will always write more than 8 checks.) For more than 12 checks

47. **Digital Music.** The amount of money spent worldwide for streaming music services t years after 2010 can be approximated by

$$m(t) = 0.42t + 0.532,$$

where $m(t)$ is in billions of dollars. Determine (using an inequality) those years for which more than \$3 billion will be spent for streaming music services. Years after 2015

Source: Based on data from Gartner