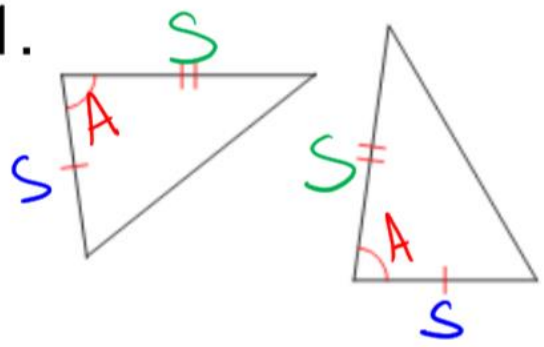
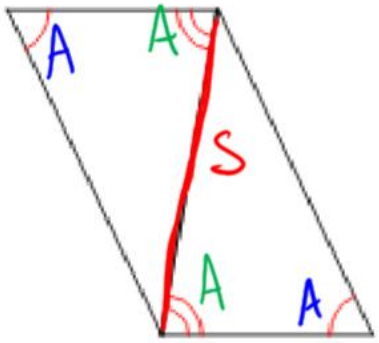
Warm up

Identify the theorem that could be used to show the following triangle pairs are congruent.

1. 

SAS

2. 

AAS

Goals

- Use two column and paragraph proofs to prove congruence in triangles.

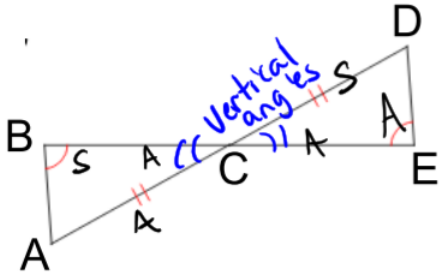
Bisect - divide into two equal part

Midpoint - the point on the line segment divides the line segment into two congruent segments

Class proofs

Given: $\overline{AC} \cong \overline{DC}$ and $\angle ABC \cong \angle DEC$.

Prove: $\Delta ABC \cong \Delta DEC$

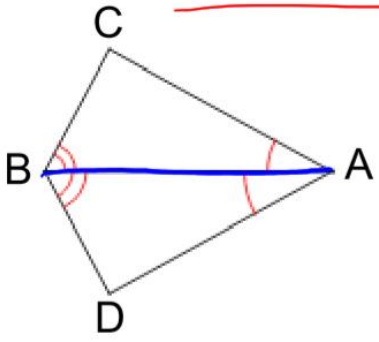


statement	Reason
$\overline{AC} \cong \overline{DC}$	Given
$\angle ABC \cong \angle DEC$	Given
$\angle DCE \cong \angle ACB$	Vertical $\angle$'s Thm.
$\Delta ABC \cong \Delta DEC$	AAS

Class proofs

Given: $\angle CAB \cong \angle DAB$ and $\angle ABC \cong \angle DEC$.

Prove $\Delta ABC \cong \Delta ABD$



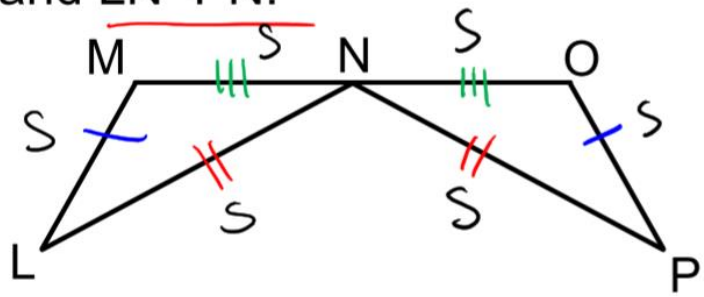
It is given that $\angle CAB \cong \angle DAB$ and $\angle ABC \cong \angle DEC$.

By reflexive property, $\overline{AB} \cong AB$.

Thus, $\Delta ABC \cong \Delta ABD$.

Class proofs

Given: N is the midpoint of $\overline{MO}$, $\overline{LM} \cong \overline{PO}$ and $\overline{LN} \cong \overline{PN}$.

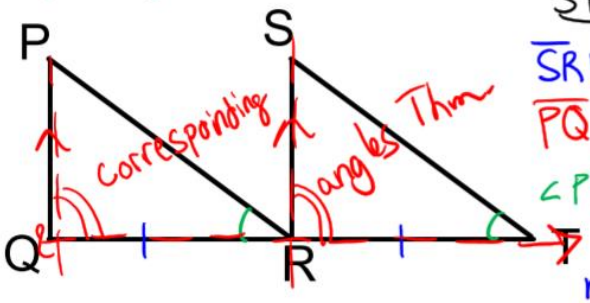


Prove: $\triangle LMN = \triangle PON$

Statement	Reason
N is the midpoint of $\overline{MO}$	Given
$\overline{LM} \cong \overline{PO}$	Given
$\overline{LN} \cong \overline{PN}$	Given
$\overline{MN} \cong \overline{ON}$	Def. of midpoint
$\triangle LMN \cong \triangle PON$	SSS

Class proofs

Given: $\overline{SR}$ bisects of $\overline{QT}$, $\overline{PQ} \parallel \overline{SR}$, and $\angle PRQ \cong \angle STR$.



Prove: $\triangle PQR \cong \triangle SRT$

Statement	Reason
$\overline{SR}$ bisects $\overline{QT}$	Given
$\overline{PQ} \parallel \overline{SR}$	Given
$\angle PRQ \cong \angle STR$	Given
$m\overline{QR} = m\overline{RT}$	Def. of bisect
$\overline{QR} \cong \overline{RT}$	Def. of congruence
$\angle PQR \cong \angle SRT$	Corr. $\angle$'s Thm.
$\triangle LMN \cong \triangle SRT$	ASA

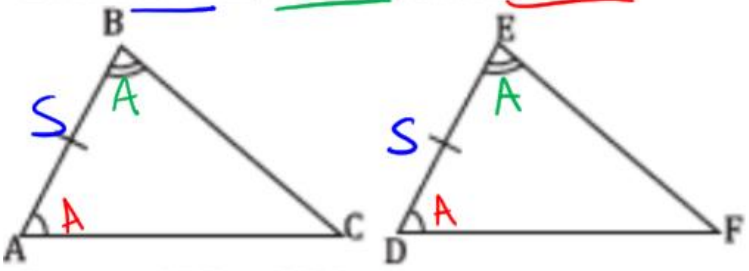
Give it a try

1, 3, 5

Check your Answers

1.

Given: $\overline{AB} \cong \overline{DE}$, $\angle B \cong \angle E$, and $\angle A \cong \angle D$

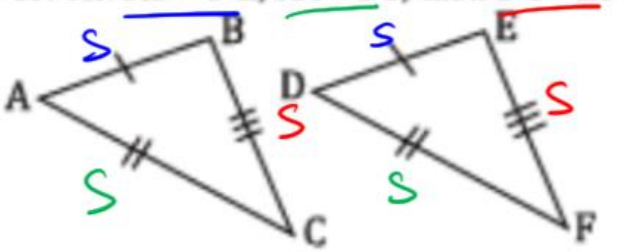


Prove: $\triangle ABC \cong \triangle DBC$

Statements	Reasons
1. $\overline{AB} \cong \overline{DE}$	1. Given
2. $\angle B \cong \angle E$	2. Given
3. $\angle A \cong \angle D$	3. Given
4. $\triangle ABC \cong \triangle DEF$	4. AS A

3.

Given: $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $\overline{BC} \cong \overline{EF}$

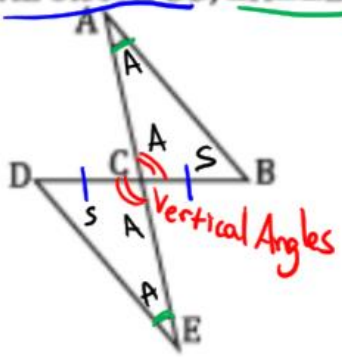


Prove: $\triangle ABC \cong \triangle DEF$

Statements	Reasons
1. $\overline{AB} \cong \overline{DE}$	1. Given
2. $\overline{AC} \cong \overline{DF}$	2. Given
3. $\overline{BC} = \overline{EF}$	3. Given
4. $\triangle ABC \cong \triangle DEF$	4. SSS

5.

Given: $\overline{AE}$ bisects $\overline{BD}$, $\angle A \cong \angle E$



Prove: $\triangle ABC \cong \triangle EDC$

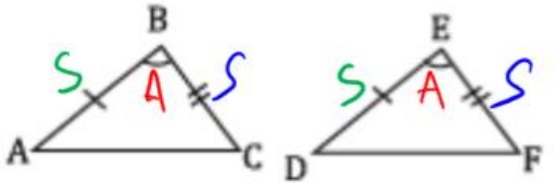
Statements	Reasons
1. $\angle A \cong \angle E$	1. Given
2. $\overline{AE}$ bisects $\overline{BD}$	2. Given
3. $m\overline{DC} = m\overline{BC}$	3. Definition of Bisect → 3b. $\overline{DC} \cong \overline{BC}$
4. $\angle ACB \cong \angle ECD$	4. Vertical Angles theorem
5. $\triangle ABC \cong \triangle EDC$	5. AAS

Try 19, 21 and 23.

Remember to do 23 as a paragraph proof.

Check your answers

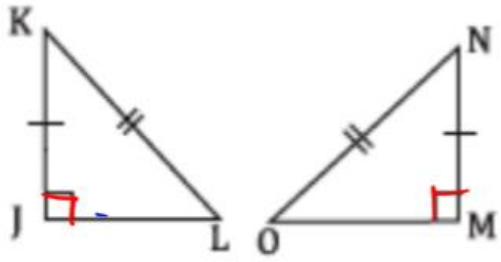
19. Given: $\overline{AB}\cong\overline{DE}$, $\overline{BC}\cong\overline{EF}$, and $\angle B\cong\angle E$



Prove: $\triangle ABC\cong\triangle DEF$

Statement	Reason
$\overline{AB}\cong\overline{DE}$	Given
$\angle B\cong\angle E$	Given
$\overline{BC}\cong\overline{EF}$	Given
$\triangle ABC\cong\triangle DEF$	SAS

21. Given: $\overline{JK}\cong\overline{MN}$, $\overline{KL}\cong\overline{NO}$

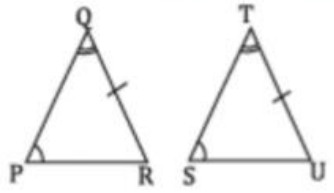


Prove: $\triangle JKL\cong\triangle MNO$

Statement	Reason
$\overline{JK}\cong\overline{MN}$	Given
$\overline{KL}\cong\overline{NO}$	Given
$\angle KJL\cong\angle NMO$	Given
$\triangle KJL\cong\triangle NMO$	HL

23.

Given: $\angle P\cong\angle S$, $\angle Q\cong\angle T$, and $\overline{QR}\cong\overline{TU}$



Prove: $\triangle PQR\cong\triangle STU$

It is given that $\angle P\cong\angle S$, $\angle Q=\angle T$, and $\overline{QR}\cong\overline{TU}$. Thus, $\triangle PQR\cong\triangle STU$

Practice:

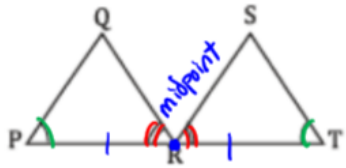
31, 32, 36

31. Given: C is the midpoint of $\overline{AE}$, $\overline{BA} \cong \overline{DE}$, and $\angle A \cong \angle E$

Prove: $\triangle ABC \cong \triangle EDC$

Statement	Reason
C is the midpoint of $\overline{AE}$	Given
$\overline{BA} \cong \overline{DE}$	Given
$\angle A \cong \angle E$	Given
$\overline{AC} \cong \overline{EC}$	Def. of midpoint
$\triangle ABC \cong \triangle EDC$	SAS

* **32.** Given: R is the midpoint of $\overline{PT}$, $\angle P \cong \angle T$, and $\angle PRQ \cong \angle TRS$

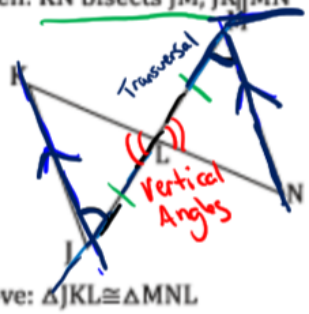


Prove: $\triangle PQR \cong \triangle TSR$

It is given that R is the midpoint of $\overline{PT}$, $\angle P \cong \angle T$, and $\angle PRQ \cong \angle TRS$. By the Definition of midpoint it follows that $\overline{PR} \cong \overline{TR}$. Thus $\triangle PQR \cong \triangle TSR$ by ASA.

36.

Given: $\overline{KN}$ bisects $\overline{JM}$, $\overline{JK} \parallel \overline{MN}$



Prove: $\triangle JKL \cong \triangle MNL$

Statement	Reason
$\overline{KN}$ bisects $\overline{JM}$	Given
$\overline{JK} \parallel \overline{MN}$	Given
$m\overline{KN} = m\overline{JM}$	Def. of bisects
$\overline{KN} \cong \overline{JM}$	Def. of congruence
$\angle NML \cong \angle KJL$	Alt. Int. $\angle$'s Theorem
$\angle MLN \cong \angle JLK$	Vert. $\angle$'s Thm.
$\triangle JKL \cong \triangle MNL$	ASA