9/25/19 - Warm Up Problem

Write each statement as a biconditional if possible.

1. If a number is divisible by 3, then it is odd.

    Not Possible

2. If an animal is a cat, then it has whiskers.

    Not possible

3. If a polygon is a triangle, then it has 3 sides.   iff

Section 2.5 - Reasoning in Algebra

Goals: Complete algebra proofs using the Properties of Equality

Deductive Reasoning:

Using facts, definitions, properties, and the laws of logic to form a logical argument

A **proof** is a logical argument for why a certain statement is true. You begin a proof with some information given to you, and then reason your way to your goal statement.

To show that your reasoning is correct, you need to justify each step along the way with a property, definition, postulate, or theorem.

Two-Column Proofs

The first column is a series of statements that leads logically from the given statement to the fact that we are proving.

The second column contains the justification for each statement.

Given: $5x - 7 = 2x + 8$

Prove: $x = 5$

Statements	Justifications
1. $5x - 7 = 2x + 8$	Given
2. $3x - 7 = 8$	Subtraction Prop. of =
3. $3x = 15$	Addition Prop. of =
4. $x = 5$	Division Prop. of =

Line 1 should contain your given statement.

Your last line must be the statement that you were asked to prove.

Justifications can include definitions, properties, postulates, and theorems that have already been accepted as true.

These are the properties you used in algebra to solve equations.
They can be used as justifications for steps in your proofs.

Properties

Property		Example
Addition Property of Equality	If $a = b$, then $a + c = b + c$.	$x - 2 = 5$ $\underline{+2 \quad +2}$ $x = 7$
Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.	$x + 3 = 2$ $\underline{-3 \quad -3}$ $x = -1$
Multiplication Property of Equality	If $a = b$, then $ac = bc$.	$2 \cdot 1/2\, x = 4 \cdot 2$ $x = 8$
Division Property of Equality	If $a = b$, then $\dfrac{a}{c} = \dfrac{b}{c}$	$\dfrac{3x}{3} = \dfrac{6}{3} \quad x = 2$
Distributive Property	$a(b + c) = ab + ac$	$2(x - 5) = 2x - 10$

Adding Justifications

- In a two-column proof your beginning statement will be the information you were given. You just write "**given**" for its justification

Given: $2x + 15 + 4x = 33$
Prove: $x = 3$

Statements	Justifications
1. $2x + 15 + 4x = 33$	Given
2. $6x + 15 = 33$	Simplify
3. $6x = 18$	Subtraction Prop.
4. $x = 3$	Division Prop.

$-15 \quad -15$

Adding Justifications

Given: $3(x - 2) + 2x = 39$
Prove: $x = 9$

Statements	Justifications
1. $3(x - 2) + 2x = 39$	Given
2. $3x - 6 + 2x = 39$	Distributive Property
3. $5x - 6 = 39$	Simplify statement 2
4. $5x = 45$	Addition Prop. of =
5. $x = 9$	Division Prop. of =

Write a Two-Column Algebra Proof

Given: $4x - 12 = 2x + 8$

Prove: $x = 10$

Statements	Justifications
1. $4x - 12 = 2x + 8$ $+12 \qquad\qquad +12$	Given
2. $4x = 2x + 20$ $-2x \qquad -2x$	Addition Prop.
3. $2x = 20$	Subtraction Prop
4. $x = 10$	Division Prop.
5.	
6.	
7.	

Assignment:

Concept 6 Worksheet - due Monday 10/7 (front)

1. Given: $\dfrac{4x+6}{2} = 9$

   Prove: $x = 3$

Statement	Justification
1. $\dfrac{4x+6}{2} = 9 \cdot 2$	Given
2. $4x + 6 = 18$	Mult. Prop.
3. $4x = 12$	Subtr. Prop.
4. $x = 3$	Division Prop.