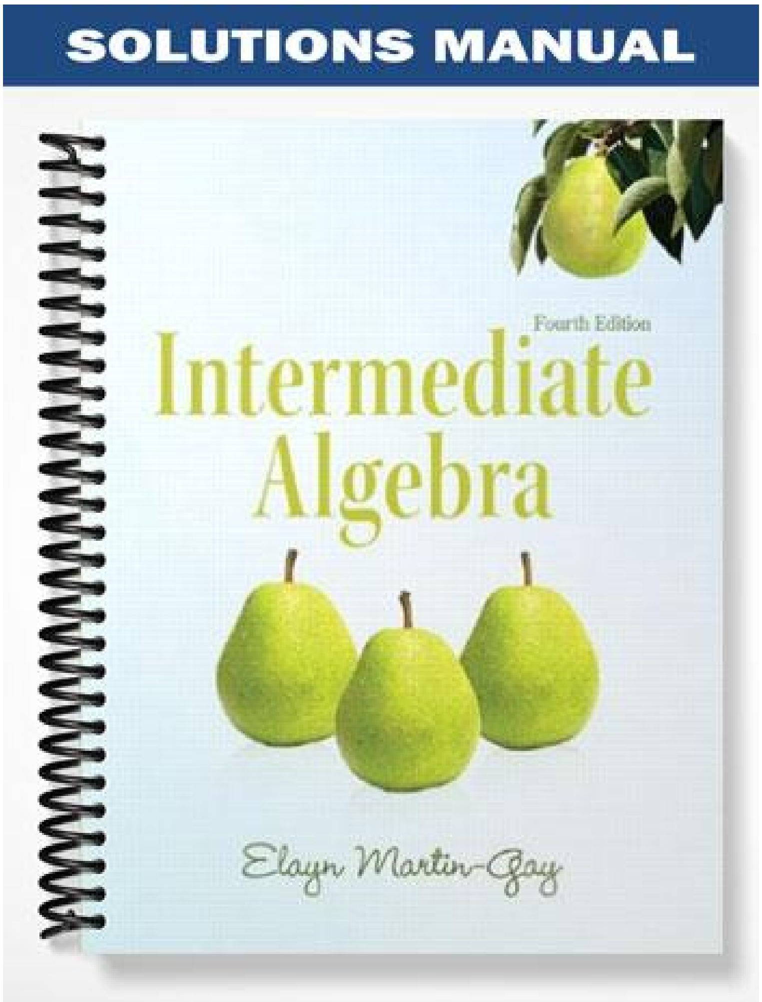
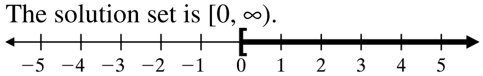
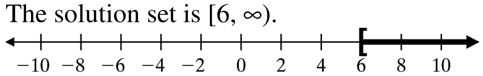

SOLUTIONS MANUAL
Fourth Edition
Intermediate
Algebra
Elayn Martin-Gay

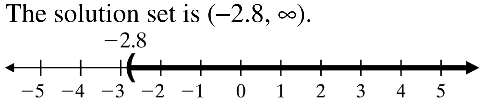
**16.** $7x-1 \geq 6x-1$
$7x-1+1 \geq 6x-1+1$
$7x \geq 6x$
$7x-6x \geq 6x-6x$
$x \geq 0$
The solution set is $[0, \infty)$.



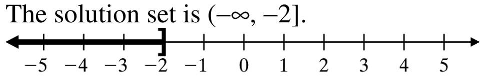

**18.** $\frac{5}{6}x \geq 5$
$\frac{6}{5}\left(\frac{5}{6}x\right) \geq \frac{6}{5}(5)$
$x \geq 6$
The solution set is $[6, \infty)$.




**20.** $4x > -11.2$
$\frac{4x}{4} > \frac{-11.2}{4}$
$x > -2.8$
The solution set is $(-2.8, \infty)$.




**22.** $-4x \geq 8$
$\frac{-4x}{-4} \leq \frac{8}{-4}$
$x \leq -2$
The solution set is $(-\infty, -2]$.




**24.** $8-5x \leq 23$
$8-5x-8 \leq 23-8$
$-5x \leq 15$
$\frac{-5x}{-5} \geq \frac{15}{-5}$
$x \geq -3$
The solution set is $[-3, \infty)$.

**26.** $20+x < 6x-15$
$20+x-20 < 6x-15-20$
$x < 6x-35$
$x-6x < 6x-35-6x$
$-5x < -35$
$\frac{-5x}{-5} > \frac{-35}{-5}$
$x > 7$
The solution set is $(7, \infty)$.

**28.** $6(2-3x) \geq 12$
$12-18x \geq 12$
$12-18x-12 \geq 12-12$
$-18x \geq 0$
$\frac{-18x}{-18} \leq \frac{0}{-18}$
$x \leq 0$
The solution set is $(-\infty, 0]$.

**30.** $5(x+4) \leq 4(2x+3)$
$5x+20 \leq 8x+12$
$5x+20-20 \leq 8x+12-20$
$5x \leq 8x-8$
$5x-8x \leq 8x-8-8x$
$-3x \leq -8$
$\frac{-3x}{-3} \geq \frac{-8}{-3}$
$x \geq \frac{8}{3}$
The solution set is $\left[\frac{8}{3}, \infty\right)$.

**32.** $\frac{1-2x}{3} + \frac{3x+7}{7} > 1$
$21\left[\frac{1-2x}{3} + \frac{3x+7}{7}\right] > 21(1)$
$21\left(\frac{1-2x}{3}\right) + 21\left(\frac{3x+7}{7}\right) > 21$
$7(1-2x)+3(3x+7) > 21$
$7-14x+9x+21 > 21$
$-5x+28 > 21$
$-5x+28-28 > 21-28$
$-5x > -7$
$\frac{-5x}{-5} < \frac{-7}{-5}$
$x < \frac{7}{5}$
The solution set is $\left(-\infty, \frac{7}{5}\right)$.

**34.**
$$\begin{aligned}-2(4x+2) &> -5[1+2(x-1)]\\ -8x-4 &> -5[1+2x-2]\\ -8x-4 &> -5[2x-1]\\ -8x-4 &> -10x+5\\ -8x-4+4 &> -10x+5+4\\ -8x &> -10x+9\\ -8x+10x &> -10x+9+10x\\ 2x &> 9\\ x &> \frac{9}{2}\end{aligned}$$
The solution set is $\left(\frac{9}{2}, \infty\right)$.

**36.**
$$\begin{aligned}x-9 &< -12\\ x-9+9 &< -12+9\\ x &< -3\end{aligned}$$
The solution set is $(-\infty, -3)$.

**38.**
$$\begin{aligned}-x &> -2\\ \frac{-x}{-1} &< \frac{-2}{-1}\\ x &< 2\end{aligned}$$
The solution set is $(-\infty, 2)$.

**40.**
$$\begin{aligned}-6x &\le 4.2\\ \frac{-6x}{-6} &\ge \frac{4.2}{-6}\\ x &\ge -0.7\end{aligned}$$
The solution set is $[-0.7, \infty)$.

**42.**
$$\begin{aligned}\frac{3}{4}-\frac{2}{3} &\ge \frac{x}{6}\\ 12\left[\frac{3}{4}-\frac{2}{3}\right] &\ge 12\left(\frac{x}{6}\right)\\ 12\left(\frac{3}{4}\right)-12\left(\frac{2}{3}\right) &\ge 2x\\ 9-8 &\ge 2x\\ 1 &\ge 2x\\ \frac{1}{2} &\ge \frac{2x}{2}\\ \frac{1}{2} &\ge x\end{aligned}$$
The solution set is $\left(-\infty, \frac{1}{2}\right]$.

**44.**
$$\begin{aligned}-6x+2 &< -3(x+4)\\ -6x+2 &< -3x-12\\ -6x+2-2 &< -3x-12-2\\ -6x &< -3x-14\\ -6x+3x &< -3x-14+3x\\ -3x &< -14\\ \frac{-3x}{-3} &> \frac{-14}{-3}\\ x &> \frac{14}{3}\end{aligned}$$
The solution set is $\left(\frac{14}{3}, \infty\right)$.

**46.**
$$\begin{aligned}\frac{4}{5}(x+1) &\le x+1\\ 5\left[\frac{4}{5}(x+1)\right] &\le 5(x+1)\\ 4(x+1) &\le 5x+5\\ 4x+4 &\le 5x+5\\ 4x+4-4 &\le 5x+5-4\\ 4x &\le 5x+1\\ 4x-5x &\le 5x+1-5x\\ -1x &\le 1\\ \frac{-1x}{-1} &\ge \frac{1}{-1}\\ x &\ge -1\end{aligned}$$
The solution set is $[-1, \infty)$.

**48.**
$$\begin{aligned}0.7x-x &> 0.45\\ -0.3x &> 0.45\\ \frac{-0.3x}{-0.3} &< \frac{0.45}{-0.3}\\ x &< -1.5\end{aligned}$$
The solution set is $(-\infty, -1.5)$.

**50.**
$$\begin{aligned}7(2x+3)+4x &\le 7+5(3x-4)+x\\ 14x+21+4x &\le 7+15x-20+x\\ 18x+21 &\le 16x-13\\ 18x+21-21 &\le 16x-13-21\\ 18x &\le 16x-34\\ 18x-16x &\le 16x-34-16x\\ 2x &\le -34\\ \frac{2x}{2} &\le \frac{-34}{2}\\ x &\le -17\end{aligned}$$
The solution set is $(-\infty, -17]$.

**52.**
$$\begin{aligned} 13y-(9y+2) &\le 5(y-6)+10 \\ 13y-9y-2 &\le 5y-30+10 \\ 4y-2 &\le 5y-20 \\ 4y-2+2 &\le 5y-20+2 \\ 4y &\le 5y-18 \\ 4y-5y &\le 5y-18-5y \\ -1y &\le -18 \\ \frac{-1y}{-1} &\ge \frac{-18}{-1} \\ y &\ge 18 \end{aligned}$$
The solution set is $[18, \infty)$.

**54.**
$$\begin{aligned} \frac{2}{3}(x+3) &< \frac{1}{6}(2x-8)+2 \\ 6\left[\frac{2}{3}(x+3)\right] &< 6\left[\frac{1}{6}(2x-8)+2\right] \\ 4(x+3) &< 6\left[\frac{1}{6}(2x-8)\right]+6(2) \\ 4x+12 &< 1(2x-8)+12 \\ 4x+12 &< 2x-8+12 \\ 4x+12 &< 2x+4 \\ 4x+12-12 &< 2x+4-12 \\ 4x &< 2x-8 \\ 4x-2x &< 2x-8-2x \\ 2x &< -8 \\ \frac{2x}{2} &< \frac{-8}{2} \\ x &< -4 \end{aligned}$$
The solution set is $(-\infty, -4)$.

**56.**
$$\begin{aligned} 0.2(8x-2) &< 1.2(x-3) \\ 10[0.2(8x-2)] &< 10[1.2(x-3)] \\ 2(8x-2) &< 12(x-3) \\ 16x-4 &< 12x-36 \\ 16x-4+4 &< 12x-36+4 \\ 16x &< 12x-32 \\ 16x-12x &< 12x-32-12x \\ 4x &< -32 \\ \frac{4x}{4} &< \frac{-32}{4} \\ x &< -8 \end{aligned}$$
The solution set is $(-\infty, -8)$.

**58.**
$$\begin{aligned} \frac{7}{12}x-\frac{1}{3} &\le \frac{3}{8}x-\frac{5}{6} \\ 24\left(\frac{7}{12}x-\frac{1}{3}\right) &\le 24\left(\frac{3}{8}x-\frac{5}{6}\right) \\ 24\left(\frac{7}{12}x\right)-24\left(\frac{1}{3}\right) &\le 24\left(\frac{3}{8}x\right)-24\left(\frac{5}{6}\right) \\ 14x-8 &\le 9x-20 \\ 14x-8+8 &\le 9x-20+8 \\ 14x &\le 9x-12 \\ 14x-9x &\le 9x-12-9x \\ 5x &\le -12 \\ \frac{5x}{5} &\le \frac{-12}{5} \\ x &\le -\frac{12}{5} \end{aligned}$$
The solution set is $\left(-\infty, -\frac{12}{5}\right]$.

**60.**
$$\begin{aligned} \frac{3-4x}{6}-\frac{1-2x}{12} &\le -2 \\ 12\left(\frac{3-4x}{6}-\frac{1-2x}{12}\right) &\le 12(-2) \\ 12\left(\frac{3-4x}{6}\right)-12\left(\frac{1-2x}{12}\right) &\le -24 \\ 2(3-4x)-(1-2x) &\le -24 \\ 6-8x-1+2x &\le -24 \\ 5-6x &\le -24 \\ 5-5-6x &\le -24-5 \\ -6x &\le -29 \\ \frac{-6x}{-6} &\ge \frac{-29}{-6} \\ x &\ge \frac{29}{6} \end{aligned}$$
The solution set is $\left[\frac{29}{6}, \infty\right)$.

**62.**
$$\begin{aligned} \frac{x-4}{2}-\frac{x-2}{3} &> \frac{5}{6} \\ 6\left(\frac{x-4}{2}-\frac{x-2}{3}\right) &> 6\left(\frac{5}{6}\right) \\ 6\left(\frac{x-4}{2}\right)-6\left(\frac{x-2}{3}\right) &> 6\left(\frac{5}{6}\right) \\ 3(x-4)-2(x-2) &> 5 \\ 3x-12-2x+4 &> 5 \\ x-8 &> 5 \\ x-8+8 &> 5+8 \\ x &> 13 \end{aligned}$$
The solution set is $(13, \infty)$.

**64.**
$$\frac{3x+2}{18}-\frac{1+2x}{6}\le-\frac{1}{2}$$
$$18\left(\frac{3x+2}{18}-\frac{1+2x}{6}\right)\le18\left(-\frac{1}{2}\right)$$
$$18\left(\frac{3x+2}{18}\right)-18\left(\frac{1+2x}{6}\right)\le18\left(-\frac{1}{2}\right)$$
$$3x+2-3(1+2x)\le-9$$
$$3x+2-3-6x\le-9$$
$$-3x-1\le-9$$
$$-3x-1+1\le-9+1$$
$$-3x\le-8$$
$$\frac{-3x}{-3}\ge\frac{-8}{-3}$$
$$x\ge\frac{8}{3}$$

The solution set is $\left[\frac{8}{3},\infty\right)$.

**66. a.** Let $x$ be Holden's time on his last trial.
$$\frac{6.85+7.04+6.92+x}{4}<7$$
$$4\left(\frac{6.85+7.04+6.92+x}{4}\right)<4(7)$$
$$6.85+7.04+6.92+x<28$$
$$20.81+x-20.81<28-20.81$$
$$x<7.19$$

The solution is $\{x|x<7.19\}$.

**b.** A time of 7.19 minutes or less will result in an average time under 7.0 minutes.

**68. a.** Let $x$ be the number of whole ounces mailed.
$$0.88+0.17(x-1)\le2$$
$$100[0.88+0.17(x-1)]\le100(2)$$
$$100(0.88)+100[0.17(x-1)]\le200$$
$$88+17(x-1)\le200$$
$$88+17x-17\le200$$
$$71+17x\le200$$
$$71+17x-17\le200-71$$
$$17x\le129$$
$$\frac{17x}{17}\le\frac{129}{17}$$
$$x\le7.5882$$

The solution is $\{x|x\le7\}$.

**b.** Seven ounces or less can be mailed for \$2.00 or less.

**70. a.** Let $x$ be the number of hours parked. So $2x$ is the number of half-hour intervals parked.
$$1.0+0.6(2x-1)\le4$$
$$10[1.0+0.6(2x-1)]\le10(4)$$
$$10(1.0)+10[0.6(2x-1)]\le40$$
$$10+6(2x-1)\le40$$
$$10+12x-6\le40$$
$$4+12x\le40$$
$$4+12x-4\le40-4$$
$$12x\le36$$
$$\frac{12x}{12}\le\frac{36}{12}$$
$$x\le3$$

The solution is $\{x|x\le3\}$.

**b.** With \$4, you can park for 3 hours or less.

**72. a.** Let $x$ be the number of daily miles. Then the daily charge for plan B is \$(24 + 0.15$x$). Plan A is more economical when the daily charge for Plan B is more than \$36.
$$24+0.15x>36$$
$$0.15x>12$$
$$x>80$$

The solution is $\{x|x>80\}$.

**b.** Plan A is more economical for more than 80 daily miles.

**74.** Stibnite melts at temperatures of 977°F or greater. Use $C=\frac{5}{9}(F-32)$. Replace $F$ with 977.
$$C=\frac{5}{9}(F-32)$$
$$C=\frac{5}{9}(977-32)$$
$$C=\frac{5}{9}(945)$$
$$C=525$$

977°F = 525°C

So stibnite melts at temperatures of 525°C or greater. The solution set is $\{C|C\ge525°\}$.

**76. a.** Let $t$ be the number of years after 1997.
$$-12.4t+480.5<c$$
$$-12.4t+480.5<50$$
$$-12.4t+480.5-480.5<50-480.5$$
$$-12.4t<-430.5$$
$$\frac{-12.4t}{-12.4}>\frac{-430.5}{-12.4}$$
$$t>34.7$$

1997 + 35 = 2032
In the year 2032 and after cigarette consumption will be less than 50 billion per year.

**b.** answers may vary

**78.** Consumption of skim milk is decreasing over time; answers may vary.

**80.** 2015 is 15 years after 2000, so 2015 corresponds to $t = 15$.
$s = -0.35t + 29.9$
$s = -0.35(15) + 29.9$
$s = -5.25 + 29.9$
$s = 24.65$
The average consumption of skim milk is expected to be 24.65 pounds per person per year in 2015.

**82.** answers may vary

**84.** answers may vary

**86.** answers may vary

**88.** The integers that are both greater than 1 and less than 5 are {2, 3, 4}.

**90.** The integers that are both greater than or equal to −2 and greater than or equal to 2 are {2, 3, 4, 5, ...}.

**92.**
$$2x-6=4$$
$$2x-6+6=4+6$$
$$2x=10$$
$$\frac{2x}{2}=\frac{10}{2}$$
$$x=5$$
The solution set is {5}.

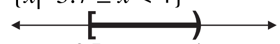
**94.**
$$-x+7=5x-6$$
$$-x+7-7=5x-6-7$$
$$-x=5x-13$$
$$-x-5x=5x-13-5x$$
$$-6x=-13$$
$$\frac{-6x}{-6}=\frac{-13}{-6}$$
$$x=\frac{13}{6}$$
The solution set is $\left\{\frac{13}{6}\right\}$.

**96.** $\{x|x > -4\}$; $(-4, \infty)$


**98.**


$(-\infty, 5]$

**100.** $\{x|-3.7 \le x < 4\}$




**102.** To solve $3x > -14$, both sides must be divided by 3, so the inequality symbol is not reversed.

**104.** To solve $-3x < -14$, both sides must be divided by −3, so the inequality symbol must be reversed.

**106.** answers may vary

**108.**
$$2x-3<5$$
$$2x<8$$
$$x<4$$
The solution set is $(-\infty, 4)$.

**110.** answers may vary

**112.** answers may vary

**114.** answers may vary

**Integrated Review**

**1.**
$$-4x=20$$
$$x=-5$$
The solution set is {−5}.

**2.**
$$-4x<20$$
$$x>-5$$
The solution set is $(-5, \infty)$.

**3.**
$$\frac{3}{4}x \ge 2$$
$$3x \ge 8$$
$$x \ge \frac{8}{3}$$
The solution set is $\left[\frac{8}{3}, \infty\right)$.

**4.**
$$5x+3 \ge 2+4x$$
$$x+3 \ge 2$$
$$x \ge -1$$
The solution set is $[-1, \infty)$.

**5.** $6(y-4)=3(y-8)$
$6y-24=3y-24$
$6y=3y$
$3y=0$
$y=0$
The solution set is $\{0\}$.

**6.** $-4x \le \frac{2}{5}$
$x \ge -\frac{1}{10}$
The solution set is $\left[-\frac{1}{10}, \infty\right)$.

**7.** $-3x \ge \frac{1}{2}$
$x \le -\frac{1}{6}$
The solution set is $\left(-\infty, -\frac{1}{6}\right]$.

**8.** $5(y+4)=4(y+5)$
$5y+20=4y+20$
$5y=4y$
$y=0$
The solution set is $\{0\}$.

**9.** $7x<7(x-2)$
$7x<7x-14$
$0<-14$
False; the solution set is $\varnothing$.

**10.** $\frac{-5x+11}{2} \le 7$
$-5x+11 \le 14$
$-5x \le 3$
$x \ge -\frac{3}{5}$
The solution set is $\left[-\frac{3}{5}, \infty\right)$.

**11.** $-5x+1.5=-19.5$
$-5x=-21$
$x=\frac{21}{5}=4.2$
The solution set is $\{4.2\}$.

**12.** $-5x+4=-26$
$-5x=-30$
$x=6$
The solution set is $\{6\}$.

**13.** $5+2x-x=-x+3-14$
$5+x=-x-11$
$x=-x-16$
$2x=-16$
$x=-8$
The solution set is $\{-8\}$.

**14.** $12x+14<11x-2$
$12x<11x-16$
$x<-16$
The solution set is $(-\infty, -16)$.

**15.**
$$\frac{x}{5}-\frac{x}{4}=\frac{x-2}{2}$$
$$20\left[\frac{x}{5}-\frac{x}{4}\right]=20\left(\frac{x-2}{2}\right)$$
$$20\left(\frac{x}{5}\right)-20\left(\frac{x}{4}\right)=10(x-2)$$
$$4x-5x=10x-20$$
$$-x=10x-20$$
$$-11x=-20$$
$$x=\frac{20}{11}$$
The solution set is $\left\{\frac{20}{11}\right\}$.

**16.** $12x-12=8(x-1)$
$12x-12=8x-8$
$12x=8x+4$
$4x=4$
$x=1$
The solution set is $\{1\}$.

**17.** $2(x-3)>70$
$2x-6>70$
$2x>76$
$x>38$
The solution set is $(38, \infty)$.

**18.** $-3x-4.7=11.8$
$-3x=16.5$
$x=-5.5$
The solution set is $\{-5.5\}$.

**19.** $-2(b-4)-(3b-1)=5b+3$
$-2b+8-3b+1=5b+3$
$-5b+9=5b+3$
$-5b=5b-6$
$-10b=-6$
$b=\frac{-6}{-10}=\frac{3}{5}$
The solution set is $\left\{\frac{3}{5}\right\}$.

**20.** $8(x+3)<7(x+5)+x$
$8x+24<7x+35+x$
$8x+24<8x+35$
$24<35$ True
The solution set is $(-\infty, \infty)$.

**21.** $\frac{3t+1}{8}=\frac{5+2t}{7}+2$
$56\left(\frac{3t+1}{8}\right)=56\left[\frac{5+2t}{7}+2\right]$
$7(3t+1)=56\left(\frac{5+2t}{7}\right)+56(2)$
$21t+7=8(5+2t)+112$
$21t+7=40+16t+112$
$21t+7=16t+152$
$21t=16t+145$
$5t=145$
$t=29$
The solution set is $\{29\}$.

**22.** $4(x-6)-x=8(x-3)-5x$
$4x-24-x=8x-24-5x$
$3x-24=3x-24$
$-24=-24$ True
The solution set is $\{x|x \text{ is a real number}\}$.

**23.** $\frac{x+3}{12}+\frac{x-5}{15}<\frac{2}{3}$
$60\left[\frac{x+3}{12}+\frac{x-5}{15}\right]<60\left(\frac{2}{3}\right)$
$60\left(\frac{x+3}{12}\right)+60\left(\frac{x-5}{15}\right)<40$
$5(x+3)+4(x-5)<40$
$5x+15+4x-20<40$
$9x-5<40$
$9x<45$
$x<5$
The solution set is $(-\infty, 5)$.

**24.** $\frac{y}{3}+\frac{y}{5}=\frac{y+3}{10}$
$30\left[\frac{y}{3}+\frac{y}{5}\right]=30\left[\frac{y+3}{10}\right]$
$30\left(\frac{y}{3}\right)+30\left(\frac{y}{5}\right)=3(y+3)$
$10y+6y=3y+9$
$16y=3y+9$
$13y=9$
$y=\frac{9}{13}$
The solution set is $\left\{\frac{9}{13}\right\}$.

**25.** $5(x-6)+2x>3(2x-1)-4$
$5x-30+2x>6x-3-4$
$7x-30>6x-7$
$7x>6x+23$
$x>23$
The solution set is $(23, \infty)$.

**26.** $14(x-1)-7x\le 2(3x-6)+4$
$14x-14-7x\le 6x-12+4$
$7x-14\le 6x-8$
$7x\le 6x+6$
$x\le 6$
The solution set is $(-\infty, 6]$.

**27.** $\frac{1}{4}(3x+2)-x\ge\frac{3}{8}(x-5)+2$
$8\left[\frac{1}{4}(3x+2)-x\right]\ge 8\left[\frac{3}{8}(x-5)+2\right]$
$8\left[\frac{1}{4}(3x+2)\right]-8(x)\ge 8\left[\frac{3}{8}(x-5)\right]+8(2)$
$2(3x+2)-8x\ge 3(x-5)+16$
$6x+4-8x\ge 3x-15+16$
$-2x+4\ge 3x+1$
$-2x\ge 3x-3$
$-5x\ge -3$
$x\le\frac{3}{5}$
The solution set is $\left(-\infty, \frac{3}{5}\right]$.

**28.**
$$\frac{1}{3}(x-10)-4x > \frac{5}{6}(2x+1)-1$$
$$6\left[\frac{1}{3}(x-10)-4x\right] > 6\left[\frac{5}{6}(2x+1)-1\right]$$
$$6\left[\frac{1}{3}(x-10)\right]-6(4x) > 6\left[\frac{5}{6}(2x+1)\right]-6(1)$$
$$2(x-10)-24x > 5(2x+1)-6$$
$$2x-20-24x > 10x+5-6$$
$$-22x-20 > 10x-1$$
$$-22x > 10x+19$$
$$-32x > 19$$
$$x < -\frac{19}{32}$$
The solution set is $\left(-\infty, -\frac{19}{32}\right)$.

**Section 2.5 Practice**

1. The numbers 3, 4, and 5 are in both sets. The intersection is $\{3, 4, 5\}$.

2. $x+5<9$ and $3x-1<2$
   $x<4$ and $3x<3$
   $x<4$ and $x<1$
   The solution set is $(-\infty, 4) \cap (-\infty, 1) = (-\infty, 1)$.

3. $4x \ge 0$ and $2x+4 \le 2$
   $x \ge 0$ and $2x \le -2$
   $x \ge 0$ and $x \le -1$
   There is no number greater than or equal to 0 and less than or equal to −1. The solution set is $\varnothing$.

4.
$$5 < 1-x < 9$$
$$5-1 < 1-x-1 < 9-1$$
$$4 < -x < 8$$
$$-4 > x > -8$$
The solution set is $(-8, -4)$.

5.
$$-2 < \frac{3}{4}x+2 \le 5$$
$$-2-2 < \frac{3}{4}x+2-2 \le 5-2$$
$$-4 < \frac{3}{4}x \le 3$$
$$4(-4) < 4\left(\frac{3}{4}x\right) \le 4(3)$$
$$-16 < 3x \le 12$$
$$\frac{-16}{3} < \frac{3x}{3} \le \frac{12}{3}$$
$$-\frac{16}{3} < x \le 4$$
The solution set is $\left(-\frac{16}{3}, 4\right]$.

6. The numbers that are in either set are $\{1, 2, 3, 4, 5, 6\}$. This set is the union.

7. $3x-2 \ge 10$ or $x-6 \le -4$
   $3x \ge 12$ or $x \le 2$
   $x \ge 4$ or $x \le 2$
   The solution set is $(-\infty, 2] \cup [4, \infty)$.

8. $x-7 \le -1$ or $2x-6 \ge 2$
   $x \le 6$ or $2x \ge 8$
   $x \le 6$ or $x \ge 4$
   The solution set is $(-\infty, \infty)$.

**Vocabulary and Readiness Check**

1. Two inequalities joined by the words "and" or "or" are called compound inequalities.
2. The word and means intersection.
3. The word or means union.
4. The symbol $\cap$ means intersection.
5. The symbol $\cup$ represents union.
6. The symbol $\varnothing$ is the empty set.
7. The inequality $-2 \le x < 1$ means $-2 \le x$ and $x < 1$.
8. $\{x | x < 0 \text{ and } x > 0\} = \varnothing$.

**Exercise Set 2.5**

2. $C \cap D = \{2, 3, 4, 5\} \cap \{4, 5, 6, 7\} = \{4, 5\}$

**4.** $A \cup D = \{x | x \text{ is an even integer}\} \cup \{4, 5, 6, 7\}$
$= \{x | x \text{ is an even integer or } x = 5 \text{ or } x = 7\}$

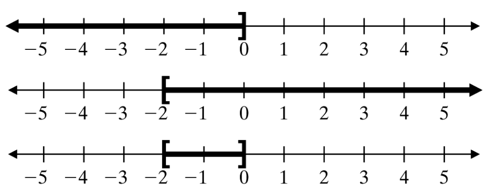
**6.** $A \cap B = \{x | x \text{ is an even integer}\} \cap \{x | x \text{ is an odd integer}\}$
$= \varnothing$

**8.** $B \cup D = \{x | x \text{ is an odd integer}\} \cup \{4, 5, 6, 7\}$
$= \{x | x \text{ is an odd integer or } x = 4 \text{ or } x = 6\}$

**10.** $B \cap C = \{x | x \text{ is an odd integer}\} \cap \{2, 3, 4, 5\}$
$= \{3, 5\}$

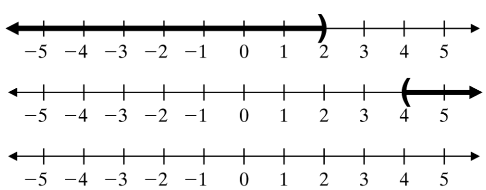
**12.** $A \cup C = \{x | x \text{ is an even integer}\} \cup \{2, 3, 4, 5\}$
$= \{x | x \text{ is an even integer or } x = 3 \text{ or } x = 5\}$

**14.**



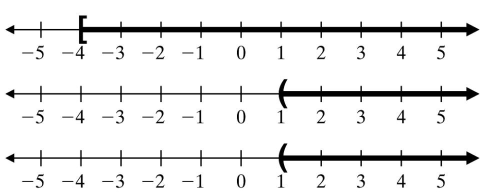

The solution set is $[-2, 0]$.

**16.**




The solution set is $\varnothing$.

**18.**




The solution set is $(1, \infty)$.

**20.**
$$\begin{aligned} x + 2 \geq 3 &\quad \text{and} \quad 5x - 1 \geq 9 \\ x \geq 1 &\quad \text{and} \quad 5x \geq 10 \\ x \geq 1 &\quad \text{and} \quad x \geq 2 \end{aligned}$$

The solution set is $[2, \infty)$.

**22.**
$$\begin{aligned} 2x + 4 > 0 &\quad \text{and} \quad 4x > 0 \\ 2x > -4 &\quad \text{and} \quad x > 0 \\ x > -2 &\quad \text{and} \quad x > 0 \end{aligned}$$

The solution set is $(0, \infty)$.

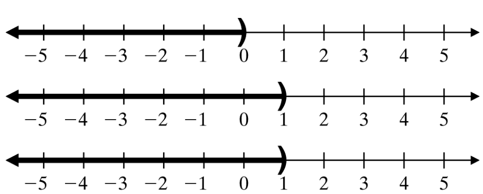
**24.** $-7x \le -21$ and $x - 20 \le -15$
$x \ge 3$ and $x \le 5$
The solution set is [3, 5].

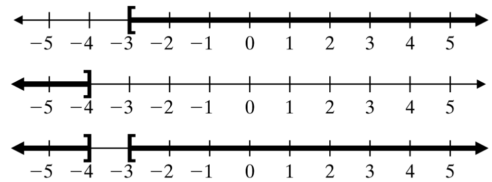
**26.**
$$-2 \le x + 3 \le 0$$
$$-2 - 3 \le x + 3 - 3 \le 0 - 3$$
$$-5 \le x \le -3$$
The solution set is [−5, −3].

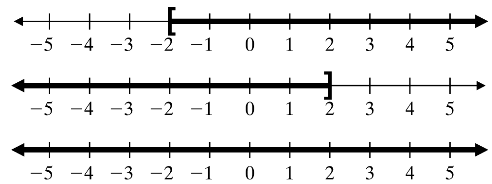
**28.**
$$1 < 4 + 2x < 7$$
$$1 - 4 < 4 + 2x - 4 < 7 - 4$$
$$-3 < 2x < 3$$
$$-\frac{3}{2} < \frac{2x}{2} < \frac{3}{2}$$
$$-\frac{3}{2} < x < \frac{3}{2}$$
The solution set is $\left(-\frac{3}{2}, \frac{3}{2}\right)$.

**30.**
$$-2 < \frac{1}{2}x - 5 < 1$$
$$-2 + 5 < \frac{1}{2}x - 5 + 5 < 1 + 5$$
$$3 < \frac{1}{2}x < 6$$
$$2(3) < 2\left(\frac{1}{2}x\right) < 2(6)$$
$$6 < x < 12$$
The solution set is (6, 12).

**32.**
$$-4 \le \frac{-2x+5}{3} \le 1$$
$$3(-4) \le 3\left(\frac{-2x+5}{3}\right) \le 3(1)$$
$$-12 \le -2x + 5 \le 3$$
$$-12 - 5 \le -2x + 5 - 5 \le 3 - 5$$
$$-17 \le -2x \le -2$$
$$\frac{-17}{-2} \ge \frac{-2x}{-2} \ge \frac{-2}{-2}$$
$$\frac{17}{2} \ge x \ge 1$$
The solution set is $\left[1, \frac{17}{2}\right]$.

**34.**

The solution set is (−∞, 1).

**36.**

The solution set is (−∞, −4] ∪ [−3, ∞).

**38.**

The solution set is (−∞, ∞).

**40.** $-5x \le 10$ or $3x - 5 \ge 1$
$x \ge -2$ or $3x \ge 6$
$x \ge -2$ or $x \ge 2$
The solution set is [−2, ∞).

**42.** $x + 9 < 0$ or $4x > -12$
$x < -9$ or $x > -3$
The solution set is (−∞, −9) ∪ (−3, ∞).

**44.** $5(x-1) \ge -5$ or $5 - x \le 11$
$5x - 5 \ge -5$ or $-x \le 6$
$5x \ge 0$ or $x \ge -6$
$x \ge 0$ or $x \ge -6$
The solution set is [−6, ∞).

**46.** $x < \frac{5}{7}$ and $x < 1$
The solution set is
$\left(-\infty, \frac{5}{7}\right) \cap (-\infty, 1) = \left(-\infty, \frac{5}{7}\right)$.

**48.** $x < \frac{5}{7}$ or $x < 1$
The solution set is $\left(-\infty, \frac{5}{7}\right)$ or
$(-\infty, 1) = (-\infty, 1)$.

**50.**
$$3 < 5x+1 < 11$$
$$3-1 < 5x+1-1 < 11-1$$
$$2 < 5x < 10$$
$$\frac{2}{5} < \frac{5x}{5} < \frac{10}{5}$$
$$\frac{2}{5} < x < 2$$
The solution set is $\left(\frac{2}{5}, 2\right)$.

**52.**
$$\frac{2}{3} < x+\frac{1}{2} < 4$$
$$6\left(\frac{2}{3}\right) < 6\left(x+\frac{1}{2}\right) < 6(4)$$
$$4 < 6(x)+6\left(\frac{1}{2}\right) < 24$$
$$4 < 6x+3 < 24$$
$$4-3 < 6x+3-3 < 24-3$$
$$1 < 6x < 21$$
$$\frac{1}{6} < \frac{6x}{6} < \frac{21}{6}$$
$$\frac{1}{6} < x < \frac{7}{2}$$
The solution set is $\left(\frac{1}{6}, \frac{7}{2}\right)$.

**54.** $2x-1 \ge 3$ and $-x > 2$
$2x \ge 4$ and $x < -2$
$x \ge 2$ and $x < -2$
The solution set is $[2, \infty) \cap (-\infty, -2) = \varnothing$.

**56.** $\frac{3}{8}x+1 \le 0$ or $-2x < -4$
$\frac{3}{8}x \le -1$ or $x > 2$
$\frac{8}{3}\left(\frac{3}{8}x\right) \le \frac{8}{3}(-1)$ or $x > 2$
$x \le -\frac{8}{3}$ or $x > 2$
The solution set is $\left(-\infty, -\frac{8}{3}\right] \cup (2, \infty)$.

**58.**
$$-2 < \frac{-2x-1}{3} < 2$$
$$3(-2) < 3\left(\frac{-2x-1}{3}\right) < 3(2)$$
$$-6 < -2x-1 < 6$$
$$-6+1 < -2x-1+1 < 6+1$$
$$-5 < -2x < 7$$
$$\frac{-5}{-2} > \frac{-2x}{-2} > \frac{7}{-2}$$
$$\frac{5}{2} > x > -\frac{7}{2}$$
The solution set is $\left(-\frac{7}{2}, \frac{5}{2}\right)$.

**60.**
$$-5 < 2(x+4) \le 8$$
$$-5 < 2x+8 \le 8$$
$$-5-8 < 2x+8-8 \le 8-8$$
$$-13 < 2x \le 0$$
$$\frac{-13}{2} < \frac{2x}{2} \le \frac{0}{2}$$
$$-\frac{13}{2} < x \le 0$$
The solution set is $\left(-\frac{13}{2}, 0\right]$.

**62.** $5x \le 0$ and $-x+5 < 8$
$x \le 0$ and $-x < 3$
$x \le 0$ and $x > -3$
The solution set is $(-\infty, 0] \cap (-3, \infty) = (-3, 0]$.

**64.** $-x < 7$ or $3x+1 < -20$
$x > -7$ or $3x < -21$
$x > -7$ or $x < -7$
The solution set is $(-\infty, -7) \cup (-7, \infty)$.

**66.** $-2x < -6$ or $1-x > -2$
$x > 3$ or $-x > -3$
$x > 3$ or $x < 3$
The solution set is $(-\infty, 3) \cup (3, \infty)$.

**68.**
$$-\frac{1}{2} \le \frac{3x-1}{10} < \frac{1}{2}$$
$$10\left(-\frac{1}{2}\right) \le 10\left(\frac{3x-1}{10}\right) < 10\left(\frac{1}{2}\right)$$
$$-5 \le 3x-1 < 5$$
$$-5+1 \le 3x-1+1 < 5+1$$
$$-4 \le 3x < 6$$
$$\frac{-4}{3} \le \frac{3x}{3} < \frac{6}{3}$$
$$-\frac{4}{3} \le x < 2$$
The solution set is $\left[-\frac{4}{3}, 2\right)$.

**70.**
$$-\frac{1}{4} < \frac{6-x}{12} < -\frac{1}{6}$$
$$12\left(-\frac{1}{4}\right) < 12\left(\frac{6-x}{12}\right) < 12\left(-\frac{1}{6}\right)$$
$$-3 < 6-x < -2$$
$$-3-6 < 6-x-6 < -2-6$$
$$-9 < -x < -8$$
$$\frac{-9}{-1} > \frac{-x}{-1} > \frac{-8}{-1}$$
$$9 > x > 8$$
$$8 < x < 9$$
The solution set is (8, 9).

**72.**
$$-0.7 < 0.4x+0.8 < 0.5$$
$$10(-0.7) < 10(0.4x+0.8) < 10(0.5)$$
$$-7 < 10(0.4x)+10(0.8) < 5$$
$$-7 < 4x+8 < 5$$
$$-7-8 < 4x+8-8 < 5-8$$
$$-15 < 4x < -3$$
$$\frac{-15}{4} < \frac{4x}{4} < \frac{-3}{4}$$
$$-3.75 < x < -0.75$$
The solution set is (–3.75, –0.75).

**74.** $|-7-19| = |-26| = 26$

**76.** $|-4|-(-4)+|-20| = 4+4+20 = 8+20 = 28$

**78.** $|x| = 5$ when $x = 5$ or $x = -5$.
The solution set is {–5, 5}.

**80.** There are no values of $x$ such that $|x| = -2$, so the solution set is ∅.

**82.** From the graph, we see that the number of single-family housing starts that are less than 1000 or the number of single-family housing completions greater than 1500 are for the years 2004, 2005, 2006, 2008, and 2009.

**84.** answers may vary

**86.** $2x - 3 < 3x + 1 < 4x - 5$
$$2x-3 < 3x+1 \quad \text{and} \quad 3x+1 < 4x-5$$
$$2x < 3x+4 \quad \text{and} \quad 3x < 4x-6$$
$$-x < 4 \quad \text{and} \quad -x < -6$$
$$x > -4 \quad \text{and} \quad x > 6$$
The solution set is $(-4, \infty) \cap (6, \infty) = (6, \infty)$.

**88.** $-3(x - 2) \le 3 - 2x \le 10 - 3x$
$$-3(x-2) \le 3-2x \quad \text{and} \quad 3-2x \le 10-3x$$
$$-3x+6 \le 3-2x \quad \text{and} \quad -2x \le 7-3x$$
$$-3x \le -3-2x \quad \text{and} \quad x \le 7$$
$$-x \le -3 \quad \text{and} \quad x \le 7$$
$$x \ge 3 \quad \text{and} \quad x \le 7$$
The solution set is $[3, \infty) \cap (-\infty, 7] = [3, 7]$.

**90.**
$$-10 \le C \le 18$$
$$-10 \le \frac{5}{9}(F-32) \le 18$$
$$\frac{9}{5}(-10) \le \frac{9}{5}\left[\frac{5}{9}(F-32)\right] \le \frac{9}{5}(18)$$
$$-18 \le F-32 \le 32.4$$
$$-18+32 \le F-32+32 \le 32.4+32$$
$$14 \le F \le 64.4$$
The temperatures ranged from 14°F to 64.4°F.

**92.** Let $x$ be her final exam score.
$$80 \le \frac{80+90+82+75+2x}{6} \le 89$$
$$6(80) \le 6\left(\frac{80+90+82+75+2x}{6}\right) \le 6(89)$$
$$480 \le 80+90+82+75+2x \le 534$$
$$480 \le 327+2x \le 534$$
$$480-327 \le 327+2x-327 \le 534-327$$
$$153 \le 2x \le 207$$
$$\frac{153}{2} \le \frac{2x}{2} \le \frac{207}{2}$$
$$76.5 \le x \le 103.5$$
To earn a B in the course, her final exam grade must be between 76.5 and 100 (assuming she can't earn extra credit.)

**Section 2.6 Practice**

**1.** $|q| = 5$
$q = 5$ or $q = -5$
The solution set is {–5, 5}.

**2.** $|2x - 3| = 5$

$2x-3=5$ or $2x-3=-5$

$2x=8$ or $2x=-2$

$x=4$ or $x=-1$

The solution set is $\{-1, 4\}$.

**3.** $\left|\dfrac{x}{5}+1\right|=15$

$\dfrac{x}{5}+1=15$ or $\dfrac{x}{5}+1=-15$

$\dfrac{x}{5}=14$ or $\dfrac{x}{5}=-16$

$x=70$ or $x=-80$

The solutions are $-80$ and 70.

**4.** $|3x|+8=14$

$|3x|=6$

$3x=6$ or $3x=-6$

$x=2$ or $x=-2$

The solutions are $-2$ and 2.

**5.** $|z| = 0$

The solution is 0.

**6.** $3|z|+9=7$

$3|z|=-2$

$|z|=-\dfrac{2}{3}$

The absolute value of a number is never negative, so there is no solution. The solution set is { } or ∅.

**7.** $\left|\dfrac{5x+3}{4}\right|=-8$

The absolute value of a number is never negative, so there is no solution. The solution set is { } or ∅.

**8.** $|2x + 4| = |3x - 1|$

$2x+4=3x-1$ or $2x+4=-(3x-1)$

$-x+4=-1$ $\quad$ $2x+4=-3x+1$

$-x=-5$ $\quad$ $5x+4=1$

$x=5$ $\quad$ $5x=-3$

$x=-\dfrac{3}{5}$

The solutions are $-\dfrac{3}{5}$ and 5.

**9.** $|x - 2| = |8 - x|$

$x-2=8-x$ or $x-2=-(8-x)$

$2x-2=8$ $\quad$ $x-2=-8+x$

$2x=10$ $\quad$ $-2=-8$ False

$x=5$

The solution is 5.

**Vocabulary and Readiness Check**

**1.** $|x - 2| = 5$

C. $x - 2 = 5$ or $x - 2 = -5$

**2.** $|x - 2| = 0$

A. $x - 2 = 0$

**3.** $|x - 2| = |x + 3|$

B. $x - 2 = x + 3$ or $x - 2 = -(x + 3)$

**4.** $|x + 3| = 5$

E. $x + 3 = 5$ or $x + 3 = -5$

**5.** $|x + 3| = -5$

D. ∅

**Exercise Set 2.6**

**2.** $|y| = 15$

$y = -15$ or $y = 15$

**4.** $|6n| = 12.6$

$6n=12.6$ or $6n=-12.6$

$n=2.1$ or $n=-2.1$

**6.** $|6 + 2n| = 4$

$6+2n=-4$ or $6+2n=4$

$2n=-10$ or $2n=-2$

$n=-5$ or $n=-1$

**8.** $\left|\dfrac{n}{3}+2\right|=4$

$\dfrac{n}{3}+2=-4$ or $\dfrac{n}{3}+2=4$

$\dfrac{n}{3}=-6$ or $\dfrac{n}{3}=2$

$n=-18$ or $n=6$

**10.** $|x|+1=3$

$|x|=2$

$x=-2$ or $x=2$

**12.** $|2x| - 6 = 4$
$|2x| = 10$
$2x = -10$ or $2x = 10$
$x = -5$ or $x = 5$

**14.** $|7z| = 0$
$7z = 0$
$z = 0$

**16.** $|3z - 2| + 8 = 1$
$|3z - 2| = -7$
which is impossible.
The solution set is ∅.

**18.** $|3y + 2| = 0$
$3y + 2 = 0$
$3y = -2$
$y = -\frac{2}{3}$

**20.** $|9y + 1| = |6y + 4|$
$9y + 1 = -(6y + 4)$ or $9y + 1 = 6y + 4$
$9y + 1 = -6y - 4$ or $3y = 3$
$15y = -5$ or $y = 1$
$y = -\frac{1}{3}$ or $y = 1$

**22.** $|2x - 5| = |2x + 5|$
$2x - 5 = -(2x + 5)$ or $2x - 5 = 2x + 5$
$2x - 5 = -2x - 5$ or $-5 = 5$
$4x = 0$ or false
$x = 0$
The only solution is 0.

**24.** $|x| = 1$
$x = 1$ or $x = -1$

**26.** $|y| = 8$
$y = 8$ or $y = -8$

**28.** The absolute value of any expression is never negative, so no solution exists. The solution set is ∅.

**30.** $|4m + 5| = 5$
$4m + 5 = 5$ or $4m + 5 = -5$
$4m = 0$ or $4m = -10$
$m = 0$ or $m = -\frac{10}{4}$
$m = 0$ or $m = -\frac{5}{2}$

**32.** $|7z| + 1 = 22$
$|7z| = 21$
$7z = 21$ or $7z = -21$
$z = 3$ or $z = -3$

**34.** The absolute value of any expression is never negative, so no solution exists. The solution set is ∅.

**36.** $|x + 4| - 4 = 1$
$|x + 4| = 5$
$x + 4 = 5$ or $x + 4 = -5$
$x = 1$ or $x = -9$

**38.** The absolute value of any expression is never negative, so no solution exists. The solution set is ∅.

**40.** The absolute value of any expression is never negative, so no solution exists. The solution set is ∅.

**42.** $|5x - 2| = 0$
$5x - 2 = 0$
$5x = 2$
$x = \frac{2}{5}$

**44.** $|2 + 3m| - 9 = -7$
$|2 + 3m| = 2$
$2 + 3m = 2$ or $2 + 3m = -2$
$3m = 0$ or $3m = -4$
$m = 0$ or $m = -\frac{4}{3}$

**46.** $|8-6c|=1$

$8-6c=1$ or $8-6c=-1$
$-6c=-7$ or $-6c=-9$
$c=\frac{-7}{-6}$ or $c=\frac{-9}{-6}$
$c=\frac{7}{6}$ or $c=\frac{3}{2}$

**48.** $|3x+5|=|-4|$

$|3x+5|=4$
$3x+5=4$ or $3x+5=-4$
$3x=-1$ or $3x=-9$
$x=-\frac{1}{3}$ or $x=-3$

**50.** $|3+6n|=|4n+11|$

$3+6n=4n+11$ or $3+6n=-(4n+11)$
$2n=8$ or $3+6n=-4n-11$
$n=4$ or $10n=-14$
$n=4$ or $n=-\frac{7}{5}$

**52.** $|4-5y|=-|-3|$

$|4-5y|=-3$
The absolute value of any expression is never negative, so no solution exists. The solution set is $\varnothing$.

**54.** $|4n+5|=|4n+3|$

$4n+5=-(4n+3)$ or $4n+5=4n+3$
$4n+5=-4n-3$ or $5=3$
$8n=-8$ or false
$n=-1$
The only solution is $-1$.

**56.** $\left|\frac{1+3n}{4}\right|=4$

$\frac{1+3n}{4}=4$ or $\frac{1+3n}{4}=-4$
$1+3n=16$ or $1+3n=-16$
$3n=15$ or $3n=-17$
$n=5$ or $n=-\frac{17}{3}$

**58.** $8+|4m|=24$

$|4m|=16$
$4m=16$ or $4m=-16$
$m=4$ or $m=-4$

**60.** $\left|\frac{5x+2}{2}\right|=|-6|$

$\left|\frac{5x+2}{2}\right|=6$
$\frac{5x+2}{2}=6$ or $\frac{5x+2}{2}=-6$
$5x+2=12$ or $5x+2=-12$
$5x=10$ or $5x=-14$
$x=2$ or $x=-\frac{14}{5}$

**62.** $|5z-1|=|7-z|$

$5z-1=-(7-z)$ or $5z-1=7-z$
$5z-1=-7+z$ or $6z=8$
$4z=-6$ or $z=\frac{4}{3}$
$z=-\frac{3}{2}$

**64.** $\left|\frac{2r-6}{5}\right|=|-2|$

$\left|\frac{2r-6}{5}\right|=2$
$\frac{2r-6}{5}=2$ or $\frac{2r-6}{5}=-2$
$2r-6=10$ or $2r-6=-10$
$2r=16$ or $2r=-4$
$r=8$ or $r=-2$

**66.** $|8-y|=|y+2|$

$8-y=-(y+2)$ or $8-y=y+2$
$8-y=-y-2$ or $6=2y$
$8=-2$ or $3=y$
false or $3=y$
The only solution is 3.

**68.** $\left|\frac{5d+1}{6}\right|=-|-9|$

$\left|\frac{5d+1}{6}\right|=-9$
The absolute value of any expression is never negative, so no solution exists. The solution set is $\varnothing$.

**70.** From the circle graph, mozzarella cheese had the highest US production in 2008.

**72.** In 2008, cream cheese accounted for 8% of the total cheese production.
8% of 9,935,000,000 is 0.08(9,935,000,000) = 794,800,000
794,800,000 pounds of cream cheese was produced in the US in 2008.

**74.** answers may vary

**76.** $|y| < 0$ has no solutions.

**78.** Since absolute value is never negative, the solution set is $\varnothing$.

**80.** All numbers whose distance from 0 is 2 units is written as $|x| = 2$.

**82.** answers may vary

**84.** $|x - 7| = 2$

**86.** answers may vary

**88.** $|2x - 1| = 4$

**90.** $|ax + b| = c$

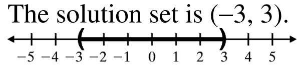
**a.** one solution if $c = 0$

**b.** no solutions if $c$ is a negative number

**c.** two solutions if $c$ is a positive number

**Section 2.7 Practice**

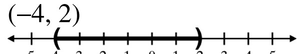
**1.** $|x| < 3$
The solution set of this inequality contains all numbers whose distance from 0 is less than 3. The solution set is $(-3, 3)$.



**2.** $|b + 1| < 3$

$$-3 < b+1 < 3$$
$$-3-1 < b+1-1 < 3-1$$
$$-4 < b < 2$$

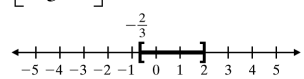
$(-4, 2)$



**3.** $|3x-2|+5 \le 9$

$$|3x-2| \le 9-5$$
$$|3x-2| \le 4$$
$$-4 \le 3x-2 \le 4$$
$$-4+2 \le 3x-2+2 \le 4+2$$
$$-2 \le 3x \le 6$$
$$-\frac{2}{3} \le x \le 2$$

$\left[-\frac{2}{3}, 2\right]$



**4.** $\left|3x+\frac{5}{8}\right| < -4$

The absolute value of a number is always nonnegative and can never be less than −4. The solution set is { } or $\varnothing$.

**5.** $\left|\frac{3(x-2)}{5}\right| \le 0$

$$\frac{3(x-2)}{5} = 0$$
$$5\left[\frac{3(x-2)}{5}\right] = 5(0)$$
$$3(x-2) = 0$$
$$3x-6 = 0$$
$$3x = 6$$
$$x = 2$$

The solution set is {2}.

**6.** $|y + 4| \ge 6$

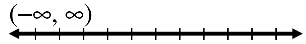
$$y+4 \le -6 \quad \text{or} \quad y+4 \ge 6$$
$$y+4-4 \le -6-4 \quad \text{or} \quad y+4-4 \ge 6-4$$
$$y \le -10 \quad \text{or} \quad y \ge 2$$

$(-\infty, -10] \cup [2, \infty)$

**7.** $|4x+3|+5 > 3$

$$|4x+3|+5-5 > 3-5$$
$$|4x+3| > -2$$

The absolute value of any number is always nonnegative and thus is always greater than −2.
$(-\infty, \infty)$



**8.** $\left|\frac{x}{2}-3\right|-5>-2$

$\left|\frac{x}{2}-3\right|-5+5>-2+5$

$\left|\frac{x}{2}-3\right|>3$

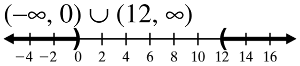
$\frac{x}{2}-3<-3$ or $\frac{x}{2}-3>3$

$2\left(\frac{x}{2}-3\right)<2(-3)$ or $2\left(\frac{x}{2}-3\right)>2(3)$

$x-6<-6$ or $x-6>6$

$x<0$ or $x>12$

$(-\infty, 0) \cup (12, \infty)$



**Vocabulary and Readiness Check**

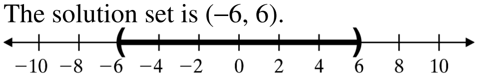
1. D
2. E
3. C
4. B
5. A

**Exercise Set 2.7**

**2.** $|x|<6$

$-6<x<6$

The solution set is $(-6, 6)$.

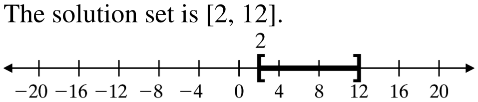


**4.** $|y-7|\le 5$

$-5\le y-7\le 5$

$2\le y\le 12$

The solution set is $[2, 12]$.

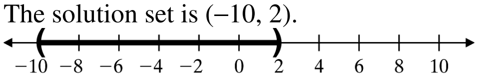


**6.** $|x+4|<6$

$-6<x+4<6$

$-10<x<2$

The solution set is $(-10, 2)$.



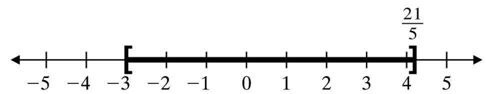
**8.** $|5x-3|\le 18$

$-18\le 5x-3\le 18$

$-15\le 5x\le 21$

$-3\le x\le \frac{21}{5}$

The solution set is $\left[-3, \frac{21}{5}\right]$.

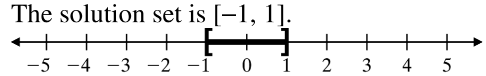


**10.** $|x|+6\le 7$

$|x|\le 1$

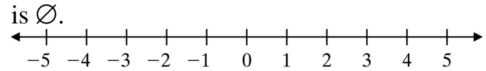
$-1\le x\le 1$

The solution set is $[-1, 1]$.



**12.** $|8x-3|<-2$

The absolute value of an expression is never negative, so no solution exists. The solution set is $\varnothing$.



**14.** $|z+2|-7<-3$

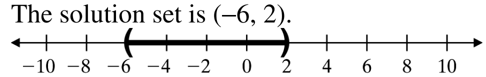
$|z+2|<4$

$-4<z+2<4$

$-4-2<z+2-2<4-2$

$-6<z<2$

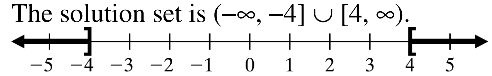
The solution set is $(-6, 2)$.



**16.** $|y|\ge 4$

$y\le -4$ or $y\ge 4$

The solution set is $(-\infty, -4] \cup [4, \infty)$.

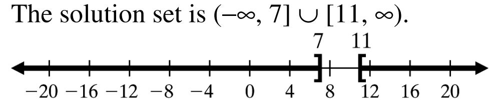


**18.** $|x-9|\ge 2$

$x-9\le -2$ or $x-9\ge 2$

$x\le 7$ or $x\ge 11$

The solution set is $(-\infty, 7] \cup [11, \infty)$.

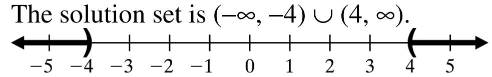


**20.** $|x|-1>3$

$|x|>4$

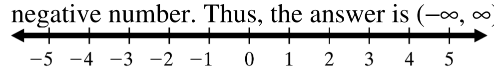
$x<-4$ or $x>4$

The solution set is $(-\infty, -4) \cup (4, \infty)$.



**22.** $|4x-11|>-1$

An absolute value is always greater than a negative number. Thus, the answer is $(-\infty, \infty)$.



**24.** $|10+3x|+1>2$

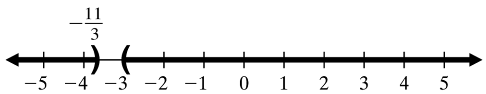
$|10+3x|>1$

$10+3x<-1 \quad \text{or} \quad 10+3x>1$

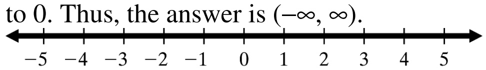
$3x<-11 \quad \text{or} \quad 3x>-9$

$x<-\frac{11}{3} \quad \text{or} \quad x>-3$

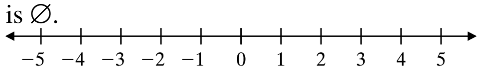
The solution set is $\left(-\infty, -\frac{11}{3}\right)\cup(-3, \infty)$.




**26.** $|x| \ge 0$
An absolute value is always greater than or equal to 0. Thus, the answer is $(-\infty, \infty)$.



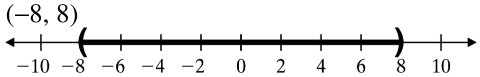

**28.** $|5x-6|<0$
The absolute value of an expression is never negative, so no solution exists. The solution set is ∅.




**30.** $|z|<8$

$-8<z<8$

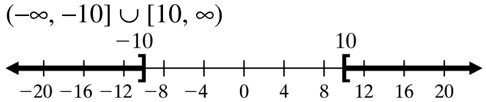
$(-8, 8)$




**32.** $|x| \ge 10$

$x \le -10 \quad \text{or} \quad x \ge 10$

$(-\infty, -10] \cup [10, \infty)$

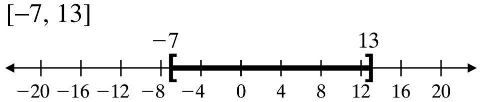



**34.** $|-3+x| \le 10$

$-10 \le -3+x \le 10$

$-7 \le x \le 13$

$[-7, 13]$




**36.** $|1+0.3x| \ge 0.1$

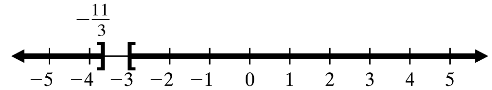
$1+0.3x \le -0.1 \quad \text{or} \quad 1+0.3x \ge 0.1$

$0.3x \le -1.1 \quad \text{or} \quad 0.3x \ge -0.9$

$\frac{0.3x}{0.3} \le -\frac{1.1}{0.3} \quad \text{or} \quad \frac{0.3x}{0.3} \ge -\frac{0.9}{0.3}$

$x \le -\frac{11}{3} \quad \text{or} \quad x \ge -3$

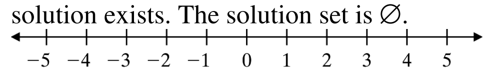
$\left(-\infty, -\frac{11}{3}\right]\cup[-3, \infty)$



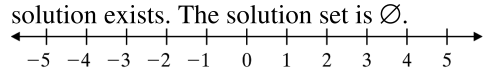

**38.** $8+|x|<1$

$|x|<-7$

An absolute value is never negative, so no solution exists. The solution set is ∅.




**40.** $|x| \le -7$
An absolute value is never negative, so no solution exists. The solution set is ∅.



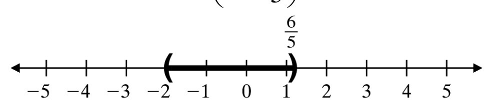

**42.** $|5x+2|<8$

$-8<5x+2<8$

$-10<5x<6$

$-2<x<\frac{6}{5}$

The solution set is $\left(-2, \frac{6}{5}\right)$.




**44.** $|-1+x|-6>2$

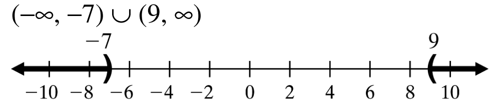
$|-1+x|-6+6>2+6$

$|-1+x|>8$

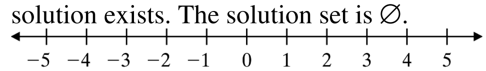
$-1+x<-8 \quad \text{or} \quad -1+x>8$

$x<-7 \quad \text{or} \quad x>9$

$(-\infty, -7) \cup (9, \infty)$



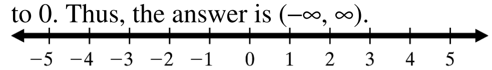

**46.** $|x|<0$
An absolute value is never negative, so no solution exists. The solution set is ∅.




**48.** $5+|x| \ge 4$

$|x| \ge -1$

An absolute value is always greater than or equal to 0. Thus, the answer is $(-\infty, \infty)$.



**50.** $-3+|5x-2|\le 4$

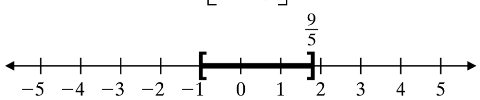
$|5x-2|\le 7$

$-7\le 5x-2\le 7$

$-5\le 5x\le 9$

$-1\le x\le \frac{9}{5}$

The solution set is $\left[-1, \frac{9}{5}\right]$.



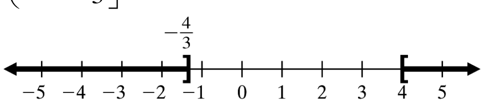
**52.** $\left|\frac{3}{4}x-1\right|\ge 2$

$\frac{3}{4}x-1\le -2$ or $\frac{3}{4}x-1\ge 2$

$\frac{3}{4}x\le -1$ or $\frac{3}{4}x\ge 3$

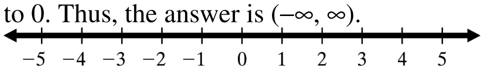
$x\le -\frac{4}{3}$ or $x\ge 4$

$\left(-\infty, -\frac{4}{3}\right]\cup[4, \infty)$



**54.** $|4+9x|\ge -6$

An absolute value is always greater than or equal to 0. Thus, the answer is $(-\infty, \infty)$.



**56.** $\left|\frac{5x+6}{2}\right|\le 0$

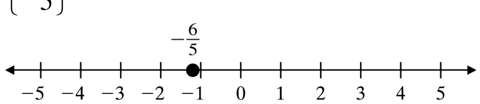
$\frac{5x+6}{2}=0$

$5x+6=0$

$5x=-6$

$x=-\frac{6}{5}$

$\left\{-\frac{6}{5}\right\}$



**58.** $|7x-3|-1\le 10$

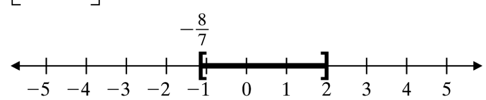
$|7x-3|\le 11$

$-11\le 7x-3\le 11$

$-8\le 7x\le 14$

$-\frac{8}{7}\le x\le 2$

$\left[-\frac{8}{7}, 2\right]$



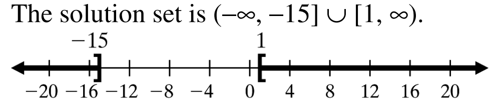
**60.** $\left|\frac{7+x}{2}\right|\ge 4$

$\frac{7+x}{2}\le -4$ or $\frac{7+x}{2}\ge 4$

$7+x\le -8$ or $7+x\ge 8$

$x\le -15$ or $x\ge 1$

The solution set is $(-\infty, -15]\cup[1, \infty)$.



**62.** $-9+|3+4x|<-4$

$-9+|3+4x|+9<-4+9$

$|3+4x|<5$

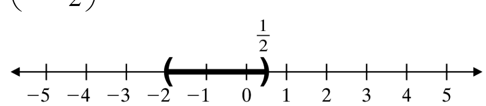
$-5<3+4x<5$

$-8<4x<2$

$-2<x<\frac{2}{4}$

$-2<x<\frac{1}{2}$

$\left(-2, \frac{1}{2}\right)$



**64.** $\left|\frac{3}{5}+4x\right|-6<-1$

$\left|\frac{3}{5}+4x\right|<5$

$-5<\frac{3}{5}+4x<5$

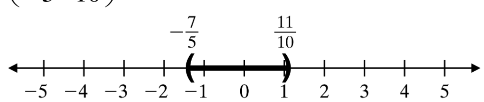
$-25<3+20x<25$

$-28<20x<22$

$-\frac{28}{20}<\frac{20x}{20}<\frac{22}{20}$

$-\frac{7}{5}<x<\frac{11}{10}$

$\left(-\frac{7}{5},\frac{11}{10}\right)$




**66.** $|2x-3|>7$

$2x-3<-7$ or $2x-3>7$

$2x<-4$ or $2x>10$

$x<-2$ or $x>5$

$(-\infty,-2)\cup(5,\infty)$

**68.** $|5-6x|=29$

$5-6x=-29$ or $5-6x=29$

$-6x=-34$ or $-6x=24$

$x=\frac{17}{3}$ or $x=-4$

The solution set is $\left\{-4,\frac{17}{3}\right\}$.

**70.** $|x+4|\ge 20$

$x+4\le -20$ or $x+4\ge 20$

$x\le -24$ or $x\ge 16$

The solution set is $(-\infty,-24]\cup[16,\infty)$.

**72.** $|9+4x|\ge 0$

An absolute value is always greater than or equal to 0. Thus, the answer is $(-\infty,\infty)$.

**74.** $8+|5x-3|\ge 11$

$|5x-3|\ge 3$

$5x-3\le -3$ or $5x-3\ge 3$

$5x\le 0$ or $5x\ge 6$

$x\le 0$ or $x\ge\frac{6}{5}$

The solution set is $(-\infty,0]\cup\left[\frac{6}{5},\infty\right)$.

**76.** $|5x-3|+2=4$

$|5x-3|=2$

$5x-3=-2$ or $5x-3=2$

$5x=1$ or $5x=5$

$x=\frac{1}{5}$ or $x=1$

The solution set is $\left\{\frac{1}{5},1\right\}$.

**78.** $|4x-4|=-3$

An absolute value is never negative, so no solution exists. The solution set is $\varnothing$.

**80.** $\left|\frac{6-x}{4}\right|=5$

$\frac{6-x}{4}=-5$ or $\frac{6-x}{4}=5$

$6-x=-20$ or $6-x=20$

$26=x$ or $-14=x$

The solution set is $\{-14, 26\}$.

**82.** $\left|\frac{4x-7}{5}\right|<2$

$-2<\frac{4x-7}{5}<2$

$-10<4x-7<10$

$-3<4x<17$

$-\frac{3}{4}<x<\frac{17}{4}$

The solution set is $\left(-\frac{3}{4},\frac{17}{4}\right)$.

**84.** $P(\text{rolling a 5})=\frac{1}{6}$

**86.** $P(\text{rolling a 0})=0$

**88.** $P(\text{rolling a 1, 2, 3, 4, 5, or 6})=1$

**90.** $3x-4y=12$

$3x-4(-1)=12$

$3x+4=12$

$3x=8$

$x=\frac{8}{3}$