

# Solving One-Step Inequalities

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 48

## Q Quick Review

**Inequality symbols:**  $<$  means “less than,”  $>$  means “greater than,”  $\leq$  means “less than or equal to,” and  $\geq$  means “greater than or equal to.” Solving an inequality is *almost* the same as solving an equation: do the same thing to both sides until the variable is isolated. But here’s the one rule that trips up everyone: when you **multiply or divide both sides by a negative number, you must flip the inequality sign.** (Why? Because multiplying by  $-1$  reverses which side of zero a number is on.) On a number line, use an **open circle**  $\circ$  at the boundary for  $<$  or  $>$  (the value isn’t included), and a **closed circle**  $\bullet$  for  $\leq$  or  $\geq$  (it is included). Then shade toward the side that solves the inequality.

## PRACTICE

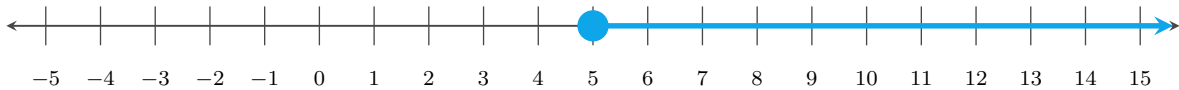
Solve each inequality.

- |                          |       |  |       |
|--------------------------|-------|--|-------|
| 1. $x + 3 > 8$           | _____ | 11. $-5p \geq 25$                      | _____ |
| 2. $n - 5 \leq 2$        | _____ | 12. $w - 8 > -3$                       | _____ |
| 3. $y + 7 < 4$           | _____ | 13. $6 + x \leq 1$                     | _____ |
| 4. $a - 1 \geq -6$       | _____ | 14. $-x > 4$                           | _____ |
| 5. $4x > 20$             | _____ | 15. $3n \geq -27$                      | _____ |
| 6. $-2m < 10$            | _____ | 16. $\frac{y}{-2} > 3$                 | _____ |
| 7. $\frac{x}{3} \geq 6$  | _____ | 17. $-15 < -3a$                        | _____ |
| 8. $\frac{n}{-4} \leq 5$ | _____ | 18. $x - \frac{1}{2} \geq \frac{3}{2}$ | _____ |
| 9. $-7k > -42$           | _____ | 19. $0.4x < 2$                         | _____ |
| 10. $x + 0.5 < 3.5$      | _____ | 20. $-\frac{2}{3}n \leq 4$             | _____ |

## ◆ VISUAL PRACTICE

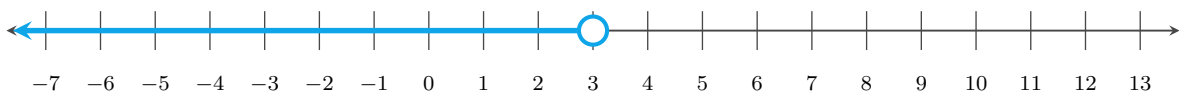
Use the graph, table, chart, or diagram to answer the question.

21. Write the inequality shown on the number line.



Answer: \_\_\_\_\_

22. Write the inequality shown on the number line.



Answer: \_\_\_\_\_



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23. Write the inequality shown on the number line.



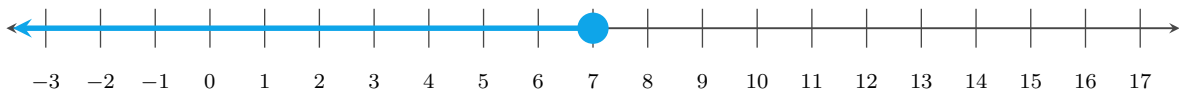
Answer: \_\_\_\_\_

24. Write the inequality shown on the number line.



Answer: \_\_\_\_\_

25. Write the inequality shown on the number line.



Answer: \_\_\_\_\_

26. Write the inequality shown on the number line.



Answer: \_\_\_\_\_

27. Write the inequality shown on the number line.



Answer: \_\_\_\_\_

28. Write the inequality shown on the number line.



Answer: \_\_\_\_\_



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## ◆ Word Problems

29. A roller coaster requires riders to be at least 48 inches tall. If Sam is  $h$  inches tall, write and solve an inequality. Sam is 45 inches — can he ride? \_\_\_\_\_
30. You have \$50 and want to buy notebooks that cost \$6 each. Write an inequality for the number of notebooks  $n$  you can buy. \_\_\_\_\_
31. To pass a class, a student needs more than 70 points on a test. If each correct answer is worth 5 points, how many correct answers  $c$  does the student need? \_\_\_\_\_
32. A delivery truck can carry no more than 2,000 pounds. Each box weighs 40 pounds. What's the maximum number of boxes  $b$  the truck can carry? \_\_\_\_\_
33. A community center room can hold at most 36 students. If 9 tables are set up, what is the greatest number of students  $s$  that can sit at each table? \_\_\_\_\_
34. Priya needs at least 45 minutes of reading practice this week. She plans to read for  $m$  minutes each day for 5 days. What inequality describes her plan? \_\_\_\_\_
35. A freezer is at  $47^{\circ}\text{F}$  and must be brought below  $40^{\circ}\text{F}$ . If the temperature drops by  $d$  degrees, what values of  $d$  work? \_\_\_\_\_
36. A school club wants to earn more than \$300 from ticket sales. Tickets cost \$12 each. How many tickets  $t$  must the club sell? \_\_\_\_\_
37. A storage shelf can safely hold no more than 75 pounds. Each box weighs 15 pounds. What is the maximum number of boxes  $b$  the shelf can hold? \_\_\_\_\_
38. A student has \$18 for lunch. A meal costs \$6 plus  $x$  dollars for an extra snack. What inequality shows how much the snack can cost? \_\_\_\_\_
39. A phone plan allows up to 8 GB of data. Jay has used 3.2 GB. How many more gigabytes  $g$  can he use? \_\_\_\_\_
40. Snack packs cost \$3 each. Luis wants to spend less than \$24. What inequality describes the number of packs  $s$ ? \_\_\_\_\_
41. Free shipping starts at \$50. Mia's cart is \$38. How much must one more item  $p$  cost? \_\_\_\_\_
42. A sample must stay above  $15^{\circ}\text{C}$ . It starts at  $21^{\circ}\text{C}$  and cools by  $c$  degrees. What values of  $c$  work? \_\_\_\_\_
43. A shelf has 42 inches of space. Each binder is 1.5 inches wide. How many binders  $b$  can fit? \_\_\_\_\_
44. A team needs at least 18 volunteers. Six signed up. How many more volunteers  $v$  are needed? \_\_\_\_\_
45. A bike rental costs \$12 plus \$4 per hour. Jalen wants to spend less than \$40. What values of  $h$  work? \_\_\_\_\_
46. An elevator can carry at most 1,000 pounds. If each crate weighs 125 pounds, how many crates  $c$  can ride? \_\_\_\_\_
47. A printer job must use fewer than 90 pages. A report uses  $p$  pages. What inequality must  $p$  satisfy? \_\_\_\_\_
48. A delivery order costs \$5 plus \$2 per mile. The budget is \$30. What values of  $m$  fit the budget? \_\_\_\_\_



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## Answer Keys

- |                 |                      |                  |
|-----------------|----------------------|------------------|
| 1. $x > 5$      | 17. $5 > a$          | 33. $s \leq 4$   |
| 2. $n \leq 7$   | 18. $x \geq 2$       | 34. $m \geq 9$   |
| 3. $y < -3$     | 19. $x < 5$          | 35. $d > 7$      |
| 4. $a \geq -5$  | 20. $n \geq -6$      | 36. $t > 25$     |
| 5. $x > 5$      | 21. $x \geq 5$       | 37. $b \leq 5$   |
| 6. $m > -5$     | 22. $x < 3$          | 38. $x \leq 12$  |
| 7. $x \geq 18$  | 23. $x \leq -2$      | 39. $g \leq 4.8$ |
| 8. $n \geq -20$ | 24. $x > 4$          | 40. $s < 8$      |
| 9. $k < 6$      | 25. $x \leq 7$       | 41. $p \geq 12$  |
| 10. $x < 3$     | 26. $x > -1$         | 42. $c < 6$      |
| 11. $p \leq -5$ | 27. $x < 0$          | 43. $b \leq 28$  |
| 12. $w > 5$     | 28. $x \geq -4$      | 44. $v \geq 12$  |
| 13. $x \leq -5$ | 29. $h \geq 48$ ; No | 45. $h < 7$      |
| 14. $x < -4$    | 30. $n \leq 8$       | 46. $c \leq 8$   |
| 15. $n \geq -9$ | 31. $c > 14$         | 47. $p < 90$     |
| 16. $y < -6$    | 32. $b \leq 50$      | 48. $m < 12.5$   |

### Step-by-Step Tutor Notes

1. Work one inverse operation at a time and keep both sides balanced. Subtract 3 from both sides:  $x > 5$ . Open circle at 5, shade right. After simplifying, the answer is  $x > 5$ .
2. Keep the order of operations in view, then simplify without skipping the sign check. Add 5 to both sides:  $n \leq 7$ . Closed circle at 7, shade left. After simplifying, the answer is  $n \leq 7$ .
3. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Subtract 7:  $y < -3$ . Open circle at  $-3$ , shade left. After simplifying, the answer is  $y < -3$ .
4. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Add 1:  $a \geq -5$ . Closed circle, shade right. After simplifying, the answer is  $a \geq -5$ .
5. Keep the order of operations in view, then simplify without skipping the sign check. Divide both sides by 4 (positive — no flip):  $x > 5$ . After simplifying, the answer is  $x > 5$ .
6. Divide both sides by  $-2$  — *flip the sign!*  $m > -5$ . (This is the rule everyone forgets. Negative divisor means flip.)
7. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Multiply both sides by 3 (positive — no flip):  $x \geq 18$ . After simplifying, the answer is  $x \geq 18$ .
8. Work one inverse operation at a time and keep both sides balanced. Multiply both sides by  $-4$  — *flip!*  $n \geq -20$ . After simplifying, the answer is  $n \geq -20$ .
9. Keep the order of operations in view, then simplify without skipping the sign check. Divide by  $-7$  — flip the sign:  $k < 6$ . Open circle, shade left. After simplifying, the answer is  $k < 6$ .
10. Subtract 0.5:  $x < 3$ . Open circle at 3, shade left. Decimals don't change the rules.
11. Keep the order of operations in view, then simplify without skipping the sign check. Divide by  $-5$  — flip:  $p \leq -5$ . Closed circle at  $-5$ , shade left. After simplifying, the answer is  $p \leq -5$ .
12. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Add 8:  $w > 5$ . Open circle, shade right. After simplifying, the answer is  $w > 5$ .
13. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Subtract 6:  $x \leq -5$ . After simplifying, the answer is  $x \leq -5$ .
14. Keep the order of operations in view, then simplify without skipping the sign check.  $-x$  is  $-1 \cdot x$ . Divide by  $-1$  — flip:  $x < -4$ . After simplifying, the answer is  $x < -4$ .
15. Divide by 3 (positive — no flip):  $n \geq -9$ . (Watch out: only flip when you divide by a negative. Positive divisor, negative number being divided — no flip.)
16. Keep the order of operations in view, then simplify without skipping the sign check. Multiply by  $-2$  — flip:  $y < -6$ . After simplifying, the answer is  $y < -6$ .
17. Divide both sides by  $-3$  — flip:  $5 > a$ , which is the same as  $a < 5$ . (Either way of writing it is correct.)
18. Work one inverse operation at a time and keep both sides balanced. Add  $\frac{1}{2}$  to both sides:  $x \geq \frac{3}{2} + \frac{1}{2} = 2$ . After simplifying, the answer is  $x \geq 2$ .
19. Keep the order of operations in view, then simplify without skipping the sign check. Divide by 0.4 (positive — no flip):  $x < 5$ . After simplifying, the answer is  $x < 5$ .
20. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Multiply both sides by  $-\frac{3}{2}$  — flip because of the negative:  $n \geq -6$ . After simplifying, the answer is  $n \geq -6$ .
21. For a table question, slow down and locate the exact row, column, or cell before calculating. The closed circle includes 5, and the arrow points right, so  $x \geq 5$ . This gives  $x \geq 5$ .
22. Focus on the main idea of the problem, then simplify carefully. The open circle at 3 and shading left mean values less than 3. So the answer is  $x < 3$ .
23. For a table question, slow down and locate the exact row, column, or cell before calculating. The closed circle includes  $-2$ , and the arrow points left. That means  $x \leq -2$ . This gives  $x \leq -2$ .
24. The open circle leaves out 4, and the arrow points right, so the graph shows  $x > 4$ .
25. The closed circle means 7 is included. Shading left means values less than or equal to 7.
26. Use the labels on the display first; they tell you which count or total belongs in the answer. The open circle at  $-1$  means  $-1$  is not included, and the arrow points right. This gives  $x > -1$ .
27. The open circle at 0 shows that 0 is not included, and the graph shades left.



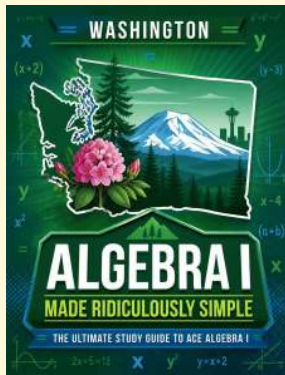
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28. The closed circle includes  $-4$ , and the arrow points right. So the inequality is  $x \geq -4$ .
29. "At least 48" means  $h \geq 48$ . Sam's height is 45. Since  $45 < 48$ , Sam cannot ride. ("At least" always means  $\geq$  — the value itself is included.)
30. Total cost is  $6n$ , and you have \$50 to spend:  $6n \leq 50$ . Divide by 6:  $n \leq \frac{50}{6} \approx 8.33$ . Since you can't buy a fraction of a notebook,  $n \leq 8$  whole notebooks.
31. "More than 70" is strictly greater:  $5c > 70$ . Divide by 5:  $c > 14$ . The student needs at least 15 correct answers to pass.
32. "No more than" is  $\leq$ :  $40b \leq 2000$ . Divide by 40:  $b \leq 50$ . The truck can carry up to 50 boxes.
33. At most 36 students means the total must be 36 or less:  $9s \leq 36$ . Divide by 9 to get  $s \leq 4$ . So each table can have no more than 4 students.
34. Five days of reading is  $5m$  minutes. "At least 45" means  $5m \geq 45$ . Divide by 5:  $m \geq 9$ . She should read at least 9 minutes each day.
35. The new temperature is  $47 - d$ . It must be below 40, so  $47 - d < 40$ . Subtract 47 to get  $-d < -7$ , then divide by  $-1$  and flip the sign:  $d > 7$ .
36. More than \$300 means  $12t > 300$ . Divide by 12:  $t > 25$ . Since tickets are whole items, the club must sell at least 26 tickets.
37. "No more than 75 pounds" means  $15b \leq 75$ . Divide both sides by 15:  $b \leq 5$ . The shelf can hold up to 5 boxes.
38. The total cost is  $6 + x$ , and it cannot be more than \$18:  $6 + x \leq 18$ . Subtract 6 from both sides:  $x \leq 12$ . The snack can cost at most \$12.
39. Jay's total use is  $3.2 + g$ , and it must be no more than 8:  $3.2 + g \leq 8$ . Subtract 3.2 to get  $g \leq 4.8$ .
40. The cost is  $3s$ , and it must be less than 24:  $3s < 24$ . Divide by 3 to get  $s < 8$ . In whole snack packs, that means at most 7.
41. The new total is  $38 + p$ . For free shipping,  $38 + p \geq 50$ . Subtract 38:  $p \geq 12$ .
42. The temperature after cooling is  $21 - c$ . It must stay above 15, so  $21 - c > 15$ . Subtract 21:  $-c > -6$ . Divide by  $-1$  and flip the sign:  $c < 6$ .
43. The binders use  $1.5b$  inches, and the shelf has 42 inches:  $1.5b \leq 42$ . Divide by 1.5 to get  $b \leq 28$ .
44. "No fewer than 18" means at least 18:  $6 + v \geq 18$ . Subtract 6 to get  $v \geq 12$ .
45. The total cost is  $12 + 4h$ . Less than \$40 means  $12 + 4h < 40$ . Subtract 12 to get  $4h < 28$ , then divide by 4:  $h < 7$ .
46. The crates weigh  $125c$  pounds total. At most 1,000 pounds means  $125c \leq 1000$ . Divide by 125:  $c \leq 8$ .
47. "Fewer than 90 pages" means the boundary 90 is not included. So the report must satisfy  $p < 90$ .
48. The cost is  $5 + 2m$ , and it must be no more than 30:  $5 + 2m \leq 30$ . Subtract 5 to get  $2m \leq 25$ , so  $m \leq 12.5$ .



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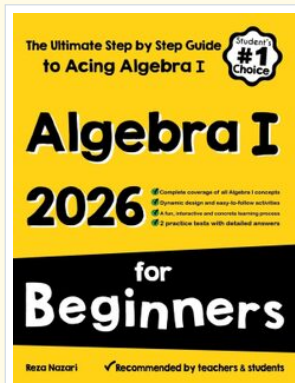
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