

# 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.  $x > 3$



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8.  $x + 7 \geq 7$



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2.  $x \leq 5$



9.  $3x \geq 9$



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3.  $x \geq -2$



10.  $x - 1 < 2$

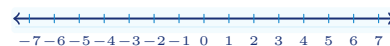


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4.  $x < 0$



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

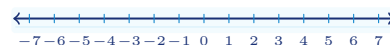


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5.  $x + 2 > 5$



12.  $x + 5 \leq 2$

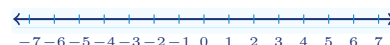


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6.  $x - 4 \leq 1$



13.  $4x > -8$



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7.  $2x < 8$



14.  $x - 6 \geq -6$

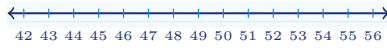


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◆ Word Problems

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



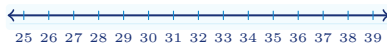
16. A parking garage allows vehicles *at most* 7 feet tall. Let  $t$  be height in feet. Write an inequality and graph it.



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*  $32^{\circ}\text{F}$  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.



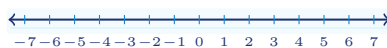
22. To enter the honors program, a score must be *greater than* 80. Let  $s$  be the score. Write an inequality and graph it.



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*  $0^{\circ}\text{F}$ . Let  $F$  be the temperature. Write an inequality and graph it.



**Answer Keys**

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.  $F < 0$



### 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.  $b < 40$

24.  $F < 0$



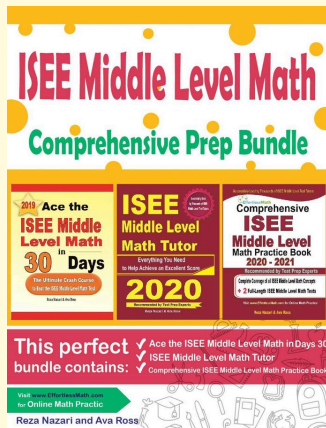
## Step-by-Step Explanations

- 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  $x > 3$ .
- 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  $x \leq 5$ .
- 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  $x \geq -2$ .
- Strict less-than does not include the endpoint. Put an open circle at 0 and shade left.
- 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  $x > 3$ .
- 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  $x \leq 5$ .
- 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  $x < 4$ .
- 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  $x \geq 0$ .
- 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  $x \geq 3$ .
- 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  $x < 3$ .
- 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  $x > 6$ .
- 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  $x \leq -3$ .
- 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  $x > -2$ .
- 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  $x \geq 0$ .
- 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  $h > 48$ .
- 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  $t \leq 7$ .
- 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  $p \geq 60$ .
- 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  $T < 32$ .
- 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.
- 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.
- 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.
- "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.
- For "at most," the endpoint is allowed. That gives  $b \leq 40$ , so the graph needs a closed circle at 40 and shading left.
- "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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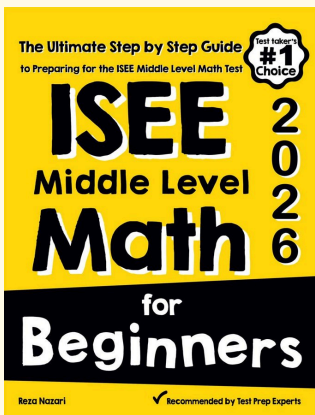
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