

2.4

### Algebraic Properties

$$x - 8 = 11$$

$$x = 19$$

Addition Property of Equality

If  $a = b$  then  $a + c = b + c$

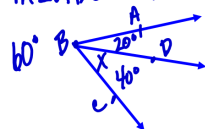
$$y + 4 = 9$$

$$y = 5$$

Subtraction Property of Equality

If  $a = b$  then  $a - c = b - c$

$$m\angle ABC = m\angle ABD + m\angle DBC$$



$$3. \frac{x}{3} = 7.3$$

$$x = 21$$

Multiplication Property of Equality

If  $a = b$  then  $ac = bc$

$$\frac{5x}{5} = \frac{30}{5}$$

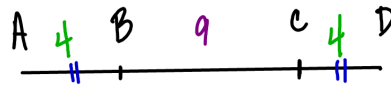
Division Property of Equality

$$x = 6$$

If  $a = b$  then  $\frac{a}{c} = \frac{b}{c}$

### Substitution Property

If  $a = b$  can replace  $a$  with  $b$   
 $b$  with  $a$

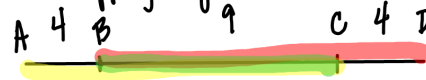


Given  $AB = CD$

Prove  $AC = BD$

| Statements             | Reasons                          |
|------------------------|----------------------------------|
| 1. $AB = CD$           | 1. Given                         |
| 2. $AC = AB + BC$      | 2. Segment Addition Postulate    |
| 3. $BD = BC + CD$      | 3. Segment Addition Postulate    |
| 4. $AB + BC = CD + BC$ | 4. Addition Property of Equality |
| 5. $AC = BD$           | 5. Substitution Property         |

### Overlapping Segments Theorem



If  $AB = CD$  then  $AC = BD$

If  $AC = BD$  then  $AB = CD$

Paragraph Proof: *conclude that therefore so because resulting in using by*

It is given that  $AB = CD$ .

Using Segment Addition Postulate,

$AB + BC = AC$  and  $BC + CD = BD$ .

Therefore  $AB + BC = BC + CD$   
by Addition Property of Equality.

Resulting in  $AC = BD$  by  
Substitution Property of Equality.

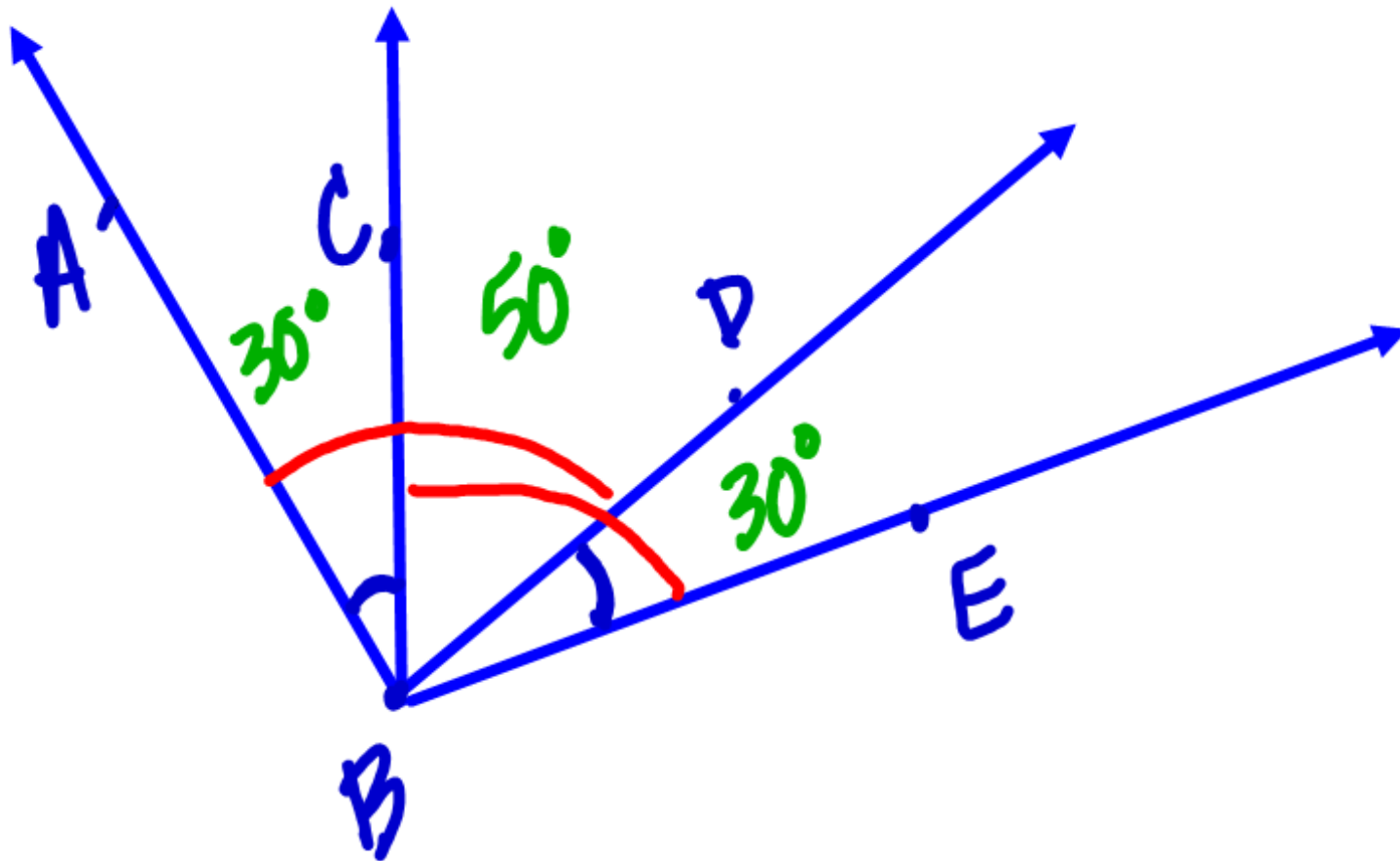
Equivalence Property

Reflexive Property  $a = a$

Symmetric Property If  $a = b$  then  $b = a$

Transitive Property If  $a = b$  and  $b = c$   
then  $a = c$

Congruence Property



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