

# 4-3

## Solving Inequalities Using Multiplication and Division

Consider the inequality  $4 > 1$ .

- Copy and complete each statement at the right by replacing each  $\square$  with  $<$ ,  $>$ , or  $=$ .
- What happens to the inequality symbol when you multiply each side by a positive number?
- What happens to the inequality symbol when you multiply each side by zero?
- What happens to the inequality symbol when you multiply each side by a negative number?

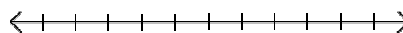
$4 \cdot 3$	$\square$	$1 \cdot 3$
$4 \cdot 2$	$\square$	$1 \cdot 2$
$4 \cdot 1$	$\square$	$1 \cdot 1$
$4 \cdot 0$	$\square$	$1 \cdot 0$
$4 \cdot -1$	$\square$	$1 \cdot -1$
$4 \cdot -2$	$\square$	$1 \cdot -2$
$4 \cdot -3$	$\square$	$1 \cdot -3$

You can multiply each side of an inequality by the same number, just as you did with equations. When you multiply each side of an inequality by a positive number, the direction of the inequality symbol stays the same. When you multiply each side by a negative number, the direction of the inequality symbol reverses.

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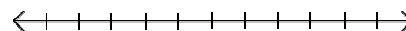
### 1 EXAMPLE Multiplying by a Positive Number

Solve  $\frac{1}{2} < -1$ . Graph and check the solution.

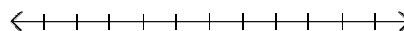


1 Solve each inequality. Graph and check your solution.

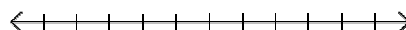
a.  $\frac{b}{4} > \frac{1}{2}$



b.  $\frac{d}{3} \geq \frac{5}{6}$



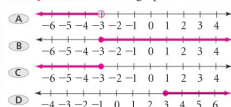
c.  $\frac{v}{0.5} \leq -3$



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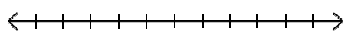
### 2 EXAMPLE Multiplying by a Negative Number

**Multiple Choice** Which graph shows the solution of  $-\frac{2}{3}n \leq 2$ ?

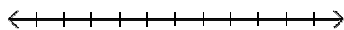


2 Solve each inequality. Graph and check the solution.

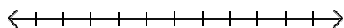
a.  $-\frac{k}{4} > -1$



b.  $-t < \frac{1}{2}$



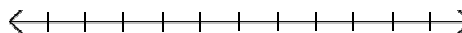
c.  $6 \leq -\frac{3}{5}w$



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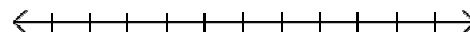
### 3 EXAMPLE Dividing to Solve an Inequality

Solve  $-5z \geq 25$ . Graph the solution.

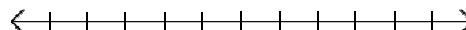


3 Solve the inequality. Graph and check your solution.

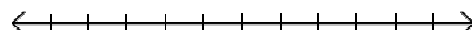
a.  $-2t < -8$



b.  $-3w \geq 12$



c.  $0.6 > -0.2n$



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### 4 EXAMPLE Real-World Problem Solving

**Community Service** The student council votes to buy food for a local food bank. A case of 12 jars of spaghetti sauce costs \$13.75. What is the greatest number of cases of sauce the student council can buy if they use at most \$216 for this project?

**Relate** cost per case times the number of cases is at most total cost

**Define** Let  $c$  = the number of cases of spaghetti sauce.

**Write**  $13.75 \cdot c \leq 216$

$$13.75c \leq 216$$

$$\frac{13.75c}{13.75} \leq \frac{216}{13.75}$$

$$c \leq 15.71 \quad \text{Divide each side by 13.75. Simplify and round to the nearest hundredth.}$$

The student council does not have enough money to buy 16 cases, so they can buy at most 15 cases of sauce for the food bank.

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Students in the school band are selling calendars. They earn \$.40 on each calendar they sell. Their goal is to earn more than \$327. Write and solve an inequality to find the fewest number of calendars they can sell and still reach their goal.

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