

Name: Key

Date: \_\_\_\_\_

UNIT 3

LESSON 11

AIM: HOW DO WE PROVE TRIANGLES CONGRUENT USING THE ADDITION PROPERTY?

Do Now: If  $\overline{DF} = 200$ , find the lengths of  $\overline{DE}$  and  $\overline{EF}$ .

$$4x - 12 + 10x - 26 = 200$$

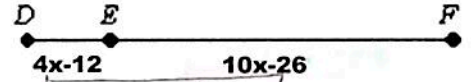
$$14x - 38 = 200$$

$$14x = 238$$

$$x = 17$$

$$\overline{DE} = 4(17) - 12 = 56 = \overline{DE}$$

$$\overline{EF} = 10(17) - 26 = 144 = \overline{EF}$$



WHAT IS THE ADDITION PROPERTY?

SEGMENT	ANGLE
<p><math>AB + BC = AC</math></p>	<p><math>\angle OEM + \angle GEM = \angle GEO</math></p>

WHAT CAN YOU CONCLUDE?

<p>Given: <math>AD = CE</math> <math>DB = EB</math></p> <p>Prove: <math>AB = CB</math></p>	<p>Given: <math>m\angle BAD = m\angle BCD</math> <math>m\angle 1 = m\angle 4</math> <math>m\angle 2 = m\angle 3</math></p> <p>Prove: <math>m\angle 2 = m\angle 3</math></p> <p><math>\angle BAD \cong \angle DCB</math></p>												
<table border="1"> <thead> <tr> <th>Statement</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td><math>\overline{AD} + \overline{DB} = \overline{AB}</math></td> <td rowspan="3">Addition Property</td> </tr> <tr> <td><math>\overline{EC} + \overline{BE} = \overline{BC}</math></td> </tr> <tr> <td><math>\overline{AB} = \overline{CB}</math></td> </tr> </tbody> </table>	Statement	Reason	$\overline{AD} + \overline{DB} = \overline{AB}$	Addition Property	$\overline{EC} + \overline{BE} = \overline{BC}$	$\overline{AB} = \overline{CB}$	<table border="1"> <thead> <tr> <th>Statement</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td><math>\angle 1 + \angle 2 = \angle BAD</math></td> <td rowspan="3">Addition Property</td> </tr> <tr> <td><math>\angle 3 + \angle 4 = \angle DCB</math></td> </tr> <tr> <td><math>\angle BAD \cong \angle DCB</math></td> </tr> </tbody> </table>	Statement	Reason	$\angle 1 + \angle 2 = \angle BAD$	Addition Property	$\angle 3 + \angle 4 = \angle DCB$	$\angle BAD \cong \angle DCB$
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**EXAMPLE #1:**

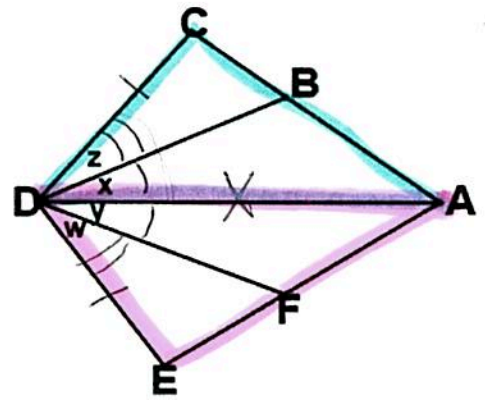
Given:  $\overline{DC} \cong \overline{DE}$

$\angle X \cong \angle Y$

$\angle Z \cong \angle W$

Prove:  $\triangle ADC \cong \triangle ADE$

(S) ✓  
(A) ✓  
(S)



STATEMENT	REASON
① $\overline{DC} \cong \overline{DE}$ , $\angle X \cong \angle Y$ , $\angle Z \cong \angle W$ (S)	① Given
② $\angle ADC = \angle X + \angle Z$ $\angle ADE = \angle W + \angle Y$ $\angle ADC \cong \angle ADE$ (A) ✓	② Addition property
③ $\overline{AD} \cong \overline{AD}$ (S) ✓	③ Reflexive property
④ $\triangle ADC \cong \triangle ADE$	④ SAS $\cong$ SAS

not full  $\angle$ 's in the triangle

**EXAMPLE #2:**

Given:  $\triangle CEF \cong \triangle DFE$

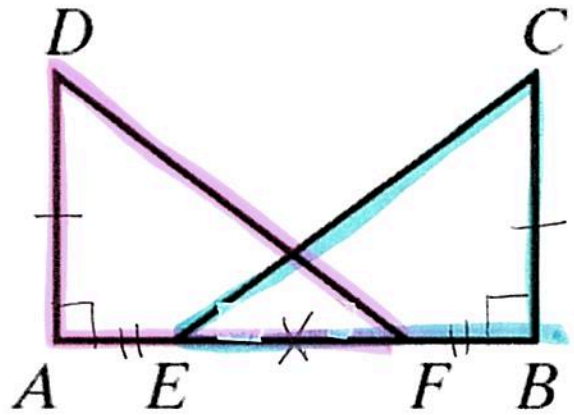
$\overline{AE} \cong \overline{FB}$

$\overline{DA} \cong \overline{CB}$

$\overline{DA} \perp \overline{AB}$

$\overline{CB} \perp \overline{AB}$

Prove:  $\overline{DF} \cong \overline{CE} \rightarrow$  CPCTC  
 $\triangle ADF \cong \triangle BCE \rightarrow$  (SAS)



STATEMENT	REASON
① $\overline{AE} \cong \overline{FB}$ , $\overline{DA} \cong \overline{CB}$ ⑤ ✓ $\overline{DA} \perp \overline{AB}$ , $\overline{CB} \perp \overline{AB}$	① Given
② $\triangle CBE \cong \triangle DAF$ ① ✓	② $\perp$ lines form $\cong$ right $\angle$ 's
③ $\overline{EF} \cong \overline{EF}$	③ Reflexive property
④ $\overline{AF} = \overline{AE} + \overline{EF}$ $\overline{BE} = \overline{BF} + \overline{EF}$ $\overline{AF} = \overline{BE}$ ⑤ ✓	④ Addition property
⑤ $\triangle ADF \cong \triangle BCE$	⑤ SAS $\cong$ SAS
⑥ $\overline{DF} \cong \overline{CE}$	⑥ CPCTC

Name: Kelly

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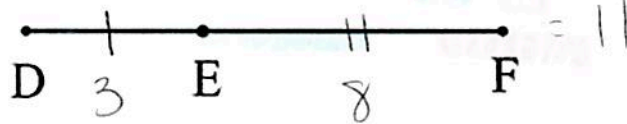
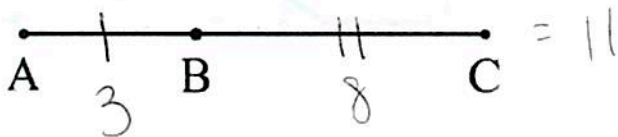
UNIT 3

LESSON 11

HOMEWORK

1. Given that  $AB = DE$  and  $BC = EF$ . If  $AB = 3$  units and  $EF = 8$  units, what can you conclude about  $AC$  and  $DF$ ?

$\therefore AC \cong DF$



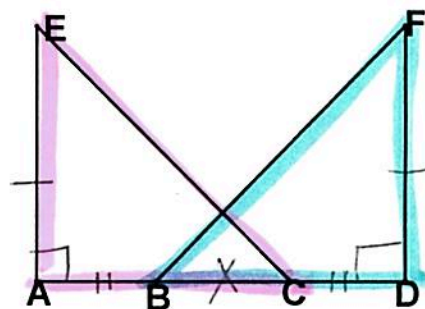
2. Given:  $\overline{AE} \perp \overline{AD}$

$\overline{DF} \perp \overline{DA}$

$\overline{AE} \cong \overline{DF}$

$\overline{AB} \cong \overline{DC}$

- (S)
- (A)
- (S)



Prove:  $\overline{EC} \cong \overline{FB} \rightarrow$  CPCTC  
 $\triangle AEC \cong \triangle FDB$  (SAS)

STATEMENT	REASON
① $\overline{AE} \perp \overline{AD}, \overline{DF} \perp \overline{DA}$ $\overline{AE} \cong \overline{DF}, \overline{AB} \cong \overline{DC}$	① Given
② $\overline{BC} \cong \overline{BC}$	② Reflexive Property
③ $\overline{AC} = \overline{AB} + \overline{BC}$ $\overline{BD} = \overline{CD} + \overline{BC}$ $\overline{AC} \cong \overline{BD}$ ✓ (S)	③ Addition property
④ $\triangle AEC \cong \triangle FDB$ ✓ (A)	④ $\perp$ lines create $\cong$ right $\angle$ 's
⑤ $\triangle AEC \cong \triangle FDB$	⑤ SAS $\cong$ SAS
⑥ $\overline{EC} \cong \overline{FB}$	⑥ CPCTC