**Sets & Steps**
Math Practice & Worked Solutions

**Algebra 1**

# Inequalities & Solution Sets Collection | Algebra 1 | 9-Topic Bundle

9-topic bundle | 864 problems | Four activity formats

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## Included topics

The following pages list all 9 included resources in the suggested order, with a link to each product. Each resource retains its complete preview.

## In every topic

| | |
|---|---|
| Answer Bank Challenge | 24 tasks |
| Grid Rounds | 24 tasks |
| Match & Move | 24 cards |
| Error Analysis & Strategy | 24 tasks |
| Quick Answer Key and Full Worked Solutions | included |
| Teacher / Parent Use Guide and Terms of Use | included |

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## Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

**72 PDFs and 9 READMEs; 468 buyer PDF pages across the 9 products.**

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

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**Sets & Steps**
Math Practice & Worked Solutions

**Algebra 1**

# Included topics

9-topic bundle | 864 problems | Four activity formats

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**01** **Writing Inequalities from Word Problems**

View individual product and its full preview

**02** **Addition and Subtraction Inequalities**

View individual product and its full preview

**03** **Multiplication and Division Inequalities**

View individual product and its full preview

**04** **Two-Step Inequalities**

View individual product and its full preview

**05** **Multi-Step Inequalities**

View individual product and its full preview

**06** **Compound Inequalities**

View individual product and its full preview

**07** **Absolute Value Equations and Inequalities**

View individual product and its full preview

**08** **Inequality Graphs and Interval Notation**

View individual product and its full preview

**09** **Inequality Word Problems: Plans and Constraints**

View individual product and its full preview

9 included resources | Complete resource previews follow this guide.

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**Sets & Steps**
Math Practice & Worked Solutions

## Algebra 1

# Writing Inequalities from Word Problems

Writing Linear Inequalities from Context | A1-U03-P01

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for inequality interpretation with boundary justification and method choice with justification, followed by inequality interpretation with boundary justification.

**8 PDFs and a README; 53 buyer pages.**

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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**Algebra 1**

# Writing Inequalities from Word Problems

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

A student remains eligible only while the absence count $a$ has not reached 5. Write the direct comparison.

Bank label: _____

Give an equivalent comparison to $m \le 0$ that begins with 0.

Bank label: _____

A review is assigned when $q$, the number of missed questions, is 12 or fewer. Write the inequality.

Bank label: _____

Test $q = \frac{1}{2}$, $q = \frac{3}{4}$, and $q = 1$ against $q > \frac{3}{4}$.

| Proposed value |
|---|
| $\frac{1}{2}$ |
| $\frac{3}{4}$ |
| 1 |

Bank label: _____

A lift may carry its full 900-kilogram rating but nothing heavier. Write the constraint for load $w$.

Bank label: _____

Express $8 < x$ with $x$ first.

Bank label: _____

Test $y = -0.1$, $y = 0$, and $y = 0.1$ in $y > 0$.

| Proposed value |
|---|
| $-0.1$ |
| 0 |
| 0.1 |

Bank label: _____

If $k$ is an integer and $k \ge -3$, identify the boundary's status and the least possible $k$.

Bank label: _____

**Algebra 1**

# Writing Inequalities from Word Problems

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Under $x \geq 4$ with real $x$, determine whether the boundary is a member and identify the least value.

Which is the stronger upper restriction, $x \leq 3$ or $x \leq 7$? Give a value showing why the weaker one does not imply the stronger.

For the signed-change condition $c \leq 0$, decide whether $-7$, $0$, and $3$ qualify.

| Proposed value |
|---|
| $-7$ |
| $0$ |
| $3$ |

Are the permitted sets for $x \geq 2$ and $x \leq 6$ nested? Support the answer with one witness for each failed implication.

For a nonnegative integer count $n$ subject to $n < 0$, decide whether a greatest or least feasible value exists.

Determine whether $t = 4.5$ and $t = 5$ satisfy $0.4t + 1 \geq 3$.

| Proposed value |
|---|
| 4.5 |
| 5 |

**Algebra 1**

# Writing Inequalities from Word Problems

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

---

**Incoming:** $T > -3$.

A specification says, 'A reading of $-5$ is no greater than the signed change $c$.' Express the permitted $c$-values with $c$ on the left and explain equality.

Your response: _____

**Incoming:** $c \geq -5$, with $-5$ included.

A signed change $c$ is required to be at most $-4$. State the inequality and do not replace the negative bound with a magnitude.

Your response: _____

**Incoming:** $t \geq 12$.

A temperature $T$ exceeds $-3$ degrees Celsius. State the inequality, keeping the negative boundary.

Your response: _____

**Incoming:** $-6 \geq c$.

A reservation permits a maximum of 9 guests. Write a direct bound for $g$, the guest count.

Your response: _____

**Incoming:** $L > 6.2$.

Rewrite $0 \geq h$ with $h$ as the subject on the left.

Your response: _____

**Incoming:** $s \geq 86$.

Rewrite $x < 7$ with 7 on the left while preserving exactly the same permitted $x$-values.

Your response: _____

**Algebra 1**

# Writing Inequalities from Word Problems

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Choose the most reliable method, briefly justify the choice, and then complete the original task. Original task: For $p \le 250$, determine the status of $p = 0$, $p = 250$, and $p = 251$.

| Proposed value |
|---|
| 0 |
| 250 |
| 251 |

| Label | Proposed method |
|---|---|
| A | Substitute each proposed value into the original comparison and evaluate both sides. |
| *B* | Compare only the absolute values and ignore the comparison symbol. |
| *C* | Decide only from how close each value is to the boundary. |

For real $x$, compare $x > 2$ and $x \ge 2.5$. Which condition is stronger, and what value separates them?

# Writing Inequalities from Word Problems

## Full Worked Solutions - excerpt

### Worked example

**Problem.** A student remains eligible only while the absence count $a$ has not reached $5$. Write the direct comparison.

**Answer.** $a < 5$.

**Explanation and check.**

Counts $0$ through $4$ have not reached five; equality at five fails.

---

### Worked example

**Problem.** Give an equivalent comparison to $m \leq 0$ that begins with $0$.

**Answer.** $0 \geq m$.

**Explanation and check.**

Zero being greater than or equal to $m$ says exactly that $m$ is at most zero.

**Sets & Steps**
Math Practice & Worked Solutions

### Algebra 1

# Addition and Subtraction Inequalities

Addition and Subtraction Inequalities | A1-U03-P02

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for solution inequality with order-preservation justification and solution inequality with order-preservation justification; justified method selection.

**8 PDFs and a README; 48 buyer pages.**

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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**Algebra 1**

# Addition and Subtraction Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

| | |
|---|---|
| Recover $k$ so that $k < x + 2$ has solution $x > 6$.<br><br>Bank label: _____ | Choose a so $2.4 \geq x + a$ has the upper boundary $-0.6$.<br><br>Bank label: _____ |
| Isolate $x$ in $-\frac{7}{4} > x + \frac{1}{2}$ and put $x$ first afterward.<br><br>Bank label: _____ | Solve $x - \frac{11}{12} < \frac{1}{6}$ exactly.<br><br>Bank label: _____ |
| Solve $-11.2 \leq x + 3.8$.<br><br>Bank label: _____ | Determine the exact solution of $x - \frac{5}{6} < -\frac{1}{3}$.<br><br>Bank label: _____ |
| Solve $6.4 > x + 1.9$ with an $x$-first answer.<br><br>Bank label: _____ | Solve $x + \frac{1}{6} < \frac{5}{12}$ exactly.<br><br>Bank label: _____ |

**Algebra 1**

# Addition and Subtraction Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

| | |
|---|---|
| Which of $0.8 > x - 0.6$ and $1.5 > x + 0.4$ permits more values? | A student reports $x < 6$ for $x + 2 \leq 8$. Does the endpoint test support that strictness? |
| A solution to $x - \frac{7}{5} < \frac{3}{5}$ is written $x \leq 2$. Test the boundary to judge the equality bar. | The proposed solution of $x + 7 < 3$ is $x < -3$. Test the claimed boundary and determine the actual one. |
| Find the signed offset a that makes $x + a \geq -2$ solve to $x \geq 5$. | Is there a value of $b$ for which $3 < x\text{-}b$ has the real solution $x \geq 7$? |

**Algebra 1**

# Addition and Subtraction Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

| | |
|---|---|
| **Incoming:** $x > \frac{7}{6}$.<br>An inequality says that $x$ plus negative 4 is greater than 6. Undo the signed offset.<br>Your response: _____ | **Incoming:** $x > 10$.<br>Isolate $x$ in $-\frac{5}{3} < x - \frac{2}{3}$.<br>Your response: _____ |
| **Incoming:** a = −7.<br>Solve $\frac{1}{3} < x - \frac{5}{6}$ and report $x$ first.<br>Your response: _____ | **Incoming:** $x < -\frac{2}{9}$.<br>Solve $x - \frac{7}{6} \leq -\frac{1}{2}$ with exact arithmetic.<br>Your response: _____ |
| **Incoming:** The shift gives $12 \geq x$, so $x \leq 12$.<br>State the solution of $x + 0 \leq 4$ and explain the zero offset.<br>Your response: _____ | **Incoming:** $x > 1$.<br>Solve $0 \geq x - 0.04$ and preserve the inclusive symbol.<br>Your response: _____ |

**Algebra 1**

# Addition and Subtraction Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A student solves $x - 2.5 \geq -1$ as $x \geq -3.5$ by subtracting $2.5$ again. Diagnose and correct.

A tenth-scaled graph proposes $x \leq -3$ for $x + 2.25 \leq -0.75$. Audit its endpoint and sides.

A proposed solution to $x - 5 \leq -2$ is $x \geq 3$. Evaluate $2, 3$, and $4$ to locate the direction error.

A student correctly chooses $a + 3$ translation for $x - 3 > -8$ but reverses the symbol and tests only $x = -6$. Explain why that test is misleading and repair the ray.

# Addition and Subtraction Inequalities

## Full Worked Solutions - excerpt

### Worked example

**Problem.** Recover $k$ so that $k < x + 2$ has solution $x > 6$.

**Answer.** k = 8.

**Explanation and check.**

Subtracting $2$ gives $k - 2 < x$. The lower boundary $k - 2$ must be $6$, so $k = 8$.

---

### Worked example

**Problem.** Choose a so $2.4 \geq x + a$ has the upper boundary $-0.6$.

**Answer.** a = 3.

**Explanation and check.**

Solving gives $x \leq 2.4$-a. Requiring $2.4$-$a = -0.6$ yields $a = 3$.

**Sets & Steps**
Math Practice & Worked Solutions

## Algebra 1

# Multiplication and Division Inequalities

Multiplication and Division Inequalities | A1-U03-P03

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for allowable scale with identifiability explanation, allowable scale with identifiability explanation; justified method selection, first error and repaired reasoning, reversed comparison with justification, reversed comparison with justification; justified method selection and set relationship with decisive witness.

**8 PDFs and a README; 47 buyer pages.**

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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**Algebra 1**

# Multiplication and Division Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

| | |
|---|---|
| Choose $k$ so $kx > -9$ is equivalent to $x > -6$.<br><br>Bank label: _____ | Determine $r$ so $x$ divided by $r$ at most $\frac{3}{4}$ has boundary $\frac{9}{8}$.<br><br>Bank label: _____ |
| Determine a so that $ax \le 18$ produces the target $x \ge -6$.<br><br>Bank label: _____ | Solve $(-\frac{5}{12})x \le -\frac{35}{18}$ and simplify the exact boundary.<br><br>Bank label: _____ |
| Determine the $x$-first solution of $-\frac{5}{2} \ge x$ divided by $-3$.<br><br>Bank label: _____ | Solve $-7 < -x$ without losing the strict endpoint.<br><br>Bank label: _____ |
| Solve $-0.06x \ge 0.9$ exactly.<br><br>Bank label: _____ | Find the solution set of $(\frac{13}{6})x \ge 0$.<br><br>Bank label: _____ |

**Algebra 1**

# Multiplication and Division Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

| | |
|---|---|
| Starting from $m < n$, scale by $-2$ and then by $-3$. Track each reversal and give the final comparison. | Find $p$ so $px > \frac{5}{6}$ yields the target $x < -\frac{10}{3}$. |
| Verify $x \leq 6$ as the solution of $18 \geq 3x$. | Solve $ax < 6$ for every possible sign of a, including $a = 0$. |
| Isolate $x$ in $8x \leq 8$. | What changes when $-3x \leq 12$ is made strict? |

**Algebra 1**

# Multiplication and Division Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

| | |
|---|---|
| **Incoming:** The solution is $x \leq -12$.<br>Solve $-2.7 \geq 0.9x$ with $x$ on the left.<br>Your response: _____ | **Incoming:** The solution is $x \leq -3$.<br>Determine the solution of $\frac{x}{7} \leq -2$.<br>Your response: _____ |
| **Incoming:** The answer is $x > 6$.<br>Isolate $x$ in $(-\frac{3}{4})x \geq 9$.<br>Your response: _____ | **Incoming:** The answer is $x > 0$.<br>Find the $x$-first ray equivalent to $4.2 < -0.6x$.<br>Your response: _____ |
| **Incoming:** The ray is $x > -6$.<br>Solve $x$ divided by $\frac{7}{3}$ at most $-\frac{2}{7}$.<br>Your response: _____ | **Incoming:** The solution is $x > \frac{11}{9}$.<br>Find all $x$ satisfying $-0.25x \leq 2$.<br>Your response: _____ |

**Algebra 1**

# Multiplication and Division Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A claimed solution of $-0.25x < 3$ is $x < -0.75$. Diagnose it using the true equality input and simple witnesses.

A student claims multiplying $1 < 3$ by $-2$ gives $-2 < -6$. Test the claim and repair it.

Use the test values $x = -8, x = -9$, and $x = 0$. A proposed answer for $(-\frac{3}{4})x > 6$ is $x > -8$. Use the listed values to audit its direction.

A student starts with $-2x \leq 14$, divides by -2 and reverses to $x \geq -7$, then reverses again because the boundary is negative and writes $x \leq -7$. The work reverses once for a negative divisor and again because the boundary is negative. Locate the first invalid line after the correct step.

# Multiplication and Division Inequalities

## Full Worked Solutions - excerpt

### Worked example

**Problem.** Choose $k$ so $kx > -9$ is equivalent to $x > -6$.

**Answer.** The scale is k = $\frac{3}{2}$.

**Explanation and check.**

The direction is preserved, so $k > 0$. Solving $-\frac{9}{k} = -6$ yields $k = \frac{3}{2}$.

---

### Worked example

**Problem.** Determine $r$ so $x$ divided by $r$ at most $\frac{3}{4}$ has boundary $\frac{9}{8}$.

**Answer.** The divisor is r = $\frac{3}{2}$.

**Explanation and check.**

The unchanged orientation requires $r > 0$; $(\frac{3}{4})r = \frac{9}{8}$ gives $r = \frac{3}{2}$.

**Sets & Steps**
Math Practice & Worked Solutions

## Algebra 1

# Two-Step Inequalities

Two-Step Inequalities | A1-U03-P04

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for accepted or repaired set with boundary and witnesses, construction satisfying all constraints with verification, first error and corrected chain, solution after order-safe denominator clearing, solution after value-preserving expansion and solution set with connected inverse steps.

8 PDFs and a README; 50 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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**Algebra 1**

# Two-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

| | |
|---|---|
| Solve $-2\frac{n}{3} + \frac{1}{4} \geq \frac{11}{12}$ for integer $n$.<br><br>Bank label: _____ | Find the $x$-values for $-6x - 5 > 13$.<br><br>Bank label: _____ |
| Solve $x$ divided by negative 5 minus 1 greater than 2.<br><br>Bank label: _____ | Find the solution of $\frac{5-2x}{3} - \frac{x+1}{4} > \frac{1}{6}$.<br><br>Bank label: _____ |
| Clear denominators in $3\frac{x}{4} - \frac{x}{6} \geq 7$ and solve.<br><br>Bank label: _____ | Solve $x$ divided by negative $\frac{5}{4}$ plus 3 at least $-1$.<br><br>Bank label: _____ |
| Expand $-2(3x - 4)$ and solve the inequality.<br>Use the inequality - $2(3x - 4) \geq 20$ .<br><br>Bank label: _____ | Expand both groups in $5(2x - 1) - 3(x + 4) \geq -3$ and solve.<br><br>Bank label: _____ |

**Algebra 1**

# Two-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

---

| | |
|---|---|
| Construct an inequality with coefficient 3 and a nonzero negative offset whose solution is $x < 4$. | What is the solution set of $5(2\text{-}x) + 5x > 10$? |
| Solve $\frac{x-1}{2} + \frac{x+2}{3} < 5$. | Construct an inequality using the group $x - 1$ and outer factor 2 that solves to $x > 5$. |
| Verify $x < -5$ for $(-\frac{3}{5})x + 2 > 5$. | For integer $n$, verify $n \geq 3$ as the solution of $\frac{2n-1}{3} > \frac{5}{4}$. |

**Algebra 1**

# Two-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

---

**Incoming:** The exact ray is $x < -\frac{7}{5}$.

Solve $-0.125x + 1 < 0$.

Your response: _____

**Incoming:** The answer is $x > 8$.

Solve $(-\frac{5}{8})x + \frac{7}{12} \geq -\frac{1}{6}$ using exact fractions.

Your response: _____

**Incoming:** Every real $x$ is a solution.

Solve $-2(3x - 5) + x > 17$.

Your response: _____

**Incoming:** The solution is $x > \frac{81}{16}$.

Find the solution of $7 - 2(2x + 1) \geq 17$.

Your response: _____

**Incoming:** The solution is $x \leq 4$.

Solve $-\frac{x}{4} + \frac{x}{6} - \frac{x}{3} \leq -\frac{5}{8}$.

Your response: _____

**Incoming:** The solution is $x \leq -12$.

Clear the denominator and solve $\frac{x}{2} + 3 < 7$.

Your response: _____

**Algebra 1**

# Two-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Compare two order-safe routes for $-\frac{x}{3}+\frac{1}{2} \geq \frac{5}{6}$.

Proposed route A: multiply every term by positive $6$. Proposed route $B$: isolate $-\frac{x}{3}$, then multiply by $-3$.

For integer $n$, compare both complete routes for $(-\frac{4}{3})n+\frac{1}{2} > \frac{5}{6}$.

Proposed route A: clear by positive $6$, solve, then restrict. Proposed route $B$: isolate the fraction, use a signed reciprocal, then restrict.

Audit $x \leq \frac{5}{2}$ for $\frac{x}{3}+\frac{1}{2} \leq \frac{5}{6}$.

Compare clearing denominators first with isolating $\frac{x}{2}$ first.

Use $\frac{x}{2}+\frac{1}{3} < \frac{7}{3}$. Proposed route A: multiply every term by $6$. Proposed route $B$: subtract $\frac{1}{3}$, then multiply by $2$.

# Two-Step Inequalities

## Full Worked Solutions - excerpt

### Worked example

**Problem.** Solve $-2\frac{n}{3} + \frac{1}{4} \geq \frac{11}{12}$ for integer $n$.

**Answer.** The integer set is $n \leq -1$.

**Explanation and check.**

Multiplying by $12$ yields $-8n + 3 \geq 11$, so $-8n \geq 8$ and $n \leq -1$.

---

### Worked example

**Problem.** Find the $x$-values for $-6x - 5 > 13$.

**Answer.** The solution is $x < -3$.

**Explanation and check.**

Adding $5$ produces $-6x > 18$; division by $-6$ reverses $>$ and yields $-3$.

**Sets & Steps**
Math Practice & Worked Solutions

### Algebra 1

# Multi-Step Inequalities

Solving Multi-Step Linear Inequalities | A1-U03-P05

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for classified solution set with net-coefficient reasoning and classified solution set with net-coefficient reasoning; justified method selection.

8 PDFs and a README; 49 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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**Algebra 1**

# Multi-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

| | |
|---|---|
| Solve $1.5(x + 2) < 0.5(x + 8)$.<br><br>Bank label: _____ | Solve the strict decimal identity.<br>The inequality is $1.2(5x - 1) > 6x - 1.2$.<br><br>Bank label: _____ |
| Solve $2x + 7 > 4x - 1$.<br><br>Bank label: _____ | Solve $0.05(20x + 4) > 0.2x + 1.8$.<br><br>Bank label: _____ |
| Solve $2(x + 3) - 3(x - 1) > 4(1\text{-}x)$.<br><br>Bank label: _____ | Solve $-1.2x + \frac{3}{5} \le 0.4x - \frac{13}{5}$.<br><br>Bank label: _____ |
| Solve $-2x + 3 < -5x + 18$.<br><br>Bank label: _____ | Find all $x$ satisfying $5 - 2(x + 1) > x - 6$.<br><br>Bank label: _____ |

**Algebra 1**

# Multi-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

---

| | |
|---|---|
| Construct a strict both-side inequality true for every $x$.<br>Use these original construction conditions: equal variable coefficients; strict true constants. | Construct a strict both-side inequality with empty solution set.<br>Use these original construction conditions: identical expressions; strict symbol. |
| Construct a fraction inequality whose integer solutions are $n \geq 2$.<br>Use these original construction conditions: fraction coefficients; real boundary $\frac{3}{2}$; strict. | For integer $n$, classify the inequality.<br>The inequality is $3n + 5 \leq 3(n + 2)$. |
| Determine all a-cases. The inequality is $(a - 1)x + a > 2x + 5$. | Construct a time inequality giving $0 \leq t \leq 6$.<br>Use these original construction conditions: $t$ nonnegative; closed upper bound; variable both sides. The target set is $0 \leq t \leq 6$ hours. |

**Algebra 1**

# Multi-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

---

**Incoming:** The solution is $x > 3$.

Find all $x$ satisfying $6x + 4 \le 2(x + 1) + x$.

Your response: _____

**Incoming:** The closed ray is $x \le -\frac{2}{3}$.

Solve $-2(x + 4) \ge -5(x - 1)$.

Your response: _____

**Incoming:** The answer is $x \ge -\frac{3}{2}$.

Solve $4x + 1 > -2x + 19$.

Your response: _____

**Incoming:** In interval notation, the solution set is (2, infinity).

Convert the mixed number and solve.

The inequality is $(-1\frac{1}{2})(2x - 4) > (\frac{1}{2})(x + 3)$. Here - $1\frac{1}{2}$ is the mixed number negative one and one half.

Your response: _____

**Incoming:** The strict answer is $x > -1$.

Solve $(-\frac{2}{3})(x - 3) \le \frac{x}{3} + 4$.

Your response: _____

**Incoming:** Exactly $x < 0$ satisfies it.

Solve $4(2x - 1) \ge 2(4x + 1)$.

Your response: _____

**Algebra 1**

# Multi-Step Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

---

For all a, compare the two reduced routes including $a = 3$.

The inequality is $ax + 1 < 3x + 7$. Supplied route A: $(a - 3)x < 6$. Supplied route $B$: $(3 - a)x > -6$.

---

For integer $n$, compare the routes through the domain step.

The inequality is $5n + 1 > 2n + 10$. Supplied route A: $3n > 9$. Supplied route $B$: $-9 > -3n$.

---

Explain why the routes point to the same closed ray.

The inequality is $-x + 4 \le 2x + 4$. Supplied route A: $-3x \le 0$. Supplied route $B$: $0 \le 3x$.

---

Relate the positive- and negative-net routes.

The inequality is $7x + 1 \le 3x + 13$. Supplied route A: $4x \le 12$. Supplied route $B$: $-12 \le -4x$.

# Multi-Step Inequalities

## Full Worked Solutions - excerpt

Worked example

**Problem.** Solve $0.07x + 0.12 > 0.02x + 0.32$.

**Answer.** The result is $x > 4$.

**Explanation and check.**
Subtract $0.02x$ and $0.12$: $0.05x > 0.20$.

Worked example

**Problem.** Construct a strict both-side inequality true for every $x$.

Use these original construction conditions: equal variable coefficients; strict true constants.

**Answer.** Use $5x - 2 < 5x + 7$.

**Explanation and check.**
Cancellation leaves $-2 < 7$.

**Sets & Steps**
Math Practice & Worked Solutions

## Algebra 1

# Compound Inequalities

Solving Compound Inequalities | A1-U03-P06

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for compound solution set with connector and endpoint reasoning.

**8 PDFs and a README; 48 buyer pages.**

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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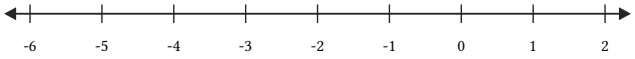
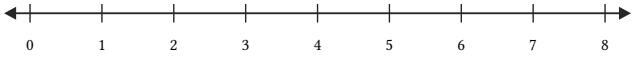
**Algebra 1**

# Compound Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

| | |
|---|---|
| Combine the conditions $(\frac{2}{3})x - 1 \geq -3$ AND $(\frac{1}{2})x + 2 < 5$. Find the exact common interval.<br><br>Bank label: _____ | Solve $x \leq 7$ AND $x < 4$.<br><br>Bank label: _____ |
| A course pass requires a grade of at least 70, unless an approved alternate assessment has been passed. Let A denote alternate passed; let $g$ denote course grade. Model the two passing routes.<br><br>Bank label: _____ | Show the intersection of $x \leq -2$ and $x > -2$.<br>  <br><br>Bank label: _____ |
| Combine the conditions $(-4 < x \leq 7)$ AND $(-4 \leq x < 6)$. Compute the exact intersection, paying attention at -4.<br><br>Bank label: _____ | Which scheduled hours 0, 2, 4, 6, and 8 satisfy $t < 2$ OR $t > 6$?<br><br>Bank label: _____ |
| Translate every part of $2 < x - 4 \leq 10$.<br><br>Bank label: _____ | Combine the conditions $(-2x \geq -8)$ OR $(-3x < -12)$. Solve and combine the rays.<br>  <br><br>Bank label: _____ |

**Algebra 1**

# Compound Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

---

| | |
|---|---|
| The target solution set is (−infinity,-2] union (5,infinity). Both displayed coefficients of $x$ must be negative. Construct the target OR set so each component requires negative division. | Check $-5$ in the condition $x < -3$ OR $x > 6$. |
| Determine whether 0 belongs to $x < -4$ OR $x > 4$. | An integer code is accepted if it is nonpositive or at least 8. Let $n$ denote integer code. State the connector, inequalities, and domain. |
| Test $x = 0$ and $x = 3$ after solving each part of $5 - 2x \geq 1$ OR $3x + 4 > 1$. | Work with $-8 < 3x + 1 \leq 7$. Solve the mixed-endpoint chain. |

**Algebra 1**

# Compound Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

---

**Incoming:** The interval is $(3, 5]$.

The allowed values are natural numbers 1 through 8. Apply the condition $5n < 10$ OR $2n \geq 12$. Solve the OR condition and list permitted natural numbers in the window.

Your response: _____

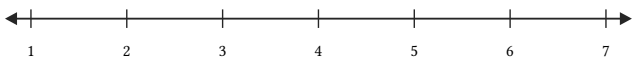
**Incoming:** The set is $\{1, 6, 7, 8\}$.

Solve $-3 < x + 2 < 5$.

Your response: _____

**Incoming:** The set is $x < -3$ OR $x \geq 4$.

Combine the conditions $(7 < 2x + 1)$ AND $(5x - 4 \leq 21)$. Solve the oppositely written bounds and graph the result.




Your response: _____

**Incoming:** The overlap is $[-6, 2)$.

Combine the conditions $((a + 2)x \leq -a - 2)$ OR $(x > 4)$. Given $a > -2$, solve the OR condition.

Your response: _____

**Incoming:** The set is $\{1, 2, 3, 5, 6, 7\}$.

Rewrite $7 > 2x - 1 \geq -5$ in increasing order and solve.

Your response: _____

**Incoming:** The interval is $-1 \leq x < 3$.

Solve $-2 < -x \leq 5$ and write the bounds in increasing order.

Your response: _____

**Algebra 1**

# Compound Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

For $x > -5$ OR $x \geq 2$, *a* student keeps only $x \geq 2$, claiming that the stricter bound must be used. Explain why 'stricter' is the wrong union rule.

Admission is free for children under 5 or for members who are at least 65. Let a denote age in years; let $m$ denote membership status. Translate the two eligibility routes without treating age alone as sufficient in the second route. Explicitly select AND or OR (including any nested connector), and justify why that logic matches the stated conditions.

Let A be the condition $x < 0$ and $B$ the condition $x > 0$. Edit $B$ to $x \geq 0$ and compare before and after.

For integer $n$, let A be the condition $n < 3.5$ and $B$ the condition $n \leq 3$. Compare AND and OR over the stated integer domain.

# Compound Inequalities

## Full Worked Solutions - excerpt

### Worked example

**Problem.** Combine the conditions $((\frac{2}{3})x - 1 \geq -3)$ AND $((\frac{1}{2})x + 2 < 5)$. Find the exact common interval.

**Answer.** The solution is $x \geq -3$ AND $x < 6$, or $[-3, 6)$.

**Explanation and check.**

Solving the fraction inequalities gives the two stated bounds.

---

### Worked example

**Problem.** Solve $x \leq 7$ AND $x < 4$.

**Answer.** The result is $x < 4$.

**Explanation and check.**

The strict bound at $4$ is the more restrictive upper condition.

**Sets & Steps**
Math Practice & Worked Solutions

### Algebra 1

# Absolute Value Equations and Inequalities

Solving Absolute Value Inequalities | A1-U03-P07

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for exact distance condition or solution set with complete case reasoning.

**8 PDFs and a README; 58 buyer pages.**

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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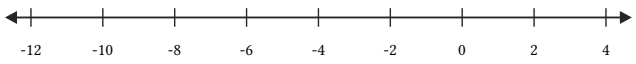
**Algebra 1**

# Absolute Value Equations and Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

| | |
|---|---|
| Reconstruct the parameterized symmetric interval.<br>target set: $[a-r, a+r]$ with $r > 0$; form restriction: closed inside condition<br><br>Bank label: _____ | Construct a valid absolute-value inequality whose solution is empty.<br>target set: empty set; form restriction: strict inside condition with radius 0<br><br>Bank label: _____ |
| Find all $x$.<br>condition: $\lvert 4x \rvert \le 12$<br><br>Bank label: _____ | Find all $x$ satisfying $\lvert 7\text{-}x \rvert = 4$.<br><br>Bank label: _____ |
| Solve and graph the result.<br>  <br><br>condition: $\left\lvert \left(\frac{1}{2}\right)x + 2 \right\rvert < 3$<br><br>Bank label: _____ | Isolate and solve both branches.<br>equation: $3\lvert -2x - 4 \rvert + 6 = 30$<br><br>Bank label: _____ |
| Find every solution of $\lvert x - 3 \rvert = 2$.<br><br>Bank label: _____ | Classify and solve $\lvert x - 4 \rvert = 0$.<br><br>Bank label: _____ |

**Algebra 1**

# Absolute Value Equations and Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

---

Normalize the outer operations and solve.

equation: $2\,|x - 4| + 1 = 11$

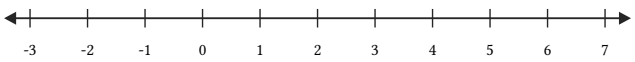
Determine the solution set without an invalid case split.

equation: $-\,2\,|x - 6| = 4$

Interpret the condition in $x$-units, giving its center and radius.

condition: $|2x - 6| \le 8$

Construct the required scaled condition.




membership constraints: include $-1$, include $5$, exclude $6$, both included points are endpoints, interior coefficient $2$

Write the model and list ages.

context: An integer age is within $2$ years of age $15$, including both limits.; quantity: a years, integer

Describe $|t| = 6$ without solving it.

**Algebra 1**

# Absolute Value Equations and Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

---

**Incoming:** The solution is $-2 < x < 10$.

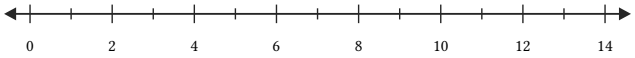
Find midpoint, radius, and the corresponding condition.

target set: $x \leq -\frac{2}{3}$ OR $x \geq \frac{10}{3}$ ; form restriction: closed outside condition

Your response: _____

**Incoming:** Use $|x - \frac{4}{3}| \geq 2$.

Use distance to solve and display the rays.

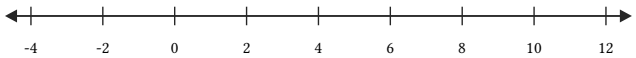



condition: $|7 - x| > 5$

Your response: _____

**Incoming:** The solution is $x \leq 2$ OR $x \geq 6$.

Find the open interval and mark its graph endpoints.




condition: $|-0.5x + 2| < 3$

Your response: _____

**Incoming:** The roots are x = $-6$ and $x = 4$.

Clear the outer divisor and find the closed interval.

condition: $\frac{|x-6|}{2} \leq 4$

Your response: _____

**Incoming:** The only solution is x = 3.

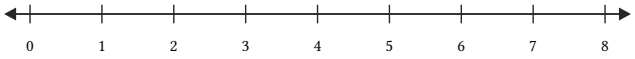
Give the exact interval.

condition: $|x - 1| \leq \frac{5}{2}$

Your response: _____

**Incoming:** Use $|x - 2| \leq 0.8$.

Graph and state $|x - 4| \leq 2$.




Your response: _____

**Algebra 1**

# Absolute Value Equations and Inequalities

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

---

Apply the missing contextual step.

Supplied solution steps:

1. $|t - 3| > 5$
2. $t \geq 0$ hours
3. student answer $t < -2$ or $t > 8$

---

Correct the center and interval.

Supplied solution steps:

1. $|x + 4| < 2$
2. student center $4$
3. answer $2 < x < 6$

---

State and prove the containment relation.

condition A: $|x - a| \leq r$; condition $B$: $|x - a| \leq s$, with $0 < r < s$

---

# Absolute Value Equations and Inequalities

## Full Worked Solutions - excerpt

**Worked example**

**Problem.** Reconstruct the parameterized symmetric interval.

target set: $[a-r, a+r]$ with $r>0$; form restriction: closed inside condition

**Answer.** Use $|x-a| \leq r$.

**Explanation and check.**

The midpoint is a and the positive half-width is $r$.

---

**Worked example**

**Problem.** Construct a valid absolute-value inequality whose solution is empty.

target set: empty set; form restriction: strict inside condition with radius $0$

**Answer.** Use $|x-1|<0$.

**Explanation and check.**

No distance is strictly below zero.

**Sets & Steps**
Math Practice & Worked Solutions

## Algebra 1

# Inequality Graphs and Interval Notation

Inequality Graphs and Interval Notation | A1-U03-P08

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for exact equivalent set representation with endpoint evidence.

8 PDFs and a README; 64 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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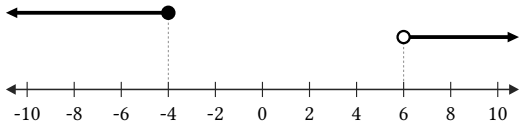
**Algebra 1**

# Inequality Graphs and Interval Notation

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Although the displayed window stops at $-10$ and 10, arrows continue. State the full set.




Bank label: _____

Represent the singleton $\{2\}$ on a number line.

Bank label: _____

From the complete menu, list every value in the represented ray.

Use the declared universe: exhaustive menu $\{-1, 0, 3, 7\}$. The represented real set is $[3, \infty)$. The scope of the supplied evidence is exhaustive declared finite universe.

Bank label: _____

Classify exactly when these encodings agree and otherwise give a symbolic witness.

The two encodings to compare are $[a, b]$ and $[a, b)$ with $a \le b$.

Bank label: _____

**Algebra 1**

# Inequality Graphs and Interval Notation

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

---

List the integer members, preserving the open upper endpoint.

Use the declared universe: integers. The represented real set is $[-4, 3)$. The scope of the supplied evidence is all integers constrained by the bounded interval.

Construct the isolated fraction and the separate bounded interval on one exact scale.

Represent $\{-\frac{5}{2}\} \cup [\frac{1}{2}, \frac{7}{4})$ using quarter-unit ticks from -3 to 2.

Encode the union and preserve its one-point gap.

The supplied condition is $x < 2$ OR $x > 2$.

Are these sets equal? If not, exhibit a value from the differing region rather than an endpoint only.

Encoding A is $[-5, -1] \cup [2, 6]$. Encoding $B$ is $[-5, 6]$.

Determine whether the apparent parameterized interval compression is valid.

Encoding A is $[a, b) \cup (b, c]$ with $a < b < c$. Encoding $B$ is $[a, c]$.

Check every join before deciding whether the encodings are equivalent.

Encoding A is $[-4, -1) \cup [-1, 2) \cup \{2\}$. Encoding $B$ is $[-4, 2]$.

**Algebra 1**

# Inequality Graphs and Interval Notation

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

---

**Incoming:** The set is [0,infinity).

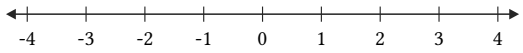
List every prime member of the represented interval.

Use the declared universe: prime integers. The represented real set is $(0, 12]$. The scope of the supplied evidence is all prime integers in the bounded interval.

Your response: _____

**Incoming:** The set is $\{2, 3, 5, 7, 11\}$.

The exact specification contains no shading and no isolated points. What is the set?




Your response: _____

**Incoming:** The set is $\{-2, -1, 0, 1, 2\}$.

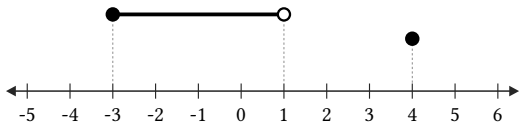
Translate $x \geq 0$ to interval notation.

The supplied condition is $x \geq 0$.

Your response: _____

**Incoming:** The set is $[-2, 7)$.

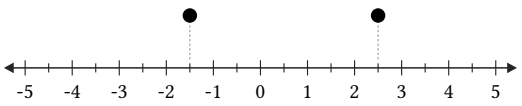
The line shades $[-3, 1)$ and separately marks 4. Encode the complete set.




Your response: _____

**Incoming:** The set is $\{-6, -3, 3, 6, 9\}$.

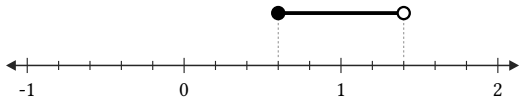
Only two filled points are shown on a half-unit scale. Encode them without shading between.




Your response: _____

**Incoming:** The interval is $(-1, 4)$.

The endpoints lie at the third and seventh ticks to the right of zero on *a*0.2 scale. Read coordinates, not tick numbers.




Your response: _____

**Algebra 1**

# Inequality Graphs and Interval Notation

**Name:** _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Verify the supplied graph using boundary, interior, and exterior values.

The original condition is $-1 < x \leq 4$. The proposed representation is hollow $-1$, filled $4$, shading between. Use the supplied checks: $-1$; $0$; $4$; $5$.

Audit the proposal across all possible orderings of the real parameters.

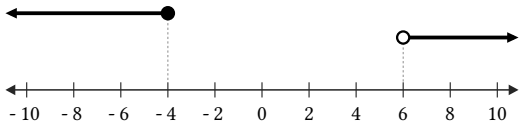
The original condition is $a \leq x \leq b$. The proposed representation is the closed segment $[a, b]$. Use the supplied checks: $a < b$; $a = b$; $a > b$.

# Inequality Graphs and Interval Notation

## Full Worked Solutions - excerpt

### Worked example

**Problem.** Although the displayed window stops at $-10$ and $10$, arrows continue. State the full set.




**Answer.** Use $(-\text{infinity}, -4]$ union $(6, \text{infinity})$.

**Explanation and check.**

Window edges are not endpoints; arrows indicate unbounded continuation.

---

### Worked example

**Problem.** Represent the singleton $\{2\}$ on a number line.

**Answer.** Draw one filled point at $2$ and no shaded segment or arrow.

**Explanation and check.**

A singleton contains one coordinate only, so adjacent values must stay unshaded.

**Sets & Steps**
Math Practice & Worked Solutions

### Algebra 1

# Inequality Word Problems: Plans and Constraints

Comparing Options with Inequalities (Applications) | A1-U03-P09

96 problems · Four activity formats



**Topic focus**

Across 96 tasks this topic asks for inequality and exact feasible choices with units.

**8 PDFs and a README; 51 buyer pages.**

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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**Algebra 1**

# Inequality Word Problems: Plans and Constraints

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

| | |
|---|---|
| Vendor $J$ charges \$75 plus \$4 per item; Vendor $K$ charges \$30 plus \$9 per item, and the order may contain at most 12 items. Let $i$ denote number of items. Here, $i$ is an integer with $0 \le i \le 12$. Determine every permitted order size for which $J$ is no more expensive.<br><br>Bank label: _____ | Two machines each take 6 minutes per batch and both require 14 minutes of setup. Let $b$ denote number of batches. Here, $b$ is a nonnegative integer. For which batch counts is Machine A no slower than Machine $B$?<br><br>Bank label: _____ |
| A decision satisfies $x \le 12$ and $x \le 20$. The second cap is tightened to 9. Let $x$ denote nonnegative real decision. Here, $x$ is a nonnegative real number. Describe the new feasible set and the switch in the active constraint.<br><br>Bank label: _____ | A printer balance includes a \$10 credit. Each poster costs \$6. At least 4 posters are required and net charges must be under \$50. Let $p$ denote number of posters. Here, $p$ is a nonnegative integer. Model the signed credit, strict budget, and count floor together.<br><br>Bank label: _____ |
| A real quantity must satisfy $3 \le x \le 11$. The lower requirement relaxes to $x \ge 1$. Let $x$ denote feasible quantity. Here, $x$ is a real number. Describe the change and name the unchanged active side.<br><br>Bank label: _____ | A count initially satisfies $n < 8.2$. A tighter limit changes it to $n < 8$. Let $n$ denote nonnegative count. Here, $n$ is a nonnegative integer. Quantify the effect of crossing the integer boundary.<br><br>Bank label: _____ |
| A parcel is accepted if it weighs under 750 grams or at least 1.2 kg but no more than 2 kg. Let $w$ denote parcel mass in kilograms. Here, $w$ is a nonnegative real number. Convert units and model both acceptance routes.<br><br>Bank label: _____ | A shelter has 440 meals and serves 36 per day. It wants at least 80 meals in reserve. Let $d$ denote number of service days. Here, $d$ is a nonnegative integer. Model the reserve and find the day cap.<br><br>Bank label: _____ |

**Algebra 1**

# Inequality Word Problems: Plans and Constraints

**Name:** _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

| | |
|---|---|
| Each craft uses 2.5 meters of cord. At least 8 crafts are needed, and only 30 meters of cord is available. Let $c$ denote number of crafts. Here, $c$ is a nonnegative integer. Model both production and resource limits. | An integer $n$ from 0 through $N$ qualifies when $n < L$ or $n \geq U$, where $0 \leq L \leq U \leq N$. Let $n$ denote qualifying count. Here, $n$ is an integer in $[0, N]$. Give the exact discrete union, including strict rounding at $L$. |
| $A96-$square-meter hall reserves 24 square meters for a display. Each table needs 6 square meters. Let $t$ denote number of tables. Here, $t$ is a nonnegative integer. Represent the floor-space limit and interpret its solution. | A shift begins with 120 completed parts and produces 35 each hour. The quota is at least 400 parts. Let $h$ denote whole production hours. Here, $h$ is a nonnegative integer. Model the quota and determine the first qualifying hour. |
| A $\$2,000$ event budget pays a fixed \$350 rental. Each meal costs \$24 plus $a12.5\%$ service charge on that meal. Let $m$ denote number of meals. Here, $m$ is a nonnegative integer. Include the per-meal service charge and find the meal cap. | A musician has practiced 55 minutes this week and adds 25 minutes per session. The requirement is 180 minutes. Let $s$ denote number of sessions. Here, $s$ is a nonnegative integer. Write the cumulative-time constraint and find the minimum session count. |

**Algebra 1**

# Inequality Word Problems: Plans and Constraints

**Name:** _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

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|---|---|
| **Incoming:** The minimum is p = 5.<br>Plan $L$ costs \$18 plus \$5 per GB. Plan $M$ costs \$30 plus \$3 per GB. Let $g$ denote data used in GB. Here, $g$ is a nonnegative real number. Determine the data amounts for which Plan $M$ is no more expensive.<br>Your response: _____ | **Incoming:** $30 + 3g \leq 18 + 5g$, so $g \geq 6$ GB.<br>A contest accepts team sizes of at most 3 or at least 8, with a maximum of 10. Let $n$ denote team size. Here, $n$ is a positive integer with $n \leq 10$. List all sizes admitted by either route.<br>Your response: _____ |
| **Incoming:** The greatest count is t = 15.<br>A solved production condition is $p \geq 4.2$. Let $p$ denote number of batches. Here, $p$ is a nonnegative integer. Find the least feasible batch count and test the previous integer.<br>Your response: _____ | **Incoming:** The minimum is k = −1.<br>A solved seating condition is $s < 12$. Let $s$ denote number of students. Here, $s$ is a nonnegative integer. Determine the greatest permitted count.<br>Your response: _____ |
| **Incoming:** $48 + 6(3)c \geq 210$, so $c \geq 9$; nine cases are needed.<br>Garage $C$ charges \$7 plus \$2.50 per hour; Garage $D$ charges \$4 plus \$3.25 per hour. Let $h$ denote parked hours. Here, $h$ is a nonnegative real number. Find the durations when Garage $C$ is no more costly.<br>Your response: _____ | **Incoming:** The minimum is r = 1.<br>A solved visit requirement is $v > 6$. Let $v$ denote number of visits. Here, $v$ is a nonnegative integer. Identify the least feasible $v$.<br>Your response: _____ |

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A budget model yields $n \leq 7.6$ for the number of tables. A planner reports 7.6 tables. Let $n$ denote number of tables. Here, $n$ is a nonnegative integer. Diagnose the interpretation and state the valid maximum.

A decision satisfies $x \leq 12$ and $x \leq 20$. The second cap is tightened from 20 to 15. Let $x$ denote nonnegative real decision. Here, $x$ is a nonnegative real number. Determine whether the feasible set changes and identify the controlling rule.

Route East takes 18 minutes plus 4 minutes per traffic zone. Route West takes 30 minutes plus 2 minutes per zone. Let $z$ denote number of traffic zones. Here, $z$ is a nonnegative integer. When is Route West no slower than Route East?

A service costs \$18 plus \$5 per use and the budget is \$63. The proposal is $5u \leq 63$. Let $u$ denote number of uses. Here, $u$ is a nonnegative integer. Audit the model and resulting count limit.

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## Full Worked Solutions - excerpt

### Worked example

**Problem.** Vendor $J$ charges \$75 plus \$4 per item; Vendor $K$ charges \$30 plus \$9 per item, and the order may contain at most 12 items. Let $i$ denote number of items. Here, $i$ is an integer with $0 \le i \le 12$. Determine every permitted order size for which $J$ is no more expensive.

**Answer.** $75 + 4i \le 30 + 9i$ gives $i \ge 9$; with the domain, $i$ is $9, 10, 11$, or $12$.

### Explanation and check.

The comparison supplies a lower bound and the order rule supplies the active upper bound.

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### Worked example

**Problem.** Two machines each take 6 minutes per batch and both require 14 minutes of setup. Let $b$ denote number of batches. Here, $b$ is a nonnegative integer. For which batch counts is Machine A no slower than Machine $B$?

**Answer.** $14 + 6b \le 14 + 6b$ is true for every nonnegative integer $b$.

### Explanation and check.

The two time models are identical, so every allowed input is a tie.