Mathematical Proofs

Name:_____

Date: _____ Period:_____

Vocabulary:

Postulate:

A statement that is assumed to be true without a proof. It is considered to be a statement that is "obviously true". Postulates may be used to prove theorems true.

Theorem:

A statement that can be proven to be true based upon postulates and previously proven theorems.

Proof:

A proof is a written account of the complete thought process that is used to reach a conclusion. Each step of the process is supported by a theorem, postulate or definition verifying why the step is possible.

Types of Proofs:

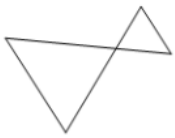
1. 2-COLUMN
2. PARAGRAPH
3. FLOW

Two Column Proof

Proofs in geometry always have:

GIVEN : A

PROVE : B



A DIAGRAM showing the given information

STATEMENTS	REASONS
1. 2. 3. 4. 5. A logical series of statements that lead from the given information to what is to be proved in an organized order.	Reasons must be given to justify each statement, just like a lawyer does in a criminal trial. He presents evidence and witnesses to back-up his statements or accusations. Results can be: Definitions, Postulates, Axioms, Theorems, Properties, Given facts — From Algebra or Geometry

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Algebraic Proofs

The following are the properties of equality and are used to solve algebraic proofs:

Properties of Equality

Let x, y and z represents Real Numbers

REFLEXIVE PROP	x = x
SYMMETRIC PROP	If x = y, then y = x
TRANSITIVE PROP	If x = y and y = z, then x = z
ADDITION PROP	If x = y, then x + z = y + z
SUBTRACTION PROP	If x = y, then x - z = y - z
MULTIPLICATION PROP	If x = y, then x × z = y × z
DIVISION PROP	If x = y, then x ÷ z = y ÷ z
SUBSTITUTION PROP	If x = y, then y can be substituted for x in any expression.

$a=b \rightarrow b=4$

$4=x \rightarrow x=4$

Example 1: Solve the following equation:

$$\frac{4x+6}{2} = 9$$

$$\frac{\cancel{2}^{1}}{1}\left(\frac{4x+6}{\cancel{2}_{1}}\right) = (9)2$$

$$4x+6 = 18$$

$$-6 \quad -6$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

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Example 2:

Given: $\frac{4x+6}{2} = 9$

Prove: $x = 3$

Statements	Reasons
① $\frac{4x+6}{2} = 9$	① GIVEN
② $\frac{\cancel{2}^{1}}{1}\left(\frac{4x+6}{\cancel{2}_{1}}\right) = (9)2$	② MULTIPLICATION PROP.
③ $4x+6 = 18$ $-6 \quad -6$	③ SUBTRACTION PROP.
④ $\frac{4x}{4} = \frac{12}{4}$ $x = 3$	④ DIVISION PROP.

Assignment:

1. Given: $4x + 8 = x + 2$

Prove: $x = -2$

Statements	Reasons
① $4x+8 = x+2$ $-8 \quad -8$	① GIVEN
② $4x = x-6$ $-x \quad -x$	② SUBTRACTION PROPERTY
③ $\frac{3x}{3} = \frac{-6}{3}$	③ SUBTRACTION PROPERTY
④ $x = -2$	④ DIVISION PROPERTY

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2. Given: $\frac{3x+5}{2} = 7$

Prove: $x = 3$

Statements	Reasons
① $\cancel{2}\left(\frac{3x+5}{\cancel{2}}\right) = (7)2$	① GIVEN
② $3x+5=14$ $-5 \quad -5$	② MULTIPLICATION PROPERTY
③ $\frac{3x}{3} = \frac{9}{3}$	③ SUBTRACTION PROPERTY
④ $x=3$	④ DIVISION PROPERTY

3. Given: $2x - 7 = \frac{1}{3}x - 2$

Prove: $x = 3$

Statements	Reasons
① $3(2x-7) = (\frac{1}{3}x - 2)3$	① GIVEN
② $6x-21 = x-6$ $+21 \quad +21$	② MULTIPLICATION PROPERTY
③ $6x = x+15$ $-x \quad -x$	③ ADDITION PROPERTY
④ $\frac{5x}{5} = \frac{15}{5}$	④ SUBTRACTION PROPERTY
⑤ $x=3$	⑤ DIVISION PROPERTY

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