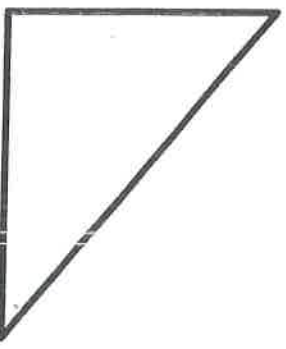


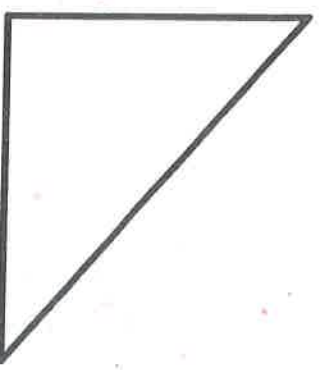
2-10-Even

# TRIANGLES

Congruence Proofs



$\cong$

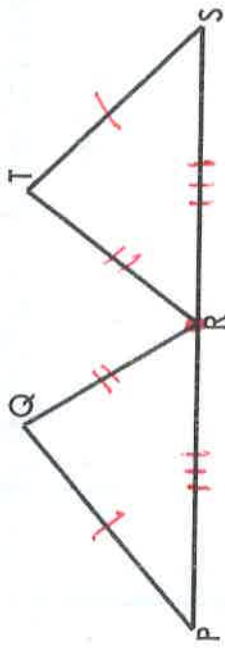


Created by:  
Mrs. G

# SSS PROOF #1

**Given:**  $\overline{PQ} \cong \overline{ST}$ ,  $\overline{QR} \cong \overline{TR}$ , R is the midpoint of  $\overline{PS}$

**Prove:**  $\triangle PQR \cong \triangle STR$



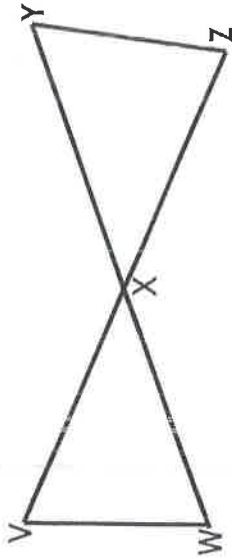
Statements	Reasons
$\overline{PQ} \cong \overline{ST}$	Given
$\overline{QR} \cong \overline{TR}$	Given
R is midpoint $\overline{PS}$	Given
$\overline{PR} \cong \overline{SR}$	Def. Midpoint
$\triangle PQR \cong \triangle STR$	SSS

$\overline{PQ} \cong \overline{ST}$	Def. of Midpoint	$\overline{QR} \cong \overline{TR}$
R is the midpoint of $\overline{PS}$	Given	
$\overline{PR} \cong \overline{SR}$	Given	SSS
Given		$\triangle PQR \cong \triangle STR$

# CPCTC PROOF #4

**Given:**  $\overline{WV} \parallel \overline{YZ}$ , X is the midpoint of  $\overline{WY}$ ,

**Prove:**  $\angle VWX \cong \angle YZX$



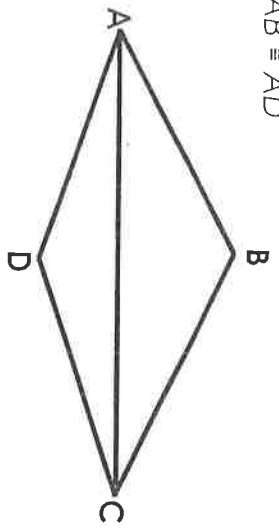
Statements	Reasons

ASA	$\triangle VWX \cong \triangle ZXY$	$\overline{WX} \cong \overline{YX}$
$\overline{WV} \parallel \overline{YZ}$	CPCTC	Given
Def. of Midpoint	Alt. Interior Angles	$\angle VXW \cong \angle ZXY$
$\angle VWX \cong \angle YZX$		X is the midpoint of $\overline{WY}$
$\angle VWX \cong \angle YZX$	Given	Vertical Angles

# CPCTC PROOF #3

**Given:**  $\overline{AC}$  bisects  $\angle BCD$ ,  $\angle ABC \cong \angle ADC$

**Prove:**  $\overline{AB} \cong \overline{AD}$



Statements	Reasons

Given  $\triangle ABC \cong \triangle ADC$

$\overline{AC}$  bisects  $\angle BCD$   $\angle ABC \cong \angle ADC$

Def. of Angle Bisector Given

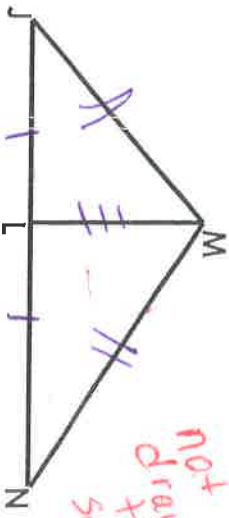
$\overline{AB} \cong \overline{AD}$   $\angle BCA \cong \angle DCA$  AAS

**13** Reflexive Property CPCTC

# SSS PROOF #2

**Given:** L is the midpoint of  $\overline{JN}$ ,  $\overline{JM} \cong \overline{NM}$ ,

**Prove:**  $\triangle JLM \cong \triangle NLM$



Statements	Reasons
L is midpt. $\overline{JN}$	Given
$\overline{JL} \cong \overline{LN}$	Defn. Midpt
$\overline{JM} \cong \overline{NM}$	Given
$\overline{ML} \cong \overline{ML}$	Reflexive
$\triangle JLM \cong \triangle NLM$	SSS

$\overline{JL} \cong \overline{NL}$  L is the midpoint of  $\overline{JN}$   $\overline{JM} \cong \overline{NM}$

Def. of Midpoint  $\triangle JLM \cong \triangle NLM$

Given Given SSS

$\overline{LM} \cong \overline{LM}$  Reflexive Property

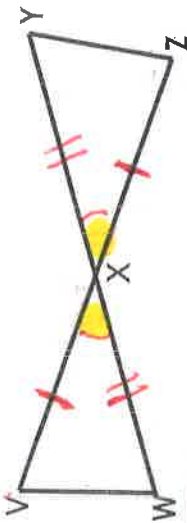
**2**

2-10 even

# SAS PROOF

**Given:** X is the midpoint of  $\overline{VZ}$ , X is the midpoint of  $\overline{WY}$

**prove:**  $\triangle VWX \cong \triangle ZYX$



Statements	Reasons
X is midpoint $\overline{VZ}$	Given
$\overline{VX} \cong \overline{XZ}$	Def. Midpoint
X is midpoint $\overline{WY}$	Given
$\overline{WX} \cong \overline{XY}$	Def. Midpoint
$\angle WXV \cong \angle YXZ$	Vertical
$\triangle VWX \cong \triangle ZYX$	SAS

Def. of Midpoint  Def. of Midpoint

$\overline{WX} \cong \overline{XY}$    $\angle WXV \cong \angle YXZ$   Vertical Angles

X is the midpoint of  $\overline{VZ}$   Given

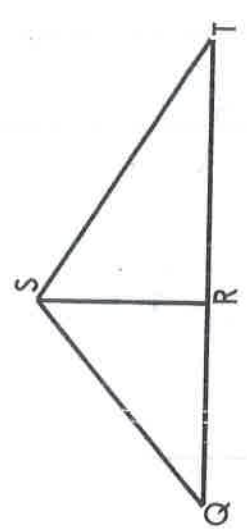
$\overline{VX} \cong \overline{XZ}$   X is the midpoint of  $\overline{WY}$   SAS

Given   $\triangle VWX \cong \triangle ZYX$

# CPCTC PROOF #2

**Given:**  $\overline{QS} \cong \overline{TS}$ , R is the midpoint of  $\overline{QT}$

**prove:**  $\angle RQS \cong \angle RTS$



Statements	Reasons

$\overline{RS} \cong \overline{RS}$   Reflexive Property

$\overline{QS} \cong \overline{TS}$   Given   $\angle RQS \cong \angle RTS$

Def. of Midpoint  Given

$\overline{QR} \cong \overline{TR}$   CPCTC  SSS

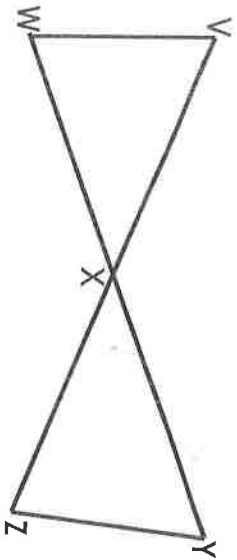
R is the midpoint of  $\overline{QT}$    $\triangle QRS \cong \triangle TRS$

# CPCTC PROOF #1



**Given:** X is the midpoint of  $\overline{VZ}$ , X is the midpoint of  $\overline{WY}$

**Prove:**  $\angle XVW \cong \angle XZY$



Statements	Reasons

Given

Def. of Midpoint

$\overline{VX} \cong \overline{XZ}$

Def. of Midpoint

$\angle XVW \cong \angle XZY$

X is the midpoint of  $\overline{VZ}$

Given

$\angle WXV \cong \angle YXZ$

$\overline{WX} \cong \overline{YX}$

$\Delta VWX \cong \Delta ZYX$

Vertical Angles

**11** X is the midpoint of  $\overline{WY}$

CPCTC

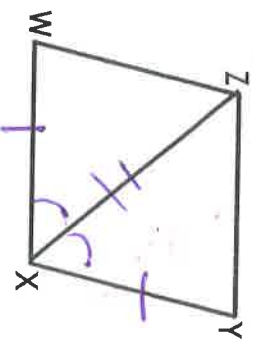
SAS

# SAS PROOF #2



**Given:**  $\overline{XW} \cong \overline{XY}$ ,  $\overline{XZ}$  bisects  $\angle WXY$

**Prove:**  $\Delta WXZ \cong \Delta YXZ$



Statements	Reasons
$\overline{XW} \cong \overline{XY}$	Given
$\overline{XZ}$ bisects $\angle WXY$	Given
$\angle WXZ \cong \angle YXZ$	Def. Angle Bisector
$\overline{XZ} \cong \overline{XZ}$	Reflexive
$\Delta WXZ \cong \Delta YXZ$	SAS

$\angle WXZ \cong \angle YXZ$

$\overline{XZ}$  bisects  $\angle WXY$

$\overline{XW} \cong \overline{XY}$

$\Delta WXY \cong \Delta YXZ$

Given

Def. of Angle Bisector

Given

SAS

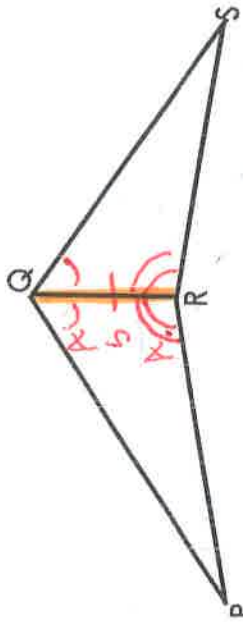
$\overline{XZ} \cong \overline{XZ}$

Reflexive Property

# ASA PROOF #1

**Given:**  $\overline{QR}$  bisects  $\angle PQS$ ,  $\angle PRQ = \angle SRQ$

**prove:**  $\triangle PQR = \triangle SQR$



Statements	Reasons
$\overline{QR}$ bisects $\angle PQS$	Given
$\angle PQR = \angle SQR$	Def. Angle bisector
$\angle PRQ = \angle SRQ$	Given
$\overline{QR} = \overline{QR}$	Reflexive
$\triangle PQR = \triangle SQR$	ASA

~~$\overline{QR} = \overline{QR}$~~   ~~Given~~   ~~$\angle PQR = \angle SQR$~~

Def. of Angle Bisector  Given

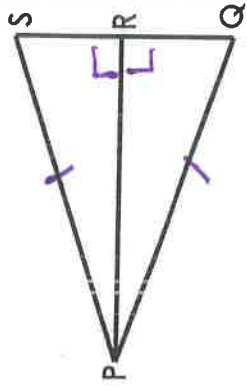
~~$\overline{QR}$  bisects  $\angle PQS$~~   ~~Reflexive Property~~   ~~$\angle PRQ = \angle SRQ$~~

ASA   $\triangle PQR = \triangle SQR$

# HL PROOF #2

**Given:**  $\overline{PR} \perp \overline{SQ}$ ,  $\overline{PQ} = \overline{PS}$

**prove:**  $\triangle PRQ = \triangle PRS$



Statements	Reasons
$\overline{PR} \perp \overline{SQ}$	Given
$\angle PRQ = \angle PRS$	Defn. $\perp$
$\overline{PQ} = \overline{PS}$	Given
$\overline{PR} = \overline{PR}$	Reflexive
$\angle PRQ = \angle PRS$	All right $\angle$ 's $\cong$ (Theorem)
$\triangle PRQ = \triangle PRS$	HL

$\angle PRQ = \angle PRS$   Given

$\overline{PQ} = \overline{PS}$   Reflexive Property   $\overline{PR} \perp \overline{SQ}$

Def. of  $\perp$   HL

$\overline{PR} = \overline{PR}$    $\angle PRQ$  and  $\angle PRS$  are right  $\angle$ 's  Given

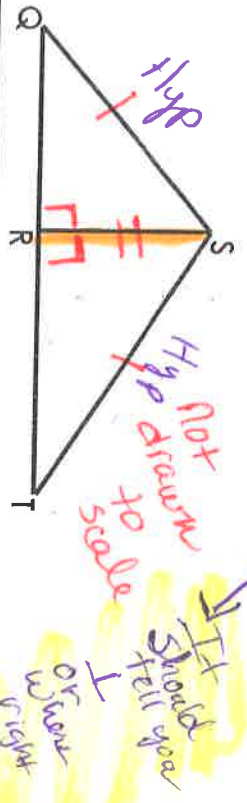
All right  $\angle$ 's are  $\cong$    $\triangle PRQ = \triangle PRS$

\* need  $\angle$ 's to be  $\cong$

# HL PROOF #1

**Given:**  $\triangle QSR$  and  $\triangle TSR$  are right triangles.  $\overline{QS} \cong \overline{TS}$

**Prove:**  $\triangle QSR \cong \triangle TSR$



Statements	Reasons
1. $\triangle QSR$ & $\triangle TSR$ are right $\angle$ s	Given
2. $\overline{QS} \cong \overline{TS}$	Given
3. $\overline{SR} \cong \overline{SR}$	Reflexive
4. $\triangle QSR \cong \triangle TSR$	HL

$\overline{QS} \cong \overline{TS}$  HL Given

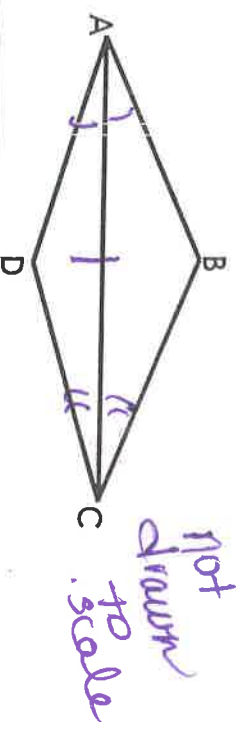
$\triangle QSR$  and  $\triangle TSR$  are right triangles Given

Reflexive Property  $\triangle QSR \cong \triangle TSR$   $\overline{SR} \cong \overline{SR}$

# ASA PROOF #2

**Given:**  $\overline{AC}$  bisects  $\angle BAD$ ,  $\overline{AC}$  bisects  $\angle BCD$

**Prove:**  $\triangle BAC \cong \triangle DAC$



Statements	Reasons
$\overline{AC}$ bisects $\angle BAD$	Given
$\angle BAC \cong \angle DAC$	Defn $\angle$ Bisector
$\overline{AC}$ bisects $\angle BCD$	Given
$\angle BCA \cong \angle DCA$	Defn $\angle$ Bisector
$\overline{AC} \cong \overline{AC}$	Reflexive
$\triangle BAC \cong \triangle DAC$	ASA

Def. of Angle Bisector Reflexive Property

$\overline{AC} \cong \overline{AC}$  Given  $\angle BAC \cong \angle DAC$

$\overline{AC}$  bisects  $\angle BCD$  Given

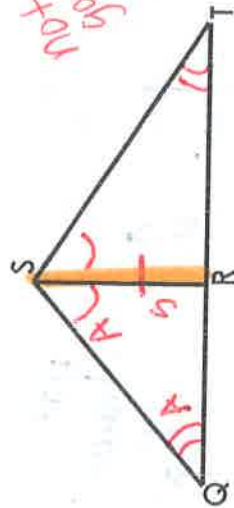
$\overline{AC}$  bisects  $\angle BAD$   $\angle BCA \cong \angle DCA$  ASA

Def. of Angle Bisector  $\triangle BAC \cong \triangle DAC$

# AAS PROOF 1

**Given:**  $\overline{SR}$  bisects  $\angle QST$   $\angle SQR \cong \angle STR$

**prove:**  $\triangle QSR \cong \triangle TSR$



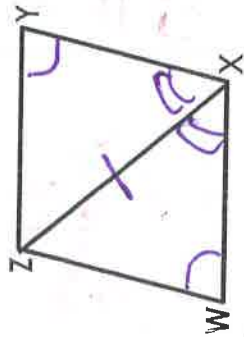
Statements	Reasons
$\overline{SR}$ bisects $\angle QST$	Given
$\angle QSR \cong \angle STR$	Def. Angle Bisector
$\angle SQR \cong \angle STR$	Given
$\overline{SR} \cong \overline{SR}$	Reflexive
$\triangle QSR \cong \triangle TSR$	AAS

$\angle QSR \cong \angle STR$	Reflexive Property	Given
$\triangle QSR \cong \triangle TSR$	Given	AAS
$\angle SQR \cong \angle STR$	$\overline{SR}$ bisects $\angle QST$	AAS
Def. of Angle Bisector	$\overline{SR} \cong \overline{SR}$	

# AAS PROOF 2

**Given:**  $\angle XWZ \cong \angle XYZ$ ,  $\overline{XZ}$  bisects  $\angle WXY$

**prove:**  $\triangle XWZ \cong \triangle XYZ$



Statements	Reasons
$\angle XWZ \cong \angle XYZ$	Given
$\overline{XZ}$ bisects $\angle WXY$	Given
$\angle WXZ \cong \angle YXZ$	Def. Angle Bisector
$\overline{XZ} \cong \overline{XZ}$	Reflexive
$\triangle XWZ \cong \triangle XYZ$	AAS

$\overline{XZ} \cong \overline{XZ}$	Reflexive Property	$\angle XWZ \cong \angle XYZ$
$\angle WXZ \cong \angle YXZ$	Given	AAS
Given	$\overline{XZ}$ bisects $\angle WXY$	AAS
Def. of Angle Bisector	$\triangle XWZ \cong \triangle XYZ$	