

Indicator 46 Class Notes by Mrs. Joshi

Two-Step Inequalities-(7.EE.3/7.EE.4a/7.EE.4b)

EXAMPLE 4 Solving a Two-Step Inequality

Solve $-3x + 2 > 11$.

$$-3x + 2 > 11 \quad \text{Write the inequality.}$$

Step 1: Undo the addition.

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

Subtract 2 from each side.

$$-3x > 9$$

Simplify.

Step 2: Undo the multiplication.

$$\rightarrow \frac{-3x}{-3} \leq \frac{9}{-3}$$

Divide each side by -3 . Reverse the inequality symbol.

$$x < -3$$

Simplify.

∴ The solution is $x < -3$.

EXAMPLE 5 Real-Life Application

Progress Report	
Month	Pounds Lost
1	9
2	5
3	x
4	x

A contestant in a weight loss competition wants to lose at least 30 pounds in 4 months. Write and solve an inequality to find the average number x of pounds the contestant must lose in each of the last 2 months to meet the goal.

Use the progress report to write an expression for the number of pounds lost.

Pounds lost: $9 + 5 + x + x = 14 + 2x$

Because the contestant wants to lose *at least* 30 pounds, use the symbol \geq .

$$14 + 2x \geq 30 \quad \text{Write an inequality.}$$

$$\frac{-14}{-14} \quad \frac{-14}{-14} \quad \text{Subtract 14 from each side.}$$

$$2x \geq 16 \quad \text{Simplify.}$$

$$\frac{2x}{2} \geq \frac{16}{2} \quad \text{Divide each side by 2.}$$

$$x \geq 8 \quad \text{Simplify.}$$

∴ The contestant must lose an average of at least 8 pounds in each of the last 2 months to meet the goal.

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● Practice

Solve the inequality. Graph the solution.

19. $5n - 3 < 12$

20. $-3(w - 10) > 27$

21. $-7 \geq \frac{c}{-2} + 2$

22. **BICYCLE** You want to purchase a bicycle that costs \$265. So far, you have saved \$128 and you plan to save an additional \$20 per week.

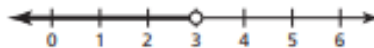
- Write and solve an inequality to find the number of weeks it will take to save at least \$265.
- Graph the solution in part (a). Will you have saved enough money after 6 weeks? 8 weeks? Explain.

Answers:

19. $5n - 3 < 12$

$$\begin{array}{r} +3 \\ 5n < 15 \end{array}$$

$$\begin{array}{r} \frac{5n}{5} < \frac{15}{5} \\ n < 3 \end{array}$$



The solution is $n < 3$.

20. $-3(w - 10) > 27$

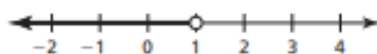
$$-3(w) - 3(-10) > 27$$

$$-3w + 30 > 27$$

$$\begin{array}{r} -30 \\ -3w > -3 \end{array}$$

$$\begin{array}{r} \frac{-3w}{-3} < \frac{-3}{-3} \\ w < 1 \end{array}$$

The solution is $w < 1$.



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21. $-7 \geq \frac{c}{-2} + 2$

$$\frac{-2}{-2} \geq \frac{c}{-2} + \frac{-2}{-2}$$

$$-9 \geq \frac{c}{-2}$$

$$-2 \cdot (-9) \leq -2 \cdot \frac{c}{-2}$$

$$18 \leq c$$

The solution is $c \geq 18$.



22. a.

Words: \$20 times the plus \$128 is at \$265.
per week number of weeks least

Variable: Let w represent the number of weeks.

Inequality: $20 \cdot w + 128 \geq 265$

$$20w + 128 \geq 265$$

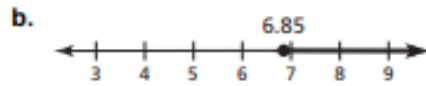
$$\frac{-128}{20w} \geq \frac{-128}{137}$$

$$\frac{20w}{20} \geq \frac{137}{20}$$

$$w \geq 6.85$$

The solution is $w \geq 6.85$. Because you save "per week," it will take at least 7 weeks to save enough money to purchase the bicycle.

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Check: $w = 6$

$$20w + 128 \geq 165$$

$$20(6) + 128 \stackrel{?}{\geq} 165$$

$$120 + 128 \geq 165$$

$$248 \geq 265 \times$$

Check: $w = 8$

$$20w + 128 \geq 165$$

$$20(8) + 128 \stackrel{?}{\geq} 165$$

$$160 + 128 \stackrel{?}{\geq} 265$$

$$288 \geq 265 \checkmark$$

After 6 weeks you will only have \$248, which is not enough. After 8 weeks you will have \$288, which is enough money to buy the bicycle.