Graphing Solutions to Inequalities on a Number Line

Spot mistakes, reason, and work backward

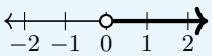
Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Check the dot and direction separately. A dot at -1 is closed only if -1 satisfies the rule. Test a value on the shaded side, too.

Worked example

Bo used a closed dot at 0 and shaded left for $x/2 + 1 > 1$. Correct his graph.

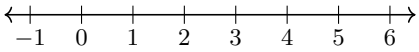


1. Subtract 1: $\frac{1}{2}x > 0$.
2. Divide by $\frac{1}{2}$: $x > 0$.
3. At $x = 0$, $\frac{1}{2}(0) + 1 = 1$. $1 > 1$ is false: use an open circle.
4. At $x = 1$, $\frac{3}{2} > 1$ is true. Shade right.
Answer: $x > 0$; open at 0, shade right.

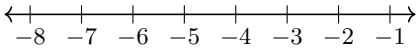
Practice Problems

Show your thinking.

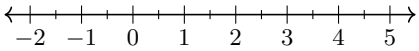
1. A student graphs $x \leq 2$ with an open circle at 2 and shading left. Fix only what is wrong and explain.



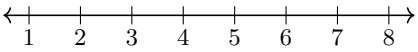
2. Rin graphs $-4x \geq 20$ with a closed circle at -5 and shades right. Test -4, then redraw correctly.



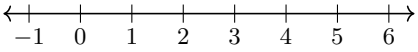
3. An open circle halfway between 1 and 2 has a ray to the right. Reproduce it, write its inequality, and test 1.5 and 2.



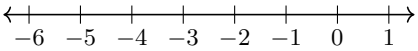
4. The solution graph of $2s - 3 < C$ is open at $s = 4$ and shaded left. Recover C, then draw the graph.



5. Choose $<, \leq, >, \geq$ in $7 - 3x \ ? \ 1$ to match a closed circle at 2 with shading right. Draw the graph.



6. Pia says the graph for $6 + x < 3$ ends farther left than the graph for $2x < -6$. Compare the rules and graph their common solutions.



Answer Key

1. $x \leq 2$; closed at 2, shade left.
2. $x \leq -5$; closed at -5, shade left. -4 fails.
3. $x > \frac{3}{2}$; open at $\frac{3}{2}$, shade right. Includes 2 but not 1.5.
4. $s < 4$; open at 4, shade left. $C = 5$.
5. $x \geq 2$; closed at 2, shade right. $7 - 3x \leq 1$.
6. $x < -3$; open at -3, shade left. The two graphs coincide.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Smaller values are left of 2; the direction is already correct.
2. At $x = 2$, $(2) = 2$. $2 \leq 2$ is true: use a closed circle.
3. At $x = 1$, $1 \leq 2$ is true. Shade left.

Problem 2

1. Rin shades -4, but $(-4)(-4) = 16 < 20$. That side is wrong.
2. Divide by -4 and reverse the comparison: $x \leq -5$.
3. At $x = -5$, $-4(-5) = 20$. $20 \geq 20$ is true: use a closed circle.
4. At $x = -6$, $24 \geq 20$ is true. Shade left.

Problem 3

1. The midpoint is $(1 + 2)/2 = \frac{3}{2}$. Right and open mean $x > \frac{3}{2}$.
2. At $x = \frac{3}{2}$, $(\frac{3}{2}) = \frac{3}{2}$. $\frac{3}{2} > \frac{3}{2}$ is false: use an open circle.
3. At $x = \frac{5}{2}$, $\frac{5}{2} > \frac{3}{2}$ is true. Shade right.
4. $2 > \frac{3}{2}$, so 2 is included; 1.5 is not.

Problem 4

1. Both sides match at the boundary: $C = 2(4) - 3 = 5$.
2. Add 3: $2s < 8$.
3. Divide by 2: $s < 4$.
4. At $s = 4$, $2(4) - 3 = 5$. $5 < 5$ is false: use an open circle.
5. At $s = 3$, $3 < 5$ is true. Shade left.

Problem 5

1. $x = 2$ gives 1 and must pass; $x = 3$ gives $-2 < 1$ and must pass. Use $\leq$.
2. Subtract 7: $-3x \leq -6$.
3. Divide by -3 and reverse the comparison: $x \geq 2$.
4. At $x = 2$, $-3(2) + 7 = 1$. $1 \leq 1$ is true: use a closed circle.
5. At $x = 3$, $-2 \leq 1$ is true. Shade right.

Problem 6

1. Subtract 6 from $6 + x < 3$: $x < -3$.
2. Divide by 2: $x < -3$.
3. At $x = -3$, $2(-3) = -6$. $-6 < -6$ is false: use an open circle.
4. At $x = -4$, $-8 < -6$ is true. Shade left.
5. Both give $x < -3$, so the rays coincide.

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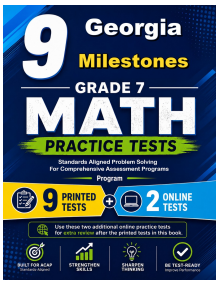

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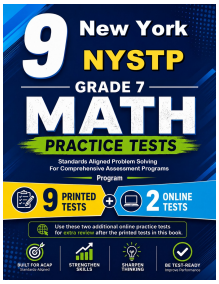

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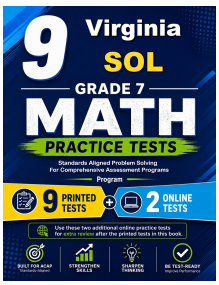

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