Just In Time Quick Check

Standard of Learning (SOL) AII.3a

Strand: Equations and Inequalities

Standard of Learning (SOL) AII.3a

The student will solve absolute value linear equations and inequalities.

Grade Level Skills:

- Solve absolute value linear equations or inequalities in one variable algebraically.
- Represent solutions to absolute value linear inequalities in one variable graphically.
- Solve equations and verify algebraic solutions using a graphing utility.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - AII.3a – Absolute Value Equations and Inequalities (Word)/PDF Version
- VDOE Word Wall Cards: Algebra II (Word) | (PDF)
  - Inequality
  - Graph of Inequality
  - Addition/Subtraction Property of Inequality
  - Transitive Property of Inequality
  - Multiplication Property of Inequality
  - Division Property of Inequality
  - Absolute Value Inequalities
- Desmos Activity
  - Absolute Value Inequalities on the Number Line
  - Compound Inequalities on the Number Line

Supporting and Prerequisite SOL: AII.6a, AII.6b, A.4a, A.5a, A.5b, 8.17, 8.18

SOL AII.3a - Just in Time Quick Check

1. Student A was asked to solve the equation $|5x - 2| = 3x + 5$. Their work is shown below.

$$|5x - 2| = 3x + 5$$

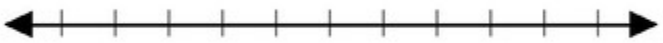
$$\begin{aligned} 5x - 2 &= 3x + 5 \\ 2x - 2 &= 5 \\ 2x &= 7 \\ x &= \frac{7}{2} \end{aligned}$$

$$\begin{aligned} 5x - 2 &= -3x + 5 \\ 8x - 2 &= 5 \\ 8x &= 7 \\ x &= \frac{7}{8} \end{aligned}$$

   Describe and correct the errors made.

2. What are the solutions to the equation $\frac{1}{3}|4 - x| + 7 = 2$? Show your work/thinking.

3. Solve and graph the inequality $8|x - 2| + 3 \geq 19$. Show your work/thinking.



4. Solve and graph the inequality $|-3x - (10 - 2x)| > 5$. Show your work/thinking.

5. Write the solution set for the inequality $|4x + 10| \leq 6x$. Show your work/thinking.

SOL AII.3a - Just in Time Quick Check Teachers Notes

Common Errors/Misconceptions and their Possible Indications

1. Student A was asked to solve the equation $|5x - 2| = 3x + 5$. Their work is shown below.

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$$\begin{aligned} 5x - 2 &= -3x + 5 \\ 8x - 2 &= 5 \\ 8x &= 7 \\ x &= \frac{7}{8} \end{aligned}$$

Describe and correct the errors made.

A common error some students make is to neglect to properly distribute the negative for the second equation resulting in $5x - 2 = -3x + 5$ instead of $5x - 2 = -3x - 5$. This may indicate that the student does not understand applying the distribution property a(b + c) = ab + ac. Teachers may want to have students write the right side of the equation using parentheses resulting in $5x - 2 = -(3x + 5)$ to help ensure students distribute the negative to both terms. Teachers may also find it helpful to use Desmos to show students the graphical representation of their solutions by separating the functions $y = |5x - 2|$ and $y = 3x + 5$. Students will be able to use the points of intersections to verify their solutions.

2. What are the solutions to the equation $\frac{1}{3}|4 - x| + 7 = 2$? Show your work/thinking.

A common misconception that some students may have is to think they must solve the equation $|4 - x| = -15$. This may indicate that some students do not realize that absolute value describes distance and cannot equal a negative value. These same students may not understand that there are no solutions to this equation since there are no values of x that would make the left side of equation have a value of -15. A teaching strategy that might be beneficial to show students is to use Desmos and have students enter y = |4 – x| and y = -15 and look for points of intersection of the two graphs. It may be beneficial to have students solve |4 – x| = -15 and obtain two possible solutions of x = 19 and x = -11. Upon checking their possible solutions, students will determine that neither of these solutions make the given equation true and conclude that there are no solutions to this equation.

3. Solve and graph the inequality $8|x - 2| + 3 \geq 19$. Show your work/thinking.

A common error some students may make is to represent the absolute value inequality using the compound inequality as $8(x - 2) + 3 \geq 19$ and $8(x - 2) + 3 \leq -19$. This may indicate that some students do not know that the absolute value needs to be isolated before creating the two inequality statements to solve. Teachers may want to have students develop a graphic organizer to help organize the steps needed to solve absolute value inequalities. Another strategy that might be helpful is to encourage students to verify their solution values in the original inequality to determine if it satisfies the condition.

4. Solve and graph the inequality $|-3x-(10-2x)|>5$. Show your work/thinking.

A common error students may make is to neglect to reverse the inequality sign when they reach these steps in the solving process: $-x>15$ and $-x<5$. This might indicate that some students are confused about reversing the inequality symbol when multiplying or dividing by a negative number. Teachers may want to have students use test points to ensure that the solution set on the number line includes values that make the original absolute value equation true. It may also be helpful for teachers to use an inequality such as $10>3$ and multiply both sides by negative two and discuss why the inequality symbol must be reversed in order to establish a true condition.

5. Write the solution set for the inequality $|4x+10|\leq 6x$. Show your work/thinking.

A common error students may make is to not check for extraneous solutions. This may indicate that some students do understand how to interpret the solution of $\{x|x\geq 5\}$ and $\{x|x\geq -1\}$ and that $\{x|x\geq 5\}$ are the only values of x that satisfy the given inequality. This may indicate that the students did not check to verify if both inequality statements $x\geq 5$ and $x\geq -1$ satisfy the given inequality. Teachers may want to encourage students to select values from their solution set and values outside the solution set to substitute into the original inequality to determine their validity. For example, not all values of x within $\{x|x\geq -1\}$ satisfy the original inequality. Teachers may also find it helpful to use the Compound Inequalities on the Number Line activity listed in the Supporting Resources to provide students with practice on graphing solutions on a number line and verifying solutions.