Solving Two-Step Inequalities

Goal: Solve two-step inequalities.

EXAMPLE 1 Solving and Graphing a Two-Step Inequality

> Remember that solving multi-step inequalities uses many of the same steps as solving multi-step equations.

$$13 + 5n \geq -22$$ Original inequality

$$13 + 5n \boxed{-13} \geq -22 \boxed{-13}$$ $\boxed{\text{Subtract 13}}$ from each side.
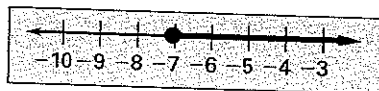
$$\boxed{5n} \geq \boxed{-35}$$ Simplify.

$$\frac{5n}{5} \geq \frac{-35}{5}$$ $\boxed{\text{Divide}}$ each side by 5.

$$\boxed{n} \geq \boxed{-7}$$ Simplify.

EXAMPLE 2 Combining Like Terms

$$6x - 4 < -2x$$ Original inequality

$$6x - 4 \boxed{-6x} < -2x \boxed{-6x}$$ $\boxed{\text{Subtract 6x}}$ from each side.
(Subtraction property of inequality)

$$\boxed{-4x} < \boxed{-8x}$$ Combine like terms.

$$\frac{-4}{-8} > \frac{-8x}{-8}$$ Divide each side by $\boxed{-8}$ and $\boxed{\text{reverse}}$ the inequality symbol.
(Division property of inequality)

$$\boxed{\frac{1}{2} > x}$$ Simplify.
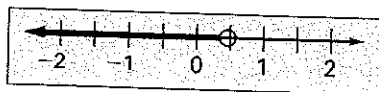
Solve the inequality.

| **1.** $-9p - 17 \leq -62$	**2.** $10a - 21 > 4a + 15$

EXAMPLE 3 Multiple Choice Practice

Video Games You are saving money to buy a video game system. You have saved $30. You earn $32 each week babysitting. You pay $7 each week for piano lessons. For how many weeks must you save your money to have at least $205?

(A) $w \leq 7$ **(B)** $w \geq 7$ **(C)** $w \leq 9.4$ **(D)** $w \geq 9.4$
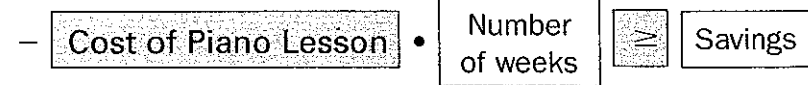
Solution

To find the number of weeks you must save your money to have at least $205, subtract your expenses from your earnings. Let w represent the number of weeks.

Earnings

Money saved	+	Babysitting earnings per week	•	Number of Weeks
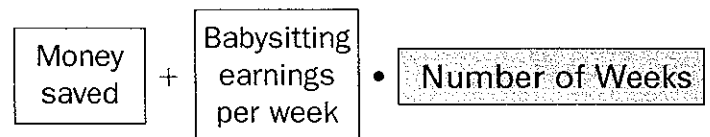
Lesson Expenses				**Savings**
−	Cost of Piano Lesson	•	Number of weeks	$\geq$	Savings

$30 + \boxed{32w} - \boxed{7w} \boxed{\geq} 205$ Write an inequality.

$30 + \boxed{25w} \boxed{\geq} 205$ Combine like terms.

$\boxed{25w} \boxed{\geq} \boxed{175}$ $\boxed{\text{Subtract 30}}$ from each side.

$\boxed{w > 7}$ Divide each side by $\boxed{25}$.

Answer: The correct answer is $\boxed{B}$. **(A)** **(B)** **(C)** **(D)**