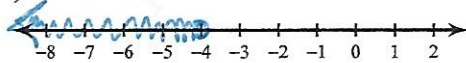


Solve & Graph Inequalities

Solve each inequality and graph its solution.

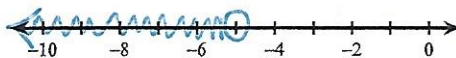
1) $5r \leq -20$



$$\frac{5r}{5} \leq \frac{-20}{5}$$

$$r \leq -4$$

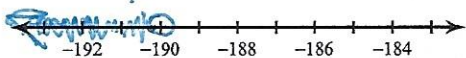
2) $\frac{r}{20} < -\frac{1}{4}$



$$\frac{r}{20} < -\frac{1}{4} \cdot \frac{20}{1}$$

$$r < -5$$

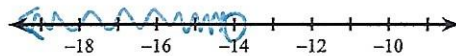
3) $-10 > \frac{n}{19}$



$$-190 > n$$

$$n < -190$$

4) $-3a - 5 > 37$



$$-3a - 5 > 37$$

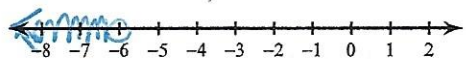
$$+5 \quad +5$$

$$-3a > 42$$

$$\frac{-3a}{-3} > \frac{42}{-3}$$

$$a < -14$$

5) $4 + \frac{v}{2} < 1$



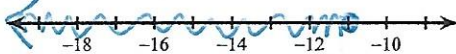
$$4 + \frac{v}{2} < 1$$

$$-4 \quad -4$$

$$2 \cdot \frac{v}{2} < -3 \cdot 2$$

$$v < -6$$

6) $-10(4 + b) \geq 70$



$$-40 - 10b \geq 70$$

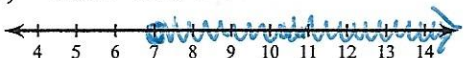
$$+40 \quad +40$$

$$-10b \geq 110$$

$$\frac{-10b}{-10} \geq \frac{110}{-10}$$

$$b \leq -11$$

7) $-66 \geq -10x + 4$



$$-66 \geq -10x + 4$$

$$-4 \quad -4$$

$$-70 \geq -10x$$

$$\frac{-70}{-10} \geq \frac{-10x}{-10}$$

$$7 \leq x$$

$$x \geq 7$$

8) $-6(-7 - 8x) - 4 > 230$



$$42 + 48x - 4 > 230$$

$$38 + 48x > 230$$

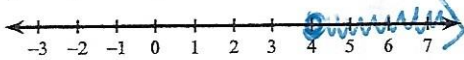
$$-38 \quad -38$$

$$48x > 192$$

$$\frac{48x}{48} > \frac{192}{48}$$

$$x > 4$$

$$9) -5(6r-3) + r \leq -101$$



$$-30r + 15 + r \leq -101$$

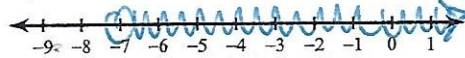
$$-29r + 15 \leq -101$$

$$\frac{-15}{-29} \quad \frac{-15}{-29}$$

$$\frac{-29r \leq -116}{-29} \quad \frac{-116}{-29}$$

$$\boxed{r \geq 4}$$

$$10) 86 > 2(1 - 6n)$$



$$86 > 2 - 12n$$

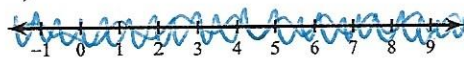
$$\frac{-2}{-12} \quad \frac{-2}{-12}$$

$$\frac{84 > -12n}{-12} \quad \frac{-12n}{-12}$$

$$\frac{-7 < n}{-7 < n}$$

$$\boxed{n > -7}$$

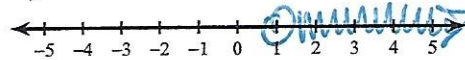
$$11) 1 - 8v \leq 1 - 8v$$



$$\boxed{10}$$

All Real Numbers

$$12) m + 5 < m + 5m$$



$$m + 5 < m + 5m$$

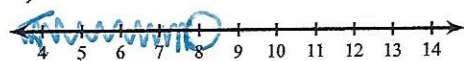
$$\frac{m + 5 < 6m}{-m} \quad \frac{-m}{-m}$$

$$\frac{5 < 5m}{5} \quad \frac{5m}{5}$$

$$1 < m$$

$$\boxed{m > 1}$$

$$13) -n - 5n > -16 - 4n$$



$$-n - 5n > -16 - 4n$$

$$\frac{-6n > -16 - 4n}{+6n} \quad \frac{-4n}{+6n}$$

$$0 > -16 + 2n$$

$$\frac{+16}{2} \quad \frac{+16}{2} \quad \frac{16}{2} > \frac{2n}{2} \quad 8 > n$$

$$\boxed{n < 8}$$

$$14) -(3x + 1) \leq 5 - 3x$$



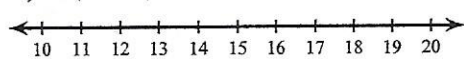
$$-3x - 1 \leq 5 - 3x$$

$$\frac{+3x}{+3x} \quad \frac{+3x}{+3x}$$

$$-1 \leq 5$$

True
All Real
Numbers

$$15) 4(x + 6) \leq 4x + 17$$



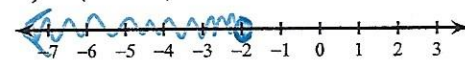
$$4x + 24 \leq 4x + 17$$

$$\frac{-4x}{-4x} \quad \frac{-4x}{-4x}$$

$$24 \leq 17$$

$$\boxed{NS}$$

$$16) 8(6x + 6) + 8 \leq 8x - 24$$



$$48x + 48 + 8 \leq 8x - 24$$

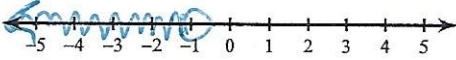
$$\frac{48x + 56 \leq 8x - 24}{-8x} \quad \frac{8x}{-8x}$$

$$\frac{40x + 56 \leq -24}{-56} \quad \frac{-56}{-56}$$

$$\frac{40x \leq -80}{40} \quad \frac{-80}{40}$$

$$\boxed{x \leq -2}$$

$$17) -3 - 5b > -8b + 6b$$



$$-3 - 5b > -8b + 6b$$

$$\begin{array}{r} -3 - 5b > -2b \\ +5b \quad +5b \end{array}$$

$$\frac{-3}{3} > \frac{3b}{3}$$

$$-1 > b$$

$$\boxed{b < -1}$$

Solve each equation.

$$19) -1 + |8 + b| = 8$$

$$\begin{array}{r} +1 \quad \quad \quad \pm 1 \\ |8 + b| = 9 \end{array}$$

$$|8 + b| = 9$$

$$\begin{array}{r} 8 + b = 9 \\ -8 \quad -8 \\ b = 1 \end{array}$$

$$\begin{array}{r} 8 + b = -9 \\ -8 \quad -8 \\ b = -17 \end{array}$$

$$\boxed{\{-17, 1\}}$$

$$21) |4p - 8| - 2 = -50$$

$$\begin{array}{r} +2 \quad +2 \\ |4p - 8| = -48 \end{array}$$

$$|4p - 8| = -48$$

$\boxed{\text{No Solution}}$

$$23) -9 + 4|7b - 7| = 75$$

$$\begin{array}{r} +9 \quad \quad \quad +9 \\ 4|7b - 7| = 84 \end{array}$$

$$\frac{4|7b - 7|}{4} = \frac{84}{4}$$

$$|7b - 7| = 21$$

$$\begin{array}{r} 7b - 7 = 21 \\ +7 \quad +7 \\ 7b = 28 \\ \sqrt[7]{7} \quad \sqrt[7]{28} \\ b = 4 \end{array}$$

$$\begin{array}{r} 7b - 7 = -21 \\ +7 \quad +7 \\ 7b = -14 \\ \sqrt[7]{7} \quad \sqrt[7]{-14} \\ b = -2 \end{array}$$

$$\boxed{\{-2, 4\}}$$

$$18) 5x - 5 > -5 + 5x$$



10

All Real Numbers

$$20) |2x| + 2 = -12$$

$$\begin{array}{r} -2 \quad -2 \\ |2x| = -14 \end{array}$$

$$|2x| = -14$$

$\boxed{\text{No Solution}}$

$$22) -5|x - 1| = -45$$

$$\begin{array}{r} \cancel{-5} \quad \quad \quad \cancel{-5} \\ |x - 1| = 9 \end{array}$$

$$|x - 1| = 9$$

$$\begin{array}{r} x - 1 = 9 \\ +1 \quad +1 \\ x = 10 \end{array}$$

$$\begin{array}{r} x - 1 = -9 \\ +1 \quad +1 \\ x = -8 \end{array}$$

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

$$\boxed{\{-8, 10\}}$$

$$24) 6|10 + 8m| + 6 = 18$$

$$\begin{array}{r} -6 \quad -6 \\ |10 + 8m| = 12 \end{array}$$

$$\frac{6|10 + 8m|}{6} = \frac{12}{6}$$

$$|10 + 8m| = 2$$

$$\begin{array}{r} 10 + 8m = 2 \\ -10 \quad -10 \\ 8m = -8 \\ \frac{8m}{8} = \frac{-8}{8} \\ m = -1 \end{array}$$

$$\begin{array}{r} 10 + 8m = -2 \\ -10 \quad -10 \\ 8m = -12 \\ \frac{8m}{8} = \frac{-12}{8} \\ m = -\frac{3}{2} \end{array}$$

$$m = -1$$

$$m = -\frac{3}{2}$$

$$\boxed{\{-\frac{3}{2}, -1\}}$$

3-1 Word Problem Practice

Solving Multi-Step Inequalities

1. **BEACHCOMBING** Jay has lost his mother's favorite necklace, so he will rent a metal detector to try to find it. A rental company charges a one-time rental fee of \$15 plus \$2 per hour to rent a metal detector. Jay has only \$35 to spend. What is the maximum amount of time he can rent the metal detector?

$$\begin{array}{r} 15 + 2h \leq 35 \\ -15 \quad -15 \\ \hline 2h \leq 20 \\ \frac{2h}{2} \leq \frac{20}{2} \\ h \leq 10 \end{array}$$

Jay can rent at most 10 hours

2. **AGES** Bobby, Billy, and Barry Smith are each one year apart in age. The sum of their ages is greater than the age of their father, who is 60. How old can the oldest brother can be?

$$\begin{array}{r} x + x + 1 + x + 2 > 60 \\ 3x + 3 > 60 \\ -3 \quad -3 \\ \hline 3x > 57 \\ \frac{3x}{3} > \frac{57}{3} \\ x > 19 \end{array}$$

The oldest brother can be 21

3. **TAXI FARE** Jamal works in a city and sometimes takes a taxi to work. The taxicabs charge \$1.50 for the first $\frac{1}{5}$ mile and \$0.25 for each additional $\frac{1}{5}$ mile. Jamal has only \$3.75 in his pocket. What is the maximum distance he can travel by taxi if he does not tip the driver?

$$\begin{array}{r} 1.50 + .25m \leq 3.75 \\ -1.50 \quad -1.50 \\ \hline .25m \leq 2.25 \\ \frac{.25m}{.25} \leq \frac{2.25}{.25} \\ m \leq 9 \end{array}$$

$$\begin{array}{l} \frac{1}{5} + \frac{1}{5}(9) \\ \frac{1}{5} + \frac{9}{5} = \frac{10}{5} = 2 \end{array}$$

Jamal can travel at most 2 miles

4. **PLAYGROUND** The perimeter of a rectangular playground must be no greater than 120 meters, because that is the total length of the materials available for the border. The width of the playground cannot exceed 22 meters. What are the possible lengths of the playground?

$$\begin{array}{r} 2(22) + 2l \leq 120 \\ 44 + 2l \leq 120 \\ \frac{2l}{2} \leq \frac{76}{2} \\ l \leq 38 \end{array}$$

less than or equal to 38m

5. **MEDICINE** Clark's Rule is a formula used to determine pediatric dosages of over-the-counter medicines.

$$\frac{\text{weight of child (lb)}}{150} \times \text{adult dose} = \text{child dose}$$

- a. If an adult dose of acetaminophen is 1000 milligrams and a child weighs no more than 90 pounds, what is the recommended child's dose?

$$\frac{90}{150} \cdot 1000 \leq 600 \text{ mg}$$

no more than 600mg

- b. This label appears on a child's cold medicine. What is the adult minimum dosage in milliliters?

Weight (lb)	Age (yr)	Dose
under 48	under 6	call a doctor
48-95	6-11	2 tsp or 10 mL

$$\frac{48}{150} \cdot a \leq 10$$

$$\frac{.32a}{.32} = \frac{10}{.32} = 31.25 \text{ mL}$$

- c. What is the maximum adult dosage in milliliters?

$$\frac{95}{150} \cdot a = 10$$

$$\frac{.63a}{.63} = \frac{10}{.63}$$

$$a = 15.87 \text{ mL}$$