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Prove:

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Given: $\angle 1$ is supplementary to $\angle 2$
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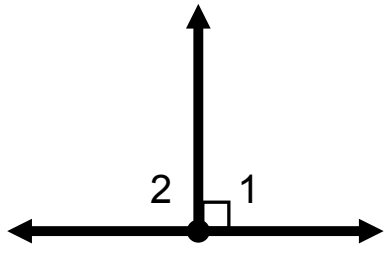
Prove: $\angle 1$ and $\angle 2$ are rt. $\angle$'s

The measures of $\angle$'s 1 and 2 have a sum of 180° by the definition of supplementary $\angle$'s. Each angle, then, must have a measure of 90°, because $\cong \angle$'s have = measures. They both must be right $\angle$'s by the definition of right angles.

Given: $\angle 1 \cong \angle 2$

Prove: $\angle 1$ and $\angle 2$ are rt. $\angle$'s



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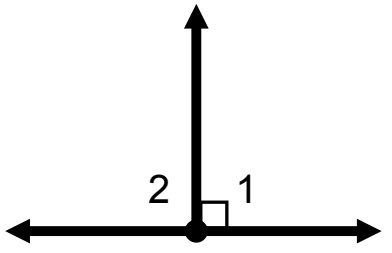


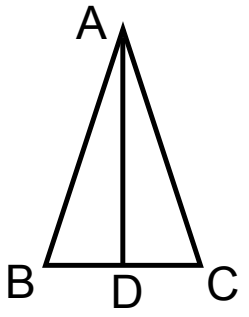
$\angle$'s 1 and 2 are supplementary, because they form a linear pair. The measures of $\angle$'s 1 and 2 have a sum of 180° by the definition of supplementary $\angle$'s. Each angle, then, must have a measure of 90°, because $\cong \angle$'s have = measures. They both must be right $\angle$'s by the definition of right angles.

Theorem 23: If two angles are both supplementary and congruent, then they are right angles.

Corollary to theorem 23: If two angles that form a linear pair are congruent, then they are right angles.

Given: $\overline{AB} \cong \overline{AC}$
$\overline{BD} \cong \overline{CD}$

Prove: $\overline{AD}$ is an altitude.



Proof

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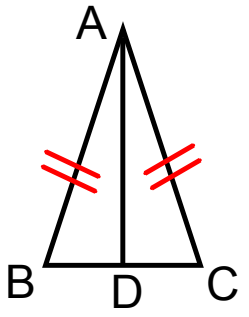

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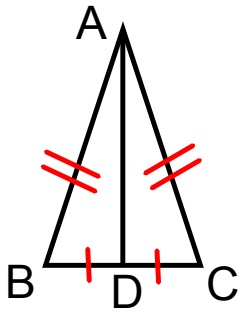

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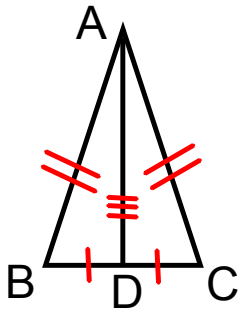

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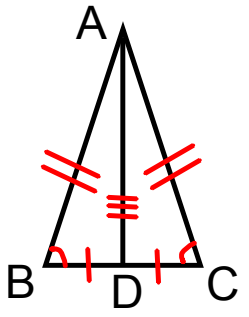

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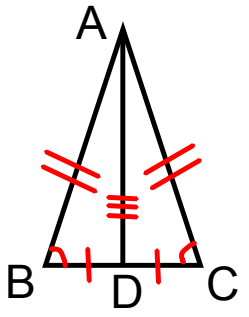

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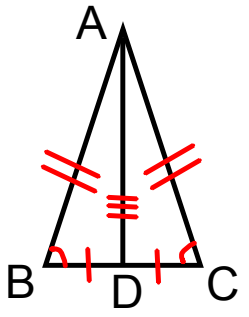

Proof

Statement	Reason
(S) **1.** $\overline{AB} \cong \overline{AC}$	**1.** Given
(S) **2.** $\overline{BD} \cong \overline{CD}$	**2.**

Given: $\overline{AB} \cong \overline{AC}$
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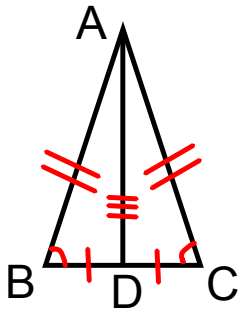

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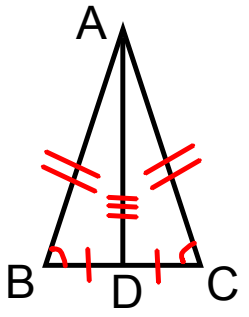

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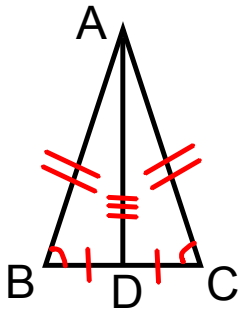

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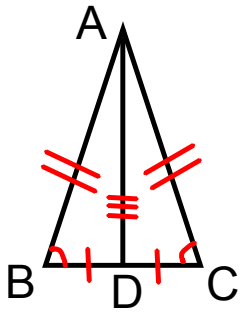

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Ⓢ **1.** $\overline{AB} \cong \overline{AC}$	**1.** Given
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Ⓢ **3.** $\overline{AD} \cong \overline{AD}$	**3.** Ref.
4. $\triangle ABD \cong \triangle ACD$	**4.**

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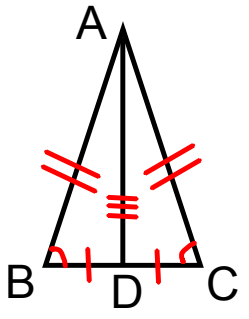

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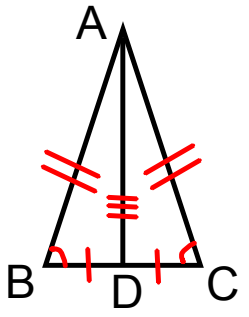

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(S) **3.** $\overline{AD} \cong \overline{AD}$	**3.** Ref.
4. $\triangle ABD \cong \triangle ACD$	**4.** SSS
5. $\angle ADB \cong \angle ADC$	**5.**

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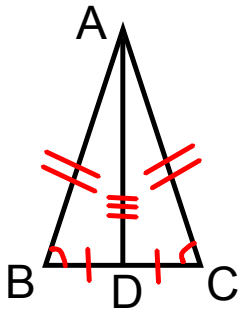

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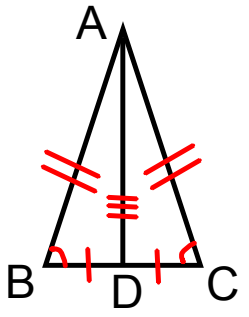

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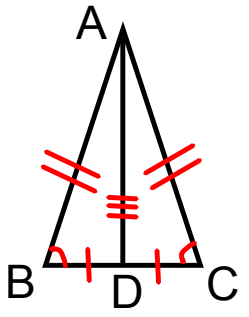

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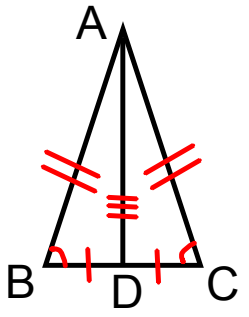

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7. $\angle ADB$ & $\angle ADC$ are rt. $\angle$'s	**7.**

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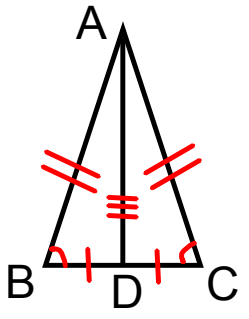

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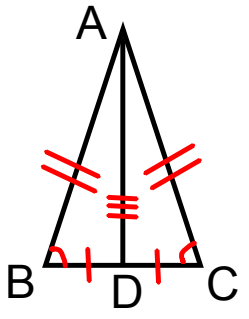

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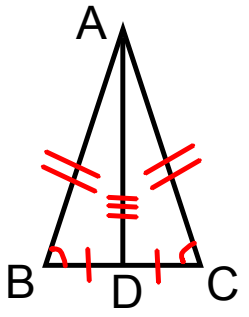

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8. $\overline{AD}$ is an altitude	**8.** def. of alt.

Definition: *Segment bisector*

A line, ray, or segment that intersects a segment so as to divide the segment into two congruent segments is a bisector of the segment.

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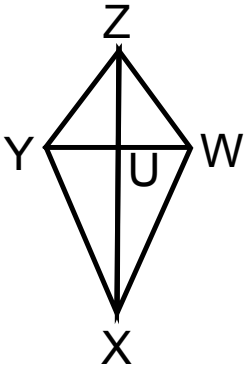
Definition: *Perpendicular bisector*
A line, ray, or segment that bisects and is perpendicular to a segment is the perpendicular bisector of the segment.

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$



Prove: $\overline{ZX}$ is $\perp$ bis. of YW

Proof

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Given: $\overline{YZ} \cong \overline{WZ}$
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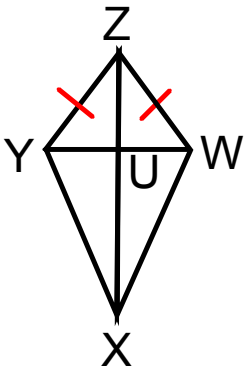
Prove: $\overline{ZX}$ is $\perp$ bis. of YW



Proof

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Given: $\overline{YZ} \cong \overline{WZ}$
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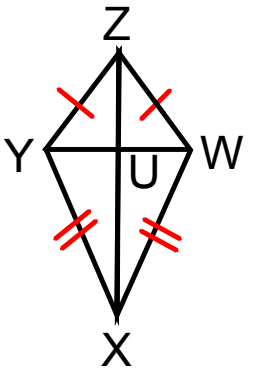
Prove: $\overline{ZX}$ is $\perp$ bis. of YW



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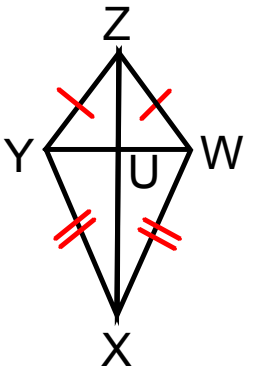

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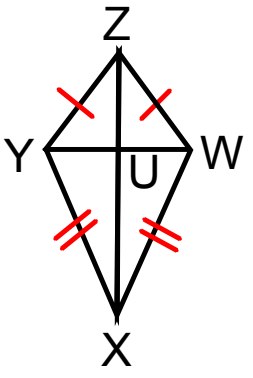

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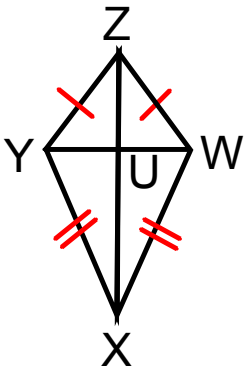

Proof

Statement	Reason
(S) **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
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Given: $\overline{YZ} \cong \overline{WZ}$
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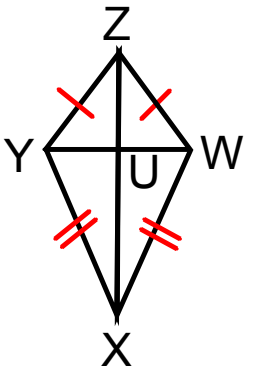

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Proof

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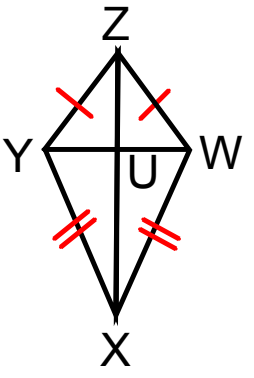

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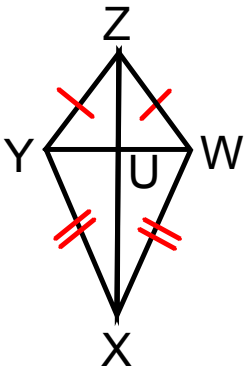
Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

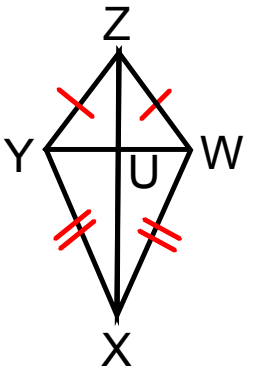


Proof

Statement	Reason
S **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S **2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S **3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

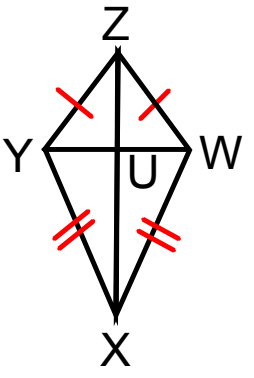


Proof

Statement	Reason
S **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S **2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S **3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

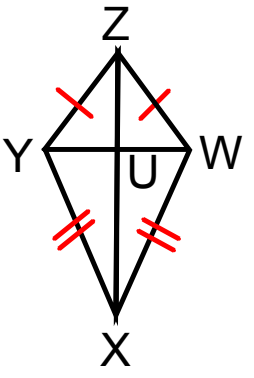


Proof

Statement	Reason
S **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S **2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S **3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

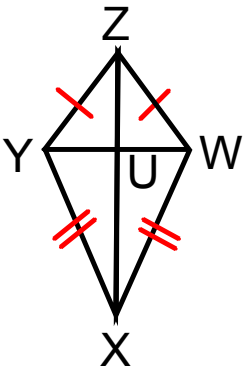


Proof

Statement	Reason
S 1. $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

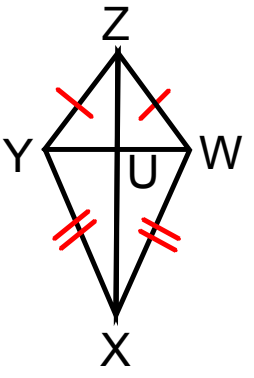


Proof

Statement	Reason
(S) **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
(S) **2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
(S) **3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
(A) **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

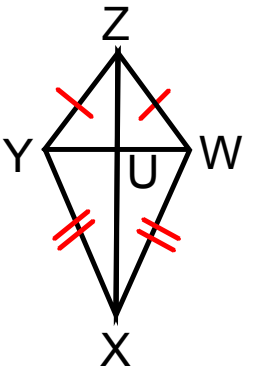


Proof

Statement	Reason
(S) **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
(S) **2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
(S) **3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
(A) **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
(S) **6.** $\overline{ZU} \cong \overline{ZU}$	**6.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW



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(S) **1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
(S) **2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
(S) **3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
(A) **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
(S) **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.

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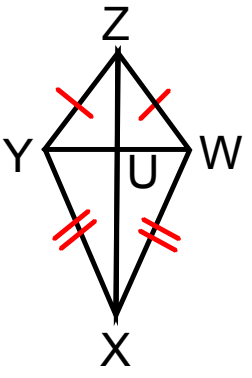
Prove: $\overline{ZX}$ is $\perp$ bis. of YW



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S 1. $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.

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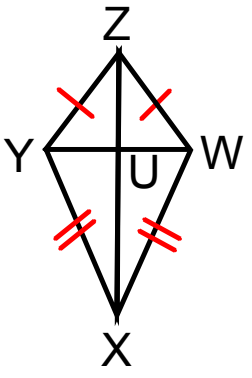

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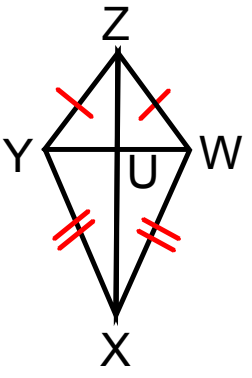
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
7. $\triangle YZU \cong \triangle WZU$	**7.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW



Proof

Statement	Reason
S 1. $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
7. $\triangle YZU \cong \triangle WZU$	**7.** SAS

Given: $\overline{YZ} \cong \overline{WZ}$
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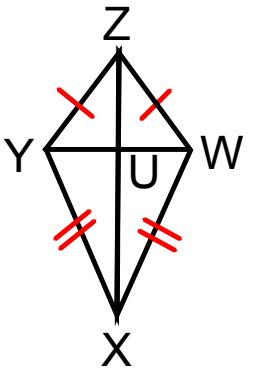
Prove: $\overline{ZX}$ is $\perp$ bis. of YW



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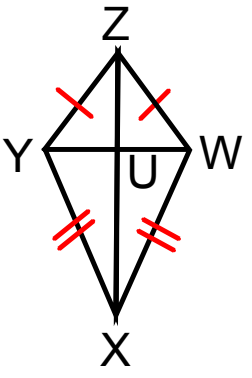
S 1. $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
8. $\angle ZUY \cong \angle ZYW$	**8.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW



Proof

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S 1. $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
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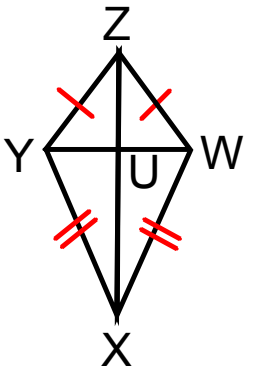

Proof

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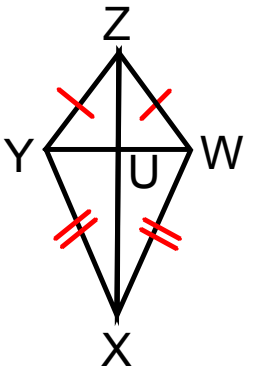
S	**1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S	**2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S	**3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A	**5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S	**6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
	7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
	8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW



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	Statement	Reason
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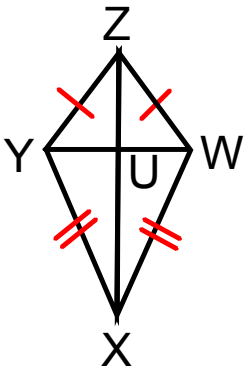
S	**2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S	**3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A	**5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S	**6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
	7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
	8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.** linear pair

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

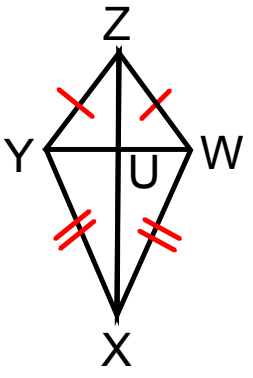


Proof

	Statement	Reason
S	**1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S	**2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S	**3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A	**5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S	**6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
	7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
	8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.** linear pair
	10. $\angle ZUY$ & $\angle ZYW$ are rt. $\angle$'s	**10.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

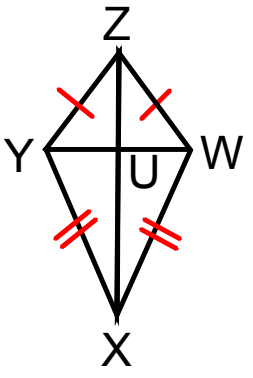


Proof

	Statement	Reason
S	**1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S	**2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S	**3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A	**5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S	**6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
	7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
	8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.** linear pair
	10. $\angle ZUY$ & $\angle ZYW$ are rt. $\angle$'s	**10.** $\cong$ & supp. $\angle$'s are rt. $\angle$'s

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

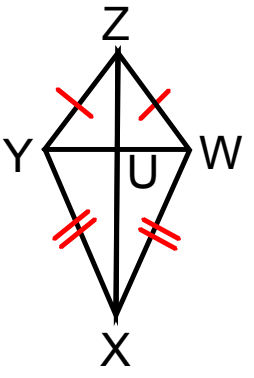


Proof

	Statement	Reason
S	**1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S	**2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S	**3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A	**5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S	**6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
	7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
	8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.** linear pair
	10. $\angle ZUY$ & $\angle ZYW$ are rt. $\angle$'s	**10.** $\cong$ & supp. $\angle$'s are rt. $\angle$'s
	11. $\overline{UY} \cong \overline{UW}$	**11.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

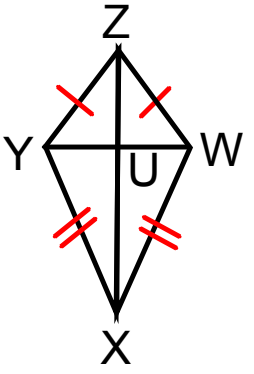


Proof

Statement	Reason
S 1. $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S 2. $\overline{XY} \cong \overline{XW}$	**2.** Given
S 3. $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A **5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S **6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.** linear pair
10. $\angle ZUY$ & $\angle ZYW$ are rt. $\angle$'s	**10.** $\cong$ & supp. $\angle$'s are rt. $\angle$'s
11. $\overline{UY} \cong \overline{UW}$	**11.** CPCTC

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of YW

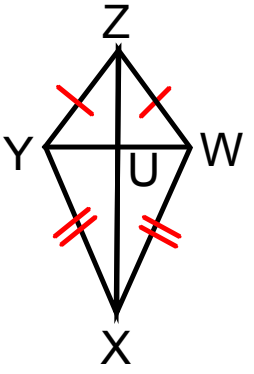


Proof

	Statement	Reason
S	**1.** $\overline{YZ} \cong \overline{WZ}$	**1.** Given
S	**2.** $\overline{XY} \cong \overline{XW}$	**2.** Given
S	**3.** $\overline{XZ} \cong \overline{XZ}$	**3.** Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	**4.** SSS
A	**5.** $\angle YZU \cong \angle WZU$	**5.** CPCTC
S	**6.** $\overline{ZU} \cong \overline{ZU}$	**6.** Ref.
	7. $\triangle YZU \cong \triangle WZU$	**7.** SAS
	8. $\angle ZUY \cong \angle ZYW$	**8.** CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	**9.** linear pair
	10. $\angle ZUY$ & $\angle ZYW$ are rt. $\angle$'s	**10.** $\cong$ & supp. $\angle$'s are rt. $\angle$'s
	11. $\overline{UY} \cong \overline{UW}$	**11.** CPCTC
	12. $\overline{ZX}$ is $\perp$ bis. of $\overline{YW}$	**12.**

Given: $\overline{YZ} \cong \overline{WZ}$
$\overline{XY} \cong \overline{XW}$

Prove: $\overline{ZX}$ is $\perp$ bis. of $\overline{YW}$



Proof

	Statement	Reason
S	1. $\overline{YZ} \cong \overline{WZ}$	1. Given
S	2. $\overline{XY} \cong \overline{XW}$	2. Given
S	3. $\overline{XZ} \cong \overline{XZ}$	3. Ref.
	4. $\triangle XYZ \cong \triangle XWZ$	4. SSS
A	5. $\angle YZU \cong \angle WZU$	5. CPCTC
S	6. $\overline{ZU} \cong \overline{ZU}$	6. Ref.
	7. $\triangle YZU \cong \triangle WZU$	7. SAS
	8. $\angle ZUY \cong \angle ZYW$	8. CPCTC
	9. $\angle ZUY$ & $\angle ZYW$ are supp.	9. linear pair
	10. $\angle ZUY$ & $\angle ZYW$ are rt. $\angle$'s	10. $\cong$ & supp. $\angle$'s are rt. $\angle$'s
	11. $\overline{UY} \cong \overline{UW}$	11. CPCTC
	12. $\overline{ZX}$ is $\perp$ bis. of $\overline{YW}$	12. def. of $\perp$ bis.

Theorem 23: If two angles are both supplementary and congruent, then they are right angles.

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Corollary to theorem 23: If two angles that form a linear pair are congruent, then they are right angles.

Definition: *Segment bisector*

A line, ray, or segment that intersects a segment so as to divide the segment into two congruent segments is a bisector of the segment.

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A line, ray, or segment that intersects a segment so as to divide the segment into two congruent segments is a bisector of the segment.

Definition: *Perpendicular bisector*
A line, ray, or segment that bisects and is perpendicular to a segment is the perpendicular bisector of the segment.