Reasoning in Algebra

Algebraic Properties of Equality:

Addition Property of = :	**If a = b, then a + c = b + c.**
Subtraction Property of = :	**If a = b, then a - c = b - c.**
Multiplication Property of = :	**If a = b, then ac = bc.**
Division Property of = :	**If a = b and c≠0, then a/c = b/c.**
Reflexive Property of = :	**For any real number a, a = a.**
Symmetric Property of = :	**If a = b, then b = a.**
Transitive Property of = :	**If a = b and b =c, then a = c.**
Substitution Property of = :	**If a = b, then a can be substituted for b in any equation.**
Distributive Property:	$a(b+c)=ab+ac$

Example 1

Write a two-column proof.

Given: $\frac{2}{9}(x+2)=2$

Prove: $x=7$

Statements	Reasons
1) $\frac{2}{9}(x+2)=2$	1) Given
2) $2(x+2)=18$	2) Multiplication Property of Equality
3) $2x+4=18$	3) Distributive Property of Equality
4) $2x=14$	4) Subtraction Property of Equality
5) $x=7$	5) Division Property of Equality

Solve each equation and write a reason for each step.

2. $5x-18=3x+2$ Given

$2x-18=2$ Subtraction prop. of =

$2x=20$ Addition Prop. of =

$x=10$ Division Prop. of =

3. $55z-3(9z+12)=-64$ Given

$55z-27z-36=-64$ Distributive Prop.

$28z-36=-64$ Simplify

$28z=-28$ Addition Prop. of =

$z=-1$ Division Prop. of =