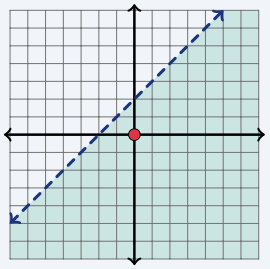
Graphing Linear Inequalities

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

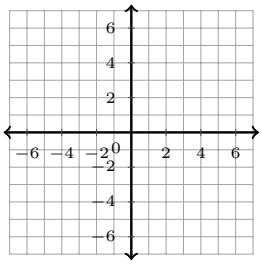


$y < x + 2$: dashed line, shade below.

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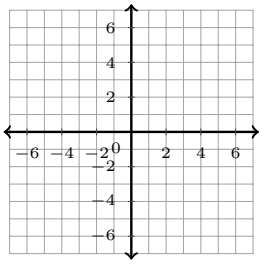
2. Graph $y > 2x$. Is $(1, 5)$ a solution?



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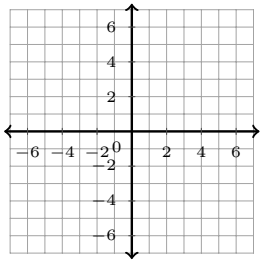
3. Graph $y \leq x$. Is $(2, 1)$ a solution?



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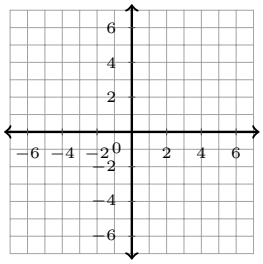
4. Graph $y > x + 1$. Is $(0, 0)$ a solution?



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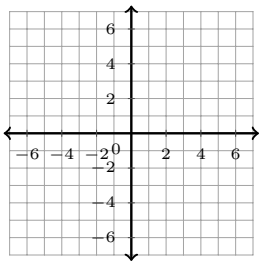
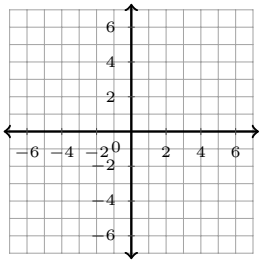
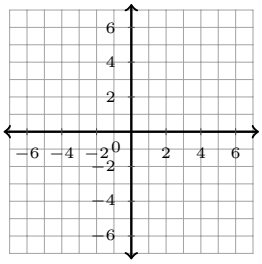
5. Graph $y \geq x$. Is $(3, 3)$ a solution?



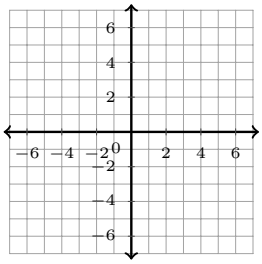
6. Graph $y < x$. Is $(1, 0)$ a solution?



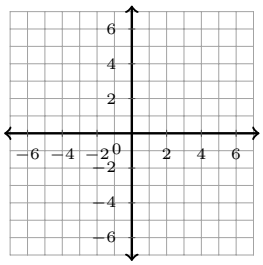
7. Graph $y \leq 2x + 1$. Is $(0, 4)$ a solution?



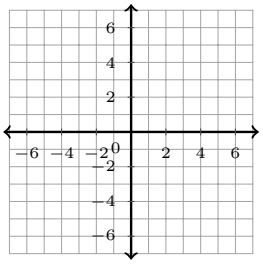
8. Graph $y > x + 2$. Is $(2, 5)$ a solution?



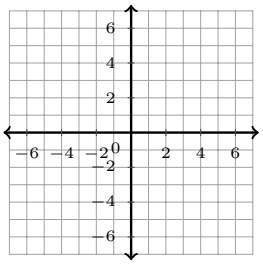
9. Graph $y \geq x + 2$. Is $(-1, 0)$ a solution?



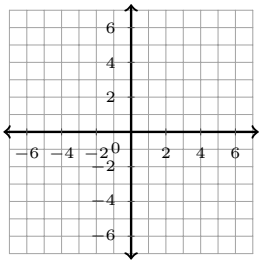
10. Graph $y < x - 1$. Is $(4, 2)$ a solution?



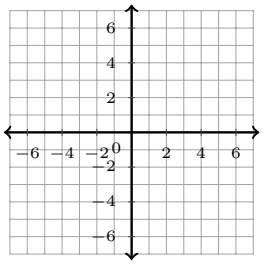
11. Graph $y \leq -x + 3$. Is $(0, 0)$ a solution?



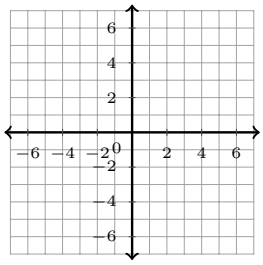
12. Graph $y \leq 2x + 1$. Is the boundary solid or dashed?



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 $y \geq 2x - 2$?

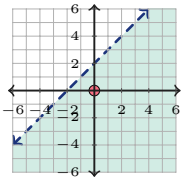
Answer Keys

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

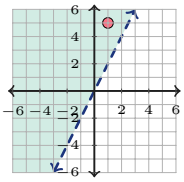
Graph Answer Sketches

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

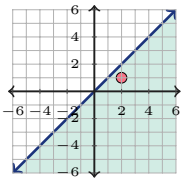
1. $y < x + 2$ **yes**



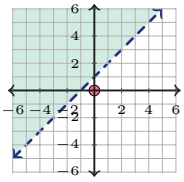
2. $y > 2x$ **yes**



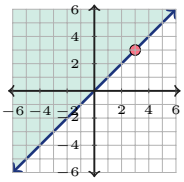
3. $y \leq x$ **yes**



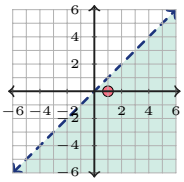
4. $y > x + 1$ **no**



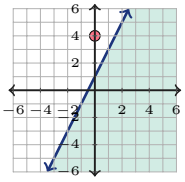
5. $y \geq x$ **yes**



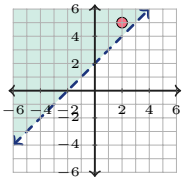
6. $y < x$ **yes**



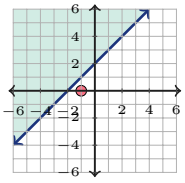
7. $y \leq 2x + 1$ **no**



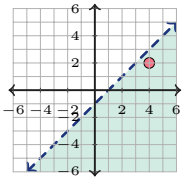
8. $y > x + 2$ **yes**



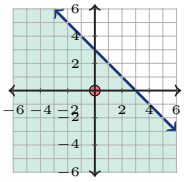
9. $y \geq x + 2$ **no**



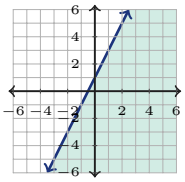
10. $y < x - 1$ **yes**



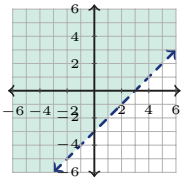
11. $y \leq -x + 3$ **yes**



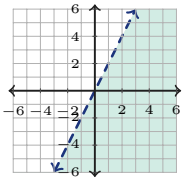
12. $y \leq 2x + 1$ **solid**



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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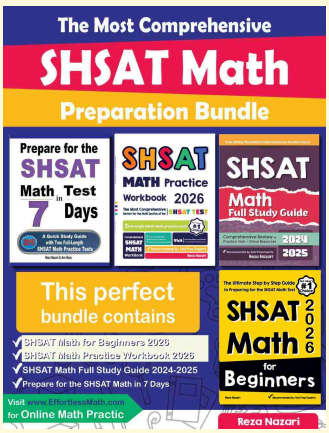

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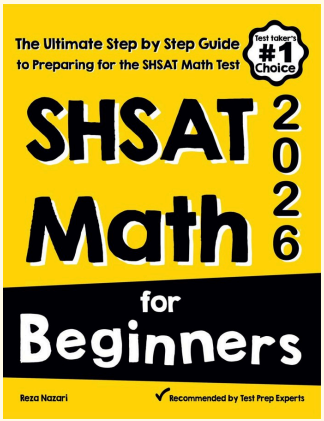

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