Inequalities

1. If $14 - 4x \geq 38$, then what is $x$?
   - (A) $x \geq -6$
   - (B) $x \leq -6$
   - (C) $x \geq 6$
   - (D) $x \leq 6$
   - (E) $x \leq -4$

2. If $4(y + 3) \leq 44$, what is $y$?
   - (A) $y \leq 8$
   - (B) $y \leq 4$
   - (C) $y \geq -4$
   - (D) $y \geq -8$
   - (E) $y < 8$

3. If $3x + 7 < 13$, what is $x$?
   - (A) $x < 2$
   - (B) $x < -2$
   - (C) $x > 2$
   - (D) $x > -2$
   - (E) $x < \frac{1}{2}$

4. $8 - 4y \geq -8$, what is $y$?
   - (A) $y \geq 4$
   - (B) $y \geq -\frac{1}{2}$
   - (C) $y \leq -4$
   - (D) $y \leq 4$
   - (E) $y \geq -4$

5. $15 + 6x \leq 2x + 7$, what is $x$?
   - (A) $x \geq 2$
   - (B) $x \leq \frac{1}{2}$
   - (C) $x \geq 4$
   - (D) $x \geq -2$
   - (E) $x \leq -2$
6. If $12 - 5x > 7$, what is $x$?

(A) $x > 1$
(B) $x < 1$
(C) $x > 0$
(D) $x > -1$
(E) $x < -1$
Answers and Explanations

1. **The correct answer is B.** First, you want to isolate the variable, $x$, by subtracting 14 from both sides of the equation:

   \[
   14 - 4x (-14) \geq 38 - 14 \\
   -4x \geq 24
   \]

   Next, divide both sides by -4. Since you are dividing by a negative number (-4), you must switch the inequality sign:

   \[
   x \leq \frac{24}{-4} \\
   x \leq -6
   \]

2. **The correct answer is A.** While your first inclination might be to eliminate the parentheses by multiplying everything inside them by four, you want to solve for $y$, so it’s actually more efficient to simply divide both sides by 4. You’ll then end up with:

   \[
   y + 3 \leq \frac{44}{4} \\
   y + 3 \leq 11
   \]

   Next, subtract 3 from both sides for your answer:

   \[
   y \leq 8
   \]

3. **The correct answer is A.** Start by subtracting 7 from each side:

   \[
   3x + 7 < 13 \\
   3x < 6
   \]

   Next, divide both sides by 3. Since you aren’t dividing by a negative number, you don’t have to worry about switching the signs:

   \[
   x < \frac{6}{3} \\
   x < 2
   \]

4. **The correct answer is D.** As with the questions above, start by subtracting 8 from both sides and then divide each side by -4. Remember to switch the signs!

   \[
   8 - 4y - 8 \geq -8 - 8 \\
   -4y \geq -16 \\
   \frac{-4y}{-4} \leq \frac{-16}{-4} \\
   y \leq 4
   \]
5. **The correct answer is E.** Start by putting the variables on one side and the rest on the other:

\[
\begin{align*}
15 + 6x - 15 & \leq 2x + 7 - 15 \\
6x & \leq 2x - 8 \\
6x - 2x & \leq 2x - 8 - 2x \\
4x & \leq -8
\end{align*}
\]

Then, divide both sides by 4:

\[
\begin{align*}
\frac{4x}{4} & \leq \frac{-8}{4} \\
x & \leq -2
\end{align*}
\]

6. **The correct answer is B.** Just as in the questions above, isolate the variable, first by subtracting 12 from both sides:

\[
\begin{align*}
12 - 5x - 12 & > 7 - 12 \\
-5x & > -5
\end{align*}
\]

Next, divide both sides by -5 and don’t forget to flip the sign!

\[
\begin{align*}
\frac{-5x}{-5} & < \frac{-5}{-5} \\
x & < 1
\end{align*}
\]