Solving One-Step Inequalities

Name: _____	Date: _____	Score: _____ / 48

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** ○ at the boundary for $<$ or $>$ (the value isn't included), and a **closed circle** • for $\leq$ or $\geq$ (it is included). Then shade toward the side that solves the inequality.

PRACTICE

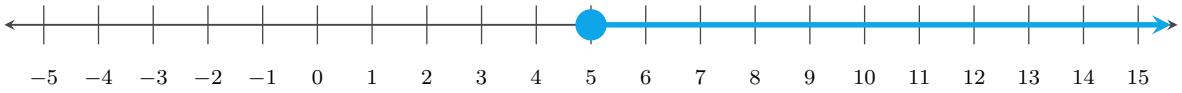
Solve each inequality.

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

VISUAL PRACTICE

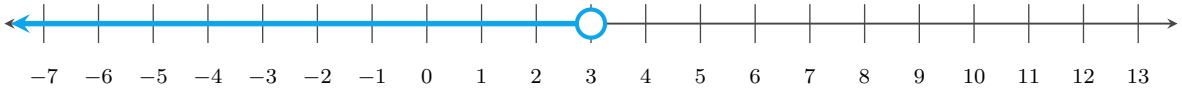
Use the graph, table, chart, or diagram to answer the question.

21. Write the inequality shown on the number line.



Answer: _____

22. Write the inequality shown on the number line.



Answer: _____

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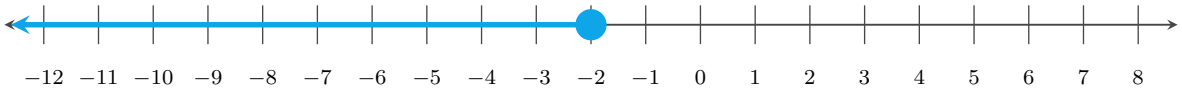
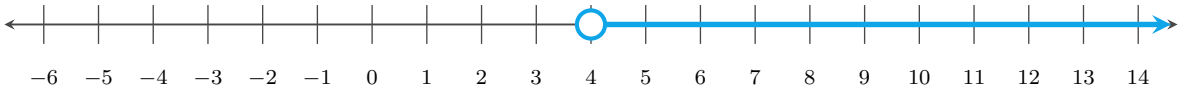
23. Write the inequality shown on the number line.



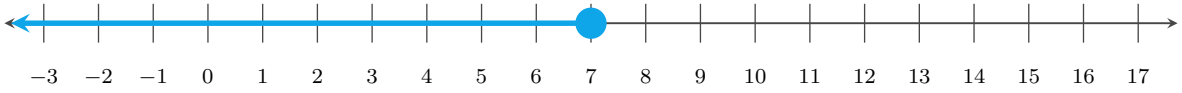
Answer: _____

24. Write the inequality shown on the number line.



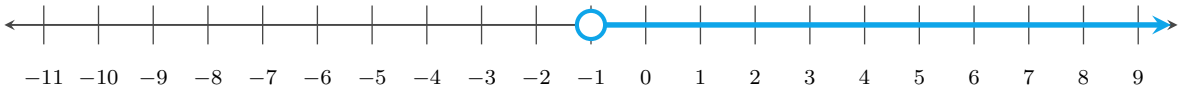
Answer: _____

25. Write the inequality shown on the number line.



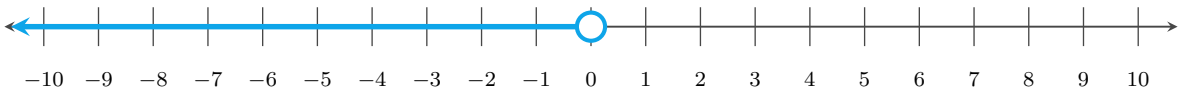
Answer: _____

26. Write the inequality shown on the number line.



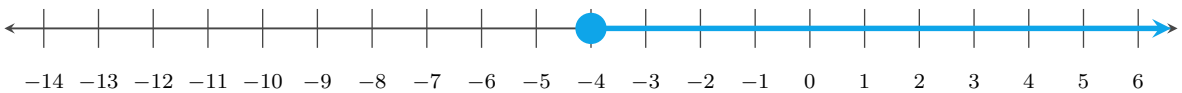
Answer: _____

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

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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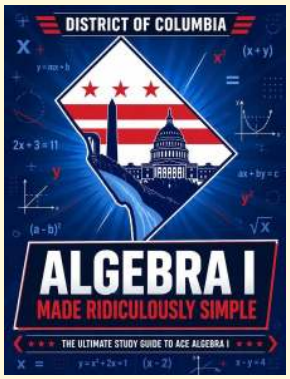

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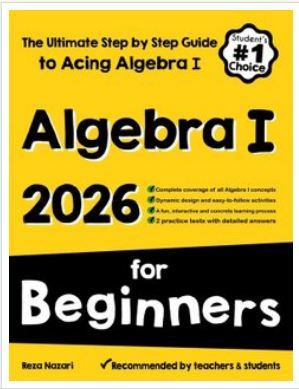

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