

## Lesson 4-6: Absolute Value Equations and Inequalities

### Part 1: Solving Absolute Value Equations

1. 010822b, A2.A.1  
Solve for all values of  $x$ :  $|2x - 5| = 3$
2. 080616b  
What is the solution set of the equation  $|x^2 - 2x| = 3x - 6$ ?
- [A]  $\{2, \pm 3\}$                       [B]  $\{\pm 3\}$   
[C]  $\{2\}$                               [D]  $\{2, 3\}$

### Part 2: Solving Absolute Value Inequalities

3. 060107b  
Which equation states that the temperature,  $t$ , in a room is less than  $3^\circ$  from  $68^\circ$ ?
- [A]  $|68 - t| < 3$                       [B]  $|68 + t| < 3$   
[C]  $|3 - t| < 68$                       [D]  $|3 + t| < 68$
4. 080102b, P.I. A2.A.1  
The solution set of  $|3x + 2| < 1$  contains
- [A] no real numbers  
[B] both positive and negative real numbers  
[C] only positive real numbers  
[D] only negative real numbers

5. 060318b, P.I. A2.A.1  
What is the solution set of the inequality  $|3 - 2x| \geq 4$ ?
- [A]  $\{x | x \leq -\frac{1}{2} \text{ or } x \geq \frac{7}{2}\}$   
[B]  $\{x | \frac{7}{2} \leq x \leq -\frac{1}{2}\}$   
[C]  $\{x | x \leq \frac{7}{2} \text{ or } x \geq \frac{1}{2}\}$   
[D]  $\{x | -\frac{1}{2} \leq x \leq \frac{7}{2}\}$
6. 080203b, P.I. A2.A.1  
What is the solution of the inequality  $|x + 3| \leq 5$ ?
- [A]  $x \leq -8 \text{ or } x \geq 2$               [B]  $-8 \leq x \leq 2$   
[C]  $x \leq -2 \text{ or } x \geq 8$               [D]  $-2 \leq x \leq 8$
7. 080509b, P.I. A2.A.1  
The solution of  $|2x - 3| < 5$  is
- [A]  $x < -1 \text{ or } x > 4$               [B]  $-1 < x < 4$   
[C]  $x < 4$                               [D]  $x > -1$
8. 010610b, P.I. A2.A.1  
What is the solution of the inequality  $|y + 8| > 3$ ?
- [A]  $-11 < y < -5$                       [B]  $y > -5 \text{ or } y < -11$   
[C]  $-5 < y < 11$                       [D]  $y > -5$

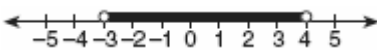
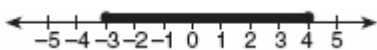
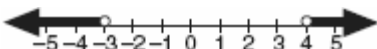
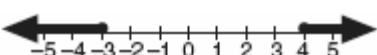
9. 010710b, P.I. A2.A.1

What is the solution set of the inequality  $|2x - 1| < 9$ ?

- [A]  $\{x|x < -4 \text{ or } x > 5\}$  [B]  $\{x|x < -4\}$   
[C]  $\{x|x < 5\}$  [D]  $\{x|-4 < x < 5\}$




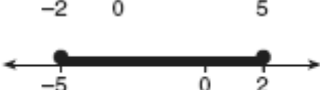
10. 080303b, P.I. A2.A.1

Which graph represents the solution set of  $|2x - 1| < 7$ ?

- [A]   
[B]   
[C]   
[D] 

11. 060505b, P.I. A2.A.1

Which graph represents the solution set for the expression  $|2x + 3| > 7$ ?

- [A]   
[B]   
[C]   
[D] 

12. 060707b, P.I. A2.A.1

Which inequality is represented by the accompanying graph?



- [A]  $|x - 5| \geq 2$  [B]  $|x - 1| \leq 5$   
[C]  $|x + 2| > 5$  [D]  $|x + 3| \geq 2$

13. 060617b, P.I. A2.A.1

The solution set of which inequality is represented by the accompanying graph?



- [A]  $|2 - x| > -7$  [B]  $|x - 2| > 7$   
[C]  $|x - 2| < 7$  [D]  $|2 - x| < -7$

14. 010326b, P.I. A2.A.1

The inequality  $|15C - 24| \leq 30$  represents the range of monthly average temperatures,  $C$ , in degrees Celsius, for Toledo, Ohio. Solve for  $C$ .

15. 010531b, P.I. A2.A.1

The heights,  $h$ , of the students in the chorus at Central Middle School satisfy the inequality

$$\left| \frac{h - 57.5}{2} \right| \leq 3.25, \text{ when } h \text{ is measured in}$$

*inches*. Determine the interval in which these heights lie and express your answer to the *nearest tenth of a foot*. [Only an algebraic solution can receive full credit.]

16. 080427b, P.I. A2.A.1

A depth finder shows that the water in a certain place is 620 feet deep. The difference between  $d$ , the actual depth of the water, and the reading is  $|d - 620|$  and must be less than or equal to  $0.05d$ . Find the minimum and maximum values of  $d$ , to the *nearest tenth of a foot*.

[21] 1 and 4, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 1 and 4, but no work is shown.

[0] 1 or 4, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[1] obviously incorrect procedure.

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[2] D

[3] A

[4] D

[5] A

[6] B

[7] B

[8] B

[9] D

[10] A

[11] B

[12] D

[13] B

[2]  $-4 \leq C \leq 36$ , and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but only one extreme value is found.

or [1]  $-4 \leq C \leq 36$ , but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[14] incorrect procedure.

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[4] 4.3-5.3, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] Appropriate work is shown, but the answer is not stated as an interval.

or [3] Appropriate work is shown, but the answer is expressed in inches.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] An appropriate inequality, such as

$-3.25 \leq \left| \frac{h-57.5}{2} \right| \leq 3.25$ , is written, but no

further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] Only half of the inequality is solved, but an appropriate answer is found and expressed to the nearest tenth of a foot.

or [1] 4.3-5.3, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[15] incorrect procedure.

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[4] 590.5 and 652.6, and appropriate work is shown, such as  $|d - 620| \leq 0.05d$ .

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] 590.5 or 652.6, and appropriate work is shown.

[1] 590.5 and 652.6, but no work is shown.

[0] 590.5 or 652.6, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[16] obviously incorrect procedure.

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