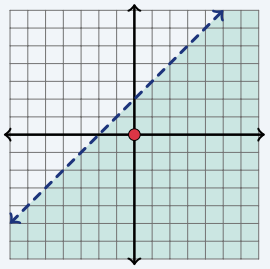
Graphing Linear Inequalities

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

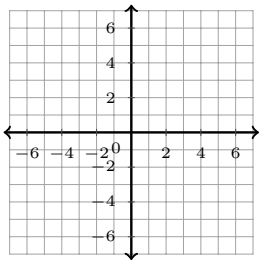


$y < x + 2$: dashed line, shade below.

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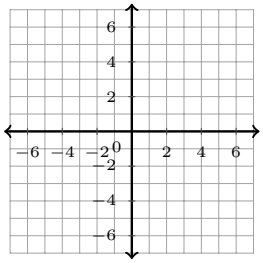
3. Graph $y \leq x$. Is $(2, 1)$ a solution?



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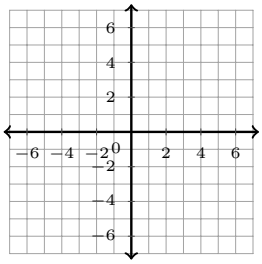
2. Graph $y > 2x$. Is $(1, 5)$ a solution?



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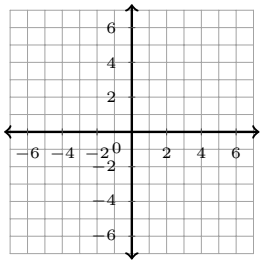
4. Graph $y > x + 1$. Is $(0, 0)$ a solution?



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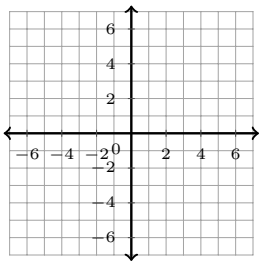
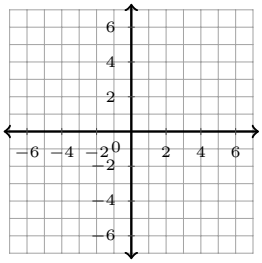
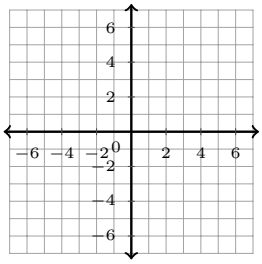
5. Graph $y \geq x$. Is $(3, 3)$ a solution?



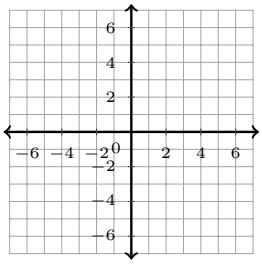
6. Graph $y < x$. Is $(1, 0)$ a solution?



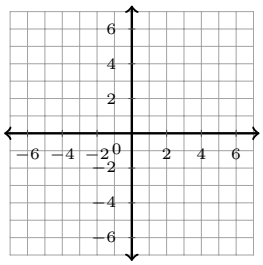
7. Graph $y \leq 2x + 1$. Is $(0, 4)$ a solution?



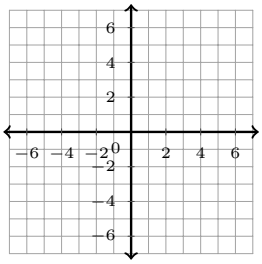
8. Graph $y > x + 2$. Is $(2, 5)$ a solution?



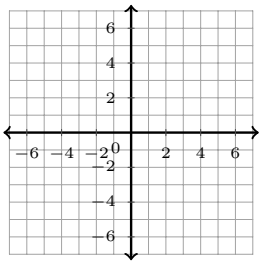
9. Graph $y \geq x + 2$. Is $(-1, 0)$ a solution?



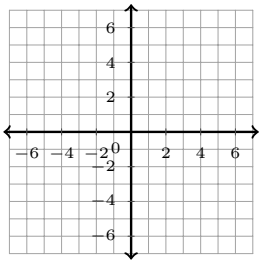
10. Graph $y < x - 1$. Is $(4, 2)$ a solution?



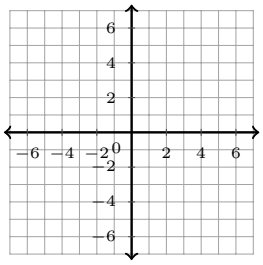
11. Graph $y \leq -x + 3$. Is $(0, 0)$ a solution?



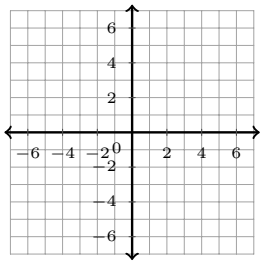
12. Graph $y \leq 2x + 1$. Is the boundary solid or dashed?



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



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



Word Problems

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

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

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

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

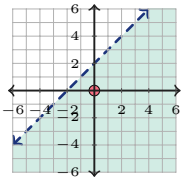
Answer Keys

1. yes	**7.** no	**13.** dashed
2. yes	**8.** yes	**14.** below
3. yes	**9.** no	**15.** solid
4. no	**10.** yes	**16.** no
5. yes	**11.** yes	**17.** below
6. yes	**12.** solid	**18.** yes

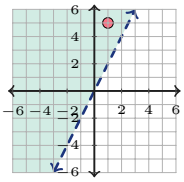
Graph Answer Sketches

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

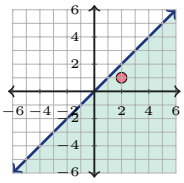
1. $y < x + 2$ **yes**



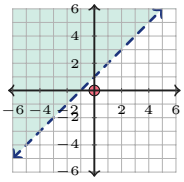
2. $y > 2x$ **yes**



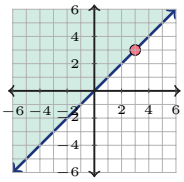
3. $y \leq x$ **yes**



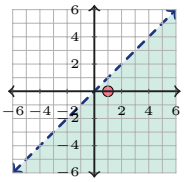
4. $y > x + 1$ **no**



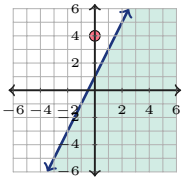
5. $y \geq x$ **yes**



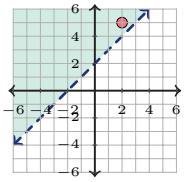
6. $y < x$ **yes**



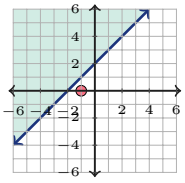
7. $y \leq 2x + 1$ **no**



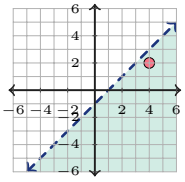
8. $y > x + 2$ **yes**



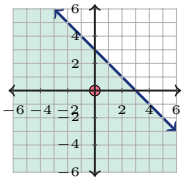
9. $y \geq x + 2$ **no**



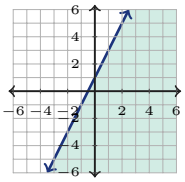
10. $y < x - 1$ **yes**



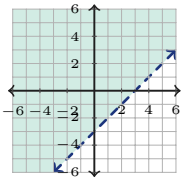
11. $y \leq -x + 3$ **yes**



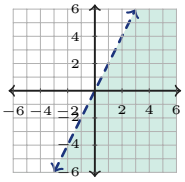
12. $y \leq 2x + 1$ **solid**



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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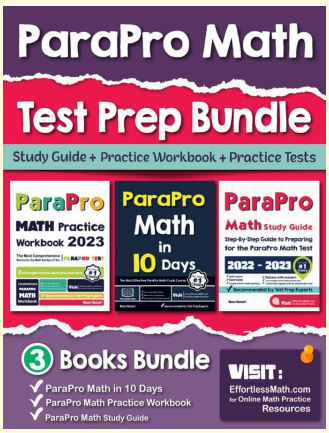

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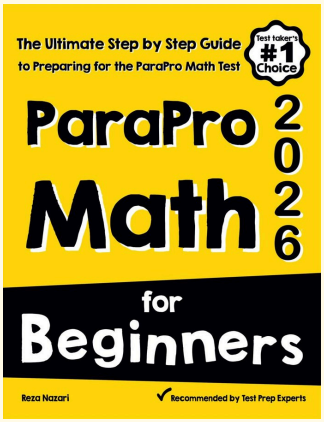

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