Algebraic Proof Worksheet

- **Algebraic proofs are two column proofs of standard algebra problems that are solved with reasons for each step. The reasons are from the properties below:**

Properties of Equality for Real Numbers	
Reflexive	For every ***a, a = a***
Symmetric	For all numbers ***a*** and ***b,*** if ***a = b, then b = a***
Transitive	For all numbers ***a, b,*** and ***c,*** if ***a = b*** and ***b = c,*** then ***a = c***
Addition & Subtraction	For all numbers ***a, b,*** and ***c,*** if ***a = b,*** then ***a + c = b + c*** and ***a – c = b - c***
Multiplication & Division	For all numbers ***a, b,*** and ***c,*** if ***a = b,*** then ***ac = bc*** and if ***c*** ≠ 0, ***a/c = b/c***
Substitution	For all numbers ***a*** and ***b,*** if ***a = b,*** then ***a*** may be replaced by ***b*** in any equation or expression
Distributive	For all numbers ***a, b,*** and ***c, a(b + c) = ab + ac***

Given: 5x – 14 = 2x + 16
Prove: x = 10

Statement	Reason
5x – 14 = 2x + 16	**Given**
+ 14 = +14	**Addition POE**
5x = 2x + 30	**Substitution (Simplify)**
-2x = -2x	**Subtraction POE**
3x = 30	**Substitution (Simplify)**
÷3 = ÷3	**Division POE**
x = 10	**Substitution (Simplify)**

Remember, after an addition, subtraction, multiplication or division, the next step is always a simplification or substitution step. Now use this example to finish all the problems on the back..

Given: 4x = 2(x + 8)
Prove: x = 8

Name: _____

Statement	Reason
4x = 2(x + 8)	Given
x = 8	Substitution (Simplify)

Given: 3(x – 4) = 2(x + 1)
Prove: x = 10

Statement	Reason
2(x + 1) = 3(x – 4)	Given
x = 14	Symmetric POE

Given: (7x – 4)/3 = x + 16
Prove: x = 13

Statement	Reason
(7x – 4)/3 = x + 16	Given
x = 13	Substitution (Simplify)