

2.6 Start Thinking

Consider the inequality $|x - 3| \geq 2$. Make a table with three columns: one for x , a second for $|x - 3|$, and the third for “yes or no,” depending on if the inequality is true for the input value.

Choose at least 8 values for x and complete the table. Do opposite values of x always give the same result? Explain.

2.6 Warm Up

Solve the equation.

1. $|w| = 7$

2. $|y| = -19$

3. $|m - 4| = 6$

4. $|-2d| = 14$

5. $|5b + 4| = 21$

6. $-6|9 + 4n| = 12$

2.6 Cumulative Review Warm Up

What value of a makes the equation an identity? Explain your reasoning.

1. $3a(x - 4) = 8x - 16$

2. $10x + 7 - 4ax = 4ax + 3a$

3. $3x - 2 = 10x - 14 + 2a$

4. $7x + 9 - 2ax = 6ax + a$

2.6**Practice A**

In Exercises 1–9, solve the inequality. Graph the solution, if possible.

1. $|x| < 4$

2. $|y| \geq 3.5$

3. $|k + 8| > 2$

4. $|y - 4| \leq 8$

5. $|3w - 8| \geq -2$

6. $|3c + 4| > 7$

7. $|6b + 4| < -8$

8. $|8 - 3r| < 5$

9. $|5y - 2| + 5 > 0$

10. The rules for a book report say that the report should have 300 words with an absolute deviation of at most 20 words. Write and solve an absolute value inequality that represents the acceptable number of words.

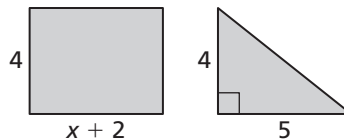
11. Describe and correct the error in solving the absolute value inequality.

\times	$ x + 2 < -3$ $x + 2 < -3$ or $x + 2 > 3$ $x < -5$ or $x > 1$
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In Exercises 12–14, write the sentence as an absolute value inequality. Then solve the inequality.

12. A number is less than 4 units from 0.
13. A number is more than 11 units from 8.
14. Half a number is at least 2 units from 20.
15. A nail manufacturer throws out nails with lengths that are not within 0.05 inch of the mean length of the batch. The lengths (in inches) of the nails in a batch are 0.42, 0.53, 0.55, 0.48, and 0.51. Which nail(s) should be thrown out?

16. Write an absolute value inequality that represents the situation. Then solve the inequality. The difference between the areas of the figures is at most 6.



2.6 Practice B

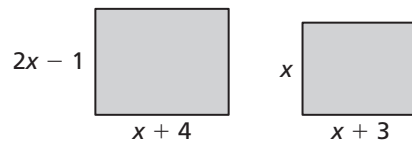
In Exercises 1–9, solve the inequality. Graph the solution, if possible.

1. $|2x - 9| < -8$
 2. $|5q - 1| - 7 \geq 2$
 3. $|y - 2| + 11 > 0$
 4. $5|12 - r| > 15$
 5. $-2|3d - 5| \leq 10$
 6. $3|2a + 8| - 11 \leq -5$
 7. $-2|1 - 3h| + 9 < -12$
 8. $5|-p + 2| + 4 > 4$
 9. $\frac{1}{3}|2x + 3| - 1 \leq 8$
10. The thermometer in a freezer is set at -2°F . This temperature varies by up to 3°F throughout the day. Write and solve an absolute value inequality that represents the range of temperatures (in degrees Fahrenheit) of the freezer throughout the day.
11. Describe and correct the error in solving the absolute value inequality.

$$\begin{aligned} \times \quad & |x - 5| + 2 < 8 \\ & -8 < x - 5 + 2 < 8 \\ & -5 < x < 11 \end{aligned}$$

In Exercises 12–14, write the sentence as an absolute value inequality. Then solve the inequality.

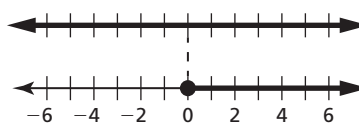
12. A number is more than 12 units from 0.
13. One-third of a number is at least 5 units from 31.
14. Twice a number is no more than 7 units from 13.
15. Write an absolute value inequality that represents the situation. Then solve the inequality. The difference between the perimeters of the figures is not greater than 10.



2.6 Enrichment and Extension

Critical Thinking: Absolute Value Inequalities


Example: Solve the absolute value inequality, graph the solution, and then state the solution in interval notation. Check your solution.

$$\begin{array}{l}
 x \leq x \text{ and } x \geq -x \\
 0 \leq 0 \text{ and } 2x \geq 0 \\
 0 \leq 0 \text{ and } x \geq 0
 \end{array}$$


The graphs only overlap at $x \geq 0$.

$0 \leq 0$ is a true statement and implies the answer of all real numbers.

So, the answer is $x \geq 0$.



Interval Notation: $[0, \infty)$

In Exercises 1–6, solve the absolute value inequality, graph the solution, and state the solution in interval notation, if possible.

1. $|x + 3| < x$
2. $|2x - 1| > 0$
3. $-2|x - 5| \geq 10$
4. $|3x + 2| \leq 0$
5. $|x| > x$
6. $|x| \geq x$

2.6 Puzzle Time

What Do Electrons Wear On Their Feet?

Write the letter of each answer in the box containing the exercise number.

Solve the inequality.

1. $|x| < 8$
2. $|x| \geq \frac{11}{2}$
3. $|x + 7| > 3$
4. $|3x - 9| > 21$
5. $\left|x - \frac{3}{2}\right| \leq \frac{15}{2}$
6. $|6x - 12| < 42$
7. $|8x - 19| > 37$
8. $|2x - 5| + 11 \leq 24$
9. $6|3x - 10| \geq 48$
10. $4|2x + 6| - 14 \leq 10$
11. $9|-x + 5| + 16 \geq 16$
12. $\frac{3}{4}|8x + 16| - 3 \geq 15$
13. The players on a basketball team decided that they wanted to score 750 points by the end of the season. The coach promised pizzas if the team scored within 50 points of its goal. Solve the inequality $|x - 750| \leq 50$, which represents the total possible number of points the team could score to earn pizzas.
14. An engineer assigned to design a product wanted the length of the main part to be within 0.004 foot of 3 feet. Solve the inequality $|x - 3| \leq 0.004$, which represents the different lengths of the part that would be acceptable to the engineer.

Answers

- A. $-6 \leq x \leq 9$
- O. $x < -10$ or $x > -4$
- K. $700 \leq x \leq 800$
- H. $x < -\frac{9}{4}$ or $x > 7$
- K. $-4 \leq x \leq 9$
- O. $-8 < x < 8$
- C. $-6 \leq x \leq 0$
- S. $2.996 \leq x \leq 3.004$
- S. $-5 < x < 9$
- N. all real numbers
- I. $x \leq -\frac{11}{2}$ or $x \geq \frac{11}{2}$
- C. $x \leq -5$ or $x \geq 1$
- T. $x \leq \frac{2}{3}$ or $x \geq 6$
- S. $x < -4$ or $x > 10$

5	11	9	2	-	14	7	3	10	8		6	1	12	13	4
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