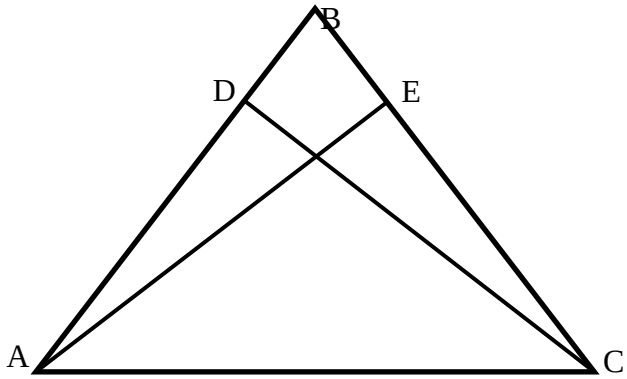
Proof Case #1

Given: $\overline{CD}$ is the altitude to $\overline{AB}$

$\overline{AE}$ is the altitude to $\overline{BC}$

$\overline{CD} \cong \overline{AE}$

Prove: ΔABC is isosceles



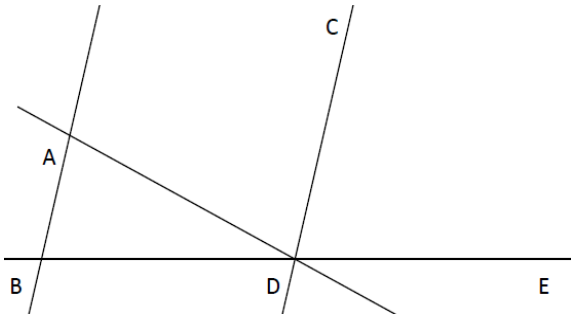
Statements	Reasons

Proof Case # 2

Given: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

$\overleftrightarrow{DC}$ bisects $\angle ADE$

Prove: ΔABD is isosceles



Statements	Reasons

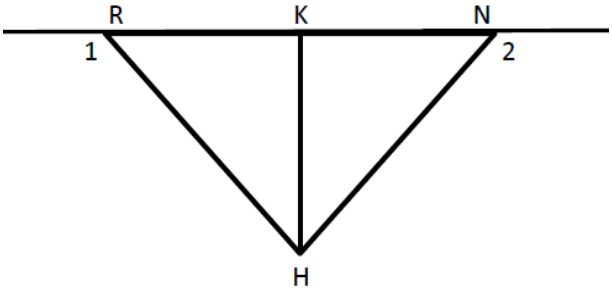
Proof Case #3

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

$\overline{HK}$ bisects $\angle RHN$

$\overline{HR} \cong \overline{HN}$

Prove: $\overline{HK} \perp \overline{RN}$



Statements	Reasons

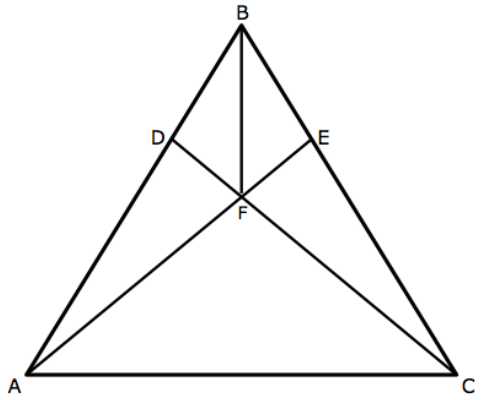
Proof Case #4

Given: $\angle FAC \cong \angle FCA$

$\overline{FD} \perp \overline{AB}$

$\overline{FE} \perp \overline{BC}$

Prove: $\overline{BF}$ bisects $\angle DBE$

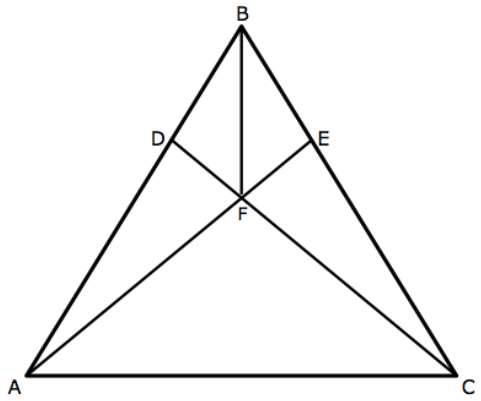


Statements	Reasons

Proof Case #5

Given: $\overline{BD} \cong \overline{BE}$
$\overline{FD} \cong \overline{FE}$

Prove: ΔAFC is isosceles



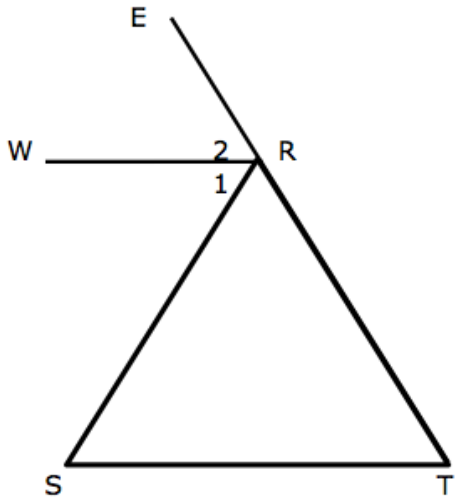
Statements	Reasons

Proof Case #6

Given: $\overline{WR} \,||\, \overline{ST}$

$\overline{WR}$ bisects $\angle SRE$

Prove: ΔSRT is isosceles



Statements	Reasons

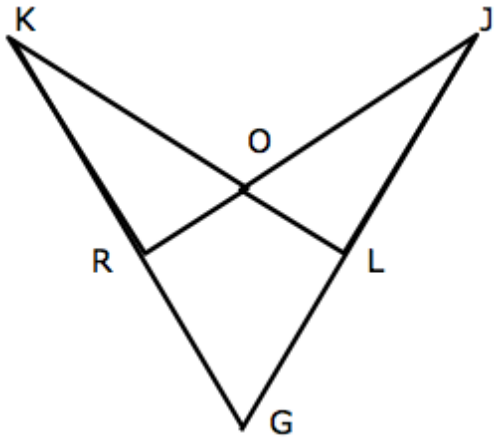
Proof Case #7

Given: $\overline{JR} \perp \overline{KG}$

$\overline{KL} \perp \overline{JG}$

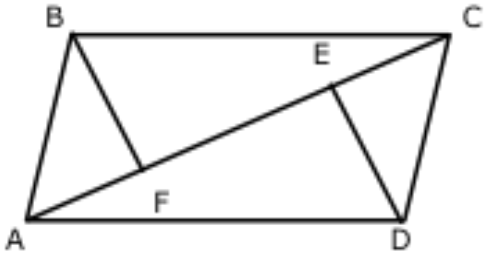
$\overline{KL} \cong \overline{JR}$

Prove: $\Delta KLG \cong \Delta JRG$



Statements	Reasons

Proof Case #8



Given: $\overline{BF} \perp \overline{AC}$

$\overline{DE} \perp \overline{AC}$

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

$\overline{AE} \cong \overline{CF}$

Prove: $\Delta AFB \cong \Delta CED$

Statements	Reasons

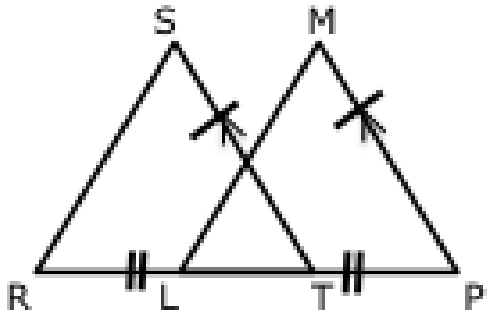
Proof Case #9

Given: $\overline{ST} \cong \overline{MP}$

$\overline{ST} \,||\, \overline{MP}$

$\overline{RT} \cong \overline{LP}$

Prove: $\overline{RS} \,||\, \overline{LM}$



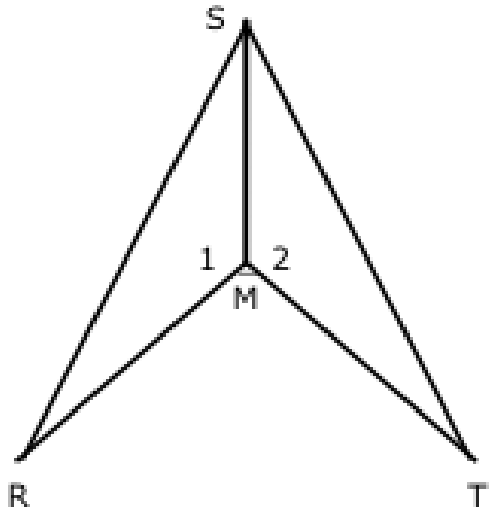
Statements	Reasons

Proof Case #10

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

$\overline{RM} \cong \overline{TM}$

Prove: $\overline{SM}$ bisects $\angle RST$

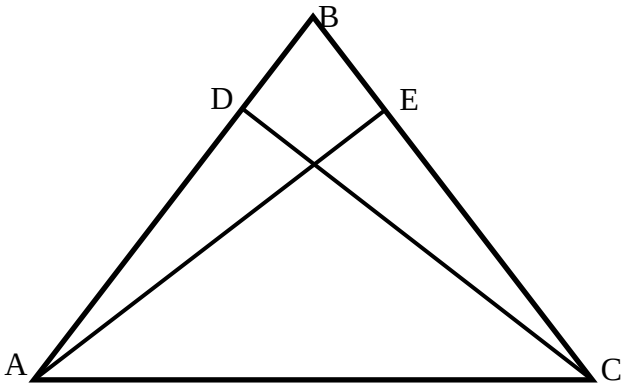


Statements	Reasons

Answer Key

Proof Case #1

Given: $\overline{CD}$ is the altitude to $\overline{AB}$
$\overline{AE}$ is the altitude to $\overline{BC}$
$\overline{CD} \cong \overline{AE}$
Prove: ΔABC is isosceles



Plan: Our goal is to show $\angle BAC = \angle BCA$ by proving $\Delta ADC \cong \Delta CEA$. The diagram suggests the Hypotenuse-Leg Postulate may be used if $\overline{AC} \cong \overline{AC}$ (Hypotenuse) and $\overline{CD} \cong \overline{AE}$ (Leg).

Statements	Reasons
1. $\overline{CD}$ is the altitude to $\overline{AB}$ $\overline{AE}$ is the altitude to $\overline{BC}$	1. Given
2. $\angle D$ and $\angle E$ are right angles	2. Definition of altitude
3. Triangles ADC and CEA are right triangles	3. Definition of a right triangle
4. $\overline{CD} \cong \overline{AE}$	4. Given
5. $\overline{AC} \cong \overline{AC}$	5. Reflexive property of congruence
6. $\Delta ADC \cong \Delta CEA$	6. Hypotenuse-Leg postulate
7. $\angle BAC \cong \angle BCA$	7. CPCTC
8. ΔABC is isosceles	8. Isosceles triangles by definition have a pair of congruent angles

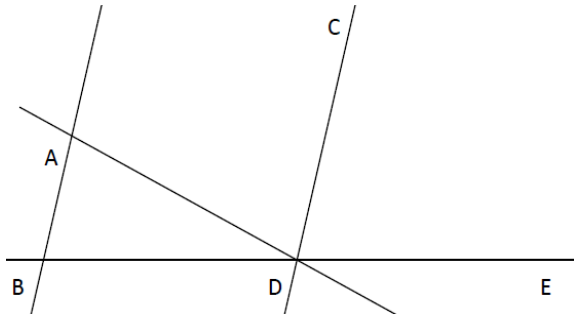
Answer Key

Proof Case # 2

Given: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

$\overleftrightarrow{DC}$ bisects $\angle ADE$

Prove: ΔABD is isosceles



Statements	Reasons
1. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $\overleftrightarrow{DC}$ bisects $\angle ADE$	1. Given
2. $\angle ADC \cong CDE$	2. Definition of angle bisector
3. $\angle CDE \cong \angle ABD$	3. Corresponding angles
4. $\angle BAD \cong \angle ADC$	4. Alternate interior angles
5. $\angle ABD \cong \angle BAD$	5. Transitive property of congruence
6. ΔABD is isosceles	6. Isosceles triangles by definition have a pair of congruent angles

Answer Key

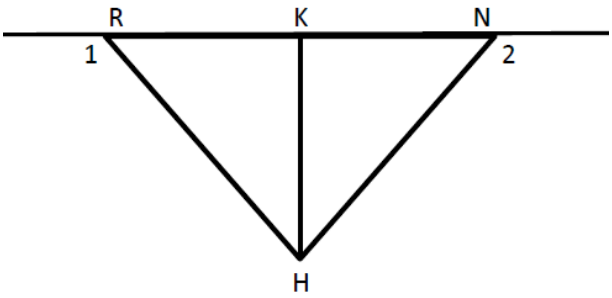
Proof Case #3

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

$\overline{HK}$ bisects $\angle RHN$

$\overline{HR} \cong \overline{HN}$

Prove: $\overline{HK} \perp \overline{RN}$



Statements	Reasons
1. $\angle 1 \cong \angle 2$ $\overline{HK}$ bisects $\angle RHN$ $\overline{HR} \cong \overline{HN}$	1. Given
2. ΔHNR is isosceles	2. Definition of isosceles triangles
3. $\angle RHK \cong \angle KHN$	3. Definition of angle bisector
4. $\angle HRK \cong \angle HNK$	4. Congruent supplements theorem
5. $\angle HKR + \angle HKN = 180$	5. Definition of linear pair
6. $\angle HKR \cong \angle HKN$	6. Third angle postulate
7. $2(m\angle HKR) = 180$ $m\angle HKR = 90$ $m\angle HKN = 90$	7. Substitution property of equality Simplify
8. $\overline{HK} \perp \overline{RN}$	8. Definition of perpendicular

Answer Key

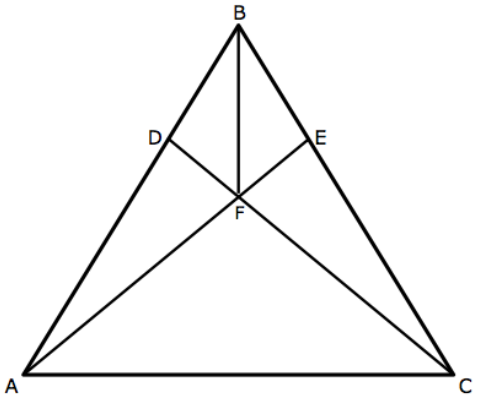
Proof Case #4

Given: $\angle FAC \cong \angle FCA$

$\overline{FD} \perp \overline{AB}$

$\overline{FE} \perp \overline{BC}$

Prove: $\overline{BF}$ bisects $\angle DBE$



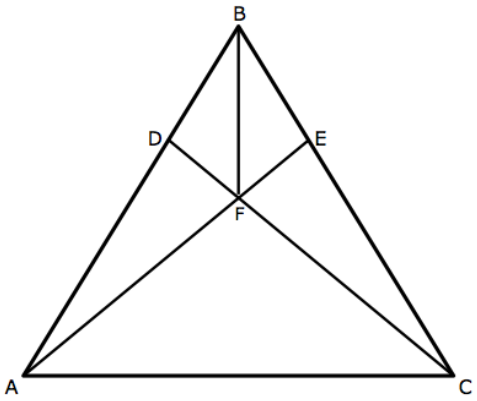
Statements	Reasons
1. $\angle FAC \cong \angle FCA$ $\overline{FD} \perp \overline{AB}$ $\overline{FE} \perp \overline{BC}$	1. Given
2. $rt\angle ADF \cong rt\angle FEC$	2. Definition of Perpendicular Lines
3. $\angle DFA + \angle AFC = 180$ $\angle EFC + \angle AFC = 180$	3. Linear Pairs
4. $\angle EFC \cong \angle DFA$	4. Congruent Supplements
5. $\overline{AF} \cong \overline{CF}$	5. Converse of Isosceles Triangle
6. $\Delta ADF \cong \Delta CEF$	6. Angle-Angle-Side
7. $rt\angle BDF \cong rt\angle BEF$	7. Definition of Perpendicular Lines
8. $\overline{DF} \cong \overline{FE}$	8. CPCTC
9. $\overline{BF} \cong \overline{BF}$	9. Reflexive Property of Equality
10. $\Delta BDF \cong \Delta BEF$	10. Hypotenuse Leg Theorem
11. $\angle DBF \cong \angle EBF$	11. CPCTC
12. $\overline{BF}$ bisects $\angle DBE$	12. Definition of Angle Bisector

Answer Key

Proof Case #5

Given: $\overline{BD} \cong \overline{BE}$
$\overline{FD} \cong \overline{FE}$

Prove: ΔAFC is isosceles



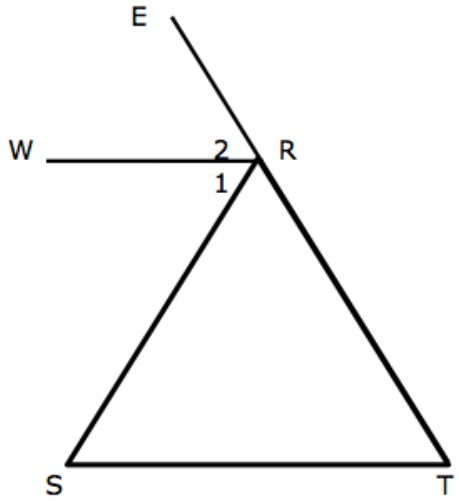
Statements	Reasons
1. $\overline{BD} \cong \overline{BE}$ $\overline{FD} \cong \overline{FE}$	1. Given
2. $\overline{BF} \cong \overline{BF}$	2. Reflexive Property of Congruence
3. $\Delta BDF \cong \Delta BEF$	3. Side-Side-Side
4. $m\angle AFC + m\angle AFD = 180$ $m\angle AFC + m\angle CFE = 180$	4. Linear Pairs
5. $\angle AFD \cong \angle CFE$	5. Congruent supplements
6. $\angle BDF \cong \angle BEF$	6. CPCTC
7. $m\angle ADF + m\angle BDF = 180$ $m\angle CEF + m\angle BEF = 180$	7. Linear Pairs
8. m<CEF + m<BDF = 180	8. Substitution Property
9. $\angle ADF \cong \angle CEF$	9. Congruent Supplements
10. $\overline{DF} \cong \overline{EF}$	10. CPCTC
11. $\Delta ADF \cong \Delta CEF$	11. Angle-Side-Angle
12. $\overline{AF} \cong \overline{CF}$	12. CPCTC
13. ΔAFC is isosceles	13. Definition of Isosceles Triangle

Answer Key

Proof Case #6

Given: $\overline{WR} \,||\, \overline{ST}$
$\overline{WR}$ bisects $\angle SRE$

Prove: ΔSRT is isosceles



Statements	Reasons
1. $\overline{WR} \,||\, \overline{ST}$ $\overline{WR}$ bisects $\angle SRE$	1. Given
2. $\angle 1 \cong \angle 2$	2. Definition of Angle Bisector
3. $\angle 1 \cong \angle S$	3. Alternate Interior Angles
4. $\angle 2 \cong \angle T$	4. Corresponding Angles
5. $\angle S \cong \angle T$	5. Transitive Property of Congruence
6. ΔSRT is isosceles	6. Definition of Isosceles Triangles which states that Isosceles Triangles have a pair of base angles that are congruent

Answer Key

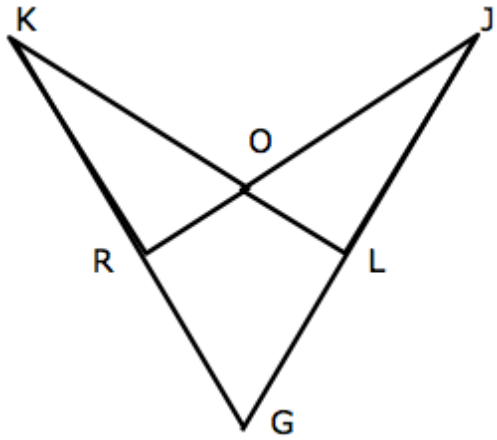
Proof Case #7

Given: $\overline{JR} \perp \overline{KG}$

$\overline{KL} \perp \overline{JG}$

$\overline{KL} \cong \overline{JR}$

Prove: $\Delta KLG \cong \Delta JRG$

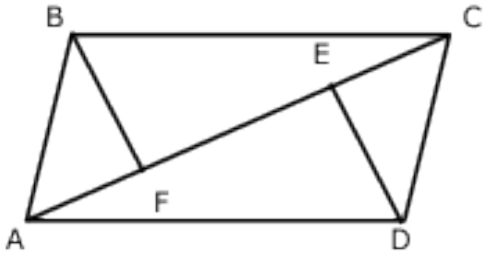


Statements	Reasons
1. $\overline{JR} \perp \overline{KG}$ $\overline{KL} \perp \overline{JG}$ $\overline{KL} \cong \overline{JR}$	1. Given
2. $\angle KLG \cong \angle JRG$	2. Definition of Perpendicular Lines
3. $\angle G \cong \angle G$	3. Reflexive Property of Congruence
4. $\Delta KLG \cong \Delta JRG$	4. Angle-Angle-Side

Answer Key

Proof Case #8

Given: $\overline{BF} \perp \overline{AC}$
$\overline{DE} \perp \overline{AC}$
$\overline{AB} \cong \overline{DC}$
$\overline{AE} \cong \overline{CF}$



Prove: $\Delta AFB \cong \Delta CED$

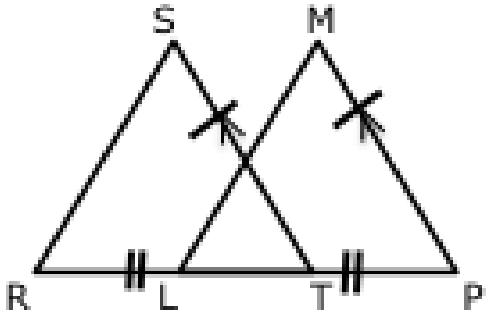
Statements	Reasons
1. $\overline{BF} \perp \overline{AC}$ $\overline{DE} \perp \overline{AC}$ $\overline{AB} \cong \overline{DC}$ $\overline{AE} \cong \overline{CF}$	1. Given
2. $\overline{AF} + \overline{FE} = \overline{AE}$	2. Segment Addition Property
3. $\overline{FE} + \overline{CE} = \overline{CF}$	3. Substitution Property
4. $\overline{AF} + \overline{FE} = \overline{FE} + \overline{CE}$	4. Subtraction Property of Equality
5. $\overline{AF} \cong \overline{CE}$	5. Hypotenuse-Leg
6. $\Delta AFB \cong \Delta CED$	

Answer Key

Proof Case #9

Given: $\overline{ST} \cong \overline{MP}$
$\overline{ST} \parallel \overline{MP}$
$\overline{RT} \cong \overline{LP}$

Prove: $\overline{RS} \parallel \overline{LM}$



Statements	Reasons
1. $\overline{ST} \cong \overline{MP}$, $\overline{ST} \parallel \overline{MP}$, $\overline{RT} \cong \overline{LP}$	1. Given
2. $\angle MPL \cong \angle STR$	2. Corresponding Angles
3. $\Delta RST \cong \Delta LMP$	3. Side-Angle-Side
4. $\angle SRT \cong \angle MLP$	4. CPCTC
5. $\overline{RS} \parallel \overline{LM}$	5. Converse of Corresponding Angles

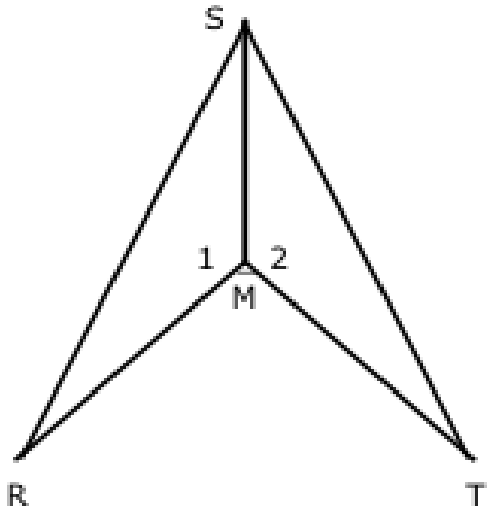
Answer Key

Proof Case #10

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

$\overline{RM} \cong \overline{TM}$

Prove: $\overline{SM}$ bisects $\angle RST$



Statements	Reasons
1. $\angle 1 \cong \angle 2$ $\overline{RM} \cong \overline{TM}$	1. Given
2. $\overline{SM} \cong \overline{SM}$	2. Reflexive Property
3. $\Delta RSM \cong \Delta TSM$	3. Side-Angle-Side
4. $\angle RSM \cong \angle TSM$	4. CPCTC
5. $\overline{SM}$ bisects $\angle RST$	5. Definition of Angle Bisector