Lesson 2-4:"Using Proof in Algebra"

PROPERTIES OF EQUALITY		
Reflexive Property	For all real numbers x, $x = x$. A number equals itself.	These three properties define an *equivalence relation*
Symmetric Property	For all real numbers x and y, if $x = y$, then $y = x$. Order of equality does not matter.	
Transitive Property	For all real numbers x, y, and z, if $x = y$ and $y = z$, then $x = z$. Two numbers equal to the same number are equal to each other.	

Addition Property (=)	For all real numbers x, y, and z, if $x = y$, then $x + z = y + z$.	These properties allow you to balance and solve equations involving real numbers
Subtraction Property (=)	For all real numbers x, y, and z, if $x = y$, then $x - z = y - z$.	
Multiplication Property (=)	For all real numbers x, y, and z, if $x = y$, then $xz = yz$.	
Division Property (=)	For all real numbers x, y, and z, if $x = y$, and $z \neq 0$, then $x/z = y/z$.	
Distributive Property	For all real numbers x, y, and z, $x(y + z) = xy + xz$.	
Substitution Property	For all numbers a and b, if a = b, then a may be replaced by b in any equation or expression	

Properties of Length and Measure

	Segment Length	Angle Measure
Reflexive	For any segment AB, $AB = AB$.	For any angle A, $m\angle A = m\angle A$.
Symmetric	If $AB = CD$, then $CD = AB$.	If $m\angle A = m\angle B$, then $m\angle B = m\angle A$.
Transitive	If $AB = CD$ and $CD = EF$, then $AB = EF$.	If $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then $m\angle A = m\angle C$

Name the property of equality that justifies each statement.

a. If $3x = 120$, then $x = 40$

b. If $12 = AB$, then $AB = 12$

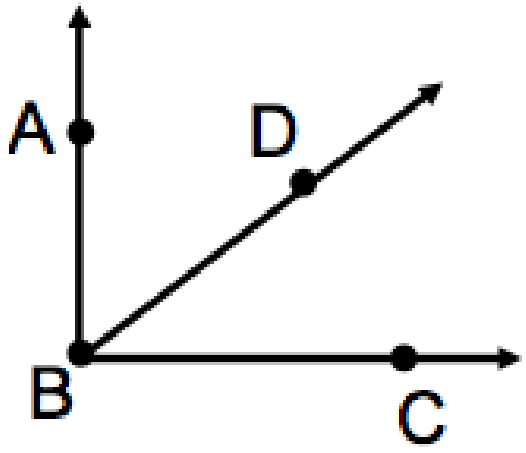
c. If $AB = BC$, and $BC = CD$, then $AB = CD$

d. If $y = 75$ and $y = m\angle A$, then $m\angle A = 75$

Justify each step in Solving.

Statements	Reasons
1. $\frac{x}{3} + 4 = 1$	Given
2. $\frac{x}{3} = -3$	Sub. prop. (=)
3. $x = -9$	Mult. prop. (=)

Justify the steps for the proof of the conditional, ***If <ABD and <DBC are complementary, then <ABC is a right angle.***



Statements	Reasons
1. <ABC and <DBC are complementary	1. Given
2. m<ABD + m<DBC = 90	2. Def. of Comp. Angles
3. m<ABD + m<DBC = m<ABC	3. Angle Addition Postulate
4. m<ABC = 90	4. Substutution Prop. (=)
5. <ABC is a right angle	5. Def. of Right Angle