Geometry (H)
Section 4.2 – Proving Triangles Congruent

<u>Ways to prove triangles congruent</u>:

1. **Side-Side-Side (SSS)** – If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent.

2. **Side-Angle-Side (SAS)** – If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.

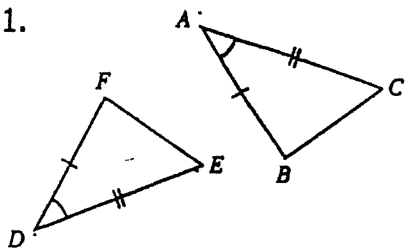
3. **Angle-Side-Angle (ASA)** – If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.

4. **Angle-Angle-Side (AAS)** – If two angles and a non-included side of one triangle are congruent to the corresponding parts of another triangle, then the triangles are congruent.

Geometry (H)
Identifying the triangle congruence postulates

Write a congruence statement between each pair of triangle and state the postulate applied. If you cannot apply a postulate, write *no conclusion possible.*

1.



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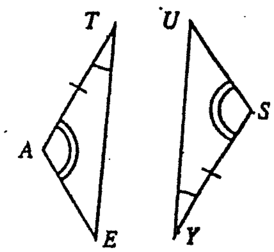

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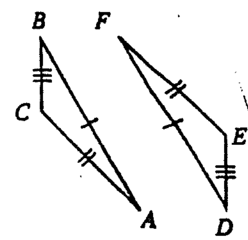

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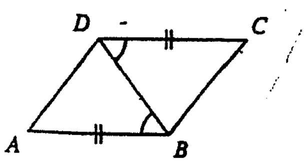

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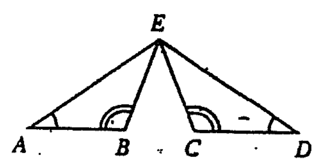

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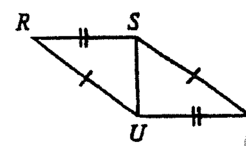

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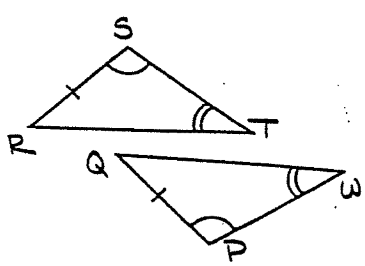

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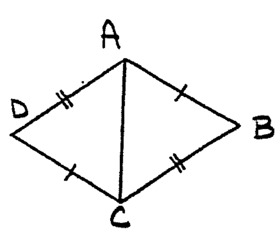

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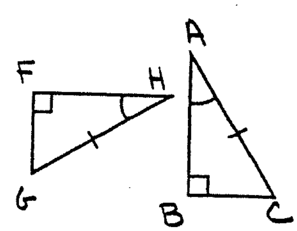
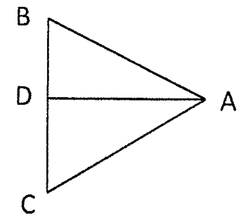


Geometry (H)

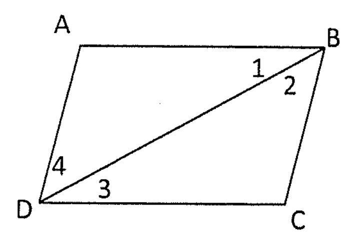
Sect 4.2 – Proving Triangles Congruent - Proofs

Directions: Write a flow proof for each.

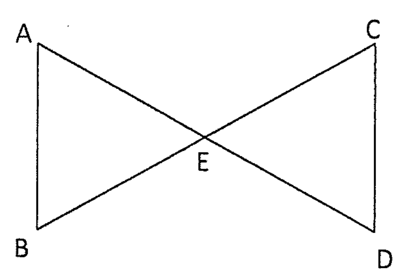
1. Given: $\overline{AB} \cong \overline{AC}$; D is the midpoint of $\overline{BC}$
   Prove: $\Delta ABD \cong \Delta ACD$



2. Given: $\overline{AB} \parallel \overline{DC}$; $\overline{AD} \parallel \overline{BC}$
   Prove: $\Delta ADB \cong \Delta CBD$

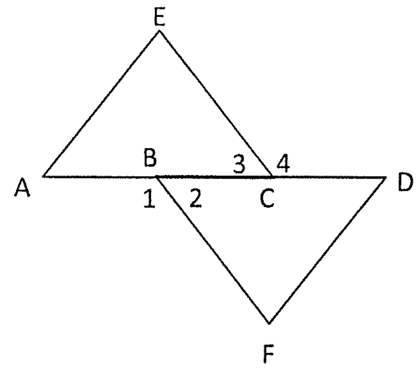


3. Given: $\overline{AB} \parallel \overline{CD}$; E is the midpoint of $\overline{AD}$
   Prove: $\Delta AEB \cong \Delta DEC$



4. Given: $\angle 1 \cong \angle 4$; $\overline{AB} \cong \overline{CD}$; $\overline{EC} \cong \overline{FB}$

Prove: $\Delta AEC \cong \Delta DFB$



5. Write a proof for the following statement. Provide a given, prove, diagram and flow proof.

In an isosceles triangle, if a segment is drawn from the vertex of the angle between the congruent sides to the midpoint of the opposite side, then congruent triangles are formed.

Given:

Diagram:

Prove:

Geometry (H)
Sect. 4.2 - Homework

Name: ____________________

Decide whether you can deduce by the SSS, SAS or ASA postulate that another triangle is congruent to △ABC. If so, write the congruence statement and name the postulate used.

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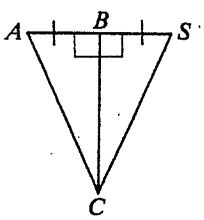

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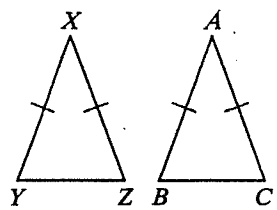

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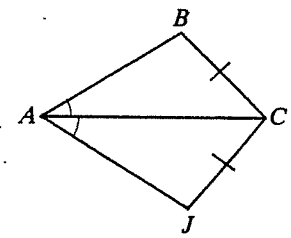

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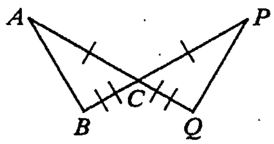

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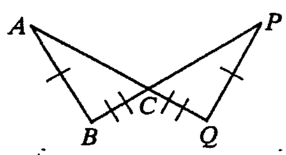

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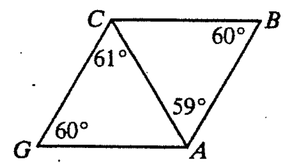

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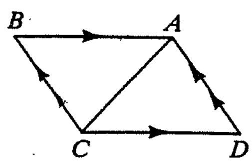

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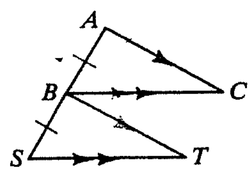

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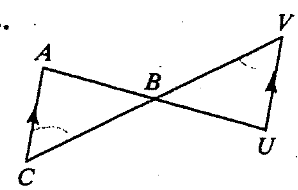

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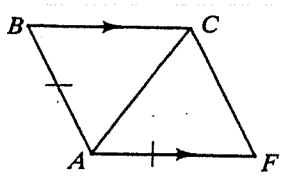

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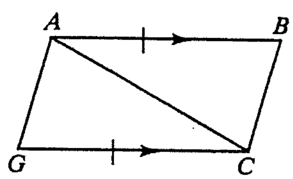

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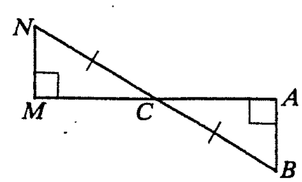
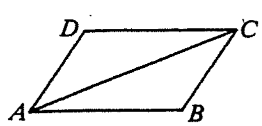


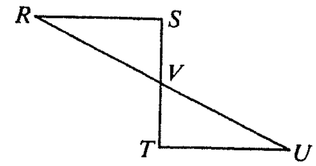
16. Supply the missing reasons.
Given: $\overline{AB} \parallel \overline{DC}$; $\overline{AB} \cong \overline{DC}$
Prove: $\triangle ABC \cong \triangle CDA$



Proof:

Statements	Reasons
1. $\overline{AB} \cong \overline{DC}$	1. ___?___
2. $\overline{AC} \cong \overline{AC}$	2. ___?___
3. $\overline{AB} \parallel \overline{DC}$	3. ___?___
4. $\angle BAC \cong \angle DCA$	4. ___?___
5. $\triangle ABC \cong \triangle CDA$	5. ___?___

17. Supply the missing statements and reasons.
Given: $\overline{RS} \perp \overline{ST}$; $\overline{TU} \perp \overline{ST}$;
V is the midpoint of $\overline{ST}$.
Prove: $\triangle RSV \cong \triangle UTV$



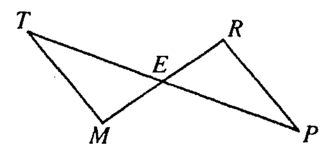
Proof:

Statements	Reasons
1. $\overline{RS} \perp \overline{ST}$; $\overline{TU} \perp \overline{ST}$	1. ?
2. $m\angle S = 90$; $m\angle$? $= 90$	2. ?
3. $\angle S \cong \angle T$	3. ?
4. V is the midpoint of $\overline{ST}$.	4. ?
5. $\overline{SV} \cong$?	5. ?
6. $\angle RVS \cong \angle$?	6. ?
7. $\triangle$? $\cong \triangle$?	7. ?

Write proofs in ~~two-column~~ flow form.

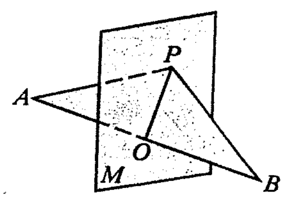
B **18.** Given: $\overline{TM} \cong \overline{PR}$; $\overline{TM} \parallel \overline{RP}$
Prove: $\triangle TEM \cong \triangle PER$

19. Given: E is the midpoint of $\overline{TP}$;
E is the midpoint of $\overline{MR}$.
Prove: $\triangle TEM \cong \triangle PER$



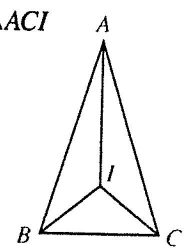
20. Given: Plane M bisects $\overline{AB}$; $\overline{PA} \cong \overline{PB}$
Prove: $\triangle POA \cong \triangle POB$

21. Given: Plane M bisects $\overline{AB}$; $\overline{PO} \perp \overline{AB}$
Prove: $\triangle POA \cong \triangle POB$

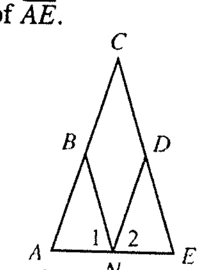


Write a ~~two-column~~ flow proof for each exercise.

19. Given: $\overline{AI}$ bisects $\angle BAC$.
$\overline{AB} \cong \overline{AC}$
Prove: $\triangle ABI \cong \triangle ACI$



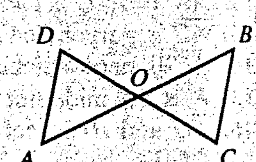
20. Given: $\angle 1 \cong \angle 2$, $\angle A \cong \angle E$
N is the midpoint of $\overline{AE}$.
Prove: $\triangle ABN \cong \triangle EDN$



23. D is the midpoint of $\overline{BC}$. $AB = 9x + 3$, $BD = 9x - 2$, $AC = 15x - 3$, $CD = 4x + 3$ Show that $\triangle ABD \cong \triangle ACD$.

24. $\overline{AD}$ bisects $\angle BAC$. $m\angle BAD = 31 - x$, $m\angle CAD = 15 + 3x$, $AB = 3x + 4$, $AC = 7x - 12$ Show that $\triangle BDA \cong \triangle CDA$.

25. $m\angle AOD = 2x + 9$, $m\angle BOC = 3x + 5$, $AO = x^2 - 2$, $OB = 3x + 2$, $OC = 2x^2 - 17$, $DO = 5x - 5$ Show that $\overline{AB}$ and $\overline{CD}$ bisect each other.



C

26. Given: In figure $ABCD$, O bisects $\overline{AC}$ and $\overline{BD}$.
Prove: $\overline{AB} \parallel \overline{CD}$, $\overline{BC} \parallel \overline{AD}$