Compound Inequalities

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

An *"and"* compound inequality such as $3 < x \leq 7$ means both parts are true at once – solve it as a double inequality, doing the same operation to all three parts. An *"or"* inequality means at least one part is true. Remember to flip the signs if you multiply or divide by a negative.

▷ **Example:** Solve $1 \leq 2x + 3 < 9$. **Work:** Subtract 3 from all three parts: $-2 \leq 2x < 6$. Divide every part by 2: $-1 \leq x < 3$.

★ **Answer:** $-1 \leq x < 3$

$-1 \leq x < 3$: closed at -1, open at 3.

Practice Problems

Solve each compound inequality.

1. $2 < x + 1 < 5$ _____

2. $-3 \leq x - 2 \leq 1$ _____

3. $4 < 2x < 10$ _____

4. $6 \leq 3x \leq 18$ _____

5. $1 \leq x + 4 \leq 7$ _____

6. $0 < 2x + 2 < 8$ _____

7. $-5 < x - 1 < 2$ _____

8. $3 \leq 2x - 1 \leq 9$ _____

9. $-4 \leq 2x \leq 6$ _____

10. $5 < x + 3 < 9$ _____

11. $4 \leq 4x \leq 12$ _____

12. $-1 < 3x + 2 < 11$ _____

13. $0 \leq 5x \leq 20$ _____

14. $-6 < 2x - 2 < 4$ _____

Word Problems

15. A number plus 3 is between 5 and 10. Write and solve a compound inequality. _____

16. Twice a number is at least 4 and at most 16. Find the numbers. _____

17. A temperature x satisfies $10 \leq x - 5 \leq 25$. Solve for x. _____

18. A storage room sensor reads $x + 1$ degrees. The safe range is above -2 degrees and at most 4 degrees. Write the solution for x. _____

Answer Keys

1. $1 < x < 4$	**7.** $-4 < x < 3$	**13.** $0 \leq x \leq 4$
2. $-1 \leq x \leq 3$	**8.** $2 \leq x \leq 5$	**14.** $-2 < x < 3$
3. $2 < x < 5$	**9.** $-2 \leq x \leq 3$	**15.** $2 < x < 7$
4. $2 \leq x \leq 6$	**10.** $2 < x < 6$	**16.** $2 \leq x \leq 8$
5. $-3 \leq x \leq 3$	**11.** $1 \leq x \leq 3$	**17.** $15 \leq x \leq 30$
6. $-1 < x < 3$	**12.** $-1 < x < 3$	**18.** $-3 < x \leq 3$

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 1 from all parts: $1 < x < 4$. So the final answer is $1 < x < 4$.

2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 2 to all parts: $-1 \leq x \leq 3$. So the final answer is $-1 \leq x \leq 3$.

3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide all parts by 2: $2 < x < 5$. So the final answer is $2 < x < 5$.

4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide all parts by 3: $2 \leq x \leq 6$. So the final answer is $2 \leq x \leq 6$.

5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 4 from all parts: $-3 \leq x \leq 3$. So the final answer is $-3 \leq x \leq 3$.

6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 2: $-2 < 2x < 6$. Divide by 2: $-1 < x < 3$. So the final answer is $-1 < x < 3$.

7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 1 to all parts: $-4 < x < 3$. So the final answer is $-4 < x < 3$.

8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 1: $4 \leq 2x \leq 10$. Divide by 2: $2 \leq x \leq 5$. So the final answer is $2 \leq x \leq 5$.

9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide all parts by 2: $-2 \leq x \leq 3$. So the final answer is $-2 \leq x \leq 3$.

10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 3 from all parts: $2 < x < 6$. So the final answer is $2 < x < 6$.

11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide all parts by 4: $1 \leq x \leq 3$. So the final answer is $1 \leq x \leq 3$.

12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 2: $-3 < 3x < 9$. Divide by 3: $-1 < x < 3$. So the final answer is $-1 < x < 3$.

13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide all parts by 5: $0 \leq x \leq 4$. So the final answer is $0 \leq x \leq 4$.

14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 2: $-4 < 2x < 6$. Divide by 2: $-2 < x < 3$. So the final answer is $-2 < x < 3$.

15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Set $5 < x + 3 < 10$. Subtract 3: $2 < x < 7$. So the final answer is $2 < x < 7$.

16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Set $4 \leq 2x \leq 16$. Divide by 2: $2 \leq x \leq 8$. So the final answer is $2 \leq x \leq 8$.

17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 5 to all parts: $15 \leq x \leq 30$. So the final answer is $15 \leq x \leq 30$.

18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 1 from all parts: $-3 < x \leq 3$. So the final answer is $-3 < x \leq 3$.

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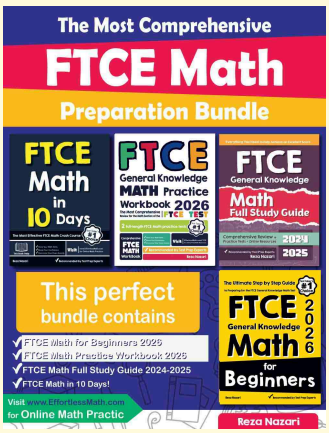

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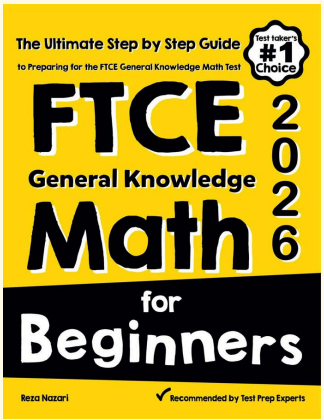

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