

## Special equations

$$2(3x - 7) = 6x + 11$$

$$10x - 15 = 5(2x - 3)$$

When variables cancel out...

- If you have the **exact same** thing on both sides (like  $8 = 8$ ), the answer is **ALL REAL NUMBERS**.
- If there is something different on the 2 sides (like  $5 = 7$ ), there is **NO SOLUTION**.

Proportion ...

- An equation where two fractions are equal

$$\frac{3}{5} = \frac{6}{10} \quad \frac{x}{7} = \frac{12}{21} \quad \frac{4x+5}{8} = \frac{9}{13}$$

You can solve equations by cross-multiplying.

- Multiply diagonally, and set equal.

$$\frac{21}{72} = \frac{28}{x}$$

$$21x = 2016$$

$$x = 96$$

$$\frac{6}{10} = \frac{x}{25}$$

$$\frac{x}{7} = \frac{3}{8}$$

$$\frac{2x+3}{9} = \frac{7}{3}$$

$$\frac{5x+10}{9} = \frac{50}{2}$$

$$\frac{3}{4x-1} = \frac{2}{5}$$

Problems that use proportion:

When a car dealer sells a \$19,000 car, he makes a profit of \$2850. At the same rate, how much profit would he make on a \$24,000 car?

The ratio of men to women in a class is 4 : 3. If there are 20 women, how many men are there?

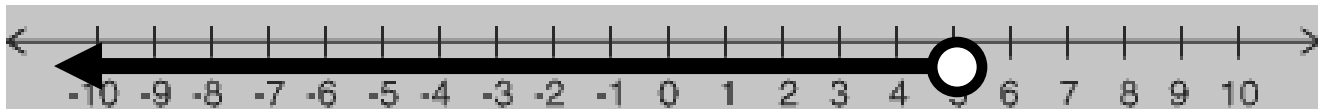
There were 36 problems on an assignment, and it took John 90 minutes to do the assignment. If the assignment only had 20 problems of similar difficulty, how long would it have taken John to do them?

### Inequality

- A statement that involves less than ( $<$ ) or greater than ( $>$ )
- Most often used to answer questions involving the idea of “at least” or “no more than”.

### Graphing inequalities

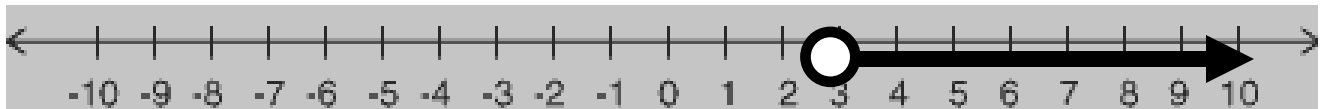
- $x < 5$



- $x < -1$



- $x > 3$



- $x > -7$



- $x \leq 4$



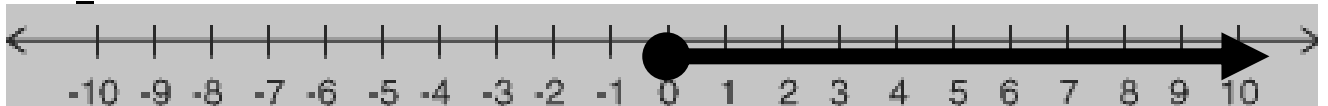
- $x \leq -2$



- $x \geq 6$



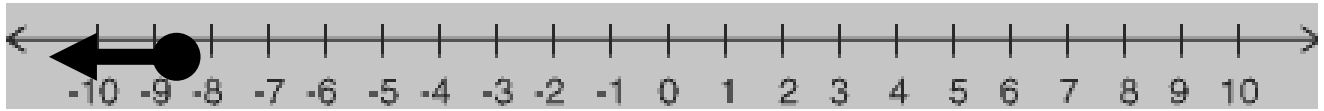
- $x \geq 0$



- $3 < x$   
(This is the same as  $x > 3$ .)



- $-9 \geq x$   
(same as  $x \leq -9$ )



In general ...

- Put a circle (< or >) or a dot ( $\leq$  or  $\geq$ ) at the endpoint.
- Make an arrow in the direction of the inequality.

### Solving inequalities

- In most cases, you just solve like an equation.

$$2x - 19 < 53$$

$$+ 19 \quad +19$$

$$\frac{2x}{2} < \frac{72}{2}$$

$$x < 36$$

- There is one important exception: If you divide by a negative number, change the symbol in the answer.
  - > becomes <
  - < becomes >
  - $\geq$  becomes  $\leq$
  - $\leq$  becomes  $\geq$

$$-5x + 73 \geq 128$$

$$-73 \quad -73$$

$$\frac{-5x}{-5} \geq \frac{55}{-5}$$

$$x \leq -11$$

Note the answer is  $\leq$ , not  $\geq$ .

- You only flip the sign when the number by "x" is negative.

$$3x + 11 > 2$$

$$- 11 \quad -11$$

$$\frac{3x}{3} > \frac{-9}{3}$$

$$x > -3$$

We don't flip the symbol, because the number we divided by (the number by "x") isn't negative.