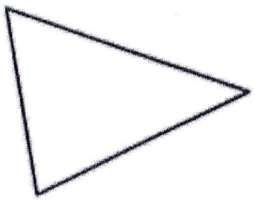
Key

Honors Math 2 — Chapter 4 Notes

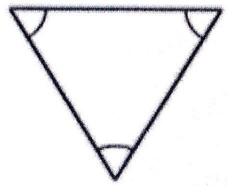
4.1/4.2

Classifying triangles by their angles:



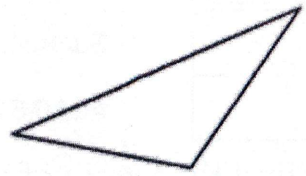
3 acute angles

acute Triange



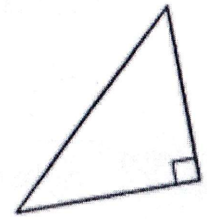
3 congruent acute angles

Equiangular



1 obtuse angle

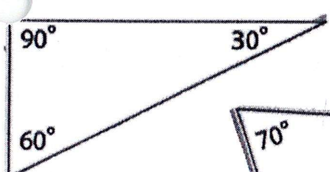
Obtuse Δ



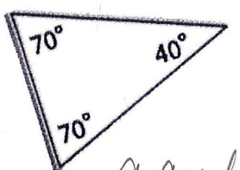
1 right angle

Right Δ

Classify each angle by its angles using the best description:

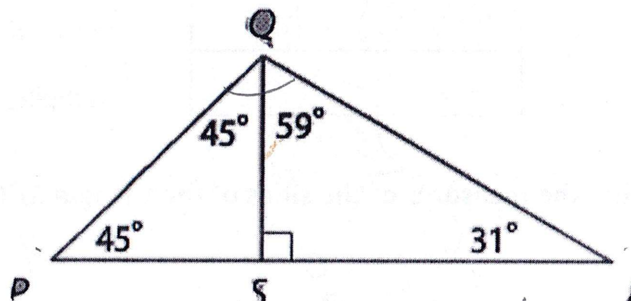


Right Δ



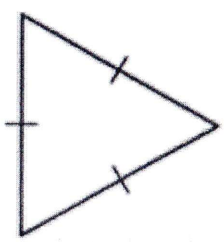
acute Δ

Classify ΔPQR as specifically as possible:



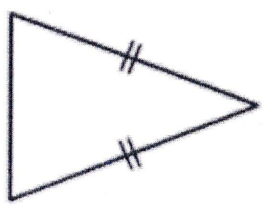
Obtuse Δ because $45° + 59° > 90°$

We can also classify triangles based on their sides:



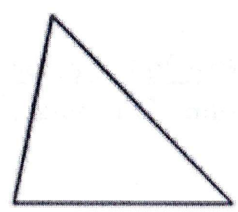
3 congruent sides

Equilateral



at least 2 congruent sides

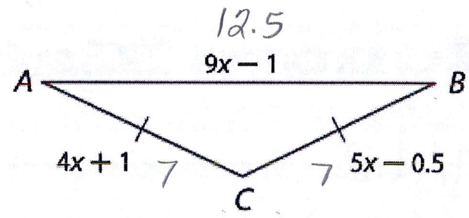
Isosceles



no congruent sides

Scalene

LGEBRA Find the measures of the sides f isosceles triangle ABC.



Step 1 Find x.

$AC = CB$ Given

$4x+1=5x-.5$	Substitution
$-4x \quad -4x$ $1=1x-.5$	Subtract 4x from each side.
$+.5 \quad +.5$ $1.5=1x$	Add 0.5 to each side.

$\boxed{x=1.5}$

Step 2 Substitute to find the length of each side.

$AC = 4x + 1$ Given

$4(1.5)+1$	$x = 1.5$
$6+1$	Given

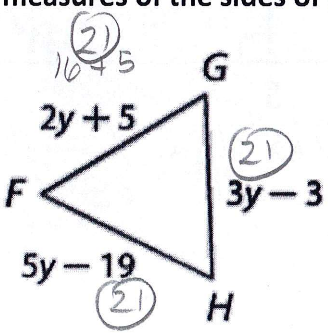
$= 7$ $AC = 7$

$AB = 9x - 1$ Given

$9(1.5)-1$	$x = 1.5$
$13.5-1$	Simplify.

$\boxed{12.5}$

Find the measures of the sides of the triangle ΔFGH:



Equilateral

$2y+5=3y-3$

$-2y \quad\quad -2y$

$5=y-3$

$+3 \quad\quad +3$

$y=8$

The Triangle Angle-Sum Theorem says that "The sum of the measures of the angles is 180°

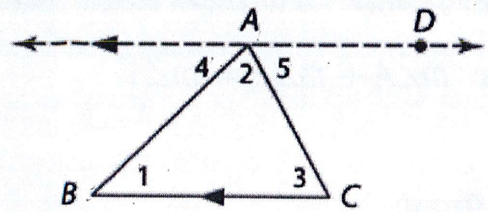
An Auxiliary Line is an extra line or segment drawn in a figure to help analyze geometric relationships. As with any statement in a proof, you must justify any properties of an auxiliary line that you have drawn.

PROOF: Triangle Angle-Sum Theorem

Given: $\triangle ABC$

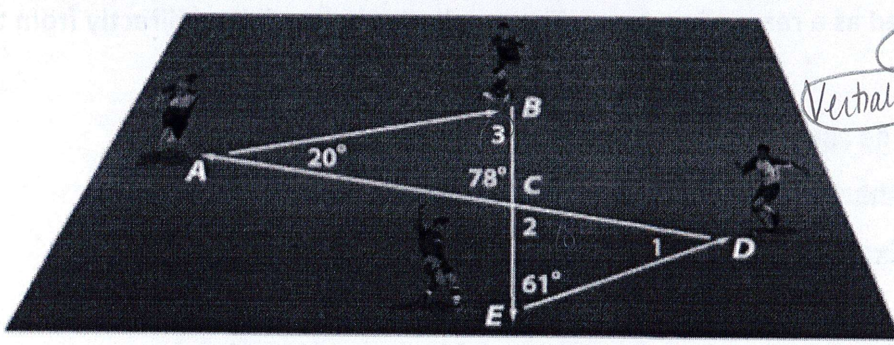
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180$

Proof:



Statements	Reasons
1. $\triangle ABC$	1. Given
2. Draw $\overleftrightarrow{AD}$ through A parallel to $\overline{BC}$.	2. Parallel Postulate
3. $\angle 4$ and $\angle BAD$ form a linear pair.	3. Def. of a linear pair
4. $\angle 4$ and $\angle BAD$ are Supp	4. If 2 $\angle$'s form linear pair they are Supp
5. $m\angle 4 + m\angle BAD = 180$	5. def of Supp $\angle$'s
6. $m\angle BAD = m\angle 2 + m\angle 5$	6. Angle Addition Postulate
7. $m\angle 2 + m\angle 5 + m\angle 4 = 180$	7. Substitution
8. $\angle 4 \cong \angle 1$, $\angle 5 \cong \angle 3$	8. alternate Interior $\angle$'s
9. $m\angle 4 = m\angle 1$ $m\angle 5 = m\angle 3$	9. Congruent $\angle$'s def
10. $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	10. Substitution

SOCCER **The diagram shows the path of the ball in a passing drill created by four friends. Find the measure of each numbered angle.**



$m\angle 3 = 82°$

Vertical $m\angle 2 = 78°$

$m\angle 1 = 180 - 61 - 78$

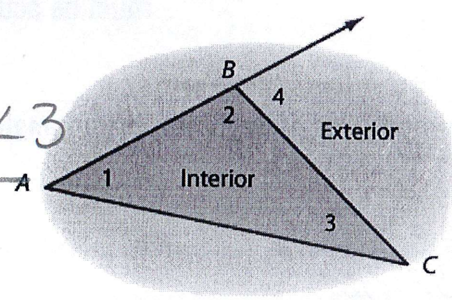
$m\angle 1 = 41°$

$180 - 20 - 78 =$

$160 - 78 = 82$

Exterior Angles Theorem:

each *exterior* angle of a triangle is equal to the sum of the two *remote interior* angles



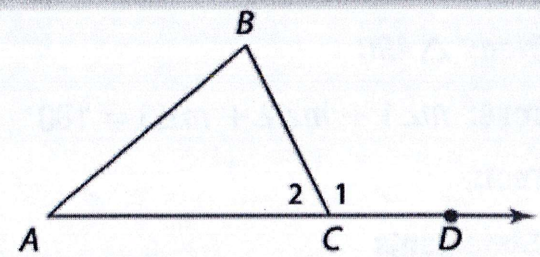
$m\angle 4 = m\angle 1 + m\angle 3$

always

Proof Exterior Angle Theorem **Flow proof: uses boxes and arrows.**

Given: $\triangle ABC$ Triangle add up 2 180

Prove: $m\angle A + m\angle B = m\angle 1$



Flow Proof:

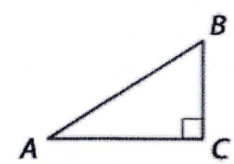
$\triangle ABC$	Given
$\angle 2$ and $\angle 1$ form a linear pair.	Definition of a linear pair
$\angle 2$ and $\angle 1$ are supplementary.	If 2 $\measuredangle$ form a linear pair, they are supplementary.
$m\angle 2 + m\angle 1 = 180$	Definition of supplementary
$m\angle A + m\angle B + m\angle 2 = 180$	Triangle Angle-Sum Theorem
$m\angle A + m\angle B + m\angle 2 = m\angle 2 + m\angle 1$	Substitution
$m\angle A + m\angle B = m\angle 1$	Subtraction Property of Equality

A corollary is a theorem with a proof that follows as a direct result of another theorem. As with theorems, corollaries can be used as a reason in a proof. The corollaries below follow directly from the Triangle Angle-Sum Theorem.

4.1 The acute angles of a right triangle are complementary.

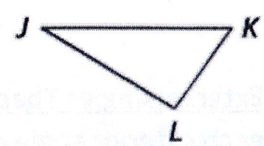
Abbreviation: *Acute $\measuredangle$ of a rt. $\triangle$ are comp.*

Example: If $\angle C$ is a right angle, then $\angle A$ and $\angle B$ are complementary.

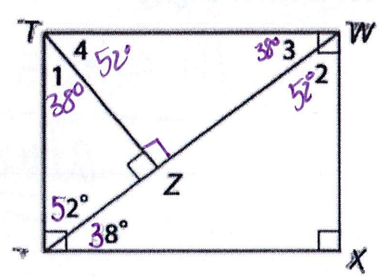


4.2 There can be at most one right or obtuse angle in a triangle.

Example: If $\angle L$ is a right or an obtuse angle, then $\angle J$ and $\angle K$ must be acute angles.



Find the measures of each numbered angle:



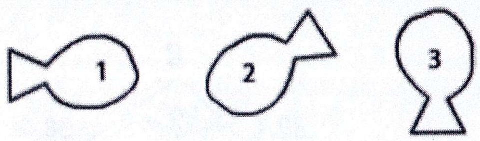
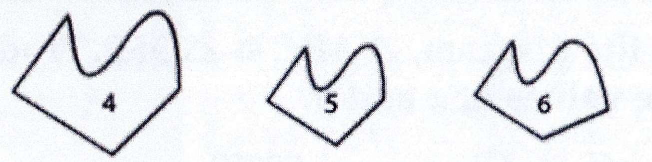
$m\angle 1 = 38°$
$m\angle 2 = 52°$
$m\angle 3 = 38°$
$m\angle 4 = 52°$

online book

Honors Math 2 Chapter 4 Notes

4.3

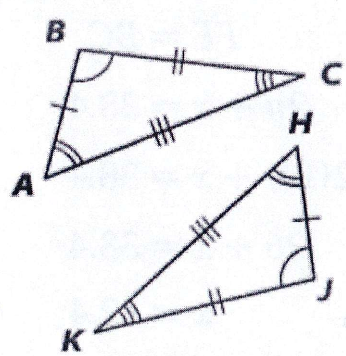
Geometric figures that are *exactly* the same shape and size are congruent.

Congruent	Not Congruent
	
While positioned differently, Figures 1, 2, and 3 are exactly the same shape and size.	Figures 4 and 5 are exactly the same shape but not the same size. Figures 5 and 6 are the same size but not exactly the same shape.

The corresponding parts of congruent shapes are also congruent:

Words Two polygons are congruent if and only if their corresponding parts are congruent.

Model



Example

Corresponding Angles

$\angle A \cong \angle H$ $\angle B \cong \angle J$ $\angle C \cong \angle K$

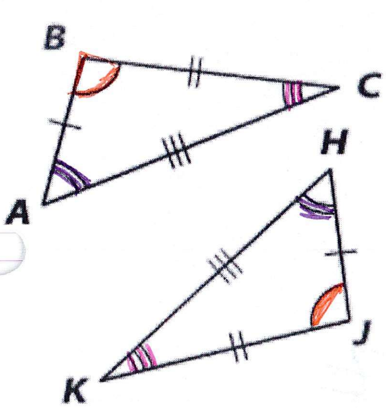
Corresponding Sides

$\overline{AB} \cong \overline{HJ}$ $\overline{BC} \cong \overline{JK}$ $\overline{AC} \cong \overline{HK}$

Congruence Statement

$\triangle ABC \cong \triangle HJK$

Congruency Statements show which parts of shapes are congruent. Take ΔABC *and* ΔHKJ:



This is a VALID congruency statement because it links each congruent angle.

Valid Statement

$\triangle BCA \cong \triangle JKH$

Use Colors

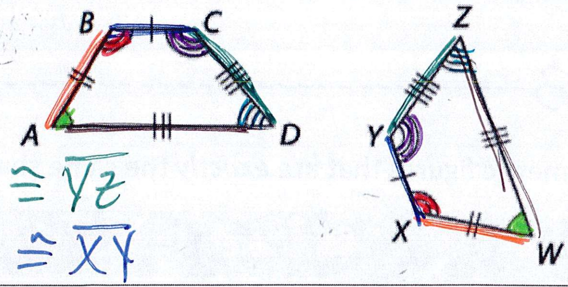
This is an INVALID congruency statement because it indicates Congruency between angles that are not congruent:

Not a Valid Statement

$\triangle ABC \cong \triangle HKJ$

FF all corresponding parts are congruent, then the figures are congruent:
(IFF = "if and only if")

$ABCD \cong WXYZ$

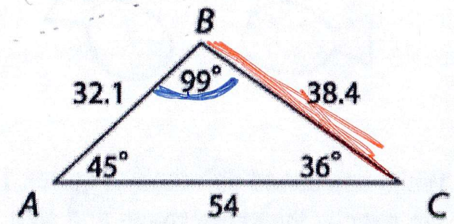


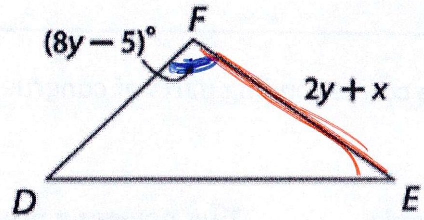
$\angle A \cong \angle W$
$\angle B \cong \angle X$
$\angle C \cong \angle Y$
$\angle D \cong \angle Z$

$\overline{AB} \cong \overline{XW}$
$\overline{AD} \cong \overline{ZW}$

$\overline{CD} \cong \overline{YZ}$
$\overline{BC} \cong \overline{XY}$

In the diagram, $\triangle ABC \cong \triangle DFE$. Find the values of x and y.





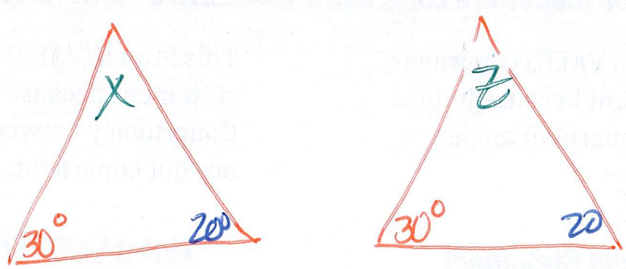
$\angle F \cong \angle B$	CPCTC
$m\angle F = m\angle B$	Definition of congruence
$8y - 5 = 99$	Substitution Blue
$8y = 104$	Add 5 to each side.
$y = 13$	Divide each side by 8.
$\overline{FE} \cong \overline{BC}$	CPCTC
$FE = BC$	Definition of congruence
$2y + x = 38.4$	Substitution
$2(13) + x = 38.4$	Substitution
$26 + x = 38.4$	Simplify.
$x = 12.4$	Subtract 26 from each side.

$8y - 5 = 99$

Third Angles Theorem:

f two angles of one triangle are congruent to two angles of a 2nd triangle, then the 3rd angles are also congruent.

Draw a picture and/or explain in your own words why this is true:

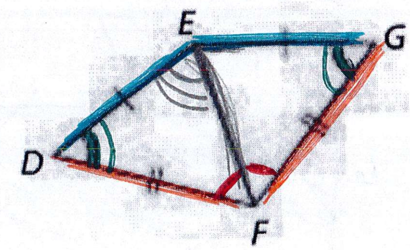


$m\angle X = m\angle Z$

Because

$180 - 30 - 20 = m\angle X \quad 180 - 30 - 20 = m\angle Z$

Write a two-column proof.



Given: $\overline{DE} \cong \overline{GE}$, $\overline{DF} \cong \overline{GF}$, $\angle D \cong \angle G$, $\angle DFE \cong \angle GFE$

Prove: $\triangle DEF \cong \triangle GEF$ Prove

1. $\overline{DE} \cong \overline{GE}$ $\overline{DF} \cong \overline{GF}$ $\angle D \cong \angle G$ $\angle DFE \cong \angle GFE$	1. Given
2. $\overline{EF} \cong \overline{EF}$	2. Reflexive prop of Congruence
3. $\angle DEF \cong \angle GEF$	3. 3rd angles thm
4. $\triangle DEF \cong \triangle GEF$	4. Def of Cong Polygons all corresponding parts cong.

As with equality, and congruence, the reflexive, Symmetric, and Transitive Properties hold true for triangles as well:

Remember these from ch2

Reflexive - $AB = AB$
Symmetric - If $A = B$ then $B = A$
Transitive - if $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$ then $m\angle 1 = m\angle 3$

Theorem 4.4 Properties of Triangle Congruence

Reflexive Property of Triangle Congruence

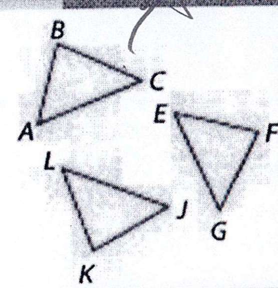
$\triangle ABC \cong \triangle ABC$

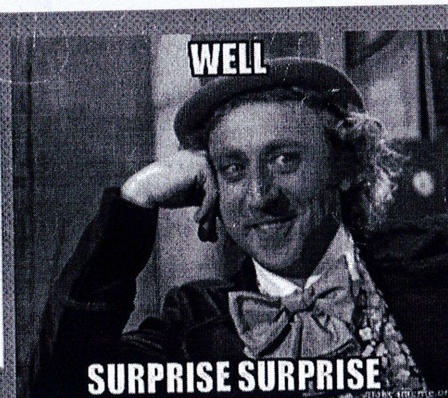
Symmetric Property of Triangle Congruence

If $\triangle ABC \cong \triangle EFG$, then $\triangle EFG \cong \triangle ABC$.

Transitive Property of Triangle Congruence

If $\triangle ABC \cong \triangle EFG$ and $\triangle EFG \cong \triangle JKL$, then $\triangle ABC \cong \triangle JKL$.



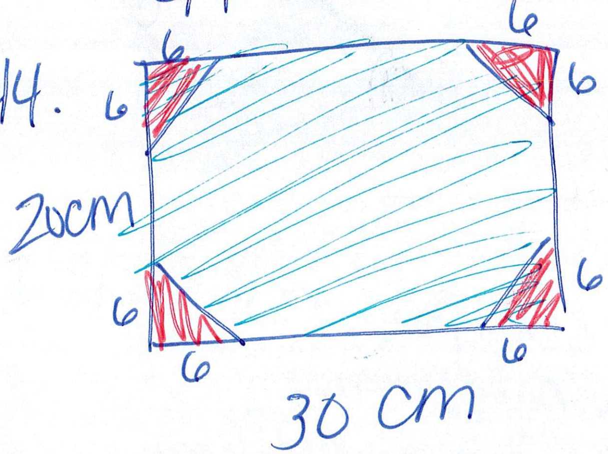


Homework pg. 259 5-15 odd
44-47

4-3 Homework pg. 259 5-15 odd

44-47

44.



area of octagon

Find area of [rectangle] Subtract out [triangle] 4 of them

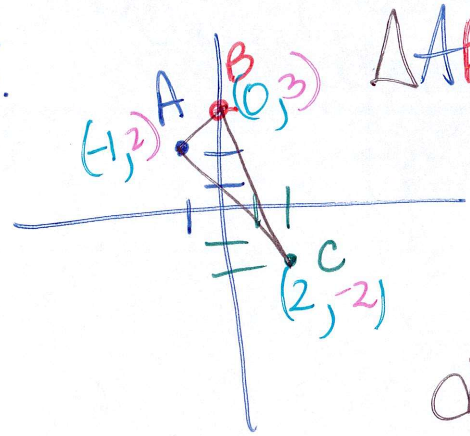
$30 \times 20 \quad \frac{1}{2} \cdot 6 \cdot 6$

$600 - 4(18)$

$600 - 72$

$528\ cm^2$ B

45.



$\triangle ABC \cong \triangle HIJ$

Measure of HJ will be the Same as Measure of AC

$\boxed{\text{CPCTC}}$

$\text{distance} = \sqrt{(-1-2)^2 + (2 - -2)^2}$

$D = \sqrt{9+16}$

$D = \sqrt{25}$

$\boxed{\text{Distance is } 5}$

46. $x^2 + 19x - 42$ $\quad \frac{-42}{21,-2 \,|\, 19}$

$(x+21)(x-2)$ H

47. D

Honors Math 2 Chapter 4 Notes

4.4

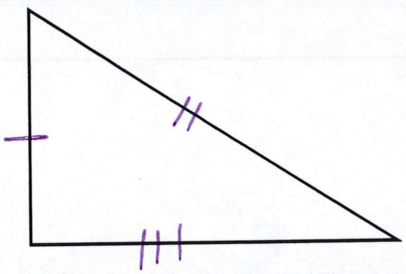
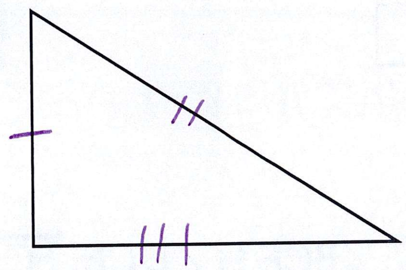
We know that we can prove that triangles are congruent if all their corresponding parts are congruent, but it's actually possible to prove the same thing with fewer known congruent parts

(as long as we have the correct congruent parts) Really nice

SIDE – SIDE – SIDE (SSS) Congruence: always

The first triangle congruency theorem we will look at is SSS (Side-Side-Side) congruence.

"If three sides of one triangle are congruent to the three sides of a 2nd triangle, the two triangles are congruent."

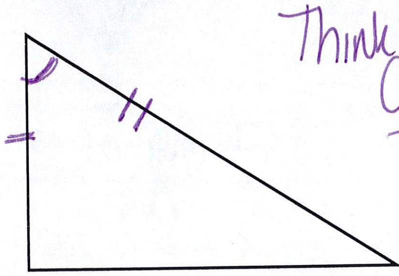
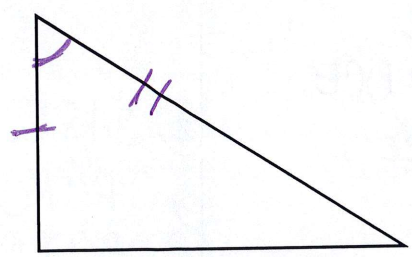



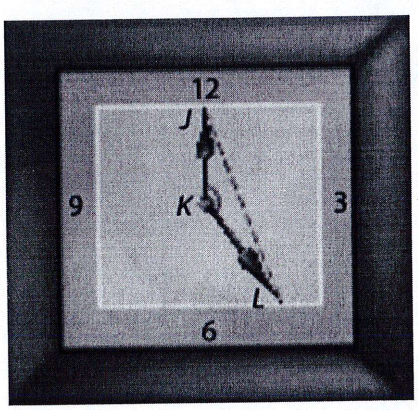
SIDE – ANGLE – SIDE (SAS) Congruence:

The second triangle congruency theorem we will use is ~~SSS~~ SAS (Side-Angle-Side) congruence.

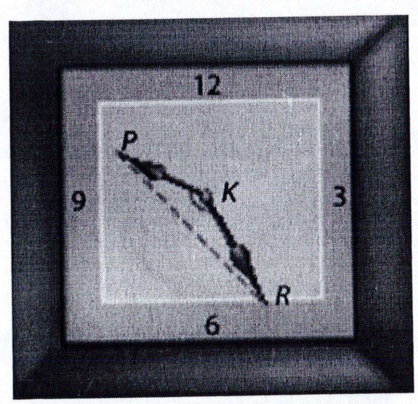
"If two sides of a triangle and their included angle are congruent with the corresponding sides/angle of a 2nd triangle, then the triangles are congruend."

Think of a clock

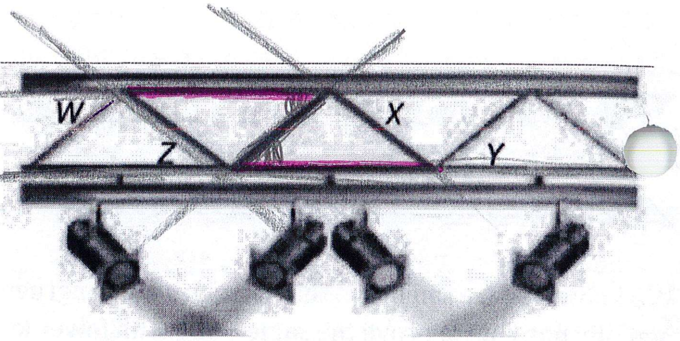





The triangle formed by the hands of this clock will always be congruent so long as angle K does not change



LIGHTING The scaffolding for stage lighting shown appears to be made up of congruent triangles. If $\overline{WX} \cong \overline{YZ}$ and $\overline{WX} \parallel \overline{ZY}$, write a two-column proof to prove that $\triangle WXZ \cong \triangle YZX$.



Proof:

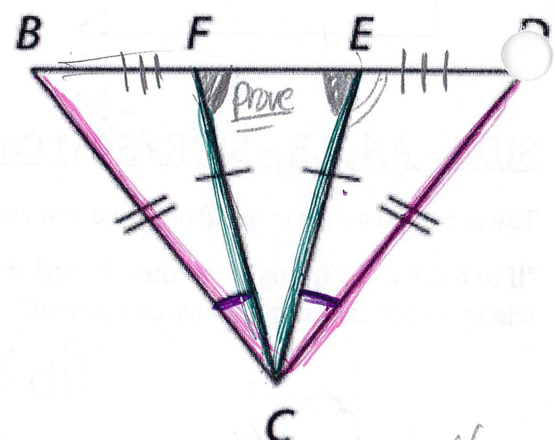
Statements	Reasons
1. $\overline{WX} \cong \overline{YZ}$	1. Given
2. $\overline{WX} \parallel \overline{ZY}$	2. Given
3. $\overline{ZX} = \overline{ZX}$	3. Reflexive
4. $\angle WXZ \cong \angle XZY$	4. alternate Interior angles
5. $\triangle WXZ \cong \triangle YZX$	5. SAS

Think about this in parts

YOYO:

Given: $\overline{BC} \cong \overline{DC}$, $\angle BCF \cong \angle DCE$, $\overline{FC} \cong \overline{EC}$

Prove: $\angle CFD \cong \angle CEB$

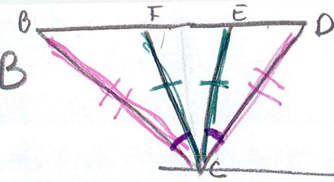


Think of 2 different $\triangle$'s

① $\overline{BC} \cong \overline{DC}$ $\overline{FC} \cong \overline{EC}$ $\angle BCF \cong \angle DCE$	① Given
② $\triangle BCF \cong \triangle DCE$	② SAS
③ $\overline{BF} \cong \overline{ED}$	③ CPCTC
④ $m\angle BFC = m\angle DEC$	④ CPCTC
⑤ $\angle BFC$; $\angle CFD$ are linear pairs $\angle DEC$; $\angle CEB$	⑤ Def of linear pairs
⑥ $\angle BFC$; $\angle CFD$ are supp $\angle DEC$; $\angle CEB$	⑥ Def of linear pairs
⑦ $m\angle BFC + m\angle CFD = 180$ $m\angle DEC + m\angle CEB = 180$	⑦ Def of Supp
⑧ $m\angle BFC + m\angle CFD = m\angle DEC + m\angle CEB$	⑧ Substitutio
⑨ $m\angle DEC + m\angle CFD = m\angle DEC + m\angle CEB$	⑨ Subs
⑩ $m\angle CFD = m\angle CEB$	⑩ Subtraction
⑪ $\angle CFD \cong \angle CEB$	⑪ Def $\cong \angle s$

Flow Chart Proof 4-4

Prove $\angle CFD \cong \angle CEB$



$\overline{BC} \cong \overline{DC}$ — Given

$\overline{FC} \cong \overline{EC}$ — Given

$\angle BCF \cong \angle DCE$ — Given

$\triangle BCF \cong \triangle DCE$ — SAS

$\angle BFC \cong \angle DEC$ — CPCTC

$m\angle BFC = m\angle DEC$ — Def $\cong$

$\angle DEC$ & $\angle CEB$, $\angle BFC$ & $\angle CFD$ are linear pairs — def of Linear pair

$\angle DEC$ & $\angle CEB$, $\angle BFC$ & $\angle CFD$ are supplementary — def of linear pair

$m\angle BFC + m\angle CFD = 180$
$m\angle DEC + m\angle CEB = 180$ — def of Supp

$m\angle BFC + m\angle CFD = m\angle DEC + m\angle CEB$ — Substitution

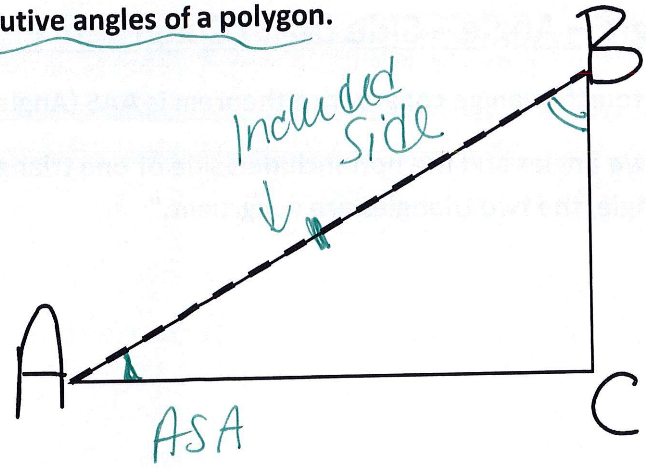
$m\angle DEC + m\angle CFD = m\angle DEC + m\angle CEB$ — Substitution

$m\angle CFD = m\angle CEB$ — Subtraction

$\angle CFD \cong \angle CEB$ — Def of $\cong$

An **Included Side** is the side located between two consecutive angles of a polygon.

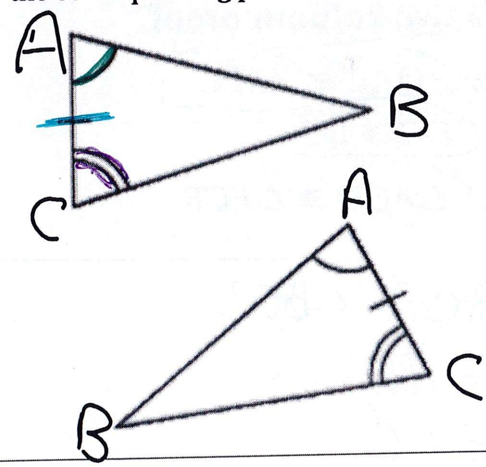
$\triangle ABC$, $\overline{AB}$ is the included side between $\angle A$ and $\angle B$



ANGLE – SIDE – ANGLE (ASA) Congruence:

The third triangle congruency theorem we will use is ASA (Angle-Side-Angle) congruence.

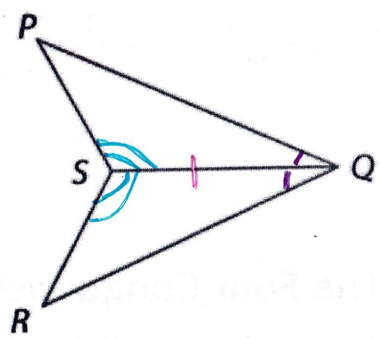
"If two angles and their included side of one triangle are congruent to the corresponding parts of a 2nd triangle, the two triangles are congruent."



Write a two-column proof.

Given: $\overline{QS}$ bisects $\angle PQR$;
$\angle PSQ \cong \angle RSQ$.

Prove: $\triangle PQS \cong \triangle RQS$



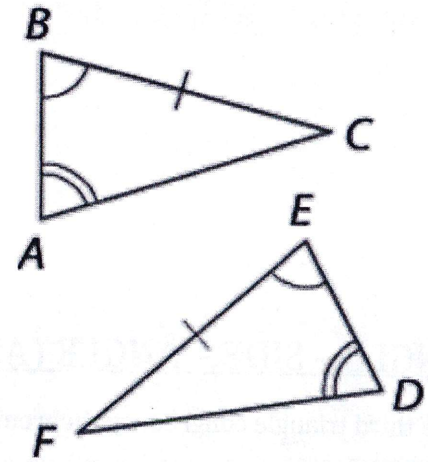
Proof:

① $\overline{QS}$ bisects $\angle PQR$	① Given
② $\angle PQS \cong \angle RQS$	② Def of angle bisector
③ $\angle PSQ \cong \angle RSQ$	③ Given
④ $\overline{SQ} \cong \overline{QS}$	④ Reflexive prop
⑤ $\triangle PQS \cong \triangle RQS$	⑤ ASA

Angle – Angle – Side (AAS) Congruence:

The fourth triangle congruence theorem is AAS (Angle-Angle-Side) Congruence.

"If two angles and the non-included side of one triangle are congruent to the corresponding parts of a 2nd triangle, the two triangles are congruent."

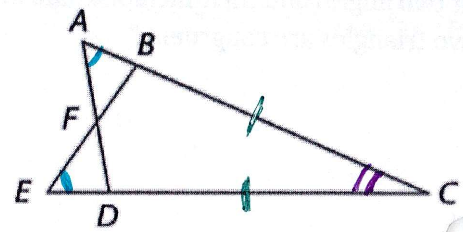


Write a two-column proof.

Given: $\angle DAC \cong \angle BEC$

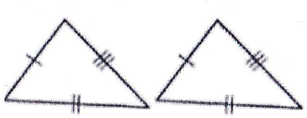
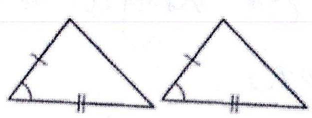
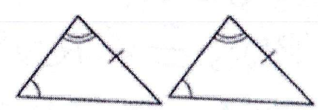
$\overline{DC} \cong \overline{BC}$

Prove: $\triangle ACD \cong \triangle ECB$



① $\angle DAC \cong \angle BEC$	① Given
② $\overline{DC} \cong \overline{BC}$	② Given
③ $\angle C \cong \angle C$	③ Reflexive
④ $\triangle ACD \cong \triangle ECD$	④ AAS

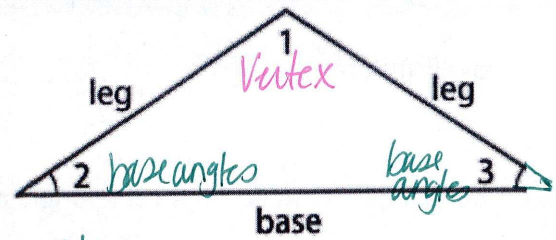
The Four Conguencies:

SSS	SAS	ASA	AAS
			
hree pairs of corresponding ides are congruent.	Two pairs of corresponding sides and their included angles are congruent.	Two pairs of corresponding angles and their included sides are congruent.	Two pairs of corresponding angles and the corresponding nonincluded sides are congruent.

What's Missing?

Honors Math 2 — Chapter 4 Notes

4.6



Isosceles △ have at least two congruent sides.

The two congruent sides are called legs

The angle joining the congruent sides is called the Vertex ∠

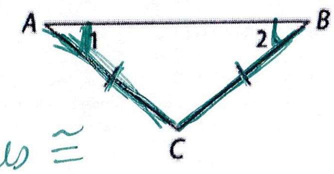
The angles that join the 3rd side with the congruent legs are the base ∠'s

Theorems Isosceles Triangle

4.10 Isosceles Triangle Theorem
If two sides of a triangle are congruent, then the angles opposite those sides are congruent.

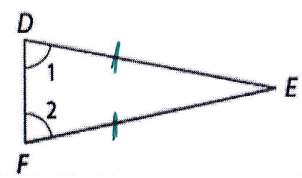
Example If $\overline{AC} \cong \overline{BC}$, then $\angle 2 \cong \angle 1$.

base angles ≅



4.11 Converse of Isosceles Triangle Theorem
If two angles of a triangle are congruent, then the sides opposite those angles are congruent.

Example If $\angle 1 \cong \angle 2$, then $\overline{FE} \cong \overline{DE}$.

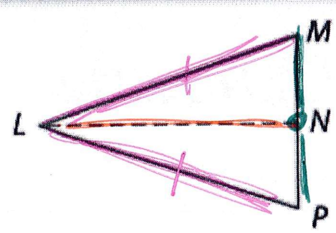


To prove the Iscosceles Triangle Theorem, draw an auxiliary line and use the two triangles formed:

Proof Isosceles Triangle Theorem

Given: $\triangle LMP$; $\overline{LM} \cong \overline{LP}$

Prove: $\angle M \cong \angle P$

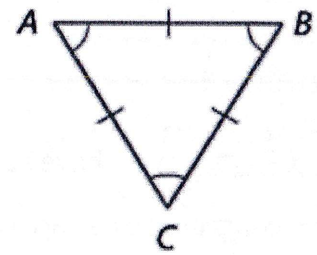


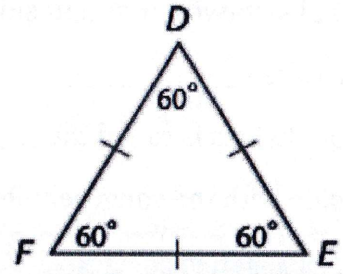
Proof:

Statements	Reasons
1. Let N be the midpoint of $\overline{MP}$.	1. Every segment has exactly one midpoint.
2. Draw an auxiliary segment $\overline{LN}$.	2. Two points determine a line.
3. $\overline{LM} \cong \overline{LP}$	3. Given
4. $\overline{MN} \cong \overline{PN}$	4. Def of Midpoint
5. $\overline{LN} = \overline{NL}$	5. Reflexive prop
6. $\triangle MNL \cong \triangle PNL$	6. SSS
7. $\angle M \cong \angle P$	7. CPCTC

Equilateral Triangles:

- A triangle is equilateral IFF it is equiangular.
  - Equiangular: $\angle A \cong \angle B \cong \angle C$
  - Equilateral: $\overline{AB} \cong \overline{BC} \cong \overline{AC}$

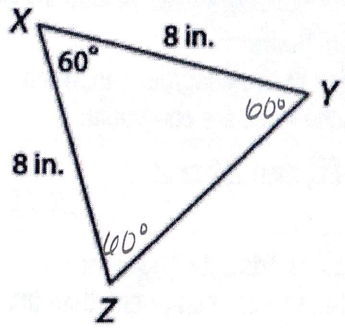




- Each angle in an equilateral triangle measures 60°

Must be

Solve the Triangle:
(find each missing measure)



$\angle Y =$ 60°

$\angle Z =$ 60°

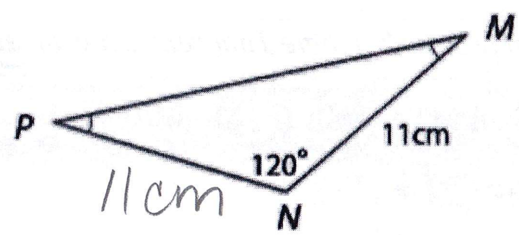
$\overline{ZY} =$ 8 in

$\angle M =$ $180 - 120 = 60 \div 2 = 30°$
30°

$\angle P =$ 30°

$\overline{PN} =$ 11cm

$\overline{PM} =$ Can't determine



$x =$ $180 - 80 = 100$

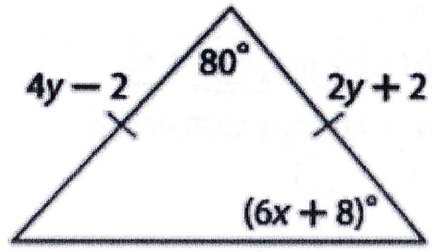
$6x + 8 + 6x + 8 = 100$

$12x + 16 = 100$

$-16 \quad -16$

$12x = 84$

$x = 7$



$4y - 2 = 2y + 2$

$-2y \quad -2y$

$2y - 2 = 2$

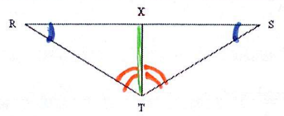
$2y = 4$

$y = 2$

Perform the following proofs:

1) Given: $\angle XRT \cong \angle XST$, $\overline{XT}$ bisects $\angle RTS$

Prove: $\Delta RXT \cong \Delta SXT$

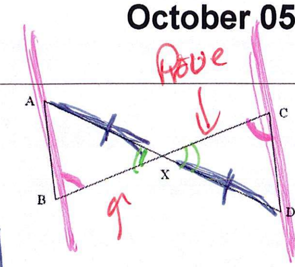


① $\angle XRT \cong \angle XST$	① Given
② $\overline{XT}$ bisects $\angle RTS$	② Given
③ $\angle XTR \cong \angle XTS$	③ Def angle Bisector
④ $\overline{XT} \cong \overline{TX}$	④ Reflexive
④ $\Delta RXT \cong \Delta SXT$	⑤ AAS

Oct 14-8:21 AM

2) Given: $AB \parallel CD$, X is the mid-point of AD

Prove: $BX \cong CX$

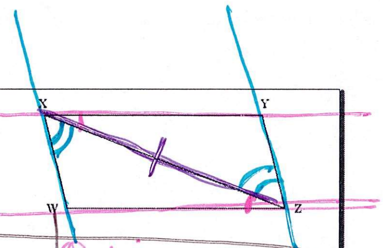


① X is Midpoint of AD	① Given
② $\overline{AX} \cong \overline{DX}$	② Def of Midpoint
③ $\overline{AB} \parallel \overline{CD}$	③ Given
④ $\angle ABX \cong \angle DCX$	④ Alternate Interior ∠'s
⑤ $\angle AXB \cong \angle DXC$	⑤ Vertical Angles
⑥ $\Delta AXB \cong \Delta DXC$	⑥ AAS
⑦ $\overline{BX} \cong \overline{CX}$	⑦ CPCTC

Oct 14-9:09 AM

3) Given: $XY \parallel WZ$, $XW \parallel YZ$

Prove: $\angle XWZ \cong \angle ZYX$

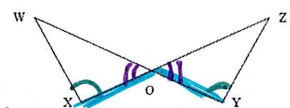


① $XY \parallel WZ$	① Given
② $\angle YXZ \cong \angle WZX$	② Alternate Interior
③ $\overline{XW} \parallel \overline{YZ}$	③ Given
④ $\angle WXZ \cong \angle YZX$	④ Alternate Interior
⑤ $\overline{XZ} = \overline{ZX}$	⑤ Reflexive
⑥ $\Delta XWZ \cong \Delta ZYX$	⑥ ASA
⑦ $\angle XWZ \cong \angle ZYX$	⑦ CPCTC

Oct 14-9:09 AM

4) Given: $\angle WXO \cong \angle ZYO$, $\overline{XO} \cong \overline{YO}$

Prove: $\overline{WO} \cong \overline{ZO}$

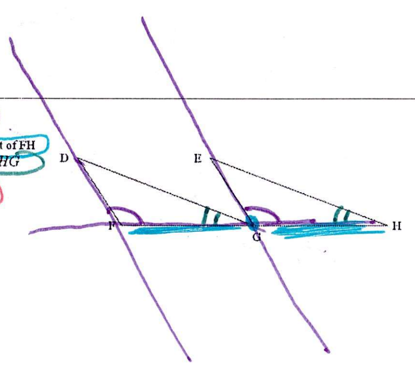


① $\angle WXO \cong \angle ZYO$	① Given
② $\overline{XO} \cong \overline{YO}$	② Given
③ $\angle WOX \cong \angle ZOY$	③ Vertical Angles
④ $\Delta WOX \cong \Delta ZOY$	④ ASA
⑤ $\overline{WO} \cong \overline{ZO}$	⑤ CPCTC

Oct 14-9:09 AM

5) Given: $\overline{DF} \parallel \overline{EG}$, G is the midpoint of FH, $\angle DGF \cong \angle EHG$

Prove: $\overline{DG} \cong \overline{EH}$



① $\overline{DF} \parallel \overline{EG}$	① Given
② $\angle DFG \cong \angle EGH$	② Corresponding ∠'s
③ G is the Midpoint of $\overline{FH}$	③ Given
④ $\overline{FG} \cong \overline{GH}$	④ Def of Midpoint
⑤ $\angle DGF \cong \angle EHG$	⑤ Given
⑥ $\Delta DGF \cong \Delta EHG$	⑥ ASA
⑦ $\overline{DG} \cong \overline{EH}$	⑦ CPCTC

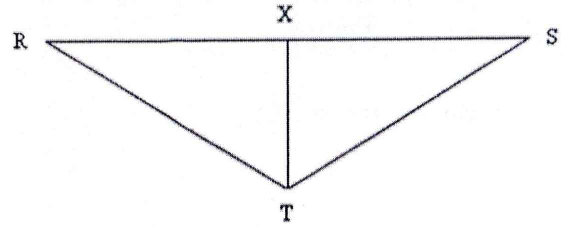
Oct 14-9:09 AM

Honors Math 2 Practice Proofs ASA AAS 4.5 Name:________________________

Perform the following proofs:

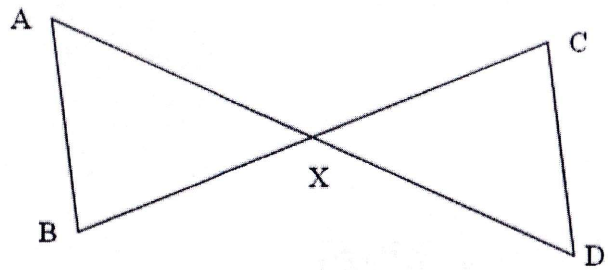
1) Given: $\angle XRT \cong \angle XST$
$\overline{XT}$ bisects $\angle RTS$

Prove: $\Delta RXT \cong \Delta SXT$



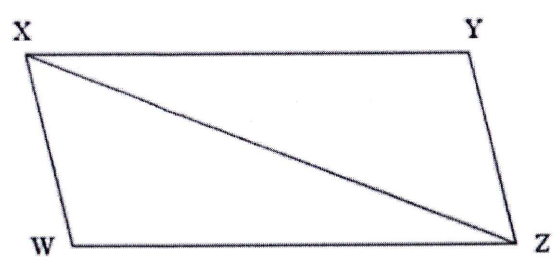
Given: AB || CD
X is the mid-point of AD

Prove: $BX \cong CX$



3) Given: XY || WZ,
XW || YZ

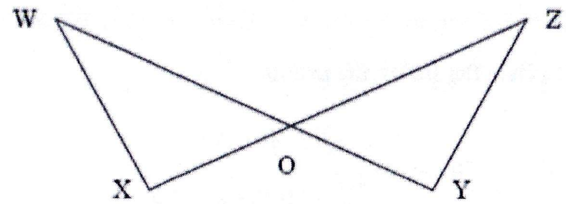
Prove: $\angle XWZ \cong \angle ZYX$



4) Given: $\angle WXO \cong \angle ZYO$

$\overline{XO} \cong \overline{YO}$

Prove: $\overline{WO} \cong \overline{ZO}$

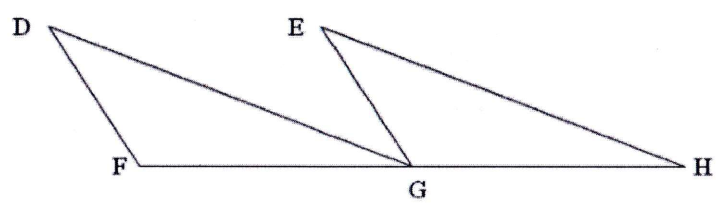


5) Given: $\overline{DF} \parallel \overline{EG}$

G is the midpoint of FH

$\angle DGF \cong \angle EHG$

Prove: $\overline{DG} \cong \overline{EH}$



4.4 Proofs SSS SAS

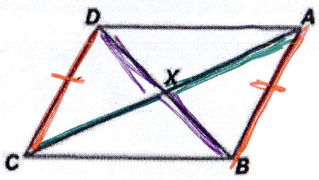
Write a flow proof.

Given: X is the midpoint of $\overline{BD}$.

X is the midpoint of $\overline{AC}$.

$\overline{CD} \cong \overline{BA}$

Prove: $\triangle DXC \cong \triangle BXA$



S $\boxed{\overline{CD} \cong \overline{BA}}$ Given

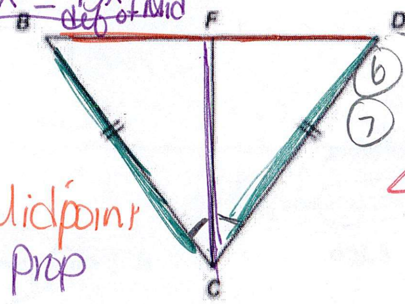
$\boxed{X \text{ is Midpoint of } \overline{AC}}$ Given → $\boxed{\overline{CX} \cong \overline{AX}}$ def of Midpoint

$\boxed{X \text{ is Midpoint } \overline{BD}}$ given → $\boxed{\overline{DX} \cong \overline{BX}}$ def of Mid

→ $\boxed{\triangle DXC \cong \triangle BXA}$ SSS

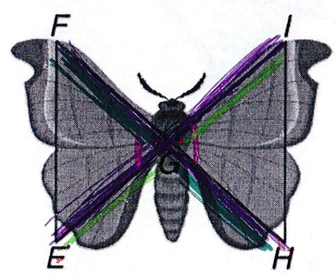
Given: $\overline{BC} \cong \overline{DC}$, F is the midpoint of $\overline{BD}$

Prove: $\overline{FC}$ bisects $\angle BCD$



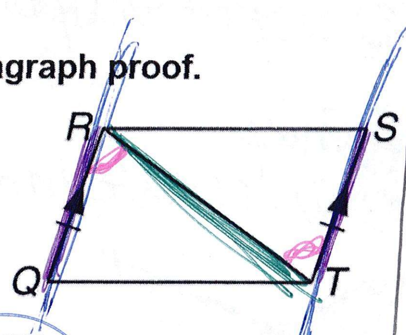
① $\overline{BC} \cong \overline{DC}$	① Given
② F is the Midpoint of BD	② Given
③ $\overline{BF} \cong \overline{FD}$	③ Def of Midpoint
④ $\overline{FC} \cong \overline{CF}$	④ Reflexive Prop
⑤ $\triangle BFC \cong \triangle DFC$	⑤ SSS
⑥ $\angle FCB \cong \angle FCD$	⑥ CPCTC
⑦ $\overline{FC}$ bisects $\angle BCD$	⑦ Def of angle bisector

ENTOMOLOGY **The wings of one type of moth form two triangles. Write a two-column proof to prove that $\triangle FEG \cong \triangle HIG$ if $\overline{EI} \cong \overline{FH}$, and G is the midpoint of both EI and FH.**



Statements	Reasons
① $\overline{EI} \cong \overline{FH}$	① Given
② $\angle FGE \cong \angle HGI$	② vertical angles
③ G is Midpoint of $\overline{EI}$ & $\overline{FH}$	③ Given
④ $\overline{EG} \cong \overline{IG}$	④ Def of Midpoint
⑤ $\overline{FG} \cong \overline{HG}$	⑤ Def of Midpoint
⑥ $\triangle FEG \cong \angle HIG$	⑥ SAS

Write a paragraph proof.



Given: $\overline{RQ} \parallel \overline{TS}$

$\overline{RQ} \cong \overline{TS}$

Prove: $\angle Q \cong \angle S$

We know that $\overline{RQ} \cong \overline{TS}$ and $\overline{RQ} \parallel \overline{TS}$ because it is given. Because of the reflexive property we know that $RT \cong TR$. Angle QRT and $\angle STR$ are alternate interior angles so they are congruent. We can say $\triangle QRT \cong \triangle STR$ because of SAS. Congruent parts of congruent triangles are $\cong$ so $\angle Q \cong \angle S$.

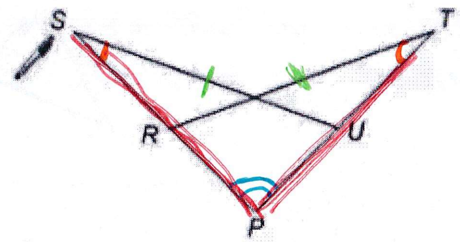
4.5 Proofs AAS ASA

Write a paragraph proof.

Given: $\angle PSU \cong \angle PTR$

$\overline{SU} \cong \overline{TR}$

Prove: $\overline{SP} \cong \overline{TP}$



$\boxed{\angle PSU \cong \angle PTR}$ Given → $\boxed{\triangle SPU \cong \triangle TPR}$ AAS → $\boxed{\overline{SP} \cong \overline{TP}}$ CPCTC

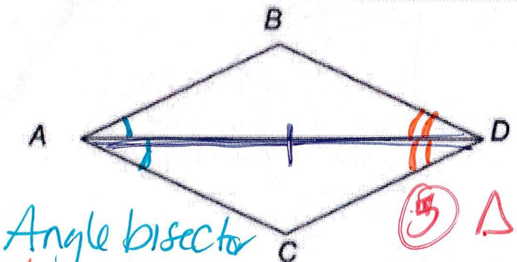
$\boxed{\overline{SU} \cong \overline{TR}}$ Given →

$\boxed{\angle P \cong \angle P}$ reflexive →

Write a two-column proof.

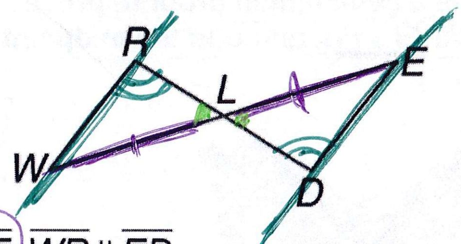
Given: $\overline{AD}$ bisects $\angle BAC$ and $\angle BDC$.

Prove: $\triangle ABD \cong \triangle ACD$



1 $\overline{AD}$ bisects $\angle BAC$; $\angle BDC$	1 Given
2 $\angle BAD \cong \angle CAD$	2 Def of Angle bisector
3 $\angle BDA \cong \angle CDA$	3 Def of Angle bisector
4 $\overline{AD} \cong \overline{DA}$	4 Reflexive
5 $\triangle ABD \cong \triangle ACD$	ASA

Write a two-column proof.



Given: L is the midpoint of $\overline{WE}$; $\overline{WR} \parallel \overline{ED}$.

Prove: $\triangle WRL \cong \triangle EDL$

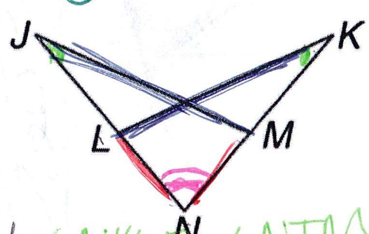
1 L is Midpoint of $\overline{WE}$	1 Given
2 $\overline{WL} \cong \overline{EL}$	2 Def of Midpoint
3 $\angle RLW \cong \angle DLE$	3 vertical angles
4 $\overline{WR} \parallel \overline{ED}$	4 Given
5 $\angle WRL \cong \angle EDL$	5 alternate Interior $\angle$'s
6 $\triangle WRL \cong \triangle EDL$	AAS

Write a paragraph proof.

Given: $\angle NKL \cong \angle NJM$

$\overline{KL} \cong \overline{JM}$

Prove: $\overline{LN} \cong \overline{MN}$



We know that $\angle NKL \cong \angle NJM$ and $\overline{KL} \cong \overline{JM}$ because it was given we also know that $\angle N \cong \angle N$ because of the reflxive property. So we can say $\triangle KNL \cong \triangle JNM$ because of AAS. We know that $\overline{LN} \cong \overline{MD}$ because CPCTC