Graphing Single-Variable Inequalities

Name: _____	Date: _____	Score: _____ / 24

Quick Review and Helpful Hints

To graph an inequality on a number line, solve for the variable first if needed. Use an *open* circle for $<$ or $>$ (endpoint *not* included) and a *closed* circle for $\leq$ or $\geq$ (endpoint *included*). Then shade toward the numbers that make it true: to the right for "greater," to the left for "less."

▷ **Example:** Graph $x > 2$ on a number line. **Work:** This says x is greater than 2, and 2 itself is not included. So draw an open circle at 2 and shade everything to the right. ★ **Answer:** open circle at 2, shade right

$x > 2$: open circle at 2, shade right.

Practice Problems

Solve if needed, then graph the solution on the provided number line.

1. $x > 3$

2. $x \leq 5$

3. $x \geq -2$

4. $x < 0$

5. $x + 2 > 5$

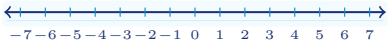
6. $x - 4 \leq 1$

7. $2x < 8$

8. $x + 7 \geq 7$

9. $3x \geq 9$

10. $x - 1 < 2$



11. $\frac{x}{2} > 3$

12. $x + 5 \leq 2$

13. $4x > -8$

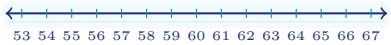
14. $x - 6 \geq -6$

Word Problems

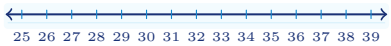
15. A ride requires you to be *taller than* 48 inches. Let h be height in inches. Write an inequality and graph it.

16. A parking garage allows vehicles *at most* 7 feet tall. Let t be height in feet. Write an inequality and graph it.

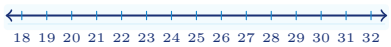
17. To pass a test, a student needs *at least* 60 points. Let p be points. Write an inequality and graph it.



18. The temperature stayed *below* $32°$F all day. Let T be temperature. Write an inequality and graph it.

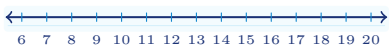


19. A coupon can be used when the order total is *at least* $\$25$. Let c be the cost in dollars. Write an inequality and graph it.



20. An elevator can hold *no more than* 12 people. Let n be the number of people. Write an inequality and graph it.

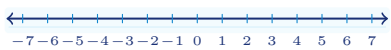
21. A child ticket is for ages *under* 13. Let a be age in years. Write an inequality and graph it.



22. To enter the honors program, a score must be *greater than* 80. Let s be the score. Write an inequality and graph it.

23. A family wants to spend *at most* $\$40$ on snacks. Let b be the amount spent. Write an inequality and graph it.

24. A freezer should stay *below* $0°$F. Let F be the temperature. Write an inequality and graph it.



Answer Keys

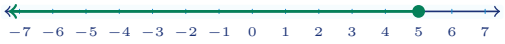
1. $x > 3$	**7.** $x < 4$	**13.** $x > -2$	**19.** $c \geq 25$
2. $x \leq 5$	**8.** $x \geq 0$	**14.** $x \geq 0$	**20.** $n \leq 12$
3. $x \geq -2$	**9.** $x \geq 3$	**15.** $h > 48$	**21.** $a < 13$
4. $x < 0$	**10.** $x < 3$	**16.** $t \leq 7$	**22.** $s > 80$
5. $x > 3$	**11.** $x > 6$	**17.** $p \geq 60$	**23.** $b \leq 40$
6. $x \leq 5$	**12.** $x \leq -3$	**18.** $T < 32$	**24.** $F < 0$

Graph Answer Sketches

Each short answer includes the matching number-line graph: open circles mean the endpoint is not included, closed circles mean it is included.

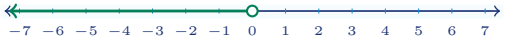
1. $x > 3$

2. $x \leq 5$



3. $x \geq -2$

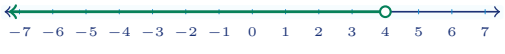
4. $x < 0$



5. $x > 3$

6. $x \leq 5$

7. $x < 4$

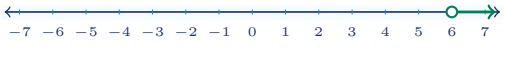


8. $x \geq 0$

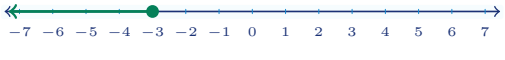
9. $x \geq 3$

10. $x < 3$

11. $x > 6$



12. $x \leq -3$



13. $x > -2$

14. $x \geq 0$

15. $h > 48$

16. $t \leq 7$

17. $p \geq 60$

18. $T < 32$

19. $c \geq 25$

20. $n \leq 12$

21. $a < 13$

22. $s > 80$

23. $b \leq 40$

24. $F < 0$

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 The variable is already isolated: $x > 3$. Use an open circle at 3 because 3 is not included, then shade right toward larger numbers. So the final answer is $x > 3$.

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 The $\leq$ symbol includes the endpoint, so put a closed circle at 5 and shade left for all numbers less than or equal to 5. So the final answer is $x \leq 5$.

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 The $\geq$ symbol includes -2. Put a closed circle at -2 and shade right because the solution is all numbers at least -2. So the final answer is $x \geq -2$.

4. Strict less-than does not include the endpoint. Put an open circle at 0 and shade left.

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 2 from both sides: $x > 3$. Put an open circle at 3 and shade right. So the final answer is $x > 3$.

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 Add 4 to both sides: $x \leq 5$. Put a closed circle at 5 and shade left. So the final answer is $x \leq 5$.

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 Divide both sides by positive 2: $x < 4$. Put an open circle at 4 and shade left. So the final answer is $x < 4$.

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 Subtract 7 from both sides: $x \geq 0$. Put a closed circle at 0 and shade right. So the final answer is $x \geq 0$.

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 both sides by positive 3: $x \geq 3$. Put a closed circle at 3 and shade right. So the final answer is $x \geq 3$.

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 Add 1 to both sides: $x < 3$. Put an open circle at 3 and shade left. So the final answer is $x < 3$.

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 Multiply both sides by positive 2: $x > 6$. Put an open circle at 6 and shade right. So the final answer is $x > 6$.

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 5 from both sides: $x \leq -3$. Put a closed circle at -3 and shade left. So the final answer is $x \leq -3$.

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 both sides by positive 4: $x > -2$. Put an open circle at -2 and shade right. So the final answer is $x > -2$.

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 6 to both sides: $x \geq 0$. Put a closed circle at 0 and shade right. So the final answer is $x \geq 0$.

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 "Taller than" is strict, so $h > 48$. Put an open circle at 48 and shade right. So the final answer is $h > 48$.

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 "At most" means $\leq$, so $t \leq 7$. Put a closed circle at 7 and shade left. So the final answer is $t \leq 7$.

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 "At least" means $\geq$, so $p \geq 60$. Put a closed circle at 60 and shade right. So the final answer is $p \geq 60$.

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 "Below" is strict, so $T < 32$. Put an open circle at 32 and shade left. So the final answer is $T < 32$.

19. Step by step: Read the phrase first. "At least" means the endpoint is included, so the inequality is $c \geq 25$. On the number line, put a closed circle at 25 and shade right.

20. Take it one move at a time: "No more than" means the value can be 12 or less, so $n \leq 12$. Use a closed circle at 12 and shade left.

21. The word "under" is strict, so 13 is not included. Write $a < 13$, then graph it with an open circle at 13 and shading to the left.

22. "Greater than" is also strict, so the score must be more than 80. Write $s > 80$, use an open circle at 80, and shade right.

23. For "at most," the endpoint is allowed. That gives $b \leq 40$, so the graph needs a closed circle at 40 and shading left.

24. "Below" means the temperature must be less than 0, not equal to 0. Write $F < 0$, draw an open circle at 0, and shade left.

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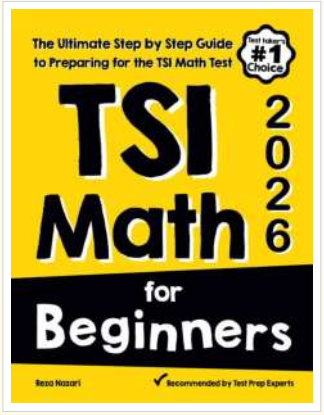

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