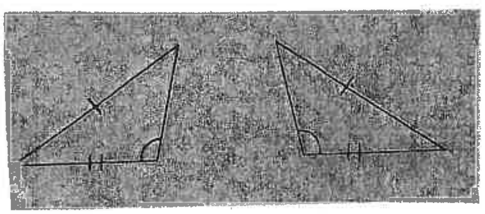
SAS Postulate

Two triangles are congruent if **two sides and the included angle** of one triangle are congruent respectively to two sides and the included angle of the other triangle.

Note: The angle must be included between the two congruent sides!!

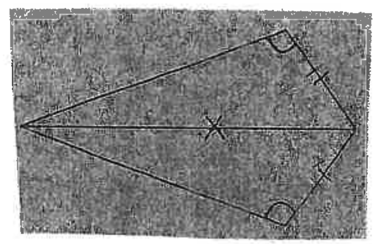
Examples: Is the given information sufficient to prove the triangles are congruent?

1.



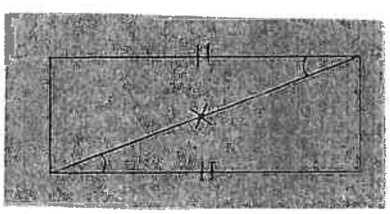
Not SAS

2.



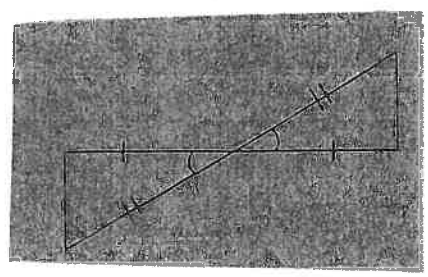
Not SAS

3.



YES SAS

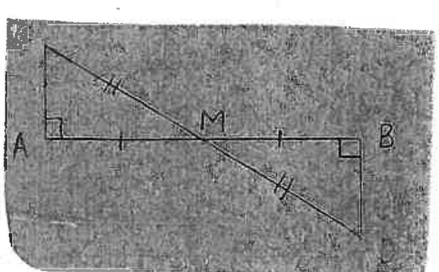
4.



Yes SAS

Name the pair of corresponding sides or pair of corresponding angles that would be needed in order to prove the triangles are congruent by SAS.

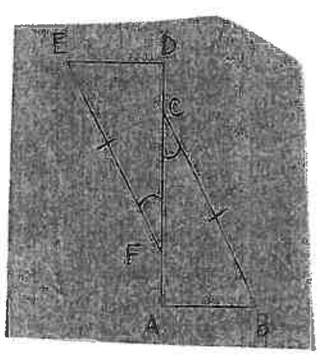
5.



either $\overline{CA} \cong \overline{DB}$

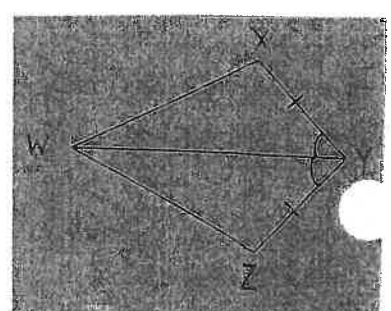
OR $\angle CMA \cong \angle DMB$

6.



$\overline{FD} \cong \overline{CA}$

7.

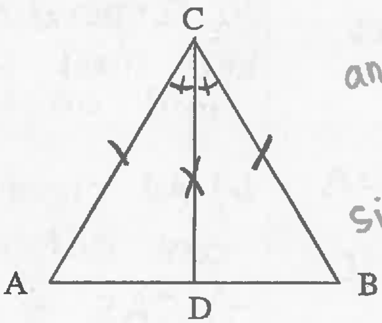


$\overline{WY} \cong \overline{WY}$

Proofs and the SAS Postulate

1. Given: $\overline{AC} \cong \overline{BC}$
   $\overline{CD}$ bisects $\angle ACB$

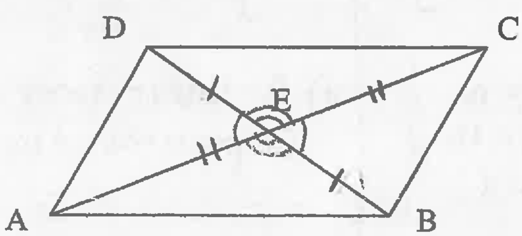
   Prove: $\Delta ACD \cong \Delta BCD$



Statements	Reasons
side 1) $\overline{AC} \cong \overline{BC}$	1) Given
2) $\overline{CD}$ bisects $\angle ACB$	2) Given
angle 3) $\angle ACD \cong \angle BCD$	3) A bisector divides a segment into 2 $\cong$ segments
side 4) $\overline{CD} \cong \overline{CD}$	4) Reflexive property
5) $\Delta ACD \cong \Delta BCD$	5) SAS $\cong$ SAS

2. Given: $\overline{DB}$ and $\overline{AC}$ bisect each other at E

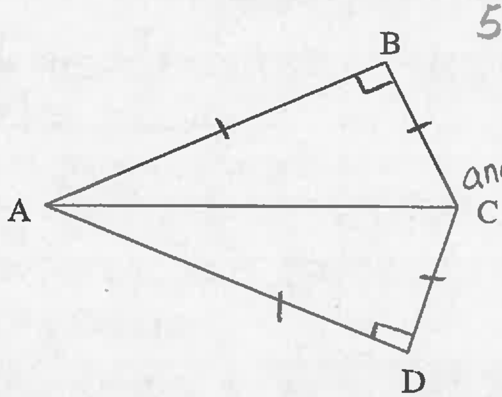
   Prove: $\Delta AEB \cong \Delta CED$



Statements	Reasons
1) $\overline{DB}$ and $\overline{AC}$ bisect each other at E	1) Given
sides 2) $\overline{DE} \cong \overline{EB}$ $\overline{AE} \cong \overline{EC}$	2) A bisector divides a segment into 2 congruent segments
angle 3) $\angle DEC \cong \angle AEB$	3) All vertical angles are $\cong$
4) $\Delta AEB \cong \Delta CED$	4) SAS $\cong$ SAS

3. Given: $\overline{AB} \perp \overline{BC}$
$\overline{AD} \perp \overline{DC}$
$\overline{AB} \cong \overline{AD}$
$\overline{BC} \cong \overline{DC}$

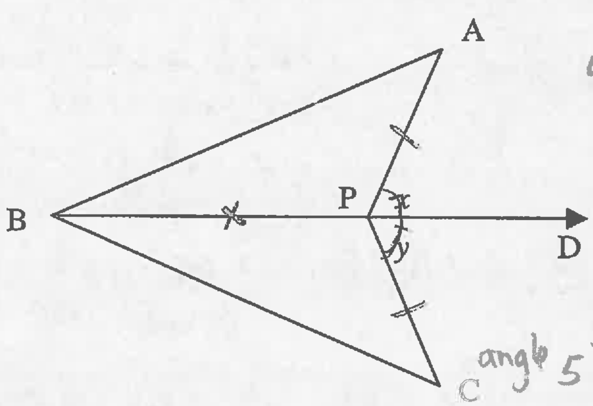
Prove: $\Delta ABC \cong \Delta ADC$



Statements	Reasons
1) $\overline{AB} \perp \overline{BC}$	1) given
2) $\overline{AD} \perp \overline{DC}$	2) given
side 3) $\overline{AB} \cong \overline{AD}$	3) given
side 4) $\overline{BC} \cong \overline{DC}$	4) given
5) $\angle ABC$ and $\angle CDA$ are right angles	5) Perpendicular lines meet to form right angles
angle 6) $\angle ABC \cong \angle CDA$	6) All right angles are congruent
7) $\Delta ABC \cong \Delta ADC$	7) SAS $\cong$ SAS

4. Given: $\overline{AP} \cong \overline{CP}$
$\angle x \cong \angle y$
$\overline{BD}$ is a straight line

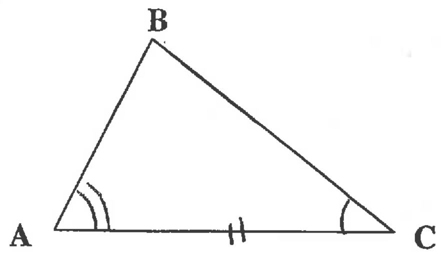
Prove: $\Delta BAP \cong \Delta BCP$



Statements	Reasons
side 1) $\overline{AP} \cong \overline{CP}$	1) given
angle 2) $\angle x \cong \angle y$	2) given
3) $\overline{BD}$ is a straight line	3) given
4) $\angle APB$ is a supplementary angle to $\angle x$ $\angle CPB$ is a supplementary angle to $\angle y$	4) A linear pair form supplementary angles
angle 5) $\angle APB \cong \angle CPB$	5) Supplements of $\cong$ angles are $\cong$
side 6) $\overline{BP} \cong \overline{BP}$	6) Reflexive
7) $\Delta BAP \cong \Delta BCP$	7) SAS $\cong$ SAS

ASA Postulate

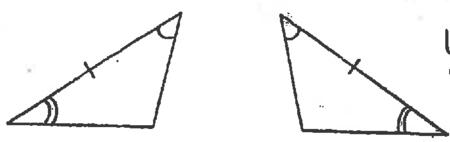
Two triangles are congruent if **two angles and the included side** of one triangle are congruent respectively to two angles and the included side of the other triangle.



Note: The side must be included between the two congruent angles!!

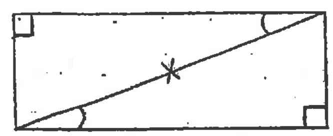
Examples: Is the given information sufficient to prove the triangles are congruent by ASA?

1.



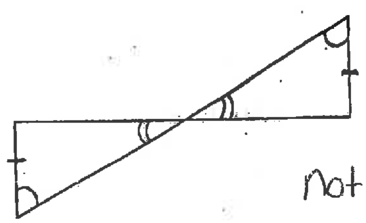
Yes ASA

2.



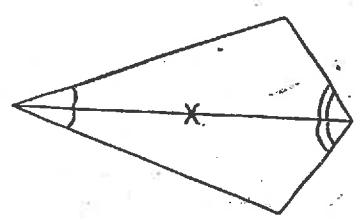
Not ASA

3.



Not ASA

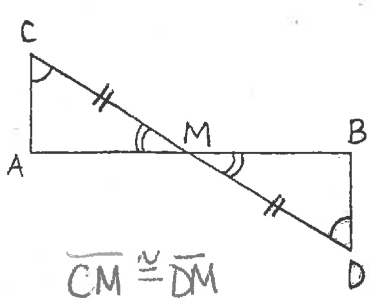
4.



Yes ASA

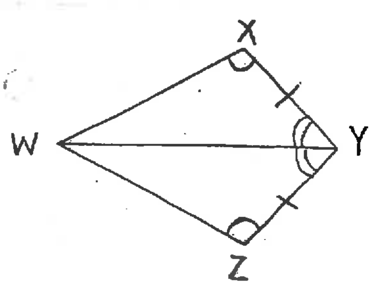
Name the pair of corresponding sides or pair of corresponding angles that would be needed in order to prove the triangles are congruent by ASA.

5.



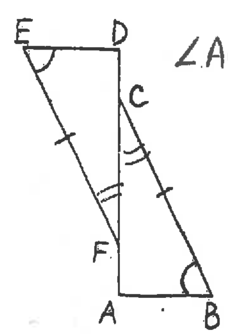
$\overline{CM} \cong \overline{DM}$

6.



$\overline{XY} \cong \overline{ZY}$

7.

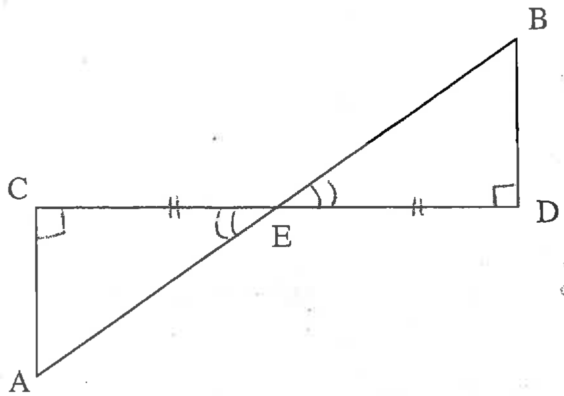


$\angle ACB \cong \angle DF$

Proofs:

1. Given: $\overline{BA}$ bisects $\overline{CD}$
$\overline{AC} \perp \overline{CD}$
$\overline{BD} \perp \overline{CD}$

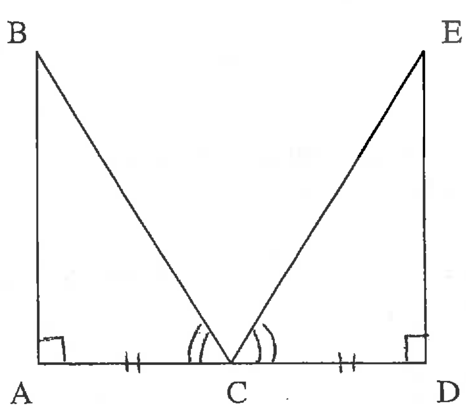
Prove: $\Delta ACE \cong \Delta BDE$



Statements	Reasons
1. $\overline{BA}$ bisects $\overline{CD}$	1. Given
2. $\overline{CE} \cong \overline{DE}$	2. A bisector cuts a segment into 2 $\cong$ segments.
3. $\overline{AC} \perp \overline{CD}$, $\overline{BD} \perp \overline{CD}$	3. Given
4. $\angle C$ & $\angle D$ are right $\angle$'s	4. $\perp$ lines meet to form right $\angle$'s
5. $\angle C \cong \angle D$	5. All right $\angle$'s are $\cong$.
6. $\angle CEA \cong \angle DEB$	6. Vertical $\angle$'s are $\cong$
7. $\Delta ACE \cong \Delta BDE$	7. ASA $\cong$ ASA

2. Given: C is the midpoint of $\overline{AD}$
$\overline{BA} \perp \overline{AD}$, $\overline{ED} \perp \overline{DA}$
$\angle BCA \cong \angle ECD$

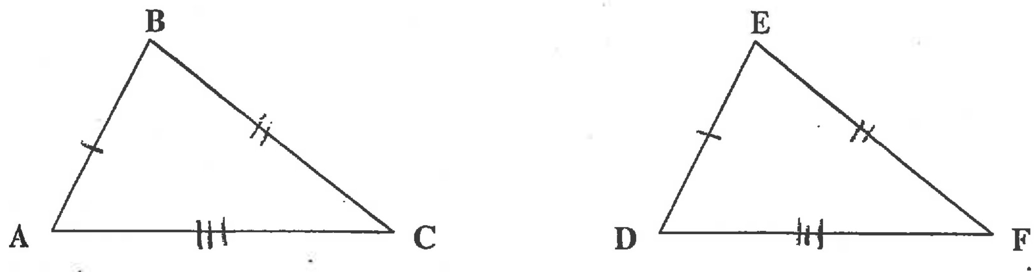
Prove: $\Delta BAC \cong \Delta EDC$



Statements	Reasons
1. C is the midpoint of $\overline{AD}$	1. Given
2. $\overline{AC} \cong \overline{DC}$	2. A midpoint cuts a segment into 2 $\cong$ segments
3. $\angle BCA \cong \angle ECD$	3. Given
4. $\overline{BA} \perp \overline{AD}$, $\overline{ED} \perp \overline{DA}$	4. Given
5. $\angle A$ & $\angle D$ are right $\angle$'s	5. $\perp$ lines meet to form right $\angle$'s
6. $\angle A \cong \angle D$	6. All right $\angle$'s are $\cong$
7. $\Delta BAC \cong \Delta EDC$	7. ASA $\cong$ ASA

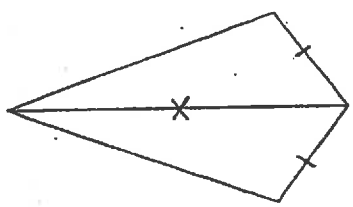
SSS Postulate

Two triangles are congruent if **the three sides** of one triangle are congruent respectively to the three sides of the other triangle.



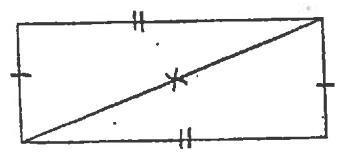
Examples: Is the given information sufficient to prove the triangles are congruent by SSS?

1.



Not SSS

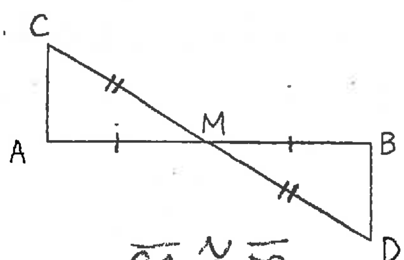
2.



yes SSS

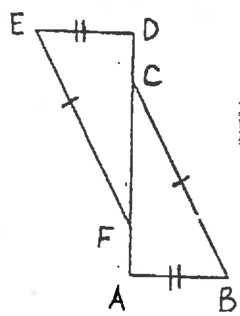
Name the pair of corresponding sides or pair of corresponding angles that would be needed in order to prove the triangles are congruent by ASA.

3.



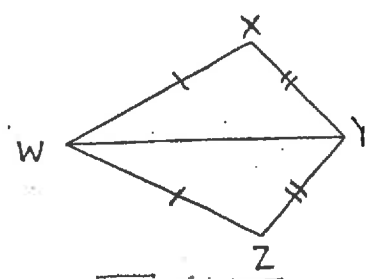
$\overline{CA} \cong \overline{DB}$

4.



$\overline{DF} \cong \overline{AC}$

5.

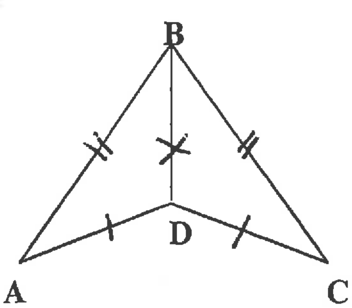


$\overline{WY} \cong \overline{WY}$

Proofs:

1. Given: $\overline{AB} \cong \overline{CB}$
   $\overline{AD} \cong \overline{CD}$

   Prove: $\Delta ABD \cong \Delta CBD$

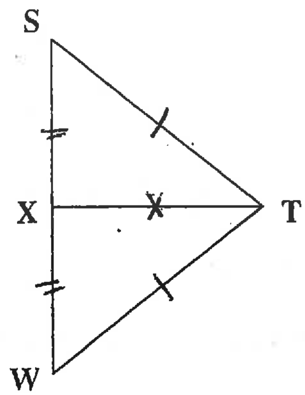


	Statements	Reasons
S	1. $\overline{AB} \cong \overline{CB}$	1 Given
S	2. $\overline{AD} \cong \overline{CD}$	2. Given
S	3. $\overline{BD} \cong \overline{BD}$	3. Reflexive Postulate
	4. $\Delta ABD \cong \Delta CBD$	4. SSS $\cong$ SSS

2. Given: x is the midpoint of $\overline{SW}$

$\overline{ST} \cong \overline{WT}$

Prove: $\Delta STX \cong \Delta WTX$

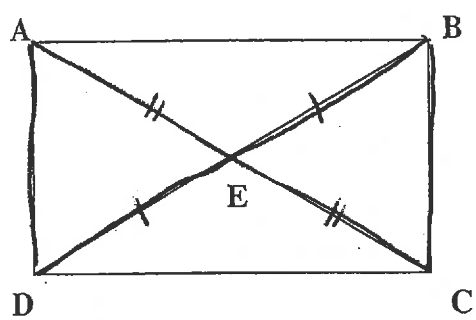


Statements	Reasons
1. $\overline{ST} \cong \overline{WT}$	1. Given
2. X is the midpt of $\overline{SW}$	2. Given
3. $\overline{SX} \cong \overline{WX}$	3. A midpoint cuts a segment into 2 $\cong$ segments.
4. $\overline{XT} \cong \overline{XT}$	4. Reflexive Postulate
5. $\Delta SXT \cong \Delta WXT$	5. SSS $\cong$ SSS

3. Given: $\overline{AC}$ and $\overline{BD}$ bisect each other at E

$\overline{AD} \cong \overline{BC}$

Prove: $\Delta AED \cong \Delta BEC$



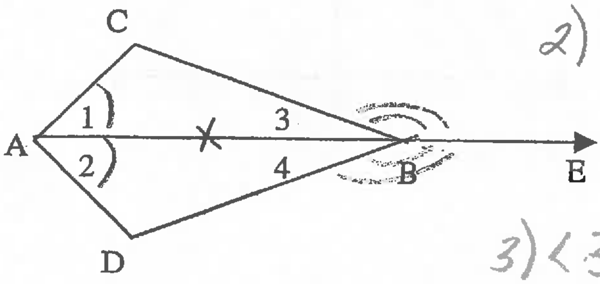
Statements	Reasons
1. $\overline{AC}$ and $\overline{BD}$ bisect each other at E	1. Given
2. $\overline{AE} \cong \overline{CE}$ $\overline{BE} \cong \overline{DE}$	2. A bisector cuts a segment into 2 $\cong$ segments
3. $\overline{AD} \cong \overline{BC}$	3. Given
4. $\Delta AED \cong \Delta BEC$	4. SSS $\cong$ SSS

★ Note: You could also do this proof by SAS if you used vertical ∡'s.

Proof Practice

1. Given: $\overleftrightarrow{ABE}$
   $\overleftrightarrow{ABE}$ bisects $\angle CAD$
   $\angle CBE \cong \angle DBE$

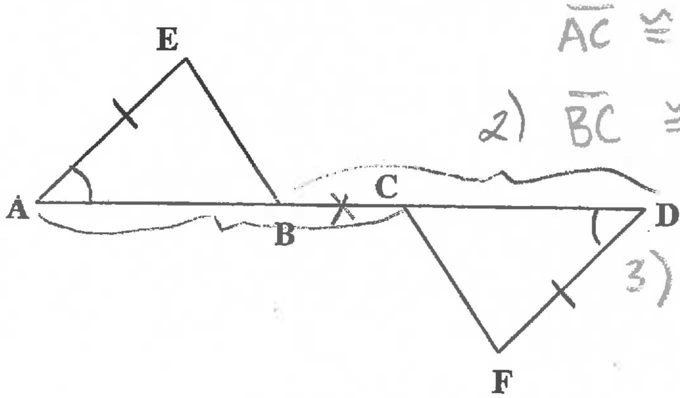
   Prove: $\Delta ACB \cong \Delta ADB$



Statements	Reasons
1) $\overline{ABE}$ bisects $\angle CAD$, $\angle CBE \cong \angle DBE$	1) given
2) $\angle 1 \cong \angle 2$	2) A bisector cuts a segment into 2 $\cong$ segments
3) $\angle 3$ and $\angle CBE$ are supp, $\angle 4$ and $\angle DBE$ are sup	3) If 2 $\angle$s form a linear pair they are sup
4) $\angle 3 \cong \angle 4$	4) Supplements of $\cong$ $\angle$s are $\cong$
5) $\overline{AB} \cong \overline{AB}$	5) Reflexive
6) $\Delta ACB \cong \Delta ADB$	6) ASA $\cong$ ASA

2. Given: $\angle A \cong \angle D$
   $\overline{AE} \cong \overline{DF}$
   $\overline{AC} \cong \overline{DB}$

   Prove: $\Delta AEB \cong \Delta DFC$

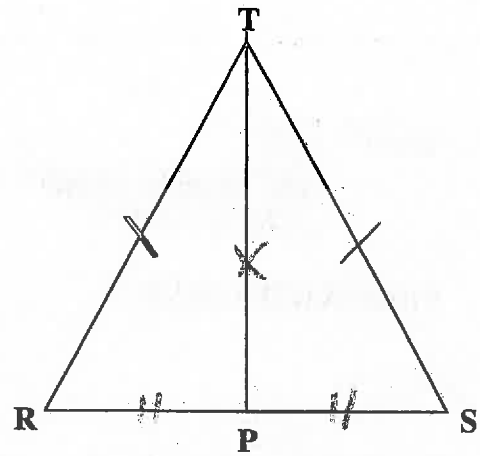


Statements	Reasons
1) $\angle A \cong \angle D$, $\overline{AE} \cong \overline{DF}$, $\overline{AC} \cong \overline{DB}$	1) given
2) $\overline{BC} \cong \overline{BC}$	2) Reflexive
3) $\overline{AB} \cong \overline{CD}$	3) subtraction
4) $\Delta AEB \cong \Delta DFC$	4) SAS $\cong$ SAS

3. Given: Isosceles ΔRST with $\overline{RT} \cong \overline{ST}$

$\overline{TP}$ is a median to base $\overline{RS}$

Prove: $\Delta RTP \cong \Delta STP$

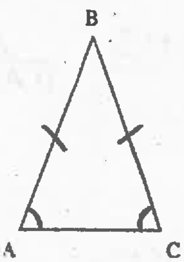


Statements	Reasons
1) $\overline{RT} \cong \overline{ST}$ $\overline{TP}$ median to base $\overline{RS}$	1) given
2) P is the midpt of $\overline{RS}$	2) Median gives us midpt
3) $\overline{RP} \cong \overline{PS}$	3) A midpt divides a segment into 2 $\cong$ segments
4) $\overline{TP} \cong \overline{TP}$	4) Reflexive
5) $\Delta RTP \cong \Delta STP$	5) SSS $\cong$ SSS

Isosceles and Equilateral Triangles

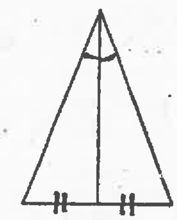
Properties of an Isosceles Δ

1. If two sides of an isosceles Δ are congruent, then the angles opposite those sides are congruent. (Base $\angle$'s of an isosceles Δ are congruent.)

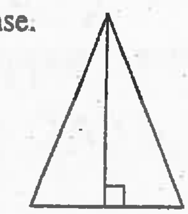


Since $\overline{AB} \cong \overline{BC}$, then $\angle A \cong \angle C$.

2. The bisector of a vertex angle of an isosceles triangle *bisects the base*.



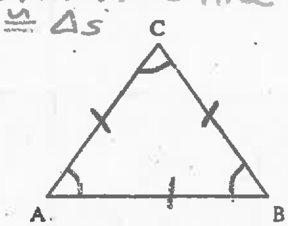
3. The bisector of the vertex angle of an isosceles triangle is *perpendicular* to the base.



* For any isosceles Δ, the altitude, the median, and the angle bisector drawn from the vertex angle to the opposite side are the same line segment. This line segment seperates the Δ into 2 $\cong$ Δs

Properties of an Equilateral Triangle

1. Every equilateral triangle is *equiangular*.



$\angle A \cong \angle B \cong \angle C$

Proof: If ΔABC is equilateral, then $\overline{AB} \cong \overline{BC} \cong \overline{CA}$

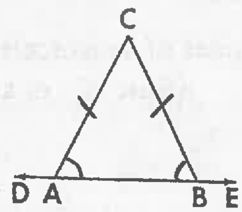
By isosceles Δ thm, since $\overline{AB} \cong \overline{BC}$, $\angle A \cong \angle C$

and since $\overline{BC} \cong \overline{CA}$, $\angle B \cong \angle A$

Therefore $\angle A \cong \angle B \cong \angle C$ (Transitive)

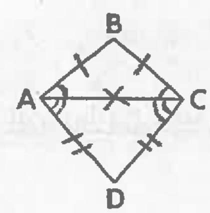
Proofs Involving Isosceles Triangles

Given: $\triangle ABC$ with $\overline{CA} \cong \overline{CB}$ and $\overleftrightarrow{DABE}$.
Prove: $\angle CAD \cong \angle CBE$.



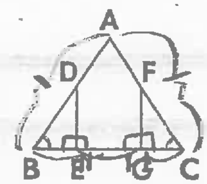
Statements	Reasons
1) ΔABC, $\overline{CA} \cong \overline{CB}$ and $\overleftrightarrow{DABE}$	1) given
2) Δ ABC is an isosceles Δ	2) An isosceles Δ has 2 $\cong$ sides.
3) $\angle CAB \cong \angle CBA$	3) Base angles of an isosceles Δ are congruent.
4) $\angle CAB$ and $\angle CAD$ are supplementary and $\angle CBA$ and $\angle CBE$ are supplementary	4) If 2 angles form a linear pair, then they are supplementary
5) $\angle CAD \cong \angle CBE$	5) Supplements of congruent angles are congruent.

2. *Given:* Isosceles triangles *ABC* and *ADC* have the common base $\overline{AC}$.
Prove: $\angle BAD \cong \angle BCD$.



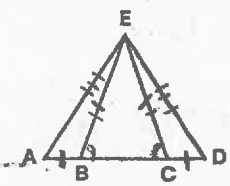
Statements	Reasons
1) ΔABC and ΔADC are isosceles Δs and have a common base $\overline{AC}$	1) Given
2) $\angle BAC \cong \angle BCA$ and $\angle DAC \cong \angle DCA$	2) Base angles of an isosceles Δ are congruent
3) $\angle BAC + \angle DAC \cong \angle BCA + \angle DCA$	3) Addition
4) $\angle BAD = \angle BAC + \angle DAC$, $\angle BCD = \angle BCA + \angle DCA$	4) Partition
5) $\angle BAD \cong \angle BCD$	5) Substitution

3. In $\triangle ABC$, $\overline{AB} \cong \overline{AC}$, $\overline{DE} \perp \overline{BC}$, $\overline{FG} \perp \overline{BC}$, and $\overline{BG} \cong \overline{CE}$. Prove that $\overline{BD} \cong \overline{CF}$.



Statements	Reasons
1) $\overline{AB} \cong \overline{AC}$, $\overline{BG} \cong \overline{CE}$, $\overline{DE} \perp \overline{BC}$, $\overline{FG} \perp \overline{BC}$	1) given
2) $\triangle ABC$ is an isosceles $\triangle$	2) An isosceles $\triangle$ has 2 $\cong$ sides
3) $\angle B \cong \angle C$	3) Base angles of an isosceles $\triangle$ are $\cong$
4) $\angle DEB$ and $\angle FGC$ are right angles	4) $\perp$ lines meet to form right angles
5) $\angle DEB \cong \angle FGC$	5) All right angles are $\cong$
6) $\overline{EG} \cong \overline{EG}$	6) Reflexive
7) $\overline{BG} - \overline{EG} = \overline{CE} - \overline{EG}$	7) Subtraction
8) $\overline{BE} = \overline{BG} - \overline{EG}$ and $\overline{GC} = \overline{CE} - \overline{EG}$	8) Partition
9) $\overline{BE} \cong \overline{GC}$	9) substitution
10) $\triangle DEB \cong \triangle FGC$	10) ASA $\cong$ ASA
11) $\overline{BD} \cong \overline{CF}$	11) CPCTC

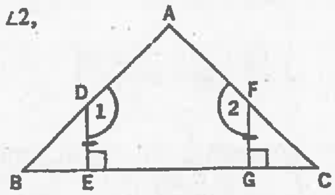
4. *Given:* $\overline{ABCD}$, $\overline{AB} \cong \overline{DC}$, $\angle EBC \cong \angle ECB$.
Prove: $\triangle EAD$ is an isosceles triangle.



Statements	Reasons
1) $\overline{ABCD}$, $\overline{AB} \cong \overline{DC}$, $\angle EBC \cong \angle ECB$	1) given
2) $\overline{EB} \cong \overline{EC}$	2) If 2 angles of a $\triangle$ are $\cong$ the sides opposite those angles are $\cong$
3) $\angle EBC$ and $\angle EBA$ are supp, $\angle ECB$ and $\angle ECD$ are supp	3) If 2 angles for a linear pair, then they are supplementary
4) $\angle EBA \cong \angle ECD$	4) Supplements of $\cong$ angles are $\cong$
5) $\triangle AEB \cong \triangle DEC$	5) SAS $\cong$ SAS
6) $\overline{AE} \cong \overline{DE}$	6) CPCTC
7) $\triangle AED$ is isosceles	7) An isoscles $\triangle$ has 2 $\cong$ sides

More Proofs Involving Isosceles Triangles

1. *Given:* $\overline{BEGC}$, $\overline{BDA}$, $\overline{AFC}$, $\overline{DE} \perp \overline{BC}$, $\overline{FG} \perp \overline{BC}$, $\angle 1 \cong \angle 2$, and $\overline{DE} \cong \overline{FG}$.
Prove: $\triangle ABC$ is isosceles.



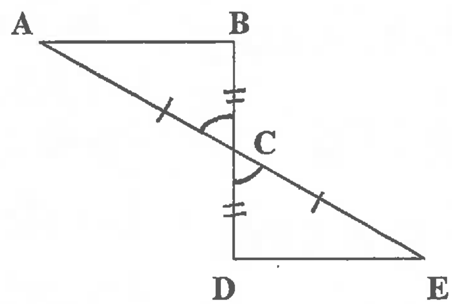
Statements	Reasons
1) $\overline{BEGC}$, $\overline{BDA}$, $\overline{AFC}$, $\overline{DE} \perp \overline{BC}$, $\overline{FG} \perp \overline{BC}$, $\angle 1 \cong \angle 2$, $\overline{DE} \cong \overline{FG}$	1) Given
2) $\angle DEB$ and $\angle FGC$ are right angles	2) $\perp$ lines meet to form right angle
3) $\angle DEB \cong \angle FGC$	3) All right angles are $\cong$
4) $\angle 1$ and $\angle EDB$ are supplemen, $\angle 2$ and $\angle GFC$ are supplementary	4) If 2 angles form a linear pair, then they are supplementary
5) $\angle EDB \cong \angle GFC$	5) Supplements of $\cong$ angles are $\cong$
6) $\triangle DBE \cong \triangle FCG$	6) ASA $\cong$ ASA
7) $\angle B \cong \angle C$	7) CPCTC
8) $\overline{AB} \cong \overline{AC}$	8) If 2 angles of a $\triangle$ are $\cong$ the sides opp those angles are $\cong$
9) $\triangle ABC$ is isosceles	9) An isosceles $\triangle$ has 2 $\cong$ sides

Corresponding Parts of Congruent Triangles

Remember: When any two triangles are congruent, their corresponding sides are congruent and their corresponding angles are congruent.

Examples:
A) Name 2 triangles that are congruent
B) State the reason why the triangles are congruent
C) Name 3 additional pairs of congruent parts

1.

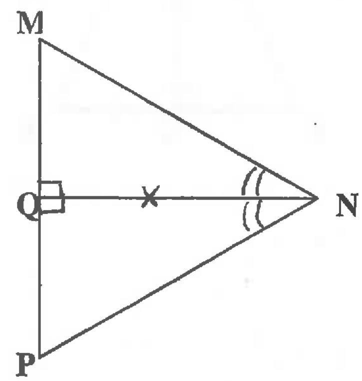


A) $\triangle ABC \cong \triangle EDC$

B) SAS ≅ SAS

C) $\angle B \cong \angle D$, $\angle A \cong \angle E$, $\overline{AB} \cong \overline{DE}$

2.



A) $\triangle QNM \cong \triangle QNP$

B) ASA ≅ ASA

C) $\angle M \cong \angle P$, $\overline{MN} \cong \overline{PN}$, $\overline{MQ} \cong \overline{QP}$

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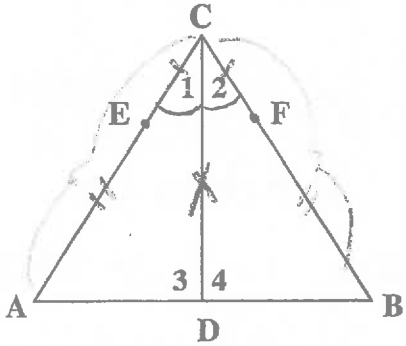
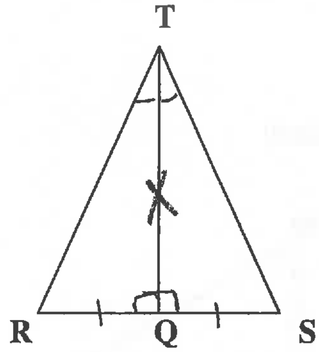
3. Given: $\angle 1 \cong \angle 2$
$\overline{CE} \cong \overline{CF}$
$\overline{EA} \cong \overline{FB}$

Prove: $\angle 3 \cong \angle 4$



Statements	Reasons
1) $\angle 1 \cong \angle 2$	1) given
2) $\overline{CE} \cong \overline{CF}$	2) given
3) $\overline{EA} \cong \overline{FB}$	3) given
4) $\overline{CE} + \overline{EA} = \overline{CF} + \overline{FB}$	4) addition
5) $\overline{CA} = \overline{CE} + \overline{EA}$ $\overline{CB} = \overline{CF} + \overline{FB}$	5) Partition
6) $\overline{CA} \cong \overline{CB}$	6) substitution
7) $\overline{CD} \cong \overline{CD}$	7) Reflexive
8) $\triangle ACD \cong \triangle BCD$	8) SAS ≅ SAS
9) $\angle 3 \cong \angle 4$	9) CPCTC

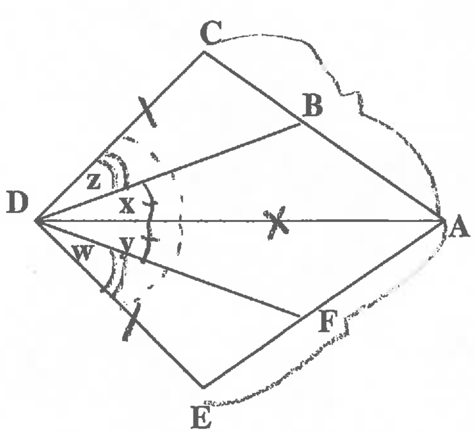
4. If $\overline{TQ}$ bisects $\angle RTS$ and $\overline{TQ} \perp \overline{RS}$, prove that $\overline{TQ}$ bisects $\overline{RS}$.



Statements	Reasons
1) $\overline{TQ}$ bisects $\angle RTS$	1) given
2) $\overline{TQ} \perp \overline{RS}$	2) given
3) $\angle RTQ \cong \angle STQ$	3) A bisector divides an angle into 2 $\cong$ angles
4) $\angle TQR$ and $\angle TQS$ are right angles	4) $\perp$ lines meet to form right angles
5) $\angle TQR \cong \angle TQS$	5) All right angles are $\cong$
6) $\overline{TQ} \cong \overline{TQ}$	6) Reflexive
7) $\triangle RTQ \cong \triangle STQ$	7) ASA $\cong$ ASA
8) $\overline{RQ} \cong \overline{QS}$	8) CPCTC
9) $\overline{TQ}$ bisects $\overline{RS}$	9) A bisector divides a segment into 2 $\cong$ segments

5. Given: $\overline{DC} \cong \overline{DE}$
$\angle x \cong \angle y$
$\angle z \cong \angle w$

Prove: $\overline{AE} \cong \overline{AC}$

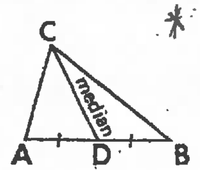


statements	reasons
1) $\overline{DC} \cong \overline{DE}$	1) given
2) $\angle x \cong \angle y$	2) given
3) $\angle z \cong \angle w$	3) given
4) $\angle z + \angle x \cong \angle w + \angle y$	4) addition
5) $\angle CDA = \angle z + \angle x$, $\angle EDA = \angle w + \angle y$	5) Partition
6) $\angle CDA \cong \angle EDA$	6) substitution
7) $\overline{AD} \cong \overline{AD}$	7) Reflexive
8) $\triangle CDA \cong \triangle EDA$	8) SAS $\cong$ SAS
9) $\overline{CA} \cong \overline{AE}$	9) CPCTC

Line Segments Associated With Triangles

Median of a Triangle: A line segment that joins any vertex of the triangle to the *midpoint* of the opposite side.

$\overline{AD} \cong \overline{DB}$

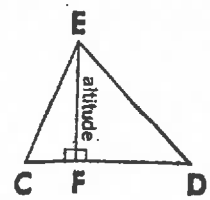


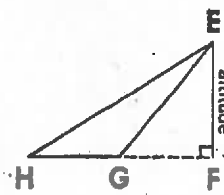
* D is the midpt of $\overline{AB}$
$\overline{CD}$ is the median drawn from vertex C to side $\overline{AB}$

* we can also draw a median from vertex A to side $\overline{BC}$ ... Every Δ has 3 medians

Altitude of a Triangle: A line segment drawn from any vertex of the triangle $\boxed{\text{perpendicular}}$ to and ending in the line that contains the opposite side.

In Δ CED, if $\overline{EF} \perp \overline{CD}$, then $\overline{EF}$ is the altitude from vertex E to the opp side

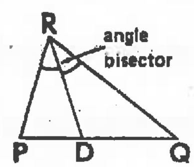




In ΔHEG, if $\overline{EF}$ is $\perp$ $\overleftrightarrow{HG}$, the line that contains the side $\overline{HG}$, then $\overline{EF}$ is the altitude from vertex E to opp side

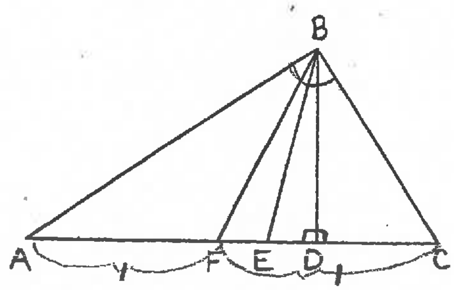
Angle Bisector of a Triangle: A line segment that bisects any angle of the triangle and terminates in the side opposite that angle.

In ΔPQR, if D is a pt on $\overline{PQ}$ such that $\angle PRD \cong \angle QRD$ then $\overline{RD}$ is the angle bisector from R



* every Δ has 3 angle bis

In a scalene triangle, the *altitude*, the *median*, and the *angle bisector* drawn from any common vertex are three distinct line segments.

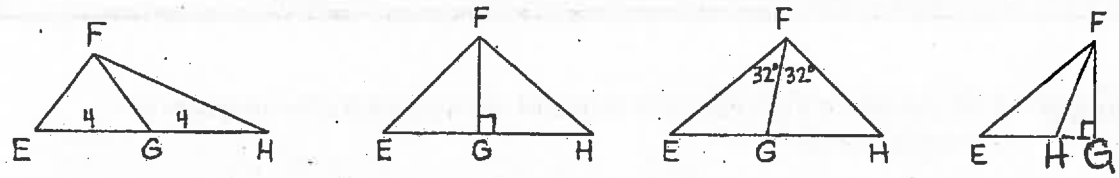


$\overline{BD}$ is the *altitude* from *B* because $\overline{BD} \perp \overline{AC}$;

$\overline{BE}$ is the *angle bisector* from *B* because $\angle ABE \cong \angle EBC$;

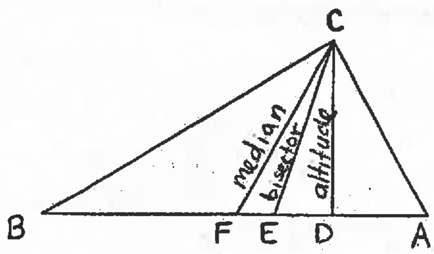
$\overline{BF}$ is the *median* from *B* because *F* is the midpoint of $\overline{AC}$.

Name the type of line segment that $\overline{FG}$ is in each triangle.



Median (middle) | Altitude | Angle Bisector | Altitude

Polygon ABC is a triangle. $\overline{CD}$ is an altitude. $\overline{CE}$ is an angle bisector. $\overline{CF}$ is a median.



a. Name two line segments which are congruent. $\overline{BF} \cong \overline{AF}$

b. Name two angles which are right angles. $\angle CDB$ and $\angle CDA$

c. Name two congruent angles, each of which has its vertex at C. $\angle BCE \cong \angle ACE$

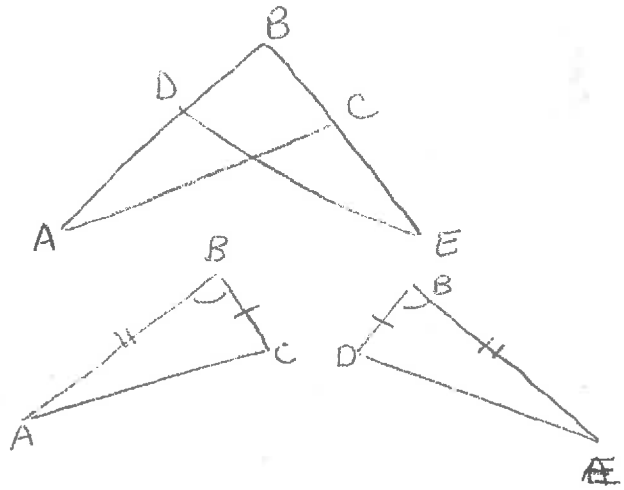
d. Name two line segments which are perpendicular to each other. $\overline{CD} \perp \overline{BA}$

Overlapping Triangle Proofs

1. Given: $\overline{BD} \cong \overline{BC}$

$\overline{DA} \cong \overline{CE}$

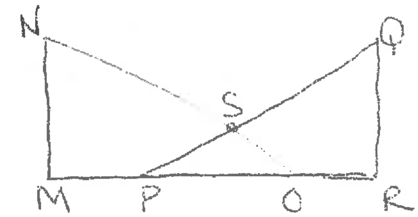
Prove: $\angle A \cong \angle E$

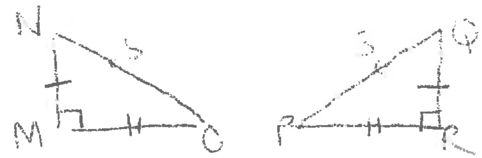


Statements	Reasons
1. $\overline{BD} \cong \overline{BC}$	1. Given
2. $\overline{DA} \cong \overline{CE}$	2. Given
3. $\overline{BA} \cong \overline{BE}$	3. Addition Postulate
4. $\angle B \cong \angle B$	4. Reflexive Postulate
5. $\triangle BAC \cong \triangle BED$	5. SAS $\cong$ SAS
6. $\angle A \cong \angle E$	6. Corresponding parts of $\cong$ $\triangle$'s are $\cong$.

*2. Given: $\overline{NM} \cong \overline{QR}$
$\overline{NM} \perp \overline{MR}$, $\overline{QR} \perp \overline{MR}$
$\overline{MP} \cong \overline{RO}$

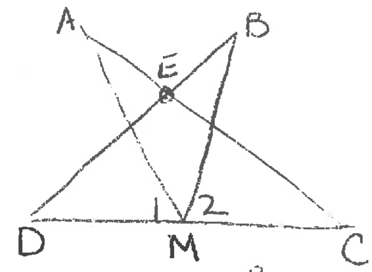
Prove: $\angle N \cong \angle Q$



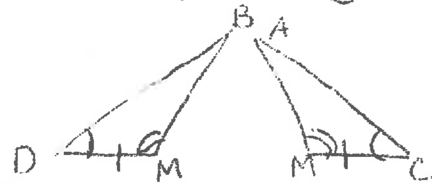


Statements	Reasons
1. $\overline{NM} \cong \overline{QR}$	1. Given
2. $\overline{NM} \perp \overline{MR}$, $\overline{QR} \perp \overline{MR}$	2 Given
3. $\angle M$ and $\angle R$ are right $\angle$'s	3. $\perp$ lines form right $\angle$'s
4. $\angle M \cong \angle R$	4. All right $\angle$'s are $\cong$
5. $\overline{MP} \cong \overline{RO}$	5. Given
6. $\overline{PO} \cong \overline{PO}$	6. Reflexive Postulate
7. $\overline{MO} \cong \overline{RP}$	7. Addition Postulate
8. $\triangle NMO \cong \triangle QRP$	8. SAS $\cong$ SAS
9 $\angle N \cong \angle Q$	9 Corresponding parts of $\cong$ $\triangle$'s are $\cong$.

Given: $\overline{AC}$ & $\overline{BD}$ intersect at E
$\angle D \cong \angle C$
M is the midpoint of $\overline{DC}$
$\angle 1 \cong \angle 2$



Prove: $\overline{DB} \cong \overline{CA}$



Statements	Reasons
1. $\overline{AC}$ & $\overline{BD}$ intersect at E	1. Given
2. $\angle D \cong \angle C$	2. Given
3. M is the midpoint of $\overline{DC}$	3. Given
4. $\overline{DM} \cong \overline{CM}$	4. A midpoint cuts a segment into 2 $\cong$ segments
5. $\angle 1 \cong \angle 2$	5. Given
6. $\angle AMB \cong \angle AMB$	6. Reflexive Postulate
7. $\angle BMD \cong \angle AMC$	7. Addition Postulate
8. $\triangle BMD \cong \triangle AMC$	8. ASA $\cong$ ASA
9. $\overline{DB} \cong \overline{CA}$	9. Corresponding parts of $\cong$ $\triangle$'s are $\cong$.