Relationships: Perpendicular Lines

Definitions:

- A **plane** is a two dimensional geometric object**.** It has infinite length and infinite width but no thickness.

  Parallel lines are lines that lie in the same plane but do not intersect. (Symbol ||)

  Perpendicular lines are two lines that meet to form congruent adjacent angles. (Symbol ⊥)

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Theorem1.6.1: If two lines are perpendicular, then they meet to form _____.

Given: $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ **intersecting at E.**

Prove: $\angle AEC$ **is a right angle**

Statements	Reasons
1. $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ **intersecting at E.**	**1.**
2. $\angle AEC \cong \angle CEB$	**2.**
3. $m\angle AEC \cong m\angle CEB$	**3.**
4. $\angle AEB$ **is a straight angle**	**4.**
5. $m\angle AEC + m\angle CEB = \angle AEB$	**5.**
6. $m\angle AEC + m\angle CEB = 180°$	**6.**
7. $m\angle AEC + m\angle AEC = 180°$ **or** $2(m\angle AEC) = 180°$	**7.**
8. $m\angle AEC = 90°$	**8.**
9. $\angle AEC$ **is a right angle**	**9.**

Table 1.8

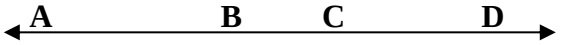
Relation	Object Related	Example
Is equal to	**numbers**	**2 + 3 = 5**
Is greater than	**numbers**	**7 > 5**
Is perpendicular to	**lines**	$n \perp m$
Is complementary to	**angles**	**$\angle 1$ is comp to $\angle 2$**
Is congruent to	**line segments**	$\overline{AB} \equiv \overline{CD}$
Is a brother	**people**	**Mike is brother of Tom**

Properties:

Reflexive property: aRa (5 = 5, equality of numbers has a reflexive property).

Symmetric property: If aRb, then bRa. (If $n \perp m$, then $m \perp n$, perpendicular lines have the symmetric property).

Transitive property: If aRb and bRc, then aRc, (If $m\angle 1 \equiv m\angle 2$ and $m\angle 2 \equiv m\angle 3$, then $m\angle 1 \equiv m\angle 3$, congruence of angle is transitive).

Example 2: Given the line segment 

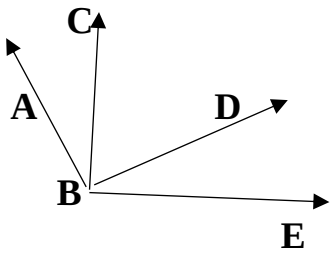
a. **An example of reflexive property:**

b. **An example of the transitive property:**

c. **An example of the symmetric property:**

Example 3: Given: $\angle ABC$ and $\angle CBD$ are complementary, $\angle CBD$ and $\angle DBE$ are complements.

Use transitive property to show that $\angle ABC \cong \angle DBE$



NOW TRY: p. 48 #'1 1, 4, 11