**This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.**

**If you have a suggestion to make the keys better, please fill out the short survey here.**

*Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.*

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1. Using an interval or intervals, describe all the $x$-values within or including a distance of the given values.

   No more than 3 units from the number 4.

   The solution is None of the above, which is option E.

   A. $[-1, 7]$

   This describes the values no more than 4 from 3

   B. $(-1, 7)$

   This describes the values less than 4 from 3

   C. $(-\infty, -1] \cup [7, \infty)$

   This describes the values no less than 4 from 3

   D. $(-\infty, -1) \cup (7, \infty)$

   This describes the values more than 4 from 3

   E. None of the above

   Options A-D described the values [more/less than] 4 units from 3, which is the reverse of what the question asked.

   **General Comment:** When thinking about this language, it helps to draw a number line and try points.

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2. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

   $$-6x + 4 \geq 3x - 5$$

   The solution is $(-\infty, 1.0]$, which is option D.

   A. $[a, \infty)$, where $a \in [1, 2]$

   $[1.0, \infty)$, which corresponds to switching the direction of the interval. You likely did this if you did not flip the inequality when dividing by a negative!

   B. $[a, \infty)$, where $a \in [-4, 0]$

   $[-1.0, \infty)$, which corresponds to switching the direction of the interval AND negating the endpoint. You likely did this if you did not flip the inequality when dividing by a negative as well as not moving values over to a side properly.

   C. $(-\infty, a]$, where $a \in [-1.5, 0]$

   $(-\infty, -1.0]$, which corresponds to negating the endpoint of the solution.

   D. $(-\infty, a]$, where $a \in [-0.6, 2.3]$

   * $(-\infty, 1.0]$, which is the correct option.

E. None of the above.

You may have chosen this if you thought the inequality did not match the ends of the intervals.

**General Comment:** Remember that less/greater than or equal to includes the endpoint, while less/greater do not. Also, remember that you need to flip the inequality when you multiply or divide by a negative.

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3. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$-6 - 5x < \frac{-30x + 3}{7} \leq 6 - 7x$$

The solution is $(-9.00, 2.05]$, which is option D.

A. $[a, b)$, where $a \in [-10.5, -6.75]$ and $b \in [0, 3]$

$[-9.00, 2.05)$, which corresponds to flipping the inequality.

B. $(-\infty, a] \cup (b, \infty)$, where $a \in [-9.75, -5.25]$ and $b \in [-1.5, 13.5]$

$(-\infty, -9.00] \cup (2.05, \infty)$, which corresponds to displaying the and-inequality as an or-inequality AND flipping the inequality.

C. $(-\infty, a) \cup [b, \infty)$, where $a \in [-15.75, -8.25]$ and $b \in [0.75, 3]$

$(-\infty, -9.00) \cup [2.05, \infty)$, which corresponds to displaying the and-inequality as an or-inequality.

D. $(a, b]$, where $a \in [-11.25, -6.75]$ and $b \in [0.75, 8.25]$

* $(-9.00, 2.05]$, which is the correct option.

E. None of the above.

**General Comment:** To solve, you will need to break up the compound inequality into two inequalities. Be sure to keep track of the inequality! It may be best to draw a number line and graph your solution.

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4. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$-9x + 9 \leq -7x + 6$$

The solution is $[1.5, \infty)$, which is option C.

A. $(-\infty, a]$, where $a \in [0.5, 3.5]$

$(-\infty, 1.5]$, which corresponds to switching the direction of the interval. You likely did this if you did not flip the inequality when dividing by a negative!

B. $[a, \infty)$, where $a \in [-2.8, -1]$

$[-1.5, \infty)$, which corresponds to negating the endpoint of the solution.

C. $[a, \infty)$, where $a \in [0.9, 1.9]$

* $[1.5, \infty)$, which is the correct option.

D. $(-\infty, a]$, where $a \in [-5.5, 0.5]$

$(-\infty, -1.5]$, which corresponds to switching the direction of the interval AND negating the endpoint. You likely did this if you did not flip the inequality when dividing by a negative as well as not moving values over to a side properly.

E. None of the above.

You may have chosen this if you thought the inequality did not match the ends of the intervals.

**General Comment:** Remember that less/greater than or equal to includes the endpoint, while less/greater do not. Also, remember that you need to flip the inequality when you multiply or divide by a negative.

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5. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$6 + 6x > 9x \text{ or } 9 + 7x < 9x$$

The solution is $(-\infty, 2.0)$ or $(4.5, \infty)$, which is option A.

A. $(-\infty, a) \cup (b, \infty)$, where $a \in [0.75, 7.5]$ and $b \in [3, 9.75]$

* Correct option.

B. $(-\infty, a] \cup [b, \infty)$, where $a \in [-1.5, 3]$ and $b \in [1.5, 6]$

Corresponds to including the endpoints (when they should be excluded).

C. $(-\infty, a) \cup (b, \infty)$, where $a \in [-9, -3.75]$ and $b \in [-5.25, 0]$

Corresponds to inverting the inequality and negating the solution.

D. $(-\infty, a] \cup [b, \infty)$, where $a \in [-8.25, -3.75]$ and $b \in [-4.5, 0.75]$

Corresponds to including the endpoints AND negating.

E. $(-\infty, \infty)$

Corresponds to the variable canceling, which does not happen in this instance.

**General Comment:** When multiplying or dividing by a negative, flip the sign.

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6. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$-9 + 5x \leq \frac{66x - 4}{8} < 8 + 8x$$

The solution is $[-2.62, 34.00)$, which is option B.

A. $(a, b]$, where $a \in [-3.75, 1.5]$ and $b \in [30.75, 36]$

$(-2.62, 34.00]$, which corresponds to flipping the inequality.

B. $[a, b)$, where $a \in [-6, 2.25]$ and $b \in [28.5, 36.75]$

$[-2.62, 34.00)$, which is the correct option.

C. $(-\infty, a] \cup (b, \infty)$, where $a \in [-3, -0.75]$ and $b \in [32.25, 39]$

$(-\infty, -2.62] \cup (34.00, \infty)$, which corresponds to displaying the and-inequality as an or-inequality.

D. $(-\infty, a) \cup [b, \infty)$, where $a \in [-6.75, -0.75]$ and $b \in [33.75, 35.25]$

$(-\infty, -2.62) \cup [34.00, \infty)$, which corresponds to displaying the and-inequality as an or-inequality AND flipping the inequality.

E. None of the above.

**General Comment:** To solve, you will need to break up the compound inequality into two inequalities. Be sure to keep track of the inequality! It may be best to draw a number line and graph your solution.

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7. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$-6 + 5x > 8x \text{ or } 6 + 3x < 5x$$

The solution is $(-\infty, -2.0)$ or $(3.0, \infty)$, which is option A.

A. $(-\infty, a) \cup (b, \infty)$, where $a \in [-2.79, -1.49]$ and $b \in [2.1, 4.8]$

* Correct option.

B. $(-\infty, a) \cup (b, \infty)$, where $a \in [-3.39, -2.93]$ and $b \in [-0.38, 2.32]$

Corresponds to inverting the inequality and negating the solution.

C. $(-\infty, a] \cup [b, \infty)$, where $a \in [-2.48, -0.3]$ and $b \in [2.4, 4.88]$

Corresponds to including the endpoints (when they should be excluded).

D. $(-\infty, a] \cup [b, \infty)$, where $a \in [-4.95, -2.62]$ and $b \in [0.82, 2.32]$

Corresponds to including the endpoints AND negating.

E. $(-\infty, \infty)$

Corresponds to the variable canceling, which does not happen in this instance.

**General Comment:** When multiplying or dividing by a negative, flip the sign.

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8. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$\frac{5}{9} + \frac{7}{6}x \leq \frac{10}{7}x - \frac{3}{3}$$

The solution is $[5.939, \infty)$, which is option A.

A. $[a, \infty)$, where $a \in [4.5, 8.25]$

* $[5.939, \infty)$, which is the correct option.

B. $(-\infty, a]$, where $a \in [3.75, 8.25]$

$(-\infty, 5.939]$, which corresponds to switching the direction of the interval. You likely did this if you did not flip the inequality when dividing by a negative!

C. $[a, \infty)$, where $a \in [-9, -5.25]$

$[-5.939, \infty)$, which corresponds to negating the endpoint of the solution.

D. $(-\infty, a]$, where $a \in [-8.25, -3.75]$

$(-\infty, -5.939]$, which corresponds to switching the direction of the interval AND negating the endpoint. You likely did this if you did not flip the inequality when dividing by a negative as well as not moving values over to a side properly.

E. None of the above.

You may have chosen this if you thought the inequality did not match the ends of the intervals.

**General Comment:** Remember that less/greater than or equal to includes the endpoint, while less/greater do not. Also, remember that you need to flip the inequality when you multiply or divide by a negative.

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9. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$\frac{6}{2} + \frac{3}{5}x > \frac{8}{8}x + \frac{5}{4}$$

The solution is $(-\infty, 4.375)$, which is option D.

A. $(a, \infty)$, where $a \in [3.75, 4.5]$

$(4.375, \infty)$, which corresponds to switching the direction of the interval. You likely did this if you did not flip the inequality when dividing by a negative!

B. $(-\infty, a)$, where $a \in [-5.25, -2.25]$

$(-\infty, -4.375)$, which corresponds to negating the endpoint of the solution.

C. $(a, \infty)$, where $a \in [-5.25, -1.5]$

$(-4.375, \infty)$, which corresponds to switching the direction of the interval AND negating the endpoint. You likely did this if you did not flip the inequality when dividing by a negative as well as not moving values over to a side properly.

D. $(-\infty, a)$, where $a \in [0.75, 6]$

* $(-\infty, 4.375)$, which is the correct option.

E. None of the above.

You may have chosen this if you thought the inequality did not match the ends of the intervals.

**General Comment:** Remember that less/greater than or equal to includes the endpoint, while less/greater do not. Also, remember that you need to flip the inequality when you multiply or divide by a negative.

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10. Using an interval or intervals, describe all the $x$-values within or including a distance of the given values.

Less than 7 units from the number $-3$.

The solution is $(-10, 4)$, which is option A.

A. $(-10, 4)$

This describes the values less than 7 from -3

B. $[-10, 4]$

This describes the values no more than 7 from -3

C. $(-\infty, -10) \cup (4, \infty)$

This describes the values more than 7 from -3

D. $(-\infty, -10] \cup [4, \infty)$

This describes the values no less than 7 from -3

E. None of the above

You likely thought the values in the interval were not correct.

**General Comment:** When thinking about this language, it helps to draw a number line and try points.

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