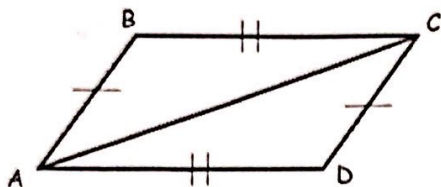


Geometric Proofs: Triangles

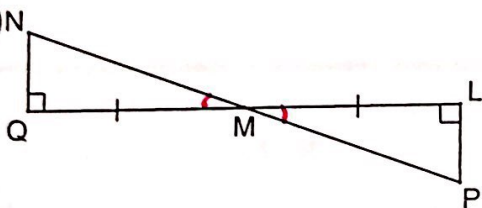
Previously, you learned that you only need 3 pieces of information (combination of angles and sides) to determine if two triangles are congruent. Today, we are going to prove two triangles are congruent using two column proofs.

A. Given: $\overline{AB} \cong \overline{CD}$, $\overline{BC} \cong \overline{AD}$
 Prove: $\triangle ABC \cong \triangle CDA$



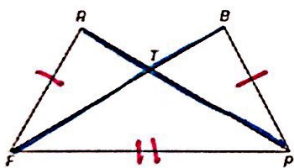
Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$	1. Given
2. $\overline{BC} \cong \overline{AD}$	2. <u>Given</u>
3. $\overline{AC} \cong \overline{AC}$	3. <u>Reflexive Prop.</u>
4. $\triangle CBA \cong \triangle ADC$	4. S-S-S Congruence

B. Given: $\overline{QM} \cong \overline{ML}$ and $\angle QMN \cong \angle LMP$
 Prove: $\triangle NQM \cong \triangle PLM$

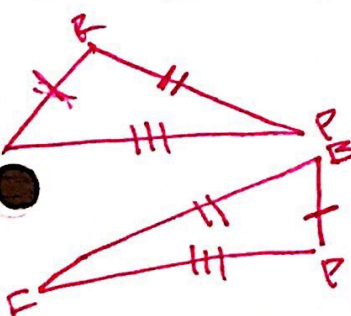


Statements	Reasons
1. $\overline{QM} \cong \overline{ML}$	1. Given
2. $\angle QMN \cong \angle LMP$	2. <u>Given</u>
3. $\angle Q \cong \angle L$	3. <u>all right angles are \cong</u>
4. $\triangle NQM \cong \triangle PLM$	4. <u>A.S.A Congruence.</u>

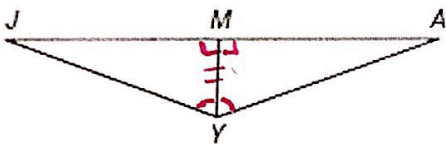
C. Given: $\overline{RF} \cong \overline{BP}$ and $\overline{BF} \cong \overline{RP}$
 Prove: $\triangle RFP \cong \triangle BFP$



Statements	Reasons
1. $\overline{RF} \cong \overline{BP}$	1. <u>Given</u>
2. $\overline{BF} \cong \overline{RP}$	2. <u>Given</u>
3. $\overline{FP} \cong \overline{FP}$	3. <u>Reflexive Prop</u>
4. $\triangle RFP \cong \triangle BFP$	4. <u>SSS congruence</u>



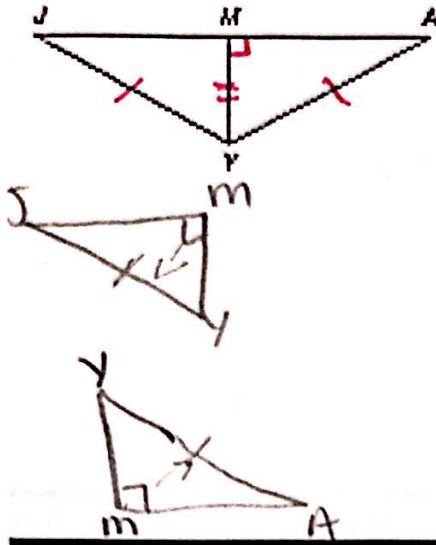
E. Given: $\overline{JA} \perp \overline{MY}$ and \overline{YM} bisects $\angle JYA$
 Prove: $\triangle JYM \cong \triangle AYM$?



- ① $\overline{JA} \perp \overline{MY}$
- ② \overline{YM} bisects $\angle JYA$
- ③ $\angle JYM \cong \angle AYM$
- ④ $\overline{MY} \cong \overline{MY}$
- ⑤ $\angle JMY \cong \angle MYA$
- ⑥ $\triangle JYM \cong \triangle AYM$

Given
 Given
 def. of bisector.
 reflexive prop.
 all right \angle 's are \cong
 ASA congruence

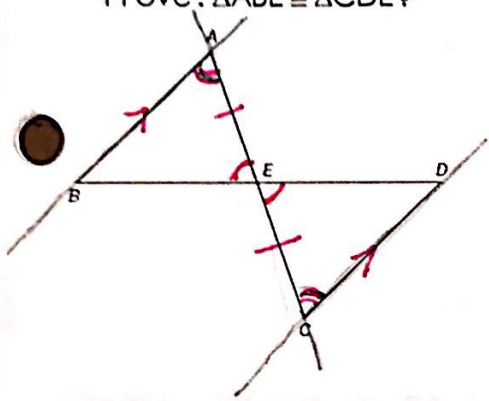
F. Given: $\overline{JA} \perp \overline{MY}$ and $\overline{JY} \cong \overline{AY}$
 Prove: $\triangle JYM \cong \triangle AYM$?



- ① $\overline{JA} \perp \overline{MY}$
- ② $\overline{JY} \cong \overline{AY}$
- ③ $\angle JMY \cong \angle AMY$
- ④ $\overline{MY} \cong \overline{MY}$
- ⑤ $\triangle JYM \cong \triangle AYM$

Given
 Given
 def. of perpendicular
 reflexive prop.
 HL congruence

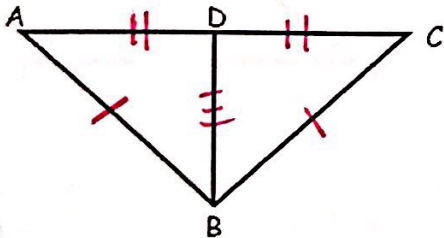
G. Given: $\overline{AB} \parallel \overline{CD}$ and $\overline{AE} \cong \overline{CE}$
 Prove: $\triangle ABE \cong \triangle CDE$?



- ① $\overline{AB} \parallel \overline{CD}$
- ② $\overline{AE} \cong \overline{CE}$
- ③ $\angle BEA \cong \angle DEC$
- ④ $\angle BAE \cong \angle DCE$
- ⑤ $\triangle ABE \cong \triangle CDE$

Given
 Given
 vertical \angle 's
 alt. int. \angle 's
 are \cong
 ASA congruence.

H. Given: $\overline{AB} \cong \overline{CB}$, D is the midpoint of \overline{AC}
 Prove: $\angle A \cong \angle C$



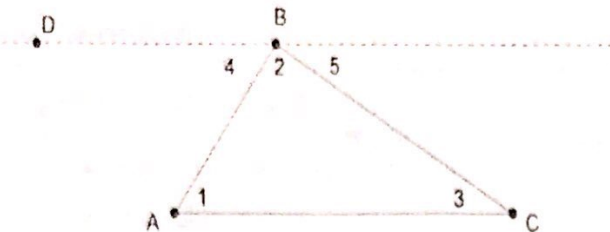
- ① $\overline{AB} \cong \overline{CB}$
- ② D is mdpt \overline{AC}
- ③ $\overline{AD} \cong \overline{CD}$
- ④ $\overline{BD} \cong \overline{BD}$
- ⑤ $\triangle ABD \cong \triangle CBD$
- ⑥ $\angle A \cong \angle C$

Given
 Given
 def. of midpoint.
 reflexive prop
 SSS congruence
 CPCTC

Prove the Triangle Interior Angles Theorem

I. Given: $\overline{AC} \parallel \overline{BD}$.

Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180$



① $\overline{AC} \parallel \overline{BD}$

Given

② $\angle 4 + \angle 2 + \angle 5 = 180$

Def. of supplementary angles

③ $\angle 4 \cong \angle 1$

alt. int. \angle 's theorem

④ $\angle 5 \cong \angle 3$

alt. int. \angle 's theorem

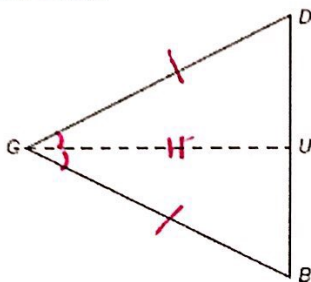
⑤ $\angle 1 + \angle 2 + \angle 3 = 180$

substitution prop.

Prove the Isosceles Base Angles Theorem

J. Given: $\overline{GB} \cong \overline{GD}$, \overline{GU} bisects $\angle DGB$

Prove: $\angle B \cong \angle D$



Statements

1. $\overline{GB} \cong \overline{GD}$
2. \overline{GU} bisects $\angle DGB$
3. $\angle DGU \cong \angle BGU$
4. $\overline{GU} \cong \overline{GU}$
5. $\triangle DGU \cong \triangle BGU$
6. $\angle B \cong \angle D$

Reasons

1. Given
2. Given
3. Definition of bisector
4. Reflexive Prop.
5. S-A-S congruence
6. CPCTC