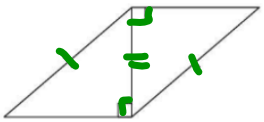
Bell Ringer

Section 10.6 – Congruence in Right Triangles

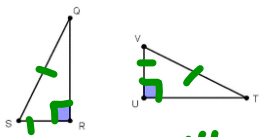
Are the triangles congruent? If so, state how you know. If not, state what information is missing.

1.



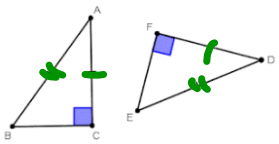
HL

2.



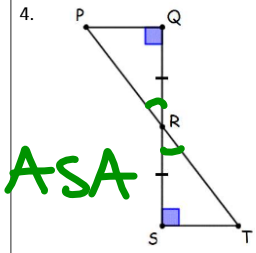
SR ≅ VU - HL

3.



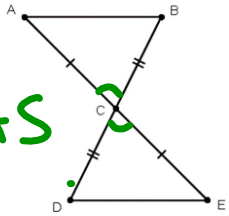
HL

4.



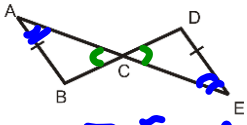
ASA

5.



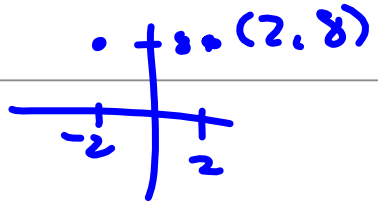
SAS

6



∠E ≅ ∠A AAS

7. Find the image of the point P(-2, 8) after a reflection over the y-axis.

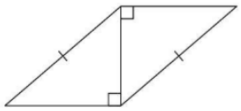


Solutions

Section 10.6 – Congruence in Right Triangles

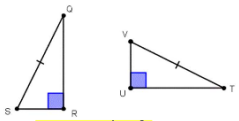
Are the triangles congruent? If so, state how you know. If not, state what information is missing.

1.



Yes – HL

2.

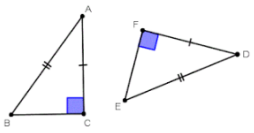


Not enough info

$HL: \overline{SR} \cong \overline{VU}$

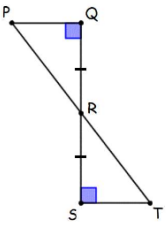
$AAS: \angle S \cong \angle V$

3.



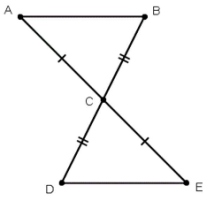
Yes – HL

4.



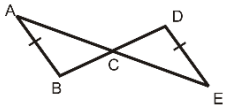
Yes – ASA

5.



Yes – SAS

6



Not enough info

$AAS: \angle A \cong \angle E$

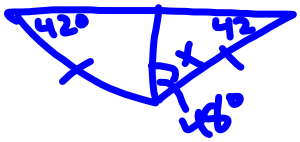
$AAS: \angle D \cong \angle B$

7. Find the image of the point P(-2, 8) after a reflection over the y-axis.

P'(2, 8)

correct 10.5 #s 1-18

1. $\overline{VX}$; Converse of Isosc. △ Thm.
2. $\overline{UW}$; Converse of Isosc. △ Thm.
3. $\overline{VY}$; Converse of Isosc. △ Thm.
4. Answers may vary. Sample: $\angle VUY$; Isosc. △ Thm.
5. $x = 80$, $y = 40$
6. $x = 40$, $y = 70$
7. 108
8. **a.** 70
   b. 53
9. **a.** 75
   b. 48



180
84
96

10. 23, 134
11. **a.** The ∡s opposite the ≅ sides are ≅.
    b. All three ∡s have measure 60, and all three sides are ≅.
12. The ≅ ∡s should be opposite the ≅ sides.
13. 52, 52
14. 45 and 45; the sum of the measures of the acute ∡s must be 90, so the measure of each acute ∠ must be half of 90.
15. 64
16. 2.5
17. 42
18. 35

due Monday 10.6 # 2, 5-9, 11-13

pg 575


10-7
Congruence in Overlapping Triangles
G.SRT.5 Use congruence . . . criteria . . . to solve problems and to prove relationships in geometric figures.
Also G.CO.10

p575

pg 575

In the Solve It, you located individual triangles among a jumble of triangles. Some triangle relationships are difficult to see because the triangles overlap.

Essential Understanding You can sometimes use the congruent corresponding parts of one pair of congruent triangles to prove another pair of triangles congruent. This often involves overlapping triangles.

Overlapping triangles may have a common side or angle. You can simplify your work with overlapping triangles by separating and redrawing the triangles.

p575

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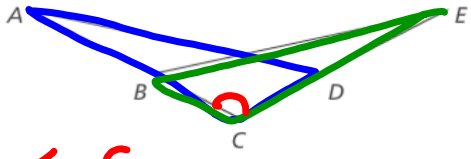
Problem 1 **Identifying Common Parts**

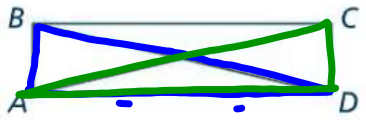
What common angle do $\triangle ACD$ and $\triangle ECB$ share?



$\angle C$

got it pg 575

Got It? **a.** What is the common side in $\triangle ABD$ and $\triangle DCA$?



$\overline{AD}$

b. What is the common side in $\triangle ABD$ and $\triangle BAC$?

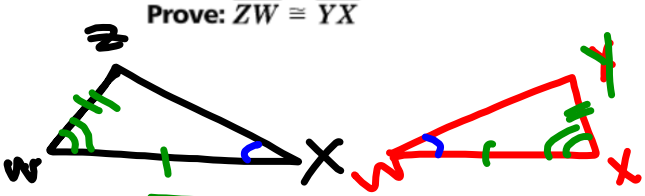
$\overline{BA}$

p575

not in book

Problem 2 Using Common Parts

Proof Given: $\angle ZXW \cong \angle YWX, \angle ZWX \cong \angle YXW$
Prove: $\overline{ZW} \cong \overline{YX}$



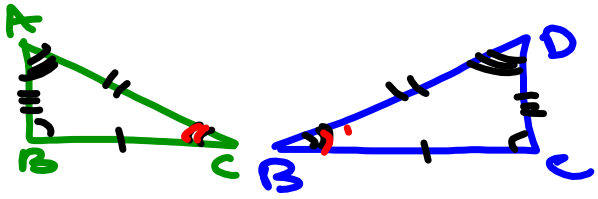
given

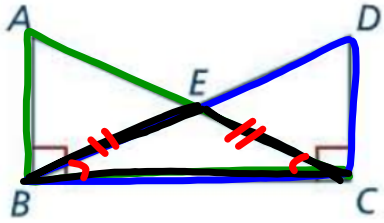
$\overline{WX} \cong \overline{WX}$ - Reflexive
$\triangle ZXW \cong \triangle YWX$ by ASA
$\overline{ZW} = \overline{YX}$ by CPCTC

Got it pg 576

Got It? **Given:** $\triangle CAB \cong \triangle BDC$

Prove: $\overline{CE} \cong \overline{BE}$





$\triangle CAB \cong \triangle BDC$ Given

$\angle DBC \cong \angle ACB$ CPCTC

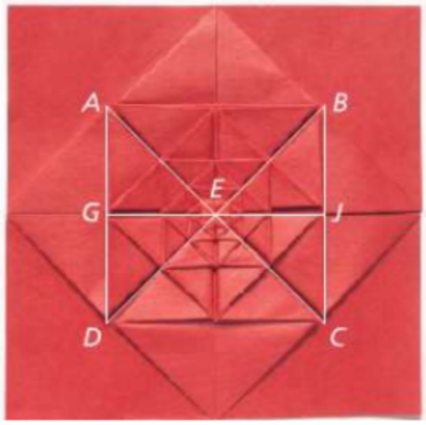
$\overline{CE} \cong \overline{BE}$ - Conv. of I.T.T

not in book

Problem 3 Using Two Pairs of Triangles

Proof **Given:** In the origami design, E is the midpoint of $\overline{AC}$ and $\overline{DB}$.

Prove: $\triangle GED \cong \triangle JEB$



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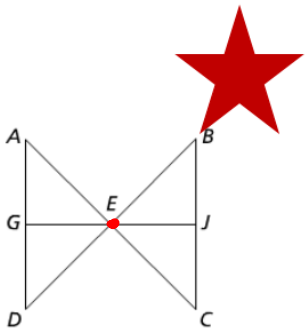
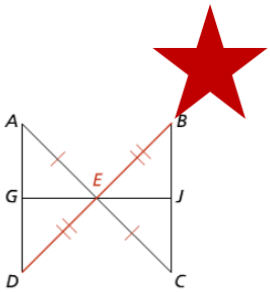


Problem 3 Using Two Pairs of Triangles

Proof **Given:** In the origami design, E is the midpoint of $\overline{AC}$ and $\overline{DB}$.

Prove: $\triangle GED \cong \triangle JEB$

Proof: E is the midpoint of $\overline{AC}$ and $\overline{DB}$, so $\overline{AE} \cong \overline{CE}$ and $\overline{DE} \cong \overline{BE}$.



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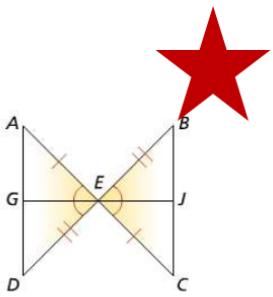

Proof: E is the midpoint of $\overline{AC}$ and $\overline{DB}$, so $\overline{AE} \cong \overline{CE}$ and $\overline{DE} \cong \overline{BE}$. $\angle AED \cong \angle CEB$ because vertical angles are congruent.

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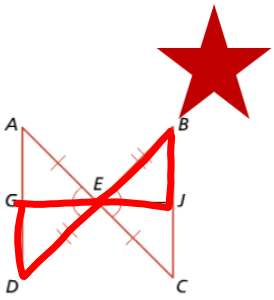
Proof: E is the midpoint of $\overline{AC}$ and $\overline{DB}$, so $\overline{AE} \cong \overline{CE}$ and $\overline{DE} \cong \overline{BE}$. $\angle AED \cong \angle CEB$ because vertical angles are congruent. Therefore, $\triangle AED \cong \triangle CEB$ by SAS.



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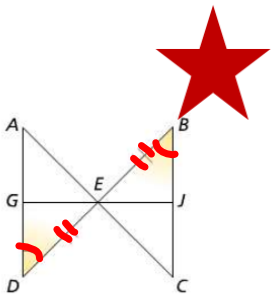
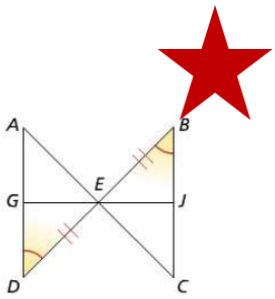


Proof: E is the midpoint of $\overline{AC}$ and $\overline{DB}$, so $\overline{AE} \cong \overline{CE}$ and $\overline{DE} \cong \overline{BE}$. $\angle AED \cong \angle CEB$ because vertical angles are congruent. Therefore, $\triangle AED \cong \triangle CEB$ by SAS. $\angle D \cong \angle B$ because corresponding parts of congruent triangles are congruent.

Problem 3 Using Two Pairs of Triangles

Proof **Given:** In the origami design, E is the midpoint of $\overline{AC}$ and $\overline{DB}$.

Prove: $\triangle GED \cong \triangle JEB$



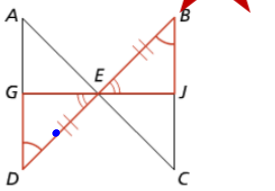
Proof: E is the midpoint of $\overline{AC}$ and $\overline{DB}$, so $\overline{AE} \cong \overline{CE}$ and $\overline{DE} \cong \overline{BE}$. $\angle AED \cong \angle CEB$ because vertical angles are congruent. Therefore, $\triangle AED \cong \triangle CEB$ by SAS. $\angle D \cong \angle B$ because corresponding parts of congruent triangles are congruent.

Now look at the smaller triangles, $\triangle GED$ and $\triangle JEB$. You know that $\triangle AED \cong \triangle CEB$. Use that to prove that $\triangle GED \cong \triangle JEB$.

Problem 3 Using Two Pairs of Triangles

Proof **Given:** In the origami design, E is the midpoint of $\overline{AC}$ and $\overline{DB}$.

Prove: $\triangle GED \cong \triangle JEB$



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$\angle D \cong \angle B$ because corresponding parts of congruent triangles are congruent.

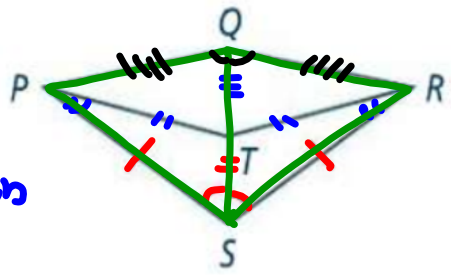
$\angle GED \cong \angle JEB$ because vertical angles are congruent.

Therefore, $\triangle GED \cong \triangle JEB$ by ASA. ✔

Got it pg 578

Got It? **Given:** $\overline{PS} \cong \overline{RS}, \angle PSQ \cong \angle RSQ$

Prove: $\triangle QPT \cong \triangle QRT$



$\overline{PS} = \overline{RS}, \angle PSQ \cong \angle RSQ$ Given

$\overline{ST} \cong \overline{ST}$ Reflexive

$\triangle PST \cong \triangle RST$ SAS

$\triangle QSP \cong \triangle QSR$ SAS

$\triangle QPT \cong \triangle QRT$ - SAS or SSS

p578

FYI... pg 579

When several triangles overlap and you need to use one pair of congruent triangles to prove another pair congruent, you may find it helpful to draw a diagram of each pair of triangles.

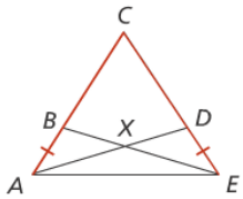
p579

not in book

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



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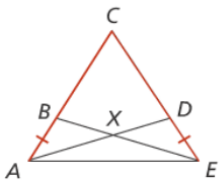


Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

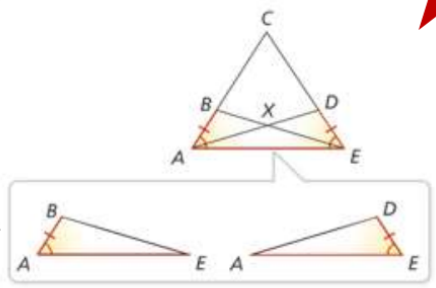
Prove: $\overline{BX} \cong \overline{DX}$

Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

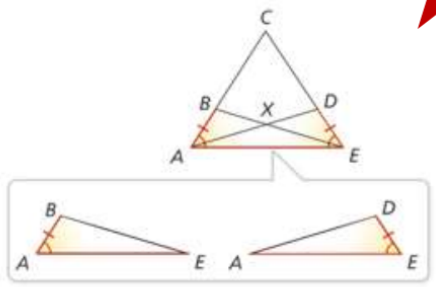
Prove: $\overline{BX} \cong \overline{DX}$

Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given
2) $\overline{CA} \cong \overline{CE}$	2) Given
3) $\angle CAE \cong \angle CEA$	3) Base $\measuredangle$s of an isosceles $\triangle$ are $\cong$.
4) $\overline{AE} \cong \overline{AE}$	4) Reflexive Property of $\cong$

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

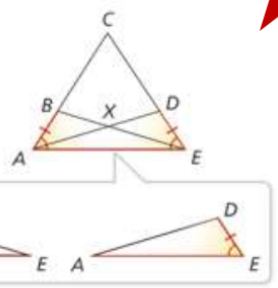
Prove: $\overline{BX} \cong \overline{DX}$

Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given
2) $\overline{CA} \cong \overline{CE}$	2) Given
3) $\angle CAE \cong \angle CEA$	3) Base $\measuredangle$ of an isosceles $\triangle$ are $\cong$.
4) $\overline{AE} \cong \overline{AE}$	4) Reflexive Property of $\cong$
5) $\triangle BAE \cong \triangle DEA$	5) SAS

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$

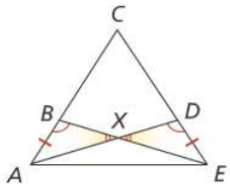
Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given
2) $\overline{CA} \cong \overline{CE}$	2) Given
3) $\angle CAE \cong \angle CEA$	3) Base $\measuredangle$ of an isosceles $\triangle$ are $\cong$.
4) $\overline{AE} \cong \overline{AE}$	4) Reflexive Property of $\cong$
5) $\triangle BAE \cong \triangle DEA$	5) SAS

Now look at the smaller triangles, $\triangle BXA$ and $\triangle DXE$. You know that $\triangle BAE \cong \triangle DEA$. Use that to prove that $\triangle BXA \cong \triangle DXE$.

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



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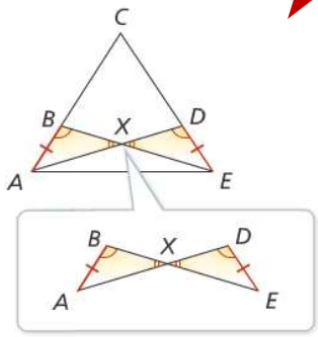
Prove: $\overline{BX} \cong \overline{DX}$

Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given
2) $\overline{CA} \cong \overline{CE}$	2) Given
3) $\angle CAE \cong \angle CEA$	3) Base $\measuredangle$ of an isosceles $\triangle$ are $\cong$.
4) $\overline{AE} \cong \overline{AE}$	4) Reflexive Property of $\cong$
5) $\triangle BAE \cong \triangle DEA$	5) SAS
6) $\angle ABE \cong \angle EDA$	6) Corresponding parts of $\cong$ $\measuredangle$ are $\cong$.

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

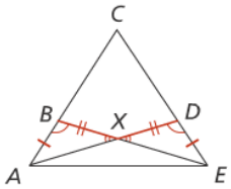
Prove: $\overline{BX} \cong \overline{DX}$

Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given
2) $\overline{CA} \cong \overline{CE}$	2) Given
3) $\angle CAE \cong \angle CEA$	3) Base $\measuredangle$ of an isosceles $\triangle$ are $\cong$.
4) $\overline{AE} \cong \overline{AE}$	4) Reflexive Property of $\cong$
5) $\triangle BAE \cong \triangle DEA$	5) SAS
6) $\angle ABE \cong \angle EDA$	6) Corresponding parts of $\cong$ $\measuredangle$ are $\cong$.
7) $\angle BXA \cong \angle DXE$	7) Vertical angles are $\cong$.
8) $\triangle BXA \cong \triangle DXE$	8) AAS

Problem 4 Separating Overlapping Triangles

Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$



Proof **Given:** $\overline{CA} \cong \overline{CE}$, $\overline{BA} \cong \overline{DE}$

Prove: $\overline{BX} \cong \overline{DX}$

Statements	Reasons
1) $\overline{BA} \cong \overline{DE}$	1) Given
2) $\overline{CA} \cong \overline{CE}$	2) Given
3) $\angle CAE \cong \angle CEA$	3) Base $\measuredangle$ of an isosceles $\triangle$ are $\cong$.
4) $\overline{AE} \cong \overline{AE}$	4) Reflexive Property of $\cong$
5) $\triangle BAE \cong \triangle DEA$	5) SAS
6) $\angle ABE \cong \angle EDA$	6) Corresponding parts of $\cong$ $\measuredangle$ are $\cong$.
7) $\angle BXA \cong \angle DXE$	7) Vertical angles are $\cong$.
8) $\triangle BXA \cong \triangle DXE$	8) AAS
✔9) $\overline{BX} \cong \overline{DX}$	9) Corresponding parts of $\cong$ $\measuredangle$ are $\cong$.

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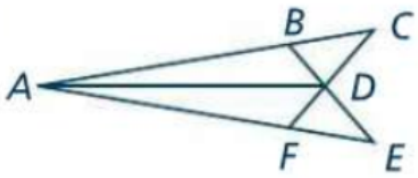
Got It? **Given:** $\angle CAD \cong \angle EAD, \angle C \cong \angle E$

Prove: $\overline{BD} \cong \overline{FD}$



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hw 10.7 #s 3, 7-12, 14