

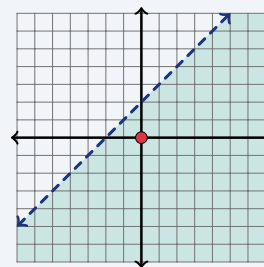
# Graphing Linear Inequalities

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

To graph a two-variable inequality, first draw the boundary line: use a *dashed* line for  $<$  or  $>$  (the line is not included) and a *solid* line for  $\leq$  or  $\geq$ . Then *shade* the side that makes it true – test a point such as  $(0, 0)$ : if it works, shade its side. For  $y >$  or  $y \geq$  shade above the line; for  $y <$  or  $y \leq$  shade below.

▷ **Example:** Describe the graph of  $y < x + 2$ , and test whether  $(0, 0)$  is a solution. **Work:** The symbol is  $<$ , so the boundary  $y = x + 2$  is dashed. Test  $(0, 0)$ :  $0 < 0 + 2$  means  $0 < 2$ , which is true, so  $(0, 0)$  is a solution and you shade its side (below the line). ★ **Answer:** dashed;  $(0, 0)$  is a solution

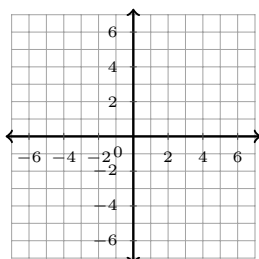


$y < x + 2$ : dashed line, shade below.

### Practice Problems

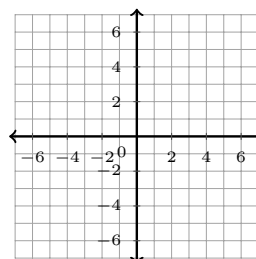
Graph each inequality on the coordinate plane, then answer the question about its solution region.

1. Graph  $y < x + 2$ . Is  $(0, 0)$  a solution?



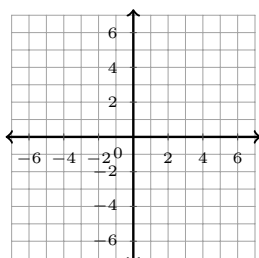
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3. Graph  $y \leq x$ . Is  $(2, 1)$  a solution?



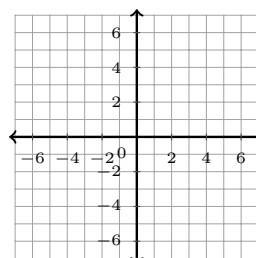
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2. Graph  $y > 2x$ . Is  $(1, 5)$  a solution?



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4. Graph  $y > x + 1$ . Is  $(0, 0)$  a solution?



5. Graph  $y \geq x$ . Is  $(3, 3)$  a solution?



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9. Graph  $y \geq x + 2$ . Is  $(-1, 0)$  a solution?



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6. Graph  $y < x$ . Is  $(1, 0)$  a solution?



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10. Graph  $y < x - 1$ . Is  $(4, 2)$  a solution?



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7. Graph  $y \leq 2x + 1$ . Is  $(0, 4)$  a solution?



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11. Graph  $y \leq -x + 3$ . Is  $(0, 0)$  a solution?



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8. Graph  $y > x + 2$ . Is  $(2, 5)$  a solution?

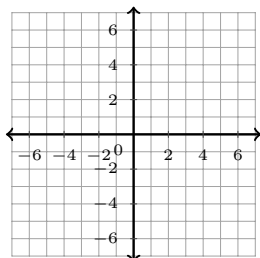


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12. Graph  $y \leq 2x + 1$ . Is the boundary solid or dashed?

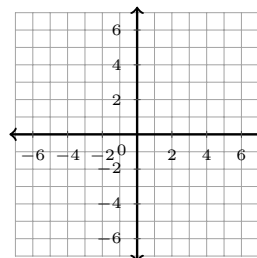


13. Graph  $y > x - 3$ . Is the boundary solid or dashed?



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14. Graph  $y < 2x$ . Shade above or below the line?



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◆ Word Problems

15. For the inequality  $y \geq 3x - 1$ , is the boundary line solid or dashed?

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17. For  $y \leq x$ , do you shade above or below the boundary line?

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16. Test the point  $(0, 0)$  in  $y > x + 4$ . Is it a solution?

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18. Is the point  $(2, 2)$  a solution of  $y \geq 2x - 2$ ?

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## Answer Keys

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### Graph Answer Sketches

Shaded regions show the solutions. Dashed boundary lines are not included; solid boundary lines are included.

1.  $y < x + 2$  **yes**

7.  $y \leq 2x + 1$  **no**

2.  $y > 2x$  **yes**

8.  $y > x + 2$  **yes**

3.  $y \leq x$  **yes**

9.  $y \geq x + 2$  **no**

4.  $y > x + 1$  **no**

10.  $y < x - 1$  **yes**

5.  $y \geq x$  **yes**

11.  $y \leq -x + 3$  **yes**

6.  $y < x$  **yes**

12.  $y \leq 2x + 1$  **solid**



13.  $y > x - 3$

dashed



14.  $y < 2x$

below



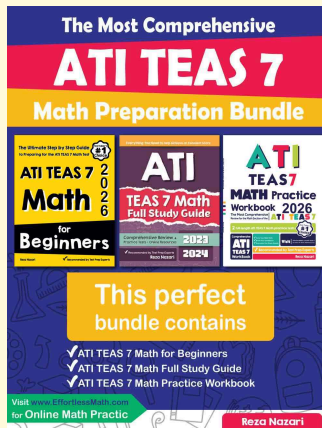
## Step-by-Step Explanations

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 Plug in the point: is  $0 < 0 + 2$ ? Since  $0 < 2$  is true,  $(0, 0)$  is a solution. So the final answer is yes.
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 Check: is  $5 > 2(1) = 2$ ? Since  $5 > 2$  is true, yes. So the final answer is yes.
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 Check: is  $1 \leq 2$ ? True, so yes. So the final answer is yes.
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 Check: is  $0 > 0 + 1 = 1$ ? Since  $0 > 1$  is false, no. So the final answer is no.
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 Check: is  $3 \geq 3$ ? Equal counts for  $\geq$ , so yes. So the final answer is yes.
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 Check: is  $0 < 1$ ? True, so yes. So the final answer is yes.
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 Check: is  $4 \leq 2(0) + 1 = 1$ ? Since  $4 \leq 1$  is false, no. So the final answer is no.
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 Check: is  $5 > 2 + 2 = 4$ ? True, so yes. So the final answer is yes.
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 Check: is  $0 \geq -1 + 2 = 1$ ? Since  $0 \geq 1$  is false, no. So the final answer is no.
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 Check: is  $2 < 4 - 1 = 3$ ? True, so yes. So the final answer is yes.
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 Check: is  $0 \leq -0 + 3 = 3$ ? True, so yes. So the final answer is yes.
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 Since the symbol is  $\leq$ , the boundary line is included, so draw it solid. So the final answer is solid.
13. Since the symbol is  $>$  (strict), the boundary is not included, so draw it dashed.
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 For  $y <$ , the solutions lie below the boundary line, so shade below. So the final answer is below.
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 The symbol  $\geq$  includes the boundary, so the line is solid. So the final answer is solid.
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 Check  $(0, 0)$  in  $y > x + 4$ : is  $0 > 0 + 4 = 4$ ? Since  $0 > 4$  is false, no. So the final answer is no.
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 For  $y \leq$ , the solutions lie below the line, so shade below. So the final answer is below.
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 Check  $(2, 2)$  in  $y \geq 2x - 2$ : is  $2 \geq 2(2) - 2 = 2$ ? Equal counts for  $\geq$ , so yes. So the final answer is yes.



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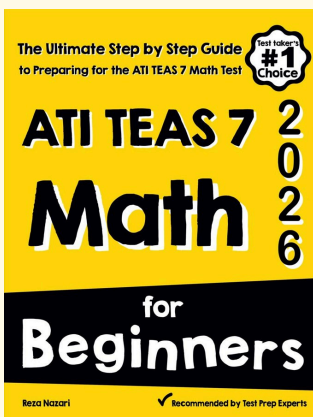
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