

**Solving Inequalities** Assignment

Solve the following Inequalities.

1)  $2(2x + 20) \geq 40$

2)  $\frac{4(x+3)}{3} \leq 12$

3)  $-2(2x + 4) \geq 16$

4)  $-4(2x - 2) \leq -x - 9$

5)  $2 - \frac{x}{4} \geq \frac{x}{4} + 1$

6)  $\frac{3+x}{2} \leq \frac{x+1}{3}$

Solve the following compound inequalities

1)  $-4 < r - 5 \leq -1$

2)  $4v + 3 < -5$  or  $-2v + 7 < 1$

3)  $7 < -3n + 1 \leq 13$

4)  $-2x + 7 > 3$  or  $3x - 4 \geq 5$

5)  $-3 < 2x - 1 < 7$

## Solving Inequalities Assignment

Solve the following word problems

- 1) Five less than one-half a number is greater than 12.
  
- 2) Sam and Alex play in the same soccer team. Last Saturday Alex scored 3 more goals than Sam, but together they scored less than 9 goals. What are the possible number of goals Alex scored?
  
- 3) The length of a rectangle is 5 times its width. The perimeter of the rectangle is at most 104 meters. Find the greatest possible dimensions of this rectangle.
  
- 4) The velocity of an object fired directly upward is given by  $V = 80 - 32t$ , where  $t$  is in seconds. When will the velocity be between 32 and 64 feet per second?
  
- 5) The antifreeze added to your car's cooling system claims that it will protect your car to  $-35^{\circ}$  C and  $120^{\circ}$  C. The coolant will remain in a liquid state as long as the temperature in Celsius satisfies the inequality  $-35^{\circ} < C < 120^{\circ}$ . Write this inequality in degrees Fahrenheit.  
Hint:  $\frac{5}{9}(F - 32)$
  
- 6) The height of a horse is measured in a vertical line from the ground to the withers (at the base of the neck). Horses are measured in "hands" where one hand = 4 inches. If a horse is more than an exact number of hands high ( $hh$ ), the extra inches are given after a decimal point, e.g. 14 hands 2 inches is written as 14.2  $hh$ . Normal riding horses are between 14.3  $hh$  and 17  $hh$ , inclusive. Horses shorter than 14.3 hands are called ponies and horses over 17  $hh$  are often called draft (or work) horses.
  - a.) Write an inequality statement to represent the heights of normal riding horses in inches.
  
  - b.) Write an inequality statement stating the heights, in inches, of equines (horses) that do not fit the normal riding horse height specifications.

# Solving Inequalities Assignment

## Answers

Solve the following Inequalities.

$$\begin{aligned} 1) \quad & 2(2x + 20) \geq 40 \\ & 2x + 20 \geq 20 \\ & 2x \geq 0 \\ & x \geq 0 \end{aligned}$$

$$\begin{aligned} 2) \quad & \frac{4 \times (x+3)}{3} \leq 12 \\ & 4x + 12 \leq 36 \\ & 4x \leq 24 \\ & x \leq 6 \end{aligned}$$

$$\begin{aligned} 3) \quad & -2 \times (2x + 4) \geq 16 \\ & 2x + 4 \leq -8 \\ & 2x \leq -12 \\ & x \leq -6 \end{aligned}$$

$$\begin{aligned} 4) \quad & -4(2x - 2) \leq -x - 9 \\ & -8x + 8 \leq -x - 9 \\ & 8 + 9 \leq -x + 8x \\ & 17 \leq 7x \\ & \frac{17}{7} \leq x \end{aligned}$$

$$\begin{aligned} 5) \quad & 2 - \frac{x}{4} \geq \frac{x}{4} + 1 \\ & 2 - 1 \geq \frac{x}{4} + \frac{x}{4} \\ & 1 \geq \frac{2x}{4} \\ & 4 \geq 2x \\ & 2 \geq x \end{aligned}$$

# Solving Inequalities Assignment

$$6) \frac{3+x}{2} \leq \frac{x+1}{3}$$

$$3 \times (3+x) \leq 2(x+1)$$

$$9+3x \leq 2x+2$$

$$3x-2x \leq 2-9$$

$$x \leq -7$$

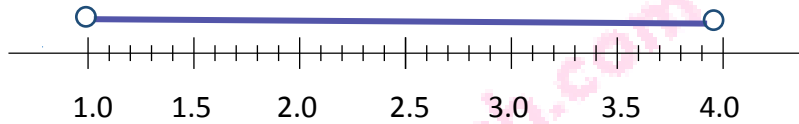
Solve the following compound inequalities

$$1) -4 < r - 5 < -1$$

$$-4 + 5 < r < -1 + 5$$

$$1 < r < 4$$

Interval notation  $(1, 4)$

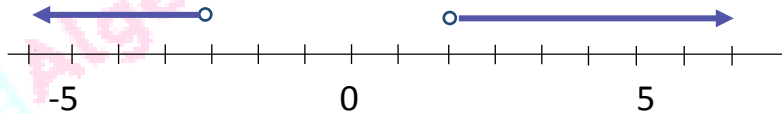


$$2) 4v + 3 < -5 \text{ or } -2v + 7 < 1$$

$$4v < -5 - 3 \text{ or } -2v < 1 - 7$$

$$v < -2 \text{ or } v > 3$$

Interval notation  $(-\infty, 2) \cup (3, \infty)$

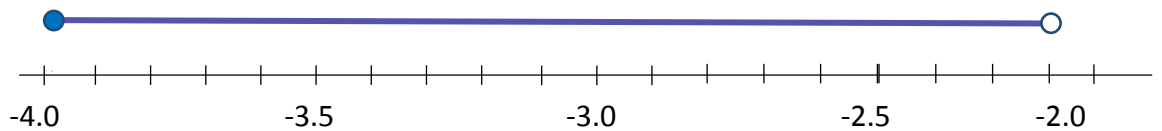


$$3) 7 < -3n + 1 \leq 13$$

$$6 < -3n \leq 12$$

$$-2 > n \geq -4$$

Interval notation  $[-4, -2)$



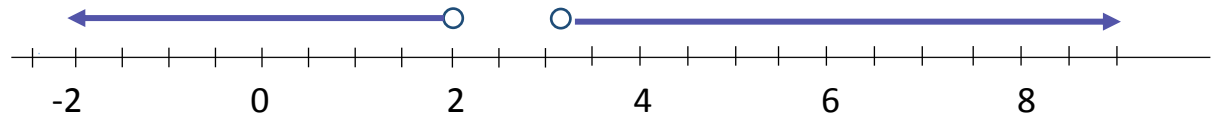
# Solving Inequalities Assignment

4)  $-2x + 7 > 3$  or  $3x - 4 \geq 5$

$-2x > -4$  or  $3x \geq 9$

$x < 2$  or  $x \geq 3$

Interval notation  $(-\infty, 2) \cup [3, \infty)$



Solve the following word problems

- 1) Five less than one-half a number is greater than 12.

Let the unknown number be  $x$ .

one-half that number will be  $\frac{1}{2}x$

five less than  $\frac{1}{2}x$  will be  $\frac{1}{2}x - 5$

$\frac{1}{2}x - 5$  is greater than 12

so the result is  $\frac{1}{2}x - 5 > 12$

$\frac{1}{2}x > 17$

$x > 34$

- 2) Sam and Alex play in the same soccer team.  
Last Saturday Alex scored 3 more goals than Sam, but together they scored less than 9 goals.

What are the possible number of goals Alex scored?

The number of goals Alex scored:  $S + 3$

The number of goals Sam scored:  $S$

$S + (S + 3) < 9$

$2S + 3 < 9$

$2S < 9 - 3$

$2S < 6$

$S < 3$

Note that the number of goals must be a whole number.

Sam could have scored 0, 1 or 2 goals.

Alex could have scored 3, 4, or 5 goals.

**Solving Inequalities** Assignment

- 3) The length of a rectangle is 5 times its width. The perimeter of the rectangle is at most 104 meters. Find the greatest possible dimensions of this rectangle.

Assume that width is  $x$ .

The length is  $5x$

$$2 \times (x + 5x) \leq 104$$

$$6x \leq 104$$

$$x \leq \frac{52}{3}$$

So the greatest possible width is  $\frac{52}{3}$

The greatest possible length is  $\frac{260}{3}$

- 4) The velocity of an object fired directly upward is given by  $V = 80 - 32t$ , where  $t$  is in seconds.

When will the velocity be between 32 and 64 feet per second?

$$32 < 80 - 32t < 64$$

$$32 - 80 < 80 - 80 - 32t < 64 - 80$$

$$-48 < -32t < -16$$

$$\frac{-48}{-32} > \frac{-32t}{-32} > \frac{-16}{-32}$$

$$1.5 > t > 0.5$$

- 5) The antifreeze added to your car's cooling system claims that it will protect your car to  $-35^\circ$  C and  $120^\circ$  C. The coolant will remain in a liquid state as long as the temperature in Celsius satisfies the inequality

$-35^\circ < C < 120^\circ$ . Write this inequality in degrees Fahrenheit.

Hint:  $\frac{5}{9}(F - 32)$

$$-35 < C < 120$$

$$-35 < \frac{5}{9}(F - 32) < 120$$

$$-63 < F - 32 < 216$$

$$-31 < F < 248$$

## Solving Inequalities Assignment

- 6) The height of a horse is measured in a vertical line from the ground to the withers (at the base of the neck). Horses are measured in "hands" where one hand = 4 inches. If a horse is more than an exact number of hands high ( $hh$ ), the extra inches are given after a decimal point, e.g. 14 hands 2 inches is written as  $14.2 hh$ . Normal riding horses are between  $14.3 hh$  and  $17 hh$ , inclusive. Horses shorter than  $14.3$  hands are called ponies and horses over  $17 hh$  are often called draft (or work) horses.
- Write an inequality statement to represent the heights of normal riding horses in inches.
  - Write an inequality statement stating the heights, in inches, of equines (horses) that do not fit the normal riding horse height specifications.

a.) Normal riding horse heights in hands:  $14.3 hh \leq h \leq 17 hh$

Convert to inches.

$$14.3 hh = 14(4) + 3 \text{ inches} = 59 \text{ inches}$$

$$17 hh = 17(4) \text{ inches} = 68 \text{ inches}$$

Normal riding horse height in inches:

$$59" \leq h \leq 68"$$

b.) Equines outside of the normal riding horse heights in hands:

$$h < 14.3 hh \text{ or } h > 17 hh$$

Use conversions from part a.

Equine heights in inches not fitting the normal riding horse heights:

$$h < 59" \text{ or } h > 68"$$