

# Solving Inequalities

# The Good News

- If you can solve an equation (which by now, you should be able to do in your sleep)—you can solve an inequality!
- There is one (slight) difference...

# Solving Inequalities using addition and subtraction

Solve  $q + 6 \geq 5$ . Graph the solution.

$$q + 6 \geq 5$$

$$\underline{-6 \quad -6}$$

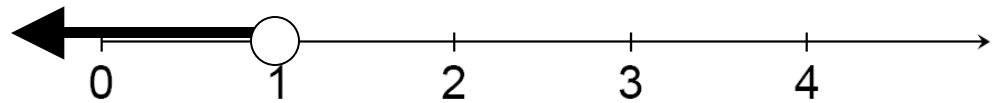
$$q \geq -1$$



# Solve each inequality. Graph the equation.

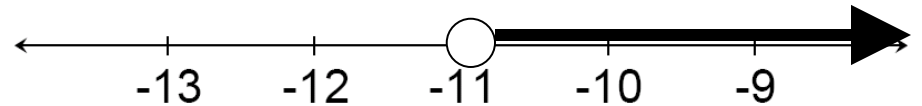
- $Y+3<4$

$$Y<1$$



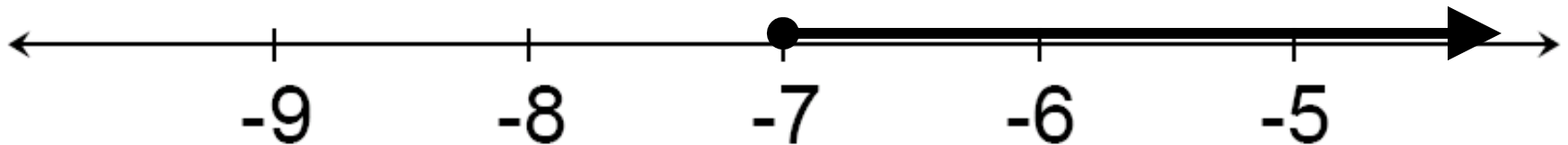
- $N+7>-4$

$$N>-11$$



$$-2 \leq d + 5$$

$$-7 \leq d$$



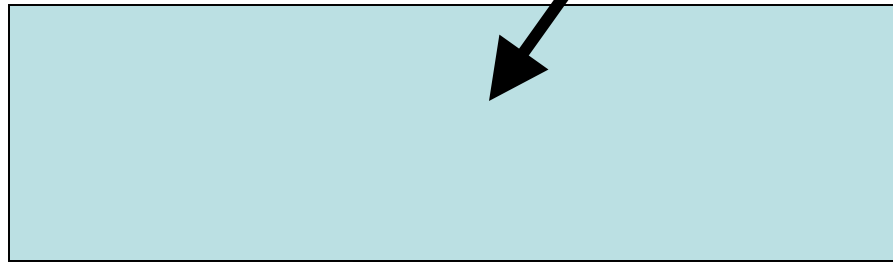
# Solving Inequalities Using Multiplication and Division

- The one big difference!!!
- If I multiply or divide by a negative, I must flip my inequality!

# For example:

$$\frac{n}{-2} < 10$$

The inequality flipped here, because I multiplied by a negative

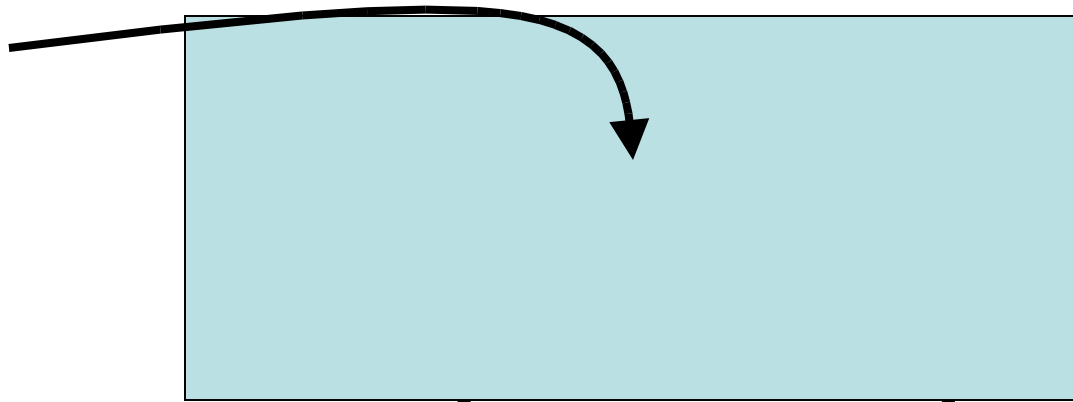


Multiply both sides by the reciprocal, in this case -2 (or -2/1)

# Another example

$$-4x \leq -20$$

The inequality flipped here, because I divided by a negative.



Divide both sides by -4 (using inverse operations)



# Another Example

$$4x > 28$$



Using inverse operations, divide both sides by 4.

Note: The inequality did NOT flip here, because I divided by a positive.

# Solve each inequality

- $-5x < 50$        $x > -10$

- $n/-6 > 30$        $n < -180$

- $4x > 16$        $x > 4$

- $x/2 < -6$        $x < -12$


# Word Problems!

For example: You spent \$12.50 on groceries. When you got home, you had at least \$25 in your wallet. How much money did you have before you went shopping?

$$m \geq \$37.50$$

# Another Word Problem

When a number is divided by  $-3$ , the result is not more than  $15$ . What is the number?



# Two Step Inequalities

Solving a two-step inequality is virtually the same as solving a two-step equation, with one change.

What is that change?

You have to flip the inequality when multiplying and dividing by a negative.

# Two-step inequalities

- Solve the inequality:

$$3x - 4 < 17$$



# Two step inequalities

$$\frac{x}{-5} + 7 \leq 10$$

The inequality  
flips, because I  
multiplied by a  
negative.

Multiply both sides by -5  
(inverse operation)

# On your own

Solve the inequality:



# On your own

- Solve: