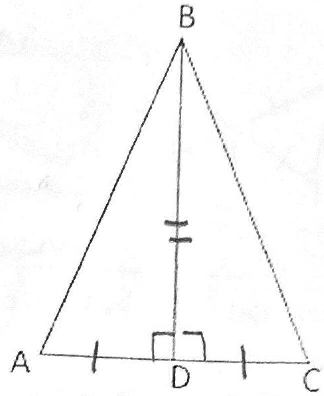
Honors Math 2

Proofs

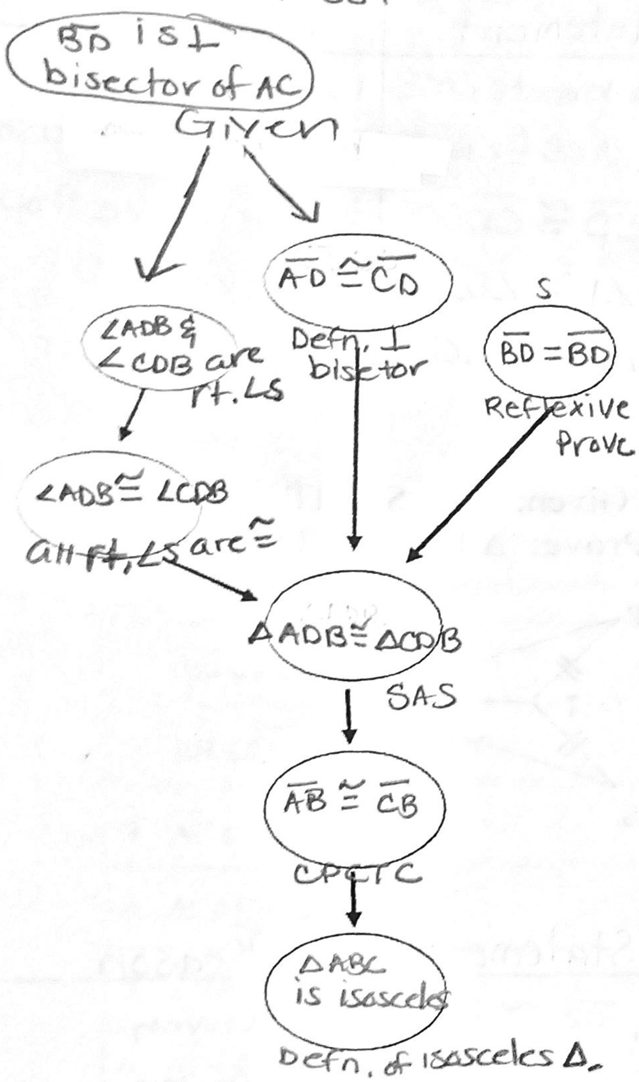
Key

Given: $\overline{BD}$ is a perpendicular bisector of $\overline{AC}$.

Prove: $\Delta$ABC isosceles.




Flow Proof

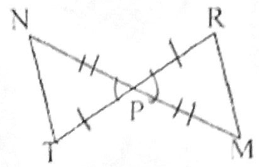



Two-Column Proof

| Statement | Reason |
|---|---|
| 1. $\overline{BD}$ is a ⊥ bisector of $\overline{AC}$ | 1. Given |
| 2. $\overline{AD} \cong \overline{CD}$, ∠ADB & ∠CDB are right ∠s | 2. Defn. of ⊥ bisector |
| 3. ∠ADB ≅ ∠CDB | 3. All right ∠s are ≅ |
| 4. $\overline{BD} \cong \overline{BD}$ | 4. Reflexive Prop. |
| 5. $\Delta$ ADB ≅ $\Delta$ CDB | 5. SAS |
| 6. $\overline{AB} \cong \overline{CB}$ | 6. CPCTC |
| 7. $\Delta$ABC is isosceles | 7. Defn. of isoseles triangle |

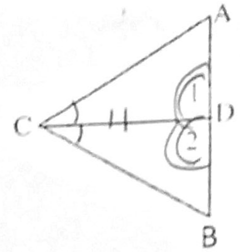
Paragraph Proof Since $\overline{BD}$ is a ⊥ bisector of $\overline{AC}$ then $\overline{AD} \cong \overline{CD}$ and ∠ADB and ∠CDB are right ∠s by definition. Since ∠ADB & ∠CDB are right angles they are congruent. Finally $\overline{BD}$ is congruent to itself by the reflexive property, Proving $\Delta$ ADB is congruent to $\Delta$CDB by SAS. This means the triangles corresponding parts are congruent, $\overline{AB}$ and $\overline{CB}$. So $\Delta$ABC has to be an isosceles $\Delta$ by definition.

1. Given: $\overline{TR}$ and $\overline{MN}$ bisect each other.
Prove: $\Delta NTP \cong \Delta MRP$ by SAS



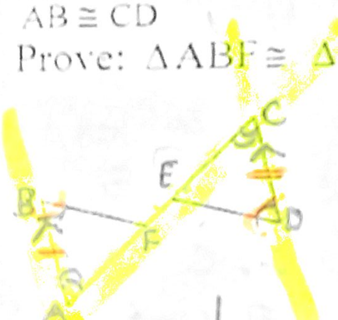

| Statement | Reason |
|---|---|
| 1. $\overline{TR}$ & $\overline{MN}$ bisect each other | 1. Given |
| 2. $\overline{NP} \cong \overline{MP}$, $\overline{TP} \cong \overline{RP}$ | 2. Defn. of segment bisectors |
| 3. $\angle NPT \cong \angle MPR$ | 3. Vertical $\angle$s are $\cong$ |
| 4. $\Delta NTP \cong \Delta MRP$ | 4. SAS |

2. Given: $\overline{CD}$ bisects $\angle ACB$; $\angle 1 \cong \angle 2$
Prove: $\Delta CDA \cong \Delta CDB$ by ASA



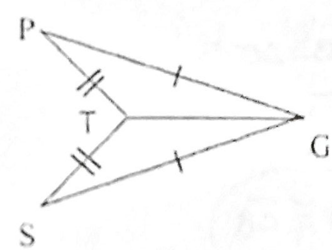

| Statement | Reason |
|---|---|
| 1. $\overline{CD}$ bisects $\angle ACB$ | 1. Given |
| 2. $\angle ACD \cong \angle BCD$ | 2. Defn. of $\angle$ bisector |
| 3. $\overline{CD} \cong \overline{CD}$ | 3. Reflexive Property |
| 4. $\angle 1 \cong \angle 2$ | 4. Given |
| 5. $\Delta CDA \cong \Delta CDB$ | 5. ASA |

3. Given: $\overline{AB} \parallel \overline{CD}$, $\angle B \cong \angle D$,
$\overline{AB} \cong \overline{CD}$
Prove: $\Delta ABE \cong \Delta CED$ by ASA




| Statement | Reason |
|---|---|
| 1. $\angle B \cong \angle D$ | 1. Given |
| 2. $\overline{AB} \cong \overline{CD}$ | 2. Given |
| 3. $\overline{AB} \parallel \overline{CD}$ | 3. Given |
| 4. $\angle A \cong \angle C$ | 4. If $\parallel$ lines are cut by a transversal, then alternate interior angles are $\cong$. |
| 5. $\Delta ABE \cong \Delta CED$ | 5. ASA |

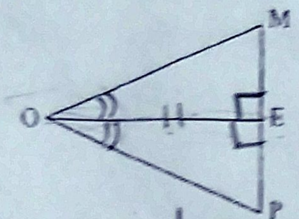
4. Given: $\overline{PG} \cong \overline{SG}$, $\overline{TP} \cong \overline{TS}$
Prove: $\Delta TPG \cong \Delta TSG$




| Statement | Reason |
|---|---|
| 1. $\overline{PG} \cong \overline{SG}$ | 1. Given |
| 2. $\overline{TP} \cong \overline{TS}$ | 2. Given |
| 3. $\overline{TG} \cong \overline{TG}$ | 3. Reflexive Prop. |
| 4. $\Delta TPG \cong \Delta TSG$ | 4. SSS |

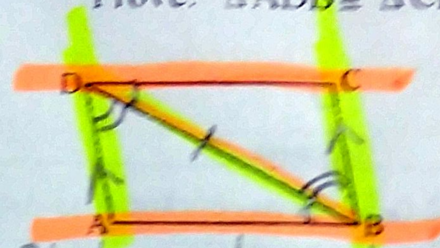
5. Given: $\overline{OE} \perp \overline{MP}$, $\overline{OE}$ bisects $\angle MOP$
Prove: $\Delta MOE \cong \Delta POE$

by ASA




| Statement | Reason |
|---|---|
| 1. $\overline{OE} \perp \overline{MP}$ | 1. Given |
| 2. $\angle MEO$ & $\angle PEO$ are right $\angle$s | 2. Defn. of $\perp$ |
| A 3. $\angle MEO \cong \angle PEO$ | 3. All right $\angle$s are $\cong$ |
| S 4. $\overline{OE} \cong \overline{OE}$ | 4. Reflexive Prop. |
| 5. $\overline{OE}$ bisects $\angle MOP$ | 5. Given |
| A 6. $\angle MOE \cong \angle POE$ | 6. Defn. $\angle$ bisector |
| 7. $\Delta MOE \cong \Delta POE$ | 7. ASA |

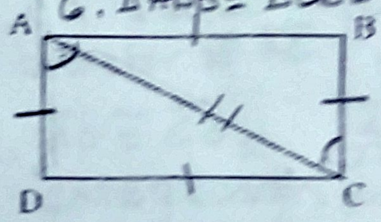
6. Given: $\overline{AD} \parallel \overline{CB}$, $\overline{DC} \parallel \overline{BA}$
Prove: $\Delta ADB \cong \Delta CBD$




| Statement | Reason |
|---|---|
| 1. $\overline{DC} \parallel \overline{AB}$ | 1. Given |
| 2. $\angle CDB \cong \angle ABD$ | 2. If $\parallel$ lines are cut by a transversal then, alternate interior angles are $\cong$ |
| 3. $\overline{DB} \cong \overline{BD}$ | 3. reflexive prop. |
| 4. $\overline{AD} \parallel \overline{CB}$ | 4. Given |
| 5. $\angle ADB \cong \angle CBD$ | 5. alt. int. $\angle$s $\cong$ |
| 6. $\Delta ADB \cong \Delta CBD$ | 6. ASA |

7. Given $\overline{AD} \cong \overline{BC}$
$\overline{AB} \cong \overline{DC}$

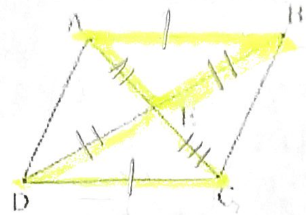
Prove: $\overline{AD} \parallel \overline{BC}$




| Statement | Reason |
|---|---|
| 1. $\overline{AD} \cong \overline{BC}$ | 1. Given |
| 2. $\overline{AB} \cong \overline{DC}$ | 2. Given |
| 3. $\overline{AC} \cong \overline{AC}$ | 3. Reflexive Property |
| 4. $\Delta CAD \cong \Delta ACB$ | 4. SSS |
| 5. $\angle DAC \cong \angle BCA$ | 5. CPCTC |
| 6. $\overline{AD} \parallel \overline{BC}$ | 6. If alternate interior $\angle$s are congruent then lines are $\parallel$. |

8. Given: ABCD is a parallelogram

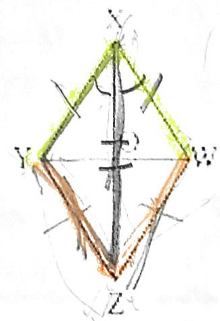
Prove: $\triangle ABE \cong \triangle CDE$




| Statement | Reason |
|---|---|
| 1. ABCD is a parallelogram | 1. Given |
| 2. $\overline{AB} \cong \overline{CD}$ | 2. In a parallelogram, opposite sides are congruent. |
| 3. $\overline{DE} \cong \overline{BE}$ | 3. In a parallelogram, diagonals bisect each other. |
| 4. $\overline{AE} \cong \overline{CE}$ | 4. In a parallelogram, diagonals bisect each other. |
| 5. $\triangle ABE \cong \triangle CDE$ | 5. Side-Side-Side congruence |

9. Given: $\overline{YX} \cong \overline{WX}$
$\overline{ZX}$ bisects $\angle YXW$

Prove: $\overline{YZ} \cong \overline{WZ}$




| | Statement | Reason |
|---|---|---|
| S | 1. $\overline{YX} \cong \overline{WX}$ | 1. Given |
| | 2. $\overline{ZX}$ bisects $\angle YXW$ | 2. Given |
| A | 3. $\angle YXZ \cong \angle WXZ$ | 3. Defn. $\angle$ bisector |
| S | 4. $\overline{XZ} \cong \overline{XZ}$ | 4. Reflexive Property |
| | 5. $\triangle YXZ \cong \triangle WXZ$ | 5. SAS |
| | 6. $\overline{YZ} \cong \overline{WZ}$ | 6. CPCTC |

$\Delta YZW$