

Grade 7 · Two-Step Inequalities · Worksheet

Answer Key

Common Core 7.EE.B.4b · mathovore.fr

Each of the twenty solutions below shows every step, a quick check with a number from the solution set, and the graph where one is needed. Compare your work step by step and watch for the sign flip when dividing by a negative number.

Grade 7 Common Core: 7.EE.B.4b

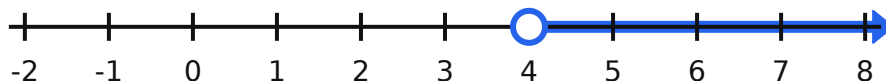
Problem 1: Solve and graph

Subtract 3 from both sides: $2x > 8$.

Divide both sides by 2: $x > 4$.

Check $x = 5$: $2(5) + 3 = 13 > 11$, true.

Answer: $x > 4$ (open circle at 4, shade right).



Graph of $x > 4$.

Problem 2: Greater than

Subtract 2 from both sides: $3x > 15$.

Divide both sides by 3: $x > 5$.

Check $x = 6$: $3(6) + 2 = 20 > 17$, true.

Answer: $x > 5$ (open circle at 5, shade right).



Graph of $x > 5$.

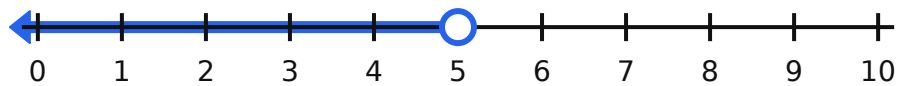
Problem 3: Subtract, then divide

Add 5 to both sides: $3x < 15$.

Divide both sides by 3: $x < 5$.

Check $x = 0$: $3(0) - 5 = -5 < 10$, true.

Answer: $x < 5$ (open circle at 5, shade left).



Graph of $x < 5$.

Problem 4: Less than

Add 6 to both sides: $4x < 16$.

Divide both sides by 4: $x < 4$.

Check $x = 3$: $4(3) - 6 = 6 < 10$, true. Check $x = 4$: $4(4) - 6 = 10 < 10$ is false, so 4 is not included.

Answer: $x < 4$ (open circle at 4, shade left).



Graph of $x < 4$.

Problem 5: Include the endpoint

Subtract 7: $4x \geq 16$.

Divide by 4: $x \geq 4$.

Check $x = 5$: $4(5) + 7 = 27 \geq 23$, true. Check $x = 3$: $19 \geq 23$ is false, so 3 is not in the set.

Answer: $x \geq 4$

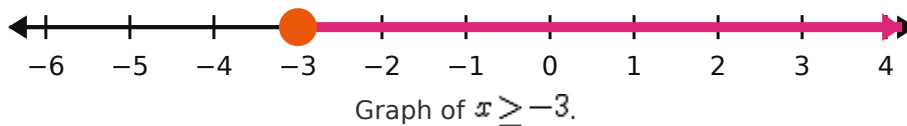
Problem 6: Include the endpoint, again

Subtract 9 from both sides: $2x \geq -6$.

Divide both sides by 2: $x \geq -3$.

Check $x = 0$: $2(0) + 9 = 9 \geq 3$, true. Check $x = -4$: $2(-4) + 9 = 1 \geq 3$ is false.

Answer: $x \geq -3$ (closed circle at -3 , shade right).

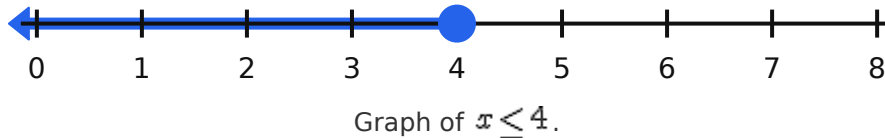


Problem 7: At most

Add 2: $5x \leq 20$.

Divide by 5: $x \leq 4$.

Answer: $x \leq 4$ (closed circle at 4, shade left).



Problem 8: Test the values

Add 4 to both sides: $3x \leq 15$.

Divide both sides by 3: $x \leq 5$.

Test $x = 3$: $3(3) - 4 = 5 \leq 11$, true. Test $x = 5$: $3(5) - 4 = 11 \leq 11$, true. Test $x = 6$: $3(6) - 4 = 14 \leq 11$, false.

Answer: $x \leq 5$; the values 3 and 5 are solutions, 6 is not.

Problem 9: A fraction coefficient

Subtract 3: $\frac{x}{2} > 4$.

Multiply both sides by 2: $x > 8$.

Check $x = 10$: $\frac{10}{2} + 3 = 8 > 7$, true.

Answer: $x > 8$

Problem 10: Divide by five

Add 1 to both sides: $\frac{x}{5} \leq 3$.

Multiply both sides by 5: $x \leq 15$.

Check $x = 10$: $\frac{10}{5} - 1 = 1 \leq 2$, true.

Answer: $x \leq 15$

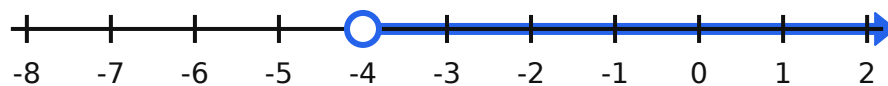
Problem 11: Dividing by a negative

Subtract 1: $-2x < 8$.

Divide by -2 and reverse the sign: $x > -4$.

Check $x = 0$: $-2(0) + 1 = 1 < 9$, true.

Answer: $x > -4$ (open circle at -4 , shade right).



Graph of $x > -4$.

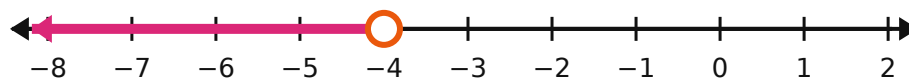
Problem 12: Flip the sign

Subtract 3 from both sides: $-4x > 16$.

Divide both sides by -4 and reverse the sign: $x < -4$.

Check $x = -5$: $-4(-5) + 3 = 23 > 19$, true.

Answer: $x < -4$ (open circle at -4 , shade left).



Graph of $x < -4$.

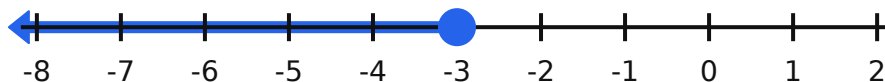
Problem 13: Negative coefficient, closed circle

Add 4: $-3x \geq 9$.

Divide by -3 and reverse the sign: $x \leq -3$.

Check $x = -4$: $-3(-4) - 4 = 8 \geq 5$, true.

Answer: $x \leq -3$: a closed circle at -3 with the ray shaded to the left.



Graph of $x \leq -3$.

Problem 14: Negative fraction

Add 3 to both sides: $-\frac{1}{2}x \leq 5$.

Multiply both sides by -2 and reverse the sign: $x \geq -10$.

Check $x = 0$: $-\frac{1}{2}(0) - 3 = -3 \leq 2$, true. Check $x = -12$: $-\frac{1}{2}(-12) - 3 = 3 \leq 2$ is false.

Answer: $x \geq -10$

Problem 15: School store budget

Inequality: $12 + 9s \leq 50$.

Subtract 12: $9s \leq 38$. Divide by 9: $s \leq 4\frac{2}{9}$.

Jamal cannot buy part of a shirt. Four shirts cost $12 + 36 = \$48$; five would cost $\$57$.

Answer: at most 4 shirts.

Problem 16: Dog walking goal

Inequality: $12h + 35 \geq 200$.

Subtract 35: $12h \geq 165$. Divide by 12: $h \geq 13.75$.

She must walk a whole number of hours. Thirteen hours give $12(13) + 35 = \$191$, which is too little; fourteen give $12(14) + 35 = \$203$.

Answer: at least 14 hours.

Problem 17: Delivery van

Inequality: $220 + 40b \leq 1000$.

Subtract 220: $40b \leq 780$. Divide by 40: $b \leq 19.5$.

Boxes come whole. Nineteen boxes weigh $220 + 40(19) = 980$ pounds; twenty would weigh 1,020 pounds, which is too much.

Answer: at most 19 boxes.

Problem 18: Freezer temperature

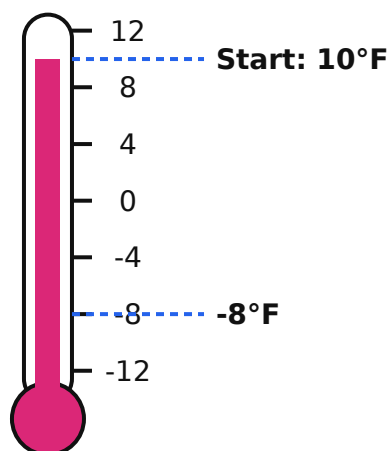
Inequality: $10 - 3h < -8$.

Subtract 10: $-3h < -18$.

Divide by -3 and reverse the sign: $h > 6$.

After 6 hours the temperature is exactly -8°F , so it is below -8°F after more than 6 hours.

Answer: $h > 6$



Check: the temperature reaches -8°F after 6 hours.

Problem 19: Drone descent

Inequality: $120 - 15s \geq 30$.

Subtract 120: $-15s \geq -90$.

Divide by -15 and reverse the sign: $s \leq 6$.

At 6 seconds the height is exactly $120 - 15(6) = 30$ ft, which is allowed. Time cannot be negative, so $0 \leq s \leq 6$.

Answer: $s \leq 6$ seconds



Graph of $s \leq 6$ (time starts at 0).

Problem 20: Bake sale profit

Profit is income minus cost: $2.5b - 20 \geq 85$.

Add 20: $2.5b \geq 105$. Divide by 2.5: $b \geq 42$.

Check: $2.5(42) - 20 = 105 - 20 = 85$, exactly the goal.

Answer: at least 42 boxes.