

Solving and Graphing Two-Step Inequalities

Grade 7 math · Worksheet Answer Key · Standards: 7.EE.B.4b

Each answer shows the undoing steps, marks where the sign reverses, and ends with a test value. Compare the direction of your ray with the answer key, because a ray pointing the wrong way is the most common error.

Standards: 7.EE.B.4b · **Level:** Grade 7

Problem 1 Add, Then Divide

Subtract 4: $3x > 15$. Divide by 3: $x > 5$. Test 6: $3(6) + 4 = 22$, and $22 > 19$.

$$x > 5$$

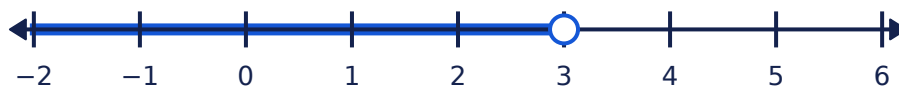
Problem 2 Subtract, Then Divide

Add 7: $2x < 16$. Divide by 2: $x < 8$. Test 7: $2(7) - 7 = 7$, and $7 < 9$.

$$x < 8$$

Problem 3 Graph a Simple Inequality

Place an open circle at 3 and shade to the left, toward the numbers less than 3.



Graph of $x < 3$.

Open circle at 3, ray to the left

Problem 4 A Quotient Inequality

Subtract 2: $\frac{x}{5} > 4$. Multiply by 5: $x > 20$.

$$x > 20$$

Problem 5 First Negative Coefficient

Subtract 3: $-2x > 8$. Divide by -2 and reverse the sign: $x < -4$. Test -5 : $-2(-5) + 3 = 13$, and $13 > 11$.



Graph of $x < -4$.

$x < -4$

Problem 6 Negative Coefficient with Subtraction

Add 10: $-5x < 30$. Divide by -5 and reverse the sign: $x > -6$. Test 0: $-10 < 20$ is true.

$x > -6$

Problem 7 Decimal Coefficient

Add 2.5: $0.5x < 5.5$. Divide by 0.5: $x < 11$.

$x < 11$

Problem 8 Decimals on Both Sides of the Sign

Subtract 3.6: $1.2x > 6$. Divide by 1.2: $x > 5$. Test 6: $1.2(6) + 3.6 = 10.8$, and $10.8 > 9.6$.

$x > 5$

Problem 9 Fraction Coefficient

Subtract 3: $\frac{5}{6}x > 10$. Multiply by $\frac{6}{5}$, a positive number, so the sign stays: $x > 12$. Test 18: $\frac{5}{6}(18) + 3 = 18$, and $18 > 13$.

$x > 12$

Problem 10 Negative Quotient

Subtract 1: $-\frac{x}{4} > 2$. Multiply by -4 and reverse the sign: $x < -8$.

$x < -8$

Problem 11 Parentheses and a Positive Factor

Divide by 3: $x - 2 > 4$. Add 2: $x > 6$. Test 7: $3(5) = 15 > 12$.

$x > 6$

Problem 12 From Graph to Inequality

The circle is open at -1 and the ray goes left: $x < -1$.

For $2x + 5 < 3$, subtract 5 to get $2x < -2$, then divide by 2 to get $x < -1$, which matches the graph.

$x < -1$

Problem 13 Negative Factor Outside

Divide by -2 and reverse the sign: $x + 3 > -5$. Subtract 3: $x > -8$. Test 0: $-2(3) = -6 < 10$.

$x > -8$

Problem 14 Variable on the Right Side

Subtract 7: $11 > -2.5x$. Divide by -2.5 and reverse the sign: $-4.4 < x$, which is $x > -4.4$. Test 0: $18 > 7$ is true.

$x > -4.4$

Problem 15 Club Fundraiser Goal

$8n + 60 > 240$. Subtract 60: $8n > 180$. Divide by 8: $n > 22.5$.

Shirts are whole numbers, and 22 shirts give only \$236, so the least is 23 ($8 \times 23 + 60 = 244$).

23 shirts

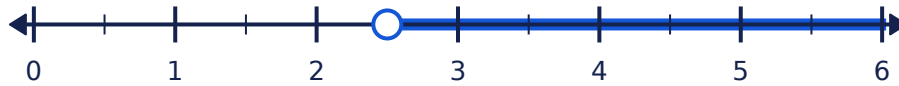
Problem 16 Texting Plan Budget

$20 + 0.05t < 35$. Subtract 20: $0.05t < 15$. Divide by 0.05: $t < 300$.

Fewer than 300 texts

Problem 17 Diver Ascent

$-12 + 4m > -2$. Add 12: $4m > 10$. Divide by 4: $m > 2.5$.



Graph of $m > 2.5$.

More than 2.5 minutes

Problem 18 Bus Rental Budget

$2.25m + 150 < 375$. Subtract 150: $2.25m < 225$. Divide by 2.25: $m < 100$.

Test 99: $2.25(99) + 150 = 372.75$, which is under 375.

Fewer than 100 miles

Problem 19 Draining the Pool

$600 - 15t < 270$. Subtract 600: $-15t < -330$. Divide by -15 and reverse the sign: $t > 22$.



Graph of $t > 22$.

Test 23: $600 - 345 = 255$, which is under 270.

More than 22 minutes

Problem 20 Markers with Tax

$4(m + 1.25) < 30$. Divide by 4: $m + 1.25 < 7.5$. Subtract 1.25: $m < 6.25$.

Test 6: $4(7.25) = 29$, under 30.

Each pack must cost less than \$6.25