| Name | Date | Class |
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## **Challenge 2-8** Relating the Length of a Solution Interval to a Coefficient

Changing the value of a coefficient in an absolute-value linear inequality results in a change in the solution interval.

## Solve.

- 1.  $|ax + b| \le c$ , where a > 0 and c > 0.
  - **a.** Solve the inequality for *x* in terms of *a*, *b*, and *c*.
  - **b.** Verify that your solution is equivalent to  $\frac{-(b+c)}{a} \le x \le \frac{c-b}{a}$ .

Apply the general solution to solve each inequality.

**2.**  $|2x+3| \le 5$  \_\_\_\_\_ **3.**  $|4x+3| \le 5$  \_\_\_\_\_

## Refer to the inequalities in Exercises 2 and 3.

4. a. Compare the values of *a*, *b*, and *c* in the two inequalities.

**b.** How does the value of *a* affect the length of the solution interval?

**c.** Predict the solution interval for the inequality  $|8x + 3| \le 5$ .

d. Use the general solution to determine if your prediction was correct.

**e.** What is the relationship between the solution interval and the coefficient of *x* in this absolute-value inequality?

## Solve.

- **5. a.** Use the general solution to solve  $|3x 6| \le 21$ .
  - **b.** Predict the solution interval of  $|6x 6| \le 21$ .
  - **c.** Predict the solution interval of  $|12x 6| \le 21$ .

| Reteach23 Solving Absolute-Value Equations and Inequalities<br>(continued)Solving absolute-Value inequalities is like solving compound inequalities.Solve: $ x  < 2$<br>Solution: $-2 < x < 2$<br>Solution: $-2 < x < 2$<br>Solution: $-2 < x < 2$<br>Solution: $x < -2$ OR $x > 2$ Solve: $ x  > 2$<br>Solution: $x < -2$ OR $x > 2$ Solve: $ x  > 2$<br>Solution: $x < -2$ OR $x > 2$ Solve: $ x  > 2$<br>Solution: $x < -2$ OR $x > 2$ Solve: $ x  > 2$<br>Solution: $x < -2$ OR $x > 2$ Solve: $ x - 2  \leq 3$ .<br>$-3 \leq x - 2 \leq 3$<br>$-3 \leq x - 2 \leq 3 + 2$ Solve: $ x - 2  \leq 3$ .<br>$-3 \leq x - 2 + 2 \leq 3 + 2$ Solve: $ x - 2  \leq 3$ .<br>$-3 \leq x - 2 + 2 \leq 3 + 2$ Solve: $ x - 2  \leq 3$ .<br>$-1 \leq x \leq 5$ Solve: $ x - 2  \leq 3$ .<br>$-1 \leq x \leq 5$ Solve: $ x - 2  < 3$<br>$-1 \leq x \leq 5$ Solve: $ 2x - 1  > 5$ .<br>$2x - 1 > 5$ Solve: $ 2x - 1  > 5$ .<br>$2x > 6$ Solve: $ 2x - 1  > 5$ .<br>$2x > 6$ Solve: $ 2x - 1  > 5$ .<br>$2x > 6$ Solve: $ 2x - 1  > 5$ .<br>$2x > 6$ Solve: $ 2x - 1  > 5$ Solve: $ 2x + 3  < 2$ Condition: $2 < x + 3 < 2$ Solve: $ 2x + 3  < 2$ Solve: $ 2x + 3  < 2$ Solve: $ 2x - 4  = 3$<br>$2x + 3 < 22$ Solve: $ 2x - 4 $<br>$x > 1$<br>$x > 1$<br>$x > 2$ Solve: $ 2x - 4 $<br>$x > 2$ <th colspan="4"><b>Challenge</b><br/><b>283 Relating the Length of a Solution Interval to a Coefficient</b><br/>Changing the value of a coefficient in an absolute-value linear inequality<br/>results in a change in the solution interval.<br/><b>Solve.</b><br/>1. <math> ax + b  \le c</math>, where <math>a &gt; 0</math> and <math>c &gt; 0</math>.<br/>a. Solve the inequality for x in terms of a, b, and c.<br/>b. Verify that your solution is equivalent to <math>\frac{-(b + c)}{a} \le x \le \frac{c - b}{a}</math>.<br/>Possible answer: The solution of the absolute-value inequality gives<br/><math>x \le \frac{c - b}{a}</math> and <math>x \ge \frac{-c - b}{a}</math>. Read the second inequality from right to left<br/>and combine the two inequalities into a single inequality.<br/><b>Apply the general solution to solve each inequality</b>.<br/><b>2.</b> <math> 2x + 3  \le 5</math> <math>-4 \le x \le 1</math><br/><b>3.</b> <math> 4x + 3  \le 5</math> <math>-2 \le x \le \frac{1}{2}</math>.<br/><b>Refer to the inequalities in Exercises 2 and 3</b>.<br/><b>4.</b> a. Compare the values of a, b, and c in the two inequalities.<br/>The values of b and c are the same in both inequalities. The value of a has<br/>increased from the first inequality to the second.<br/><b>b.</b> How does the value of a affect the length of the solution interval?<br/><b>As a increases, the length of the solution interval decreases.</b><br/><b>c.</b> Predict the solution to determine if your prediction was correct.<br/><math>\frac{-5 - 3}{8} \le x \le \frac{5 - 3}{8} = \frac{-8}{8} \le x \le \frac{2}{8} = -1 \le x \le \frac{1}{4}</math><br/><b>e.</b> What is the relationship between the solution interval and the<br/>coefficient of x in this absolute-value inequality?<br/>Possible answer: When the coefficient of x is doubled, the solution<br/>interval is reduced by <math>\frac{1}{2}</math> of the units.<br/><b>Solve.</b><br/><b>5.</b> a. 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| Copyright © by Holt, Rinshart and Winston. 63<br>All rights rearrend. 63<br>ESSON Problem Solving<br>2-3 Solving Absolute-Value Equa  |  | -  | Holt Algebra 2  | b. Predict tł<br>c. Predict tł<br>Copyright © by Holt, Rimitari<br>At riphs reserved.  | the solution interval of $ 6x - 6 $<br>the solution interval of $ 12x - 6 $   | 6  ≤ 21<br>- 6  ≤ 21<br>64   | $-2.5 \le x \le 4.5$<br>$-1.25 \le x \le 2.25$<br>Holt Algebra 2  |
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| Gita's science class is making a set of posters a wildlife. The table shows some of the data collect 1. What is the center of each weight group?<br>a. W <sub>1</sub> 292.5   | cted.  | American<br>rth American<br>Animal   | Wildlife<br>Daily Food  | statements. Disj<br>statements.<br>Compound  | unctions and conjunctions   | are two types of comp  |   |
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| wildlife. The table shows some of the data collect<br>1. What is the center of each weight group?<br>a. $W_1$   | cted.<br>Not<br>Weight<br>Groups<br>(kg)<br>$W_1$<br>135–450<br>$W_2$<br>10–90<br>$W_3$<br>3–8<br>mction on her<br>the use? Why?<br>the use? Why?<br>the weight groups<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$<br>$M_3$ | American       Animal       Grizzly bear       Polar bear       Black bear       Mule deer       Arctic wolf       River otter       Nutria       Opossum       Rabbit   | Daily Food<br>Requirement<br>(kg)           10.5           9.9           3.9           2.8           2.3           0.8           0.38           0.19           0.18   | statements. Disj<br>statements. Disj<br>statements.<br>Compound<br>Statement<br>Disjunction<br>Conjunction<br>Answer each q<br>1. $x > 1$ or $x =$<br>a. Is the co<br>Yes; sin<br>b. Is the co<br>N0; $x =$<br>c. For which<br>-2 < x<br>2. $x > 0$ and $x$<br>a. Describe<br>The cor<br>b. Describe   | Definition a         Two statements joined by         Symbol: ∪         Two statements joined by         Symbol: ∩         Two statements joined by         Symbol: ∩         restion.         2         mpound statement true for x         compound statement true for x         0 makes both inequalities         a         values of x is the disjunction         ≤ 1; all x-values within         ≤ 6         the values of x for which the         junction is true for all r         e         the values of x for which the         junction is false for all | are two types of comp<br>and Symbol<br>the word or<br>the word and<br>= 6? Explain.<br>st inequality in the<br>atement is also tru<br>= 0? Explain.<br>ies false, so the co<br>lso false.<br>n false?<br>this range make by<br>conjunction is true.<br>numbers greater tha<br>qual to 6.   | Example $x > 1$ or $x \le -2$ $x > 0$ and $x \le 6$ disjunction true, the e.         mpound statement is         oth inequalities false.         an 0 and less than or  |
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Disj<br>statements. Disj<br>statements.<br>Compound<br>Statement<br>Disjunction<br>Conjunction<br>a. Is the con<br>Yes; sin<br>b. Is the co<br>N0; $x =$<br>c. For which<br>-2 < x<br>2. $x > 0$ and $x$<br>a. Describe<br>The cor<br>b. Describe<br>The cor<br>3. $ x  > 5$<br>a. Describe<br>The number<br>a. Describe               | unctions and conjunctions<br>Definition a<br>Two statements joined by<br>Symbol: ∪<br>Two statements joined by<br>Symbol: ∩<br>appoind statement true for x<br>cce x = 6 makes the firri-<br>compound statement true for x<br>0 makes both inequalit<br>a values of x is the disjunctio<br>≤ 1; all x-values within<br>≤ 6<br>the values of x for which the<br>junction is false for all<br>number:<br>in words the values of x for<br>e a compound statement for   | are two types of comp<br>nd Symbol<br>the word or<br>= 6? Explain.<br>the word and<br>= 6? Explain.<br>tinequality in the<br>atement is also tru<br>= 0? Explain.<br>ies false, so the co<br>lso false.<br>In false?<br>this range make bi<br>conjunction is true.<br>numbers greater tha<br>qual to 6.<br>conjunction is false?<br>those values of x.   | Example $x > 1$ or $x \le -2$ $x > 0$ and $x \le 6$ $x > 0$ and $x \le 6$ disjunction true, the e.         mpound statement is         oth inequalities false.         an 0 and less than or         or equal to 0 and all         true.                          |
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| wildlife. The table shows some of the data collect<br>1. What is the center of each weight group?<br>a. $W_1$ 292.5<br>b. $W_2$ 50<br>c. $W_3$ 5.5<br>2. Express each weight group as an absolute-<br>value expression.<br>a. $W_1$ $ W_1 - 292.5  \le 157.5$<br>b. $W_2$ $ W_2 - 50  \le 40$<br>c. $W_3$ $ W_3 - 5.5  \le 2.5$<br>3. Write inequalities to show the amount of<br>food required each day for animals in each<br>weight group.<br>a. $W_1$ $f \ge 3.9$ and $f \le 10.5$<br>b. $W_2$ $f \ge 0.18$ and $f \le 0.38$<br>c. $W_3$ $f \ge 0.18$ and $f \le 0.38$<br>b. $U_2$ $f \ge 0.18$ and $f \le 0.38$<br>c. $W_3$ $f \ge 0.18$ and $f \le 0.38$<br>5. Les includes the following on his poster:<br>Solve this equation to find the number of kild<br>consumed each day by an animal in one of t<br>$ f - 7.2  \le 3.3$ .<br>Find the solution.<br>3.9 $\le f = 100$<br>6. Write an absolute-value inequality to represent<br>difference between a grizzly bear, g, and a black   | cted.<br>Not<br>Weight<br>Groups<br>(kg)<br>$W_1$<br>135–450<br>$W_2$<br>10–90<br>$W_3$<br>3–8<br>mction on her<br>the use? Why?<br>the use? 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