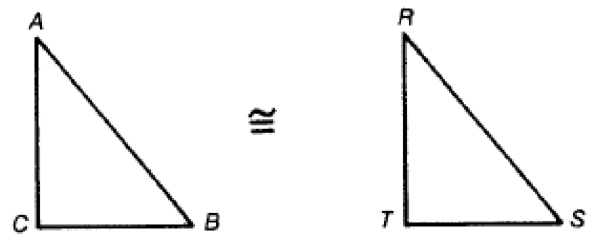
Proving Triangles Congruent



Topic	Pages in Packet	Assignment: (Honors TXTBK)
Angles in Triangles/Definition of Congruent Triangles	Pages 2-6	**HOLT TXTBK:** Page 227#9-14,19-22,41-42,45,49
Identifying Congruent Triangles	Pages 7- 13	**This Packet pages 14- 15**
Congruent Triangles Proofs	Pages 16-21	**This Packet pages 22-24**
C.P.C.T.C.	Pages 25-29	Pages 127-129 #'s 6,12,13,18,21
C.P.C.T.C. and BEYOND	Pages 30 - 33	Pages 135 #'s #2, 5, 7-11, 15
Isosceles Triangle	Pages 34 - 37	Page 155 #'s 20,21, 23, 24, 25 Page 160 # 16
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Right Angle Theorem & Equidistance Theorems	Pages 44-50	Pgs 182-183 #'s 4, 9, 14 Pg 189-190 #'s 14,15,16, 17, 20
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Answer Keys Start on page 63		

Day 1

SWBAT: Use properties of congruent triangles. Prove triangles congruent by using the definition of congruence.

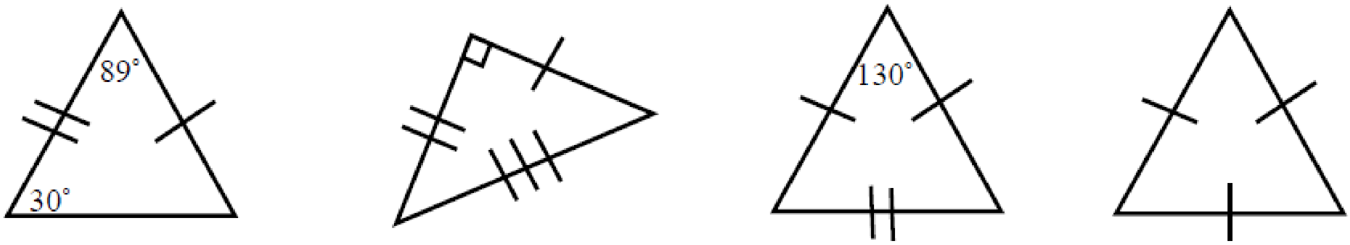
Vocabulary Review: Describe how to classify triangles by sides or angles. Draw a diagram for each.

By Angles	By Sides
Acute	Scalene
Right	Isosceles
Obtuse	Equilateral
Equilateral	

Theorem Review: Describe each theorem and include a diagram

Theorem	Diagram
Triangle Sum Theorem	
Exterior Angle Theorem	
Third Angles Theorem	

1. Classify the triangles based on their side lengths and angle measures.

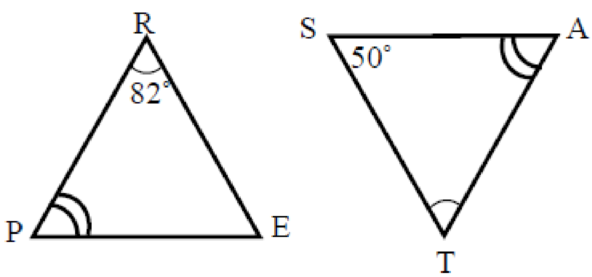


________________ ________________ ________________ ________________

________________ ________________ ________________ ________________

For #2 – 5, solve for the variable and then find missing angle or side lengths.

2. If $m\measuredangle A = (5x - 7)^\circ$, find x, $m\measuredangle A$ and $m\measuredangle E$.



2. x = __________

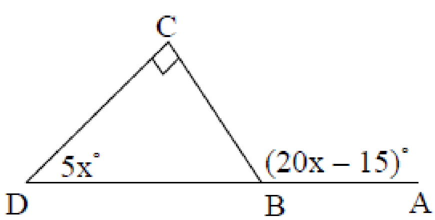
$m\measuredangle A =$ ________

$m\measuredangle E =$ ________

3. In ΔWIN $m\measuredangle W = (2y + 7)^\circ$, $m\measuredangle I = (6y)^\circ$, $m\measuredangle N = (8y + 13)^\circ$. Find y.
(Hint: Draw a diagram.)

3. ____________

4.



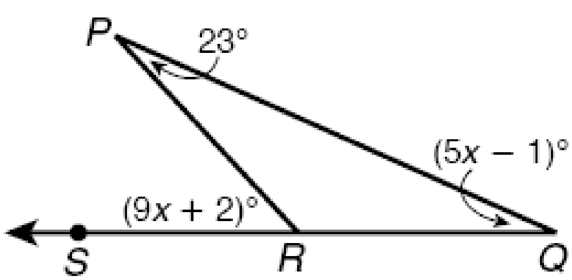
4. x = __________

$m\measuredangle ABC =$ _______

5. In right triangle ABC, $m\angle C = 3y - 10$, $m\angle B = y + 40$, and $m\angle A = 90$. What type of right triangle is triangle ABC?

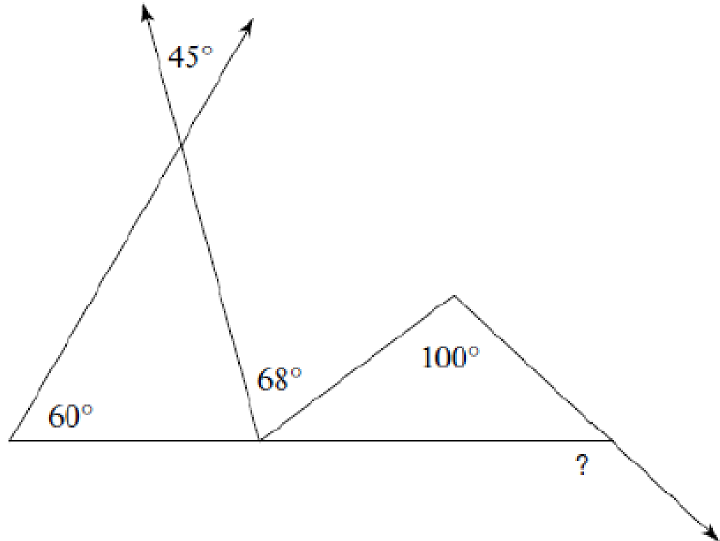
6. The angle measures of a triangle are in the ratio of 5:6:7. Find the angle measures of the triangle.

7. Solve for m∡*PRS*

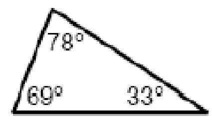
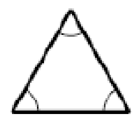
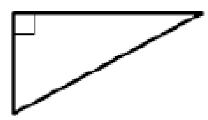
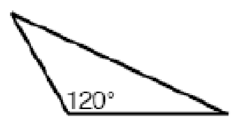
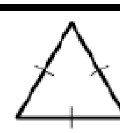
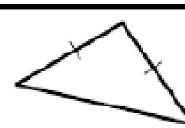
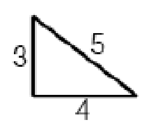


Challenge

Find the measure of the angle indicated.



SUMMARY

Classification	Description	Example
acute triangle	triangle that has *three* acute **angles**	
equiangular triangle	triangle that has *three* congruent acute **angles**	
right triangle	triangle that has *one* right **angle**	
obtuse triangle	triangle that has *one* obtuse **angle**	
equilateral triangle	triangle with *three* congruent **sides**	
isosceles triangle	triangle that has *at least two* congruent **sides**	
scalene triangle	triangle that has *no* congruent **sides**	

Exit Ticket

1. In $\triangle ABC$, $m\angle A = x$, $m\angle B = 2x + 2$, and $m\angle C = 3x + 4$. What is the value of x?

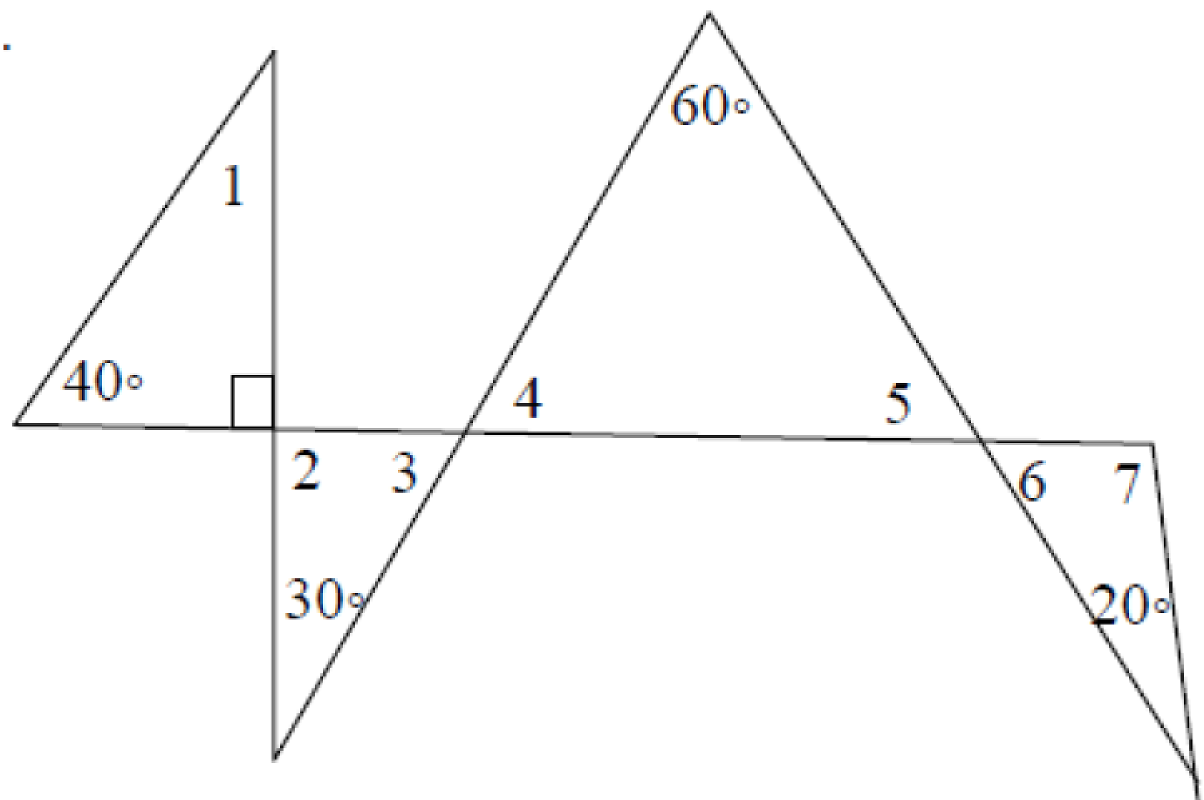
1) 29
2) 31
3) 59
4) 61

2. Triangle PQR has angles in the ratio of $2:3:5$. Which type of triangle is $\triangle PQR$?

1) acute
2) isosceles
3) obtuse
4) right

Day 2 - Identifying Congruent Triangles

Warm – Up
Find the measure of the missing angles



$m\measuredangle 1 =$ ______

$m\measuredangle 2 =$ ______

$m\measuredangle 3 =$ ______

$m\measuredangle 4 =$ ______

$m\measuredangle 5 =$ ______

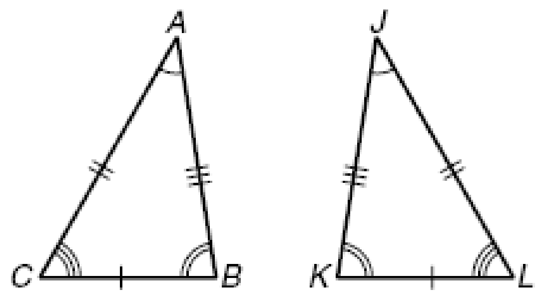
$m\measuredangle 6 =$ ______

$m\measuredangle 7 =$ ______

Geometric figures are congruent if they are the same size and shape. **<u>Corresponding angles</u>** and **<u>corresponding sides</u>** are in the same _______________ in polygons with an equal number of _______.

Two polygons are _________ **polygons** if and only if their _________________ sides are _____________. Thus triangles that are the same size and shape are congruent.

Ex 1: Name all the corresponding sides and angles below if the polygons are congruent.



$\triangle ABC \cong \triangle JKL$

Corresponding Sides **Corresponding Angles**

Ex 2:

Given $\Delta GEO \cong \Delta FUN$ **. Let** $m\measuredangle E = (3x-4)^\circ$, $m\measuredangle F = 2x^\circ$, $m\measuredangle N = (20-x)^\circ$ **.**

a. Draw and label a diagram.
b. List all six pairs of congruent parts
c. Solve for x

b.

____

____

____

____

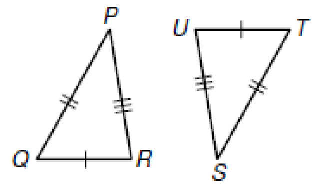
____

____

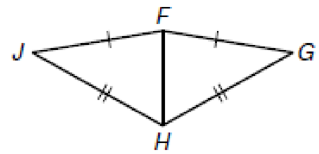
c. x = ___________

Identifying Congruent Triangles

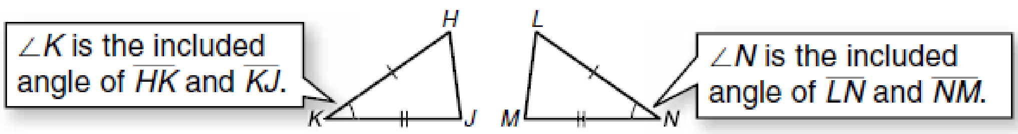
Side-Side-Side (SSS) Congruence Postulate
If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent. $\overline{QR} \cong \overline{TU}$, $\overline{RP} \cong \overline{US}$, and $\overline{PQ} \cong \overline{ST}$, so $\triangle PQR \cong \triangle STU$.



You can use SSS to explain why $\triangle FJH \cong \triangle FGH$.
It is given that $\overline{FJ} \cong \overline{FG}$ and that $\overline{JH} \cong \overline{GH}$. By the Reflex. Prop. of $\cong$, $\overline{FH} \cong \overline{FH}$. So $\triangle FJH \cong \triangle FGH$ by SSS.

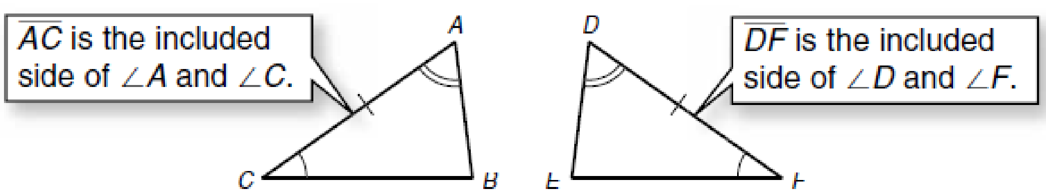


Side-Angle-Side (SAS) Congruence Postulate
If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.



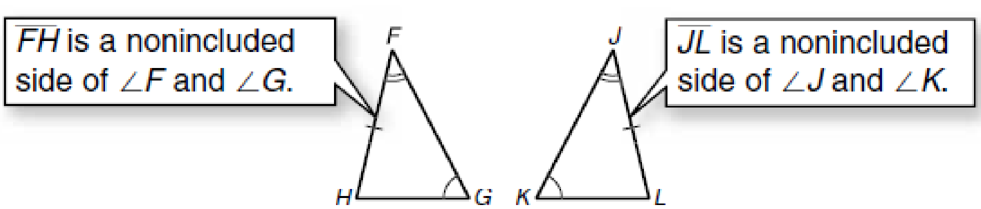
$\triangle HJK \cong \triangle LMN$

Angle-Side-Angle (ASA) Congruence Postulate
If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.



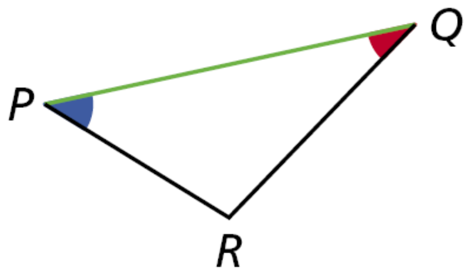
$\triangle ABC \cong \triangle DEF$

Angle-Angle-Side (AAS) Congruence Theorem
If two angles and a nonincluded side of one triangle are congruent to the corresponding angles and nonincluded side of another triangle, then the triangles are congruent.



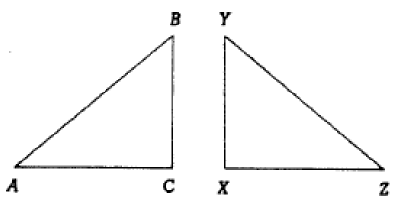
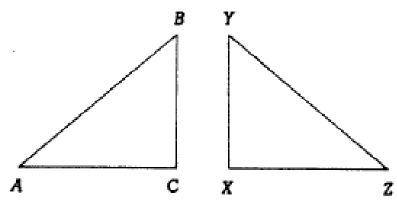
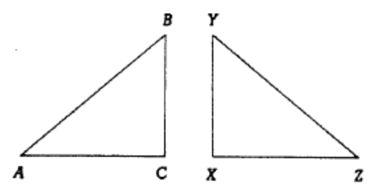
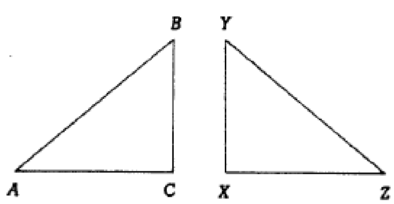
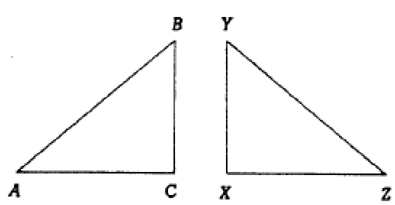
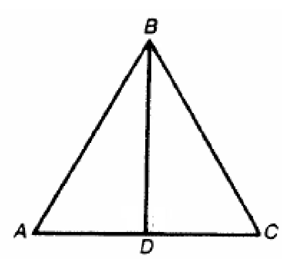
$\triangle FGH \cong \triangle JKL$

An **<u>included side</u>** is the common side of two consecutive angles in a polygon. The following postulate uses the idea of an included side.



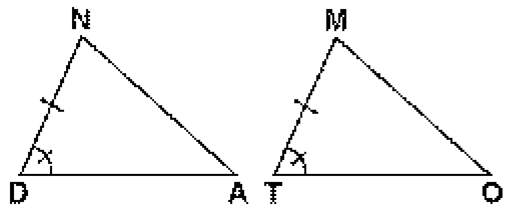
$\overline{PQ}$ is the included side of $\angle P$ and $\angle Q$.

Name the postulate or theorem you would use to prove $\triangle ACB \cong \triangle ZXY$ given following information. If there is *not* enough information, state none.

$\angle B \cong \angle Y$ $\angle A \cong \angle Z$ $\overline{BC} \cong \overline{YX}$ 	$\angle C \cong \angle X$ $\angle A \cong \angle Z$ $\overline{CA} \cong \overline{XZ}$ 	$\overline{AC} \cong \overline{ZX}$ $\angle B \cong \angle Y$ $\overline{BC} \cong \overline{YX}$ 
$\overline{ZX} \cong \overline{AC}$ $\overline{XY} \cong \overline{CB}$ $\angle X \cong \angle C$ 	$\overline{AB} \cong \overline{ZY}$ $\overline{AC} \cong \overline{ZX}$ $\overline{CB} \cong \overline{XY}$ 	$\overline{AB} \cong \overline{BC}$, $\overline{BD}$ bisects $\angle ABC$. 

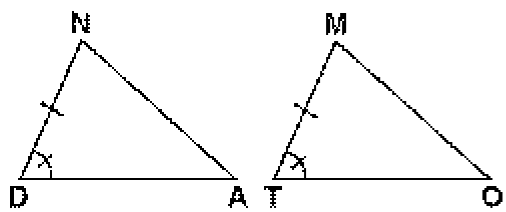
The pair of triangles below has two corresponding parts marked as congruent.

1. What additional information is needed for a SAS congruence correspondence?



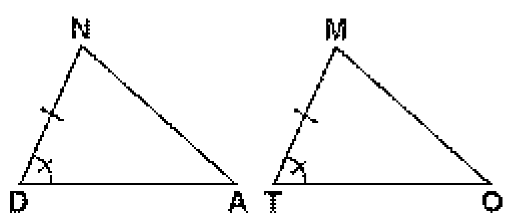
Answer: _______ ≅ _______

2. What additional information is needed for an ASA congruence correspondence?



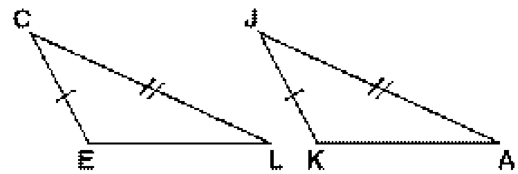
Answer: _______ ≅ _____

3. What additional information is needed for an AAS congruence correspondence?



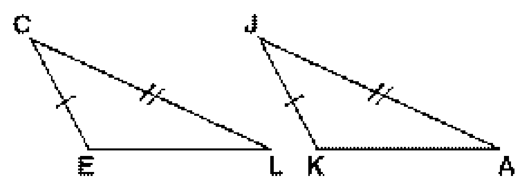
Answer: _______ ≅ _______

4. What additional information is needed for a SSS congruence correspondence?



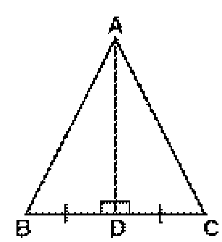
Answer: _______ ≅ ______

5. What additional information is needed for a SAS congruence correspondence.



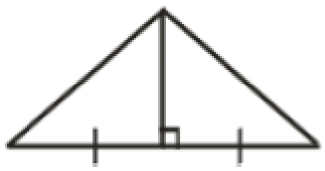
Answer: _______ ≅ _______

6. What additional information is needed for an ASA congruence correspondence?



Answer: _______ ≅ _______

Using the tick marks for each pair of triangles, name the method {SSS, SAS, ASA, AAS} that can be used to prove the triangles congruent. If not, write ***not possible***.
(Hint: Remember to look for the <u>reflexive side</u> and vertical angles!!!!)



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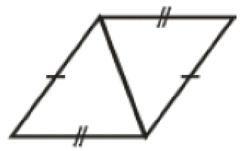

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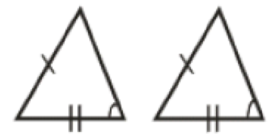

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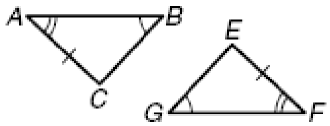

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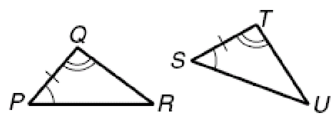

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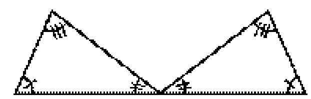

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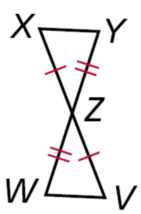

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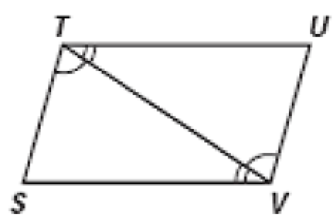

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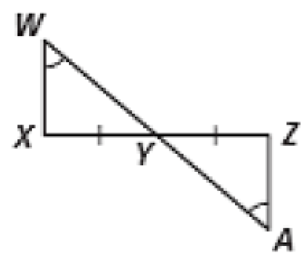

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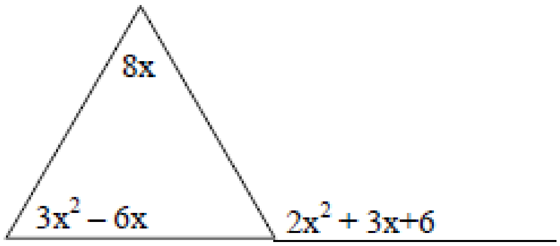
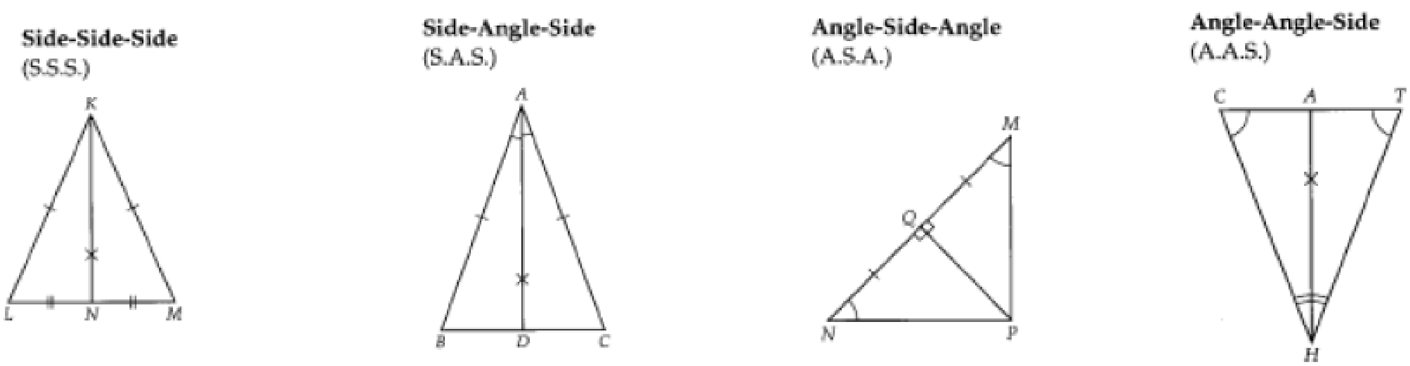
Challenge

Solve for x.

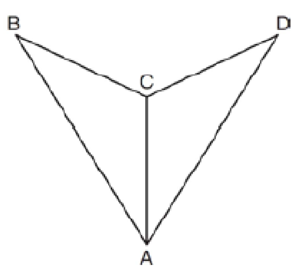


SUMMARY



Exit Ticket

As shown in the diagram below, $\overline{AC}$ bisects $\angle BAD$ and $\angle B \cong \angle D$.



Which method could be used to prove $\triangle ABC \cong \triangle ADC$?

1) SSS
2) AAA
3) SAS
4) AAS

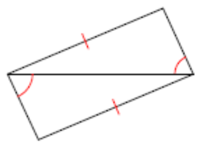
Kuta Software - Infinite Geometry   Name___________________________________

SSS, SAS, ASA, and AAS Congruence

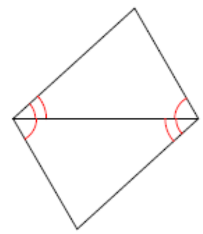
Date________________ Period____

State if the two triangles are congruent. If they are, state how you know.

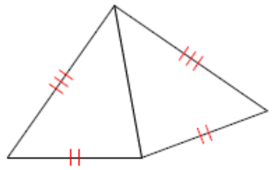
1)



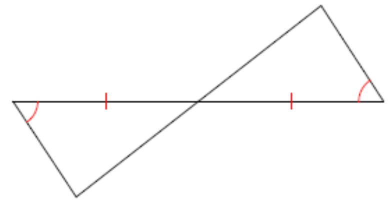
2)



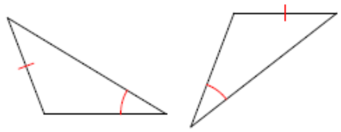
3)



4)



5)



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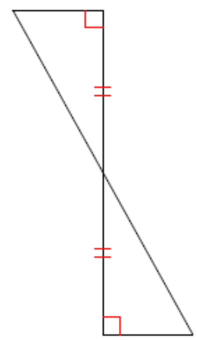

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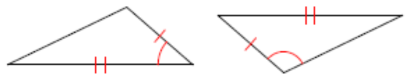

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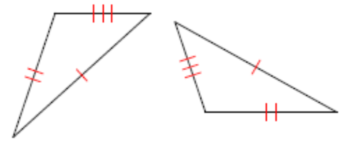
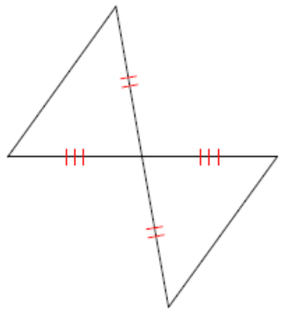
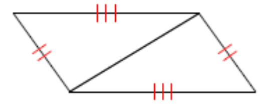


9)

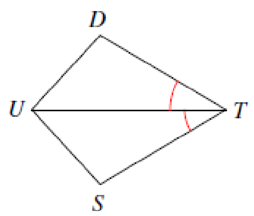


10)

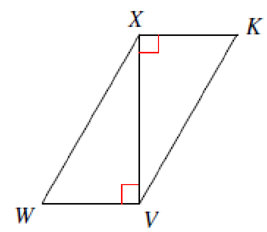


State what additional information is required in order to know that the triangles are congruent for the reason given.

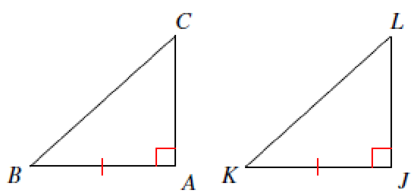
11) ASA



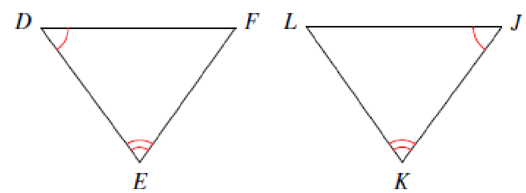
12) SAS



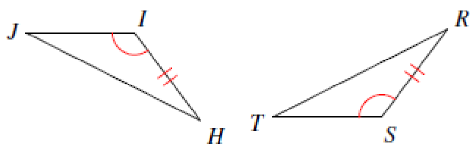
13) SAS



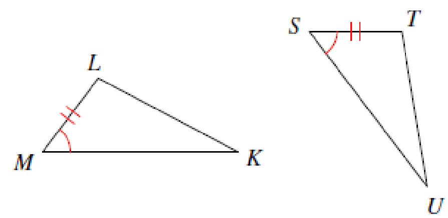
14) ASA



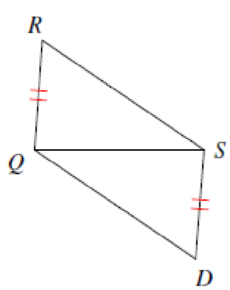
15) SAS



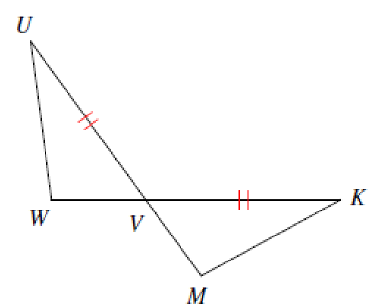
16) ASA



17) SSS



18) SAS



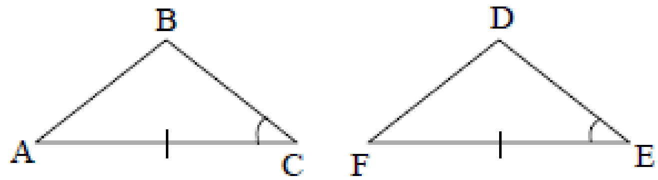
Day 3 – Proving Congruent Triangles

Warm - Up

Each pair of triangles below has two corresponding sides or angles marked congruent. Indicate the additional information needed to enable us to apply the specified congruence postulate.

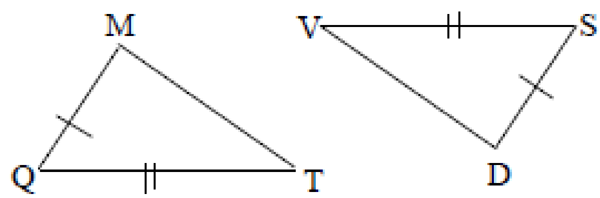
1. For ASA ________________

   For SAS ________________



2. For SAS ________________

   For SSS ________________

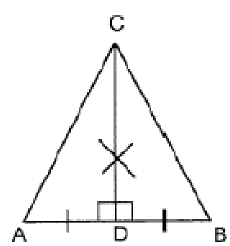


Congruent Triangle Proofs

Example 1: Proving Triangles Congruent

GIVEN: $\triangle ABC$, $\overline{CD} \perp \overline{AB}$
D midpoint of $\overline{AB}$.

PROVE: $\triangle ACD \cong \triangle BCD$



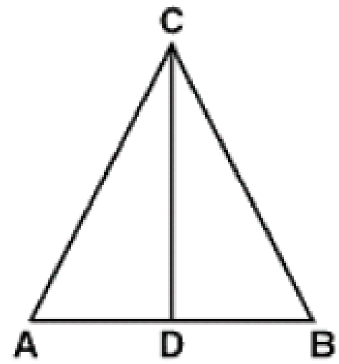
STATEMENTS	REASONS
1) $\overline{CD} \perp \overline{AB}$ D midpoint of $\overline{AB}$.	1) Given
2) $\overline{AD} \cong \overline{DB}$ (s ≅ s)	2) A midpoint divides a segment into two congruent segments.
3) $\angle ADC$ is a right angle $\angle BDC$ is a right angle.	3) Perpendicular lines form right angles.
4) $\angle ADC \cong \angle BDC$ (a ≅ a)	4) All right angles are congruent.
5) $\overline{CD} \cong \overline{CD}$ (s ≅ s)	5) Reflexive postulate.
6) $\triangle ACD \cong \triangle BCD$	6) s.a.s. ≅ s.a.s.

Model Problem #1

Given: $\overline{AC} \cong \overline{BC}$

D is the midpoint of $\overline{AB}$

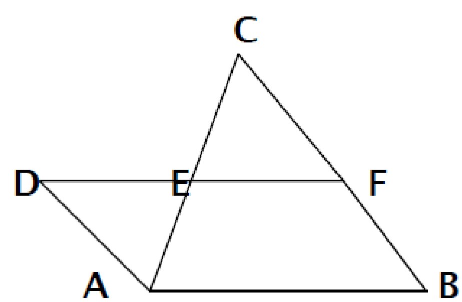
Prove: $\Delta ACD \cong \Delta BCD$



Statements	Reasons
☐ 1	1 Given
2	2 Given
☐ 3 ______ $\cong$ ______	3 ______ $\rightarrow$ ______
☐ 4 ______ $\cong$ ______	4
5 $\Delta ACD \cong \Delta BCD$	5

2) **Given:** $\overline{AC}$ *and* $\overline{DF}$ bisect each other at E

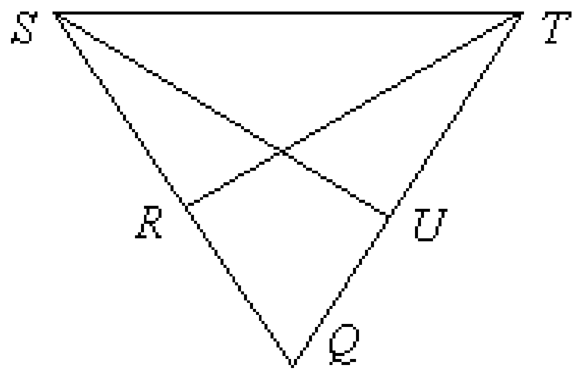
Prove: $\triangle DEA \cong \triangle FEC$



Statements	Reasons
1	1 Given
2	2 Seg bisector $\rightarrow$ ______
☐ 3 ______ $\cong$ ______	3 } ______ $\rightarrow$ ______
☐ 4 ______ $\cong$ ______	4
☐ 5 ______ $\cong$ ______	5
6 $\Delta DEA \cong \Delta FEC$	6

3) Given: $\overline{SR} \perp \overline{RT}$; $\overline{TU} \perp \overline{US}$; $\measuredangle STR \cong \measuredangle TSU$

Prove: $\triangle TRS \cong \triangle SUT$

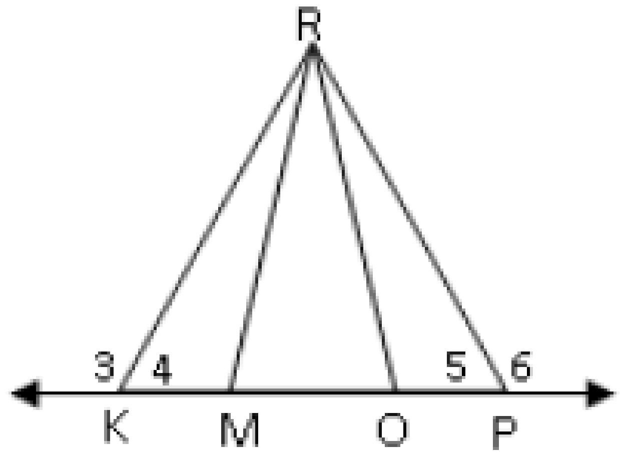


Statements	Reasons
1	1 Given
☐ 2	2 Given
3	3 ___ → _______
☐ 4 _____ ≅ ______	4
☐ 5 _____ ≅ ______	5
6 $\Delta TRS \cong \Delta SUT$	6

LEVEL B

4) *Given:* $\angle 3 \cong \angle 6$,
$\overline{KR} \cong \overline{PR}$,
$\angle KRO \cong \angle PRM$

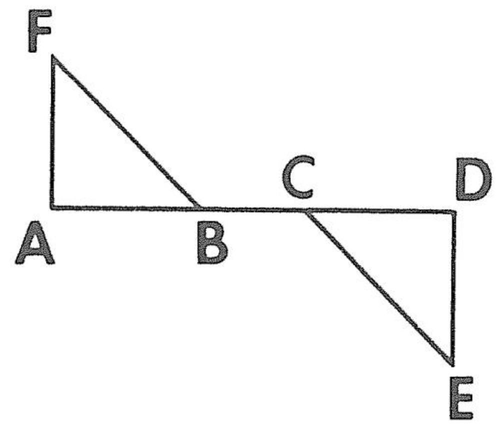
Prove: $\triangle KRM \cong \triangle PRO$



Statements	Reasons

5. Given: $\overline{FA} \perp \overline{AD}$, $\overline{ED} \perp \overline{AD}$,
$\overline{AC} \cong \overline{DB}$, $\measuredangle F \cong \measuredangle E$

Prove: $\triangle ABF \cong \triangle DCE$.



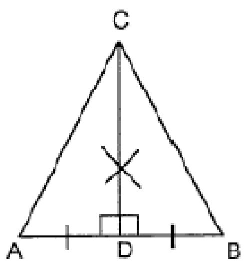
Statements	Reasons

SUMMARY

Example 1: Proving Triangles Congruent

GIVEN: ΔABC, $\overline{CD} \perp \overline{AB}$
D midpoint of $\overline{AB}$.

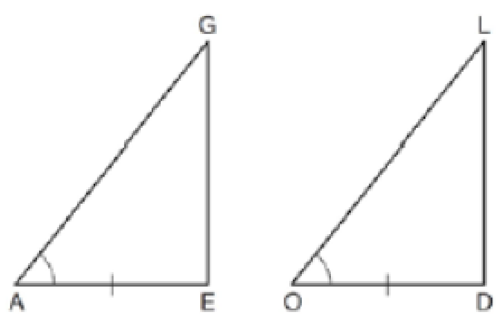
PROVE: $\Delta ACD \cong \Delta BCD$



STATEMENTS	REASONS
1) $\overline{CD} \perp \overline{AB}$ D midpoint of $\overline{AB}$.	1) Given
2) $\overline{AD} \cong \overline{DB}$ (s ≅ s)	2) A midpoint divides a segment into two congruent segments.
3) ∠ ADC is a right angle ∠ BDC is a right angle.	3) Perpendicular lines form right angles.
4) ∠ ADC ≅ ∠BDC (a ≅ a)	4) All right angles are congruent.
5) $\overline{CD} \cong \overline{CD}$ (s ≅ s)	5) Reflexive postulate.
6) Δ ACD ≅ Δ BCD	6) s.a.s. ≅ s.a.s.

Exit Ticket

In the diagram below of ΔAGE and ΔOLD, $\angle GAE \cong \angle LOD$, and $\overline{AE} \cong \overline{OD}$.

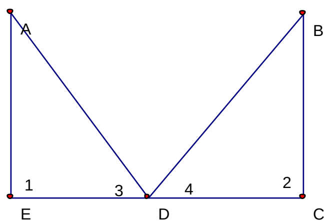


To prove that ΔAGE and ΔOLD are congruent by SAS, what other information is needed?

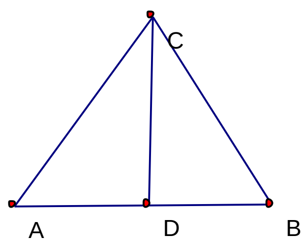
1) $\overline{GE} \cong \overline{LD}$
2) $\overline{AG} \cong \overline{OL}$
3) $\angle AGE \cong \angle OLD$
4) $\angle AEG \cong \angle ODL$

Practice with Congruent Triangles

1. **Given:** $\overline{AE} \perp \overline{ED}$
   $\overline{BC} \perp \overline{CD}$
   D is the midpoint of $\overline{EC}$**.**
   $\measuredangle 3 \cong \measuredangle 4$
   Prove: $\triangle AED \cong \triangle BCD$

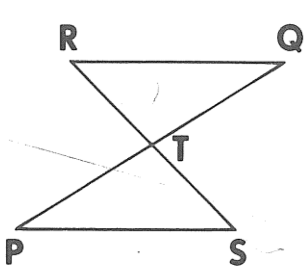


2. **Given:** $\overline{AC} \cong \overline{CB}$
   $\overline{CD}$ **Bisects** $\overline{AB}$
   Prove: $\triangle ADC \cong \triangle BDC$



3.

Given: $\overline{RS}$ bisects $\overline{PQ}$ at T, $\overline{PQ}$ bisects $\overline{RS}$ at T.
Prove: $\triangle PTS \cong \triangle QTR$.

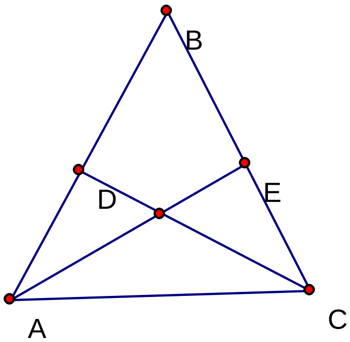


4. Given: $\measuredangle BAC \cong \measuredangle BCA$

$\overline{CD}$ **bisects** $\measuredangle BCA$

$\overline{AE}$ **bisects** $\measuredangle BAC$

Prove: $\triangle ADC \cong \triangle CEA$

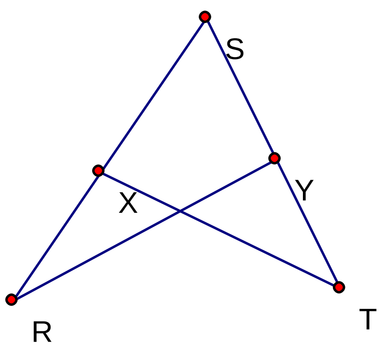


5. Given: $\overline{SR}$ **and** $\overline{ST}$ **are straight lines.**

$\overline{SX} \cong \overline{SY}$

$\overline{XR} \cong \overline{YT}$

Prove: $\triangle RSY \cong \triangle TSX$

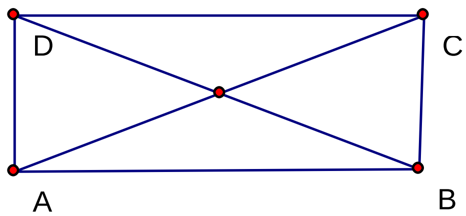


6. Given: $\overline{DA} \cong \overline{CB}$

$\overline{DA} \perp \overline{AB}$

$\overline{CB} \perp \overline{AB}$

Prove: $\triangle DAB \cong \triangle CBA$

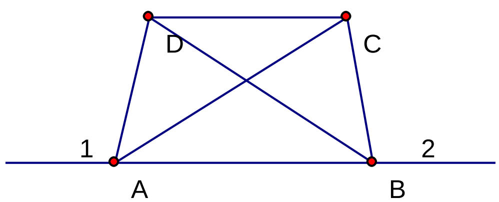


7. Given: $\overline{LM}$ **is a straight line**

$\overline{CB} \cong \overline{DA}$

$\measuredangle 1 \cong \measuredangle 2$

Prove: $\triangle ABC \cong \triangle BAD$



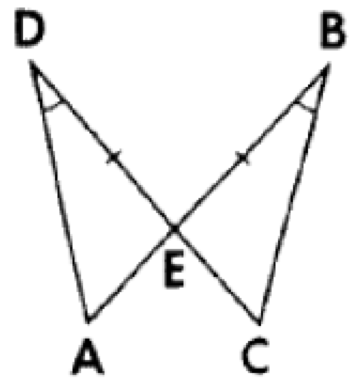
Day 4 - CPCTC

SWBAT: To use triangle congruence and CPCTC to prove that parts of two triangles are congruent.

Warm-Up

What additional information would you need to prove these triangles congruent by ASA?

_______ ≅ ________



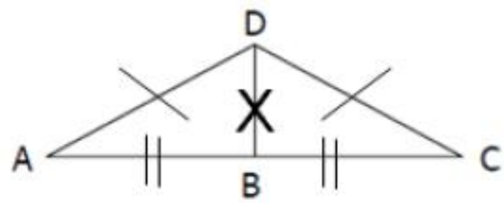
With SSS, SAS, ASA, and AAS, you know how to use three parts of triangles to show that the triangles are congruent. Once you have triangles congruent, you can make conclusions about their other parts because, by definition, corresponding parts of congruent triangles are congruent. You can abbreviate this as **CPCTC.**

CPCTC Proofs

Corresponding Parts of Congruent Triangles are Congruent (CPCTC)
To use CPCTC, you must **first** show the triangles are congruent!!!

Example 2: USING CPCTC

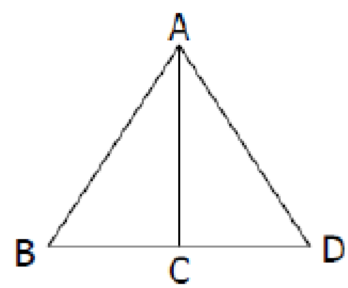
Given: B is the midpoint of $\overline{AC}$, $\overline{AD} \cong \overline{CD}$
Prove: $\angle DAB \cong \angle DCB$



	Statements	Reasons
(s)	1) B is the midpoint of $\overline{AC}$, $\overline{AD} \cong \overline{CD}$	1) Given
(s)	2) $\overline{AB} \cong \overline{CB}$	2) **Midpoint → 2 ≅ *segments***
(s)	3) $\overline{DB} \cong \overline{DB}$	3) Reflexive property of segments
	4) $\triangle ADB \cong \triangle CDB$	4) SSS
	5) $\angle DAB \cong \angle DCB$	5) CPCTC

You Try It!

Given: C is the midpoint of $\overline{BD}$, $\overline{AC} \perp \overline{BD}$
Prove: $\angle BAC \cong \angle DAC$

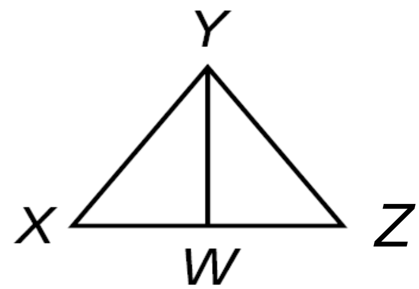


	Statements	Reasons
	1) ______	1) ______
☐	2) $\overline{BC} \cong \overline{DC}$	2) ______
	3) $\angle ACB$ & $\angle ACD$ are right angles	3) ______
☐	4) $\angle ACB \cong \angle ACD$	4) ______
☐	5) ______	5) Reflexive Property
	6) $\triangle ACB \cong \triangle ACD$	6) ______
	7)	7) ______

Example 1:

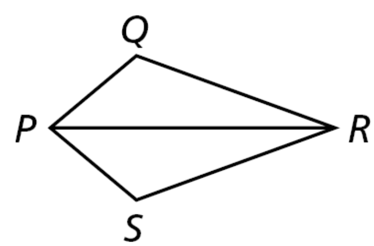
Given: W is the midpoint of $\overline{XZ}$, $\overline{XY} \cong \overline{ZY}$

Prove: $\angle XYW \cong \angle ZYW$



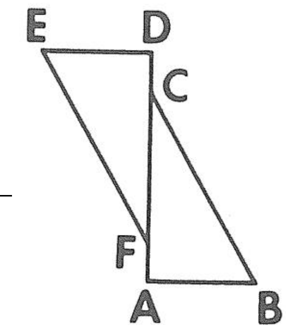
Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6

Example 2: **Given:** $\overline{PR}$ bisects $\angle QPS$ and $\angle QRS$.
Prove: $\overline{PQ} \cong \overline{PS}$

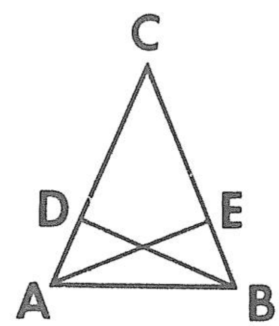


Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6

3. *Given:* $\overline{AFCD}$, $\overline{ED} \perp \overline{DA}$, $\overline{BA} \perp \overline{DA}$, $\overline{DC} \cong \overline{AF}$, and $\angle E \cong \angle B$.
Prove: $\overline{EF} \cong \overline{BC}$.



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

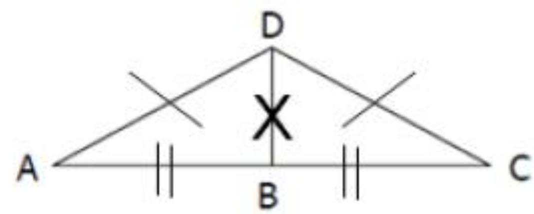


4. *Given:* In $\triangle ACB$, $\overline{AC} \cong \overline{BC}$ and $\angle ADB \cong \angle BEA$.
Prove: $\overline{AE} \cong \overline{BD}$.

Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

SUMMARY

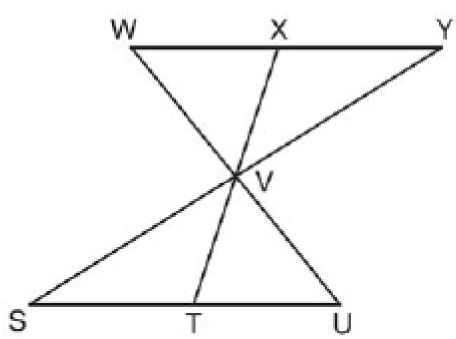
Given: B is the midpoint of $\overline{AC}$, $\overline{AD} \cong \overline{CD}$
Prove: $\angle DAB \cong \angle DCB$



Statements	Reasons
(s) 1) B is the midpoint of $\overline{AC}$, $\overline{AD} \cong \overline{CD}$	1) Given
(s) 2) $\overline{AB} \cong \overline{CB}$	2) **Midpoint → 2 ≅ *segments***
(s) 3) $\overline{DB} \cong \overline{DB}$	3) Reflexive property of segments
4) $\triangle ADB \cong \triangle CDB$	4) SSS
5) $\angle DAB \cong \angle DCB$	5) CPCTC

Warm - Up

In the diagram below, $\Delta XYV \cong \Delta TSV$.



Which statement can *not* be proven?

1) $\angle XVY \cong \angle TVS$
2) $\angle VYX \cong \angle VUT$
3) $\overline{XY} \cong \overline{TS}$
4) $\overline{YV} \cong \overline{SV}$

C.P.C.T.C. and BEYOND

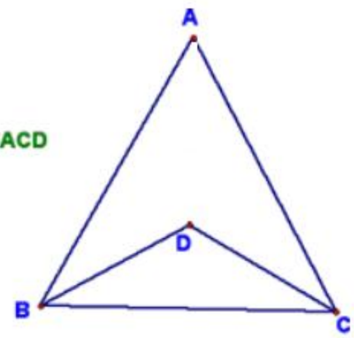
Auxiliary Lines

A diagram in a proof sometimes requires lines, rays, or segments that do not appear in the original figure. These additions to diagrams are auxiliary lines.

Ex 1: Consider the following problem.

Given: $\overline{AB} \cong \overline{AC}$
$\overline{BD} \cong \overline{CD}$

Prove: $\angle ABD \cong \angle ACD$



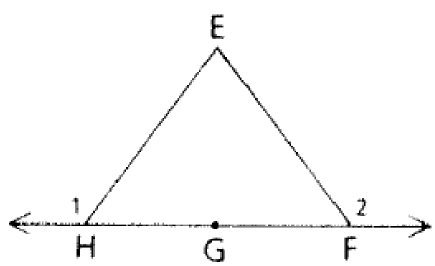
This proof would be easy if____

Theorem:

Ex 2:

Given: G is the midpt. of $\overline{FH}$.
$\overline{EF} \cong \overline{EH}$

Prove: $\angle 1 \cong \angle 2$



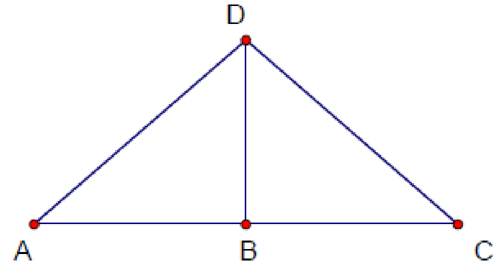
Statements	Reasons

Ex 3: CPCTC and Beyond

Given: $\overline{AD} \cong \overline{CD}$

$\measuredangle ADB \cong \measuredangle CDB$

Prove: $\overline{DB}$ is the median to $\overline{AC}$



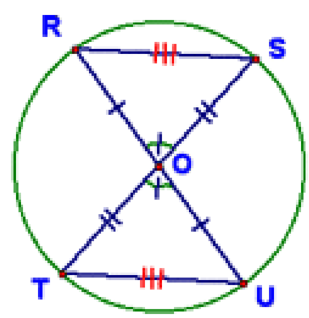
Statements	Reasons
1. $\overline{AD} \cong \overline{CD}$	1. Given
2. $\measuredangle ADB \cong \measuredangle CDB$	2. Given
3.	3.
4. $\triangle ABD \cong \triangle CBD$	4.
5.	5. **CPCTC**
6.	6.
7. $\overline{DB}$ is the median to $\overline{AC}$	**7.**

Defn: A circle is the set of all points in a plane that are a given distance from a point located at its center. This distance is called the radius. (plural - radii). A circle consists only of of a "rim" but is named by the point in its center -- even *though the center is not an element of the circle.*

Theorem: All radii of a circle are congruent!

Given: ⊙O

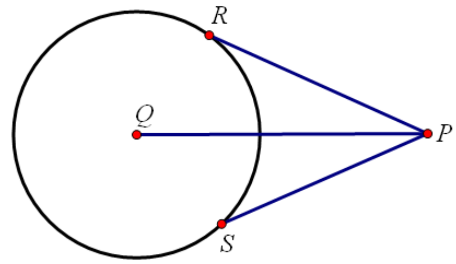
Prove: $\overline{RS} \cong \overline{UT}$



Statements	Reasons
1. ⊙O	1. Given
S 2. $\overline{RO} \cong \overline{UO}$	2. All radii of a ⊙ are ≅
S 3. $\overline{TO} \cong \overline{SO}$	3. Same as 2
A 4. $\angle ROS \cong \angle UOT$	4. Vertical ∠s are ≅ (VAT)
5. $\triangle ROS \cong \triangle UOT$	5. SAS (Steps 2, 4, 3)
6. $\overline{RS} \cong \overline{UT}$	6. CPCTC

Example 4: Given: $\odot$ Q, $\overline{RP} \cong \overline{SP}$

Prove: $\overrightarrow{PQ}$ *bisects* $\measuredangle RPS$

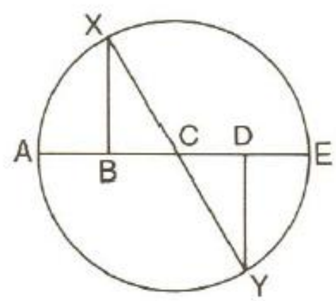


Statements	Reasons

Example 5:

Given: $\odot C$, $\measuredangle ABX \cong \measuredangle EDY$

Prove: C is the midpoint of $\overline{BD}$

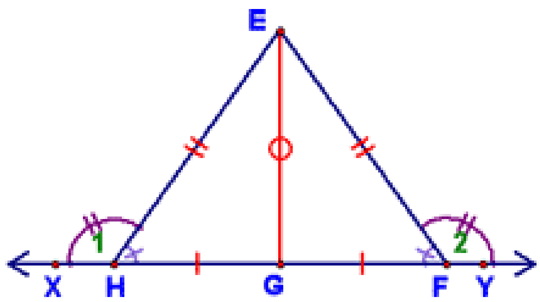


Statements	Reasons

SUMMARY

Given: G is the midpoint of $\overline{HF}$
$\overline{EF} \cong \overline{EH}$

Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
1. G is the midpoint of $\overline{HF}$	1. Given
S 2. $\overline{HG} \cong \overline{FG}$	2. Defn. of midpoint
S 3. $\overline{EH} \cong \overline{EF}$	3. Given
4. Draw $\overline{EG}$	4. Auxiliary Lines
S 5. $\overline{EG} \cong \overline{EG}$	5. Reflexive Property
6. $\triangle EGH \cong \triangle EGF$	6. SSS (Steps 2, 3, 5)
7. $\angle EHG \cong \angle EFG$	7. CPCTC
8. $\angle 1$ is supp to $\angle EHG$	8. Linear Pair Thm.
9. $\angle 2$ is supp to $\angle EFG$	9. Linear Pair Thm.
10. $\angle 1 \cong \angle 2$	10. Supps of $\cong \angle$s are $\cong$

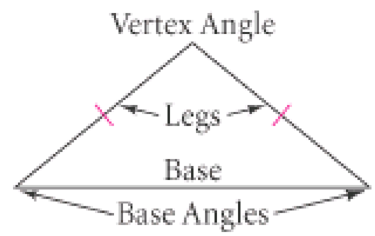
Exit Ticket

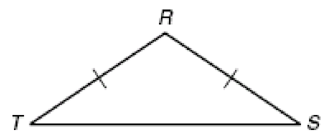
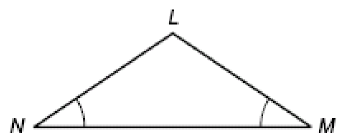
If $\triangle JKL \cong \triangle MNO$, which statement is always true?

1) $\angle KLJ \cong \angle NMO$
2) $\angle KJL \cong \angle MON$
3) $\overline{JL} \cong \overline{MO}$
4) $\overline{JK} \cong \overline{ON}$

Day 6 - Isosceles Triangle Proofs

Isosceles triangles are common in the real world. You can find them in structures such as bridges and buildings. The congruent sides of an isosceles triangle are its **legs.** The third side is the **base.** The two congruent sides form the **vertex angle.** The other two angles are the **base angles.**

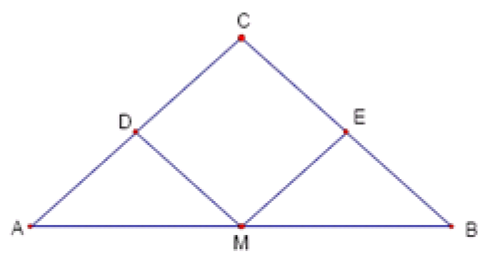


Theorem	Examples
Isosceles Triangle Theorem If two sides of a triangle are congruent, then the angles opposite the sides are congruent. *(If △, then △.)*	 If $\overline{RT} \cong \overline{RS}$, then $\angle T \cong \angle S$.
Converse of Isosceles Triangle Theorem If two angles of a triangle are congruent, then the sides opposite those angles are congruent. *(If △, then △.)*	 If $\angle N \cong \angle M$, then $\overline{LN} \cong \overline{LM}$.

Practice Problems:

1. Given: Isosceles triangle ABC with base $\overline{AB}$
   M is the midpoint of AB
   $\overline{AD} \cong \overline{BE}$

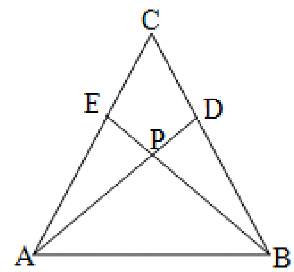
   Prove: $\overline{DM} \cong \overline{ME}$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

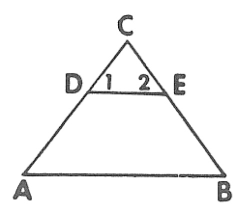
Given: $\overline{CA} \cong \overline{CB}$
$\angle PAB \cong \angle PBA$

Prove: $\Delta EPA \cong \Delta DPB$



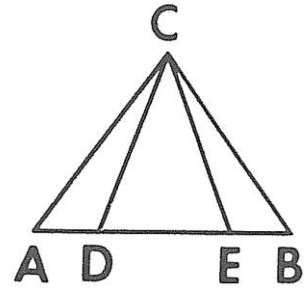
Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

If $\overline{CA} \cong \overline{CB}$, and $\overline{DA} \cong \overline{EB}$, prove that $\angle 1 \cong \angle 2$.



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

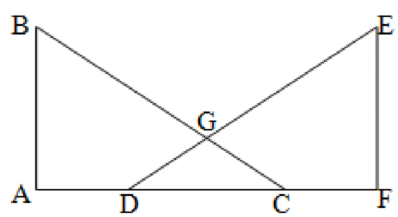
Given $\overline{AD} \cong \overline{BE}$, $\overline{CD} \cong \overline{CE}$, and $\overline{ADEB}$, prove that $\overline{AC} \cong \overline{BC}$.



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Given: $\overline{DG} \cong \overline{CG}$,
$\overline{AD} \cong \overline{FC}$
$\overline{BC} \cong \overline{ED}$

Prove: $\angle B \cong \angle E$



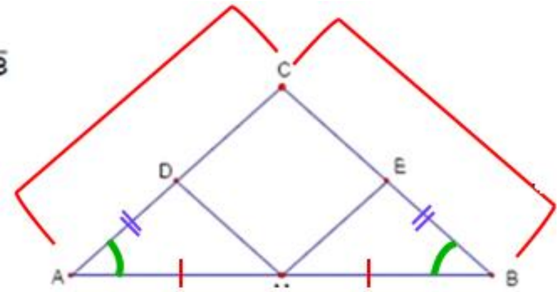
Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Summary of Isosceles Triangles

Given: Isosceles triangle ABC with base $\overline{AB}$
M is the midpoint of AB
$\overline{AD} \cong \overline{BE}$

Prove: $\overline{DM} \cong \overline{ME}$

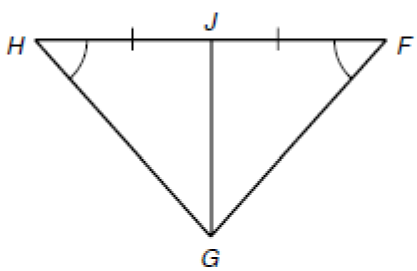
Plan: $\Delta ADM \cong \Delta BEM$ by SAS



	Statements	Reasons
	1 Isosceles triangle ABC with base $\overline{AB}$	1 Given
	2 M is the midpoint of AB	2 Given
S	3 $\overline{AD} \cong \overline{BE}$	3 Given
	4 $\overline{CA} \cong \overline{CB}$	4 Isosceles $\Delta \to$ 2 *legs* $\cong$
A	5 $\measuredangle A \cong \measuredangle B$	5 *If* △, *then* △
S	6 $\overline{AM} \cong \overline{BM}$	6 Midpoint $\to$ 2 $\cong$ *segments*
	7 $\Delta ADM \cong \Delta BEM$	7 SAS (3, 5, 6)
	8 $\overline{DM} \cong \overline{ME}$	8 CPCTC

Exit Ticket

Use the figure for Exercises 1 and 2 .



1 . What postulate or theorem proves $\overline{HG} \cong \overline{FG}$?

A Isosceles Triangle Theorem (*If* △, *then* △.)

B Converse of Isosceles Triangle Theorem (*If* △, *then* △.)

2 . If $\triangle FGJ \cong \triangle HGJ$, what reason justifies the statement $\angle HGJ \cong \angle FGJ$?

A ASA

B Reflex. Prop. of $\cong$

C Def. of bisects

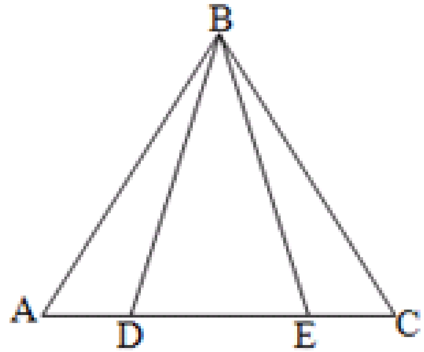
D CPCTC

Day 7 - Hy-Leg

Warm – Up

Given: $\angle BDE \cong \angle BED$
$\angle ABE \cong \angle CBD$

Prove: ΔABC is Isosceles

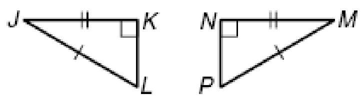


Statements	Reasons

PROVING RIGHT TRIANGLES CONGRUENT BY HYPOTENUSE, LEG

If the hypotenuse and a leg of one triangle are congruent to the corresponding parts of the other, then the two right triangles are congruent. (HL)

Hypotenuse-Leg (HL) Congruence Theorem
If the hypotenuse and a leg of a right triangle are congruent to the hypotenuse and a leg of another right triangle, then the triangles are congruent.



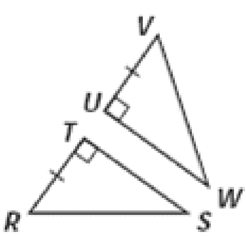
$\triangle JKL \cong \triangle MNP$

To use the HL Theorem, you must show that these three conditions are met:

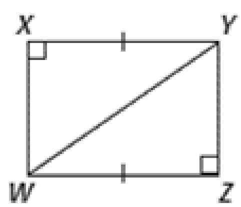
- **There are two right triangles**
- **There is one pair of ≅ hypotenuses**
- **There is one pair of ≅ legs**

What additional information would you need to prove the triangles congruent by the HL Theorem?

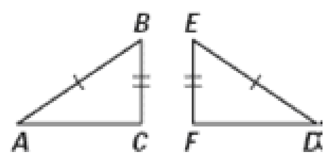
1.



2.

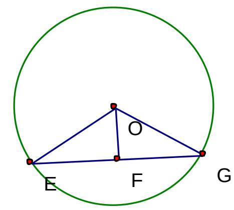


3.



1. **Given: $\overline{OF}$ is an altitude in Circle O.**

Prove: $\overline{EF} \cong \overline{FG}$

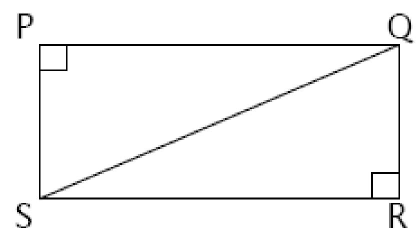


Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

2. Given: $\measuredangle P, \measuredangle R$ are right angles

$\overline{PS} \cong \overline{QR}$

Prove: $\triangle PQS \cong \triangle RSQ$

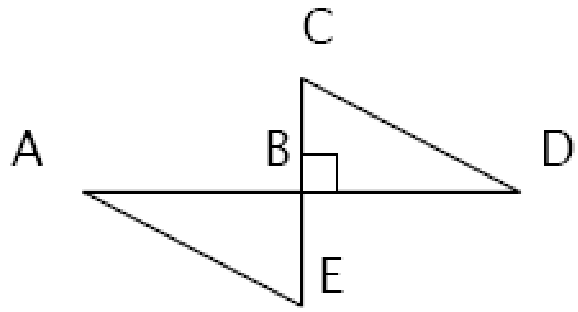


Statements	
1	1
2	2
3	3
4	4
5	5

3. **Given:** $\overline{AD}$ is the $\perp$ bisector of $\overline{EC}$

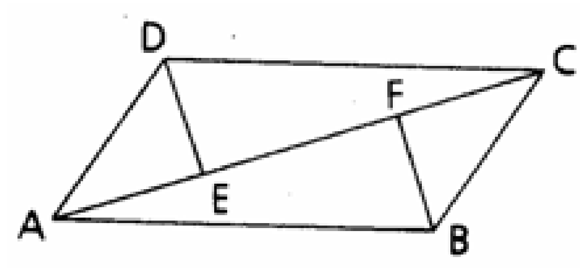
$\overline{CD} \cong \overline{EA}$

Prove: $\triangle CDB \cong \triangle EBA$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

4. Given: $\overline{AE} \cong \overline{CF}$,
$\overline{AB} \cong \overline{CD}$;
$\angle BFA$ is a right angle.
$\angle DEC$ is a right angle.
Prove: $\triangle CDE \cong \triangle ABF$

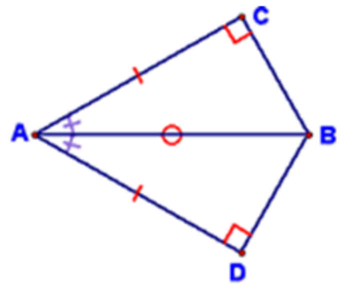


Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

SUMMARY

Given: $\overline{BC} \perp \overline{AC}$
$\overline{BD} \perp \overline{AD}$
$\overline{AC} \cong \overline{AD}$

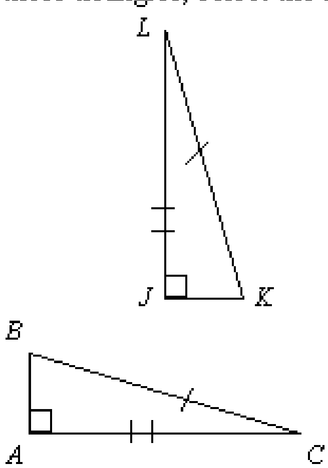
Prove: $\overrightarrow{AB}$ bisects $\angle CAD$



	Statements	Reasons
	1. $\overline{BC} \perp \overline{AC}$	1. Given
R	2. $\angle ACB$ is a right $\angle$	2. Definition of $\perp$ Segments
	3. $\overline{BD} \perp \overline{AD}$	3. Given
R	4. $\angle ADB$ is a right $\angle$	4. Same as 2
L	5. $\overline{AC} \cong \overline{AD}$	5. Given
H	6. $\overline{AB} \cong \overline{AB}$	6. Reflexive Property
	7. $\triangle ACB \cong \triangle ADB$	7. HL (2, 4, 6, 5)
	8. $\angle CAB \cong \angle DAB$	8. CPCTC
	9. $\overrightarrow{AB}$ bisects $\angle CAD$	9. Definition of $\angle$ Bisector

Exit Ticket

For these triangles, select the triangle congruence statement and the postulate or theorem that supports it.

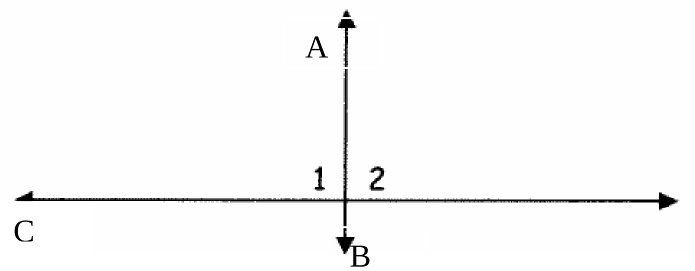


1) $\Delta ABC \cong \Delta JLK$, HL
2) $\Delta ABC \cong \Delta JKL$, HL
3) $\Delta ABC \cong \Delta JLK$, SAS
4) $\Delta ABC \cong \Delta JKL$, SAS

Day 8 –
Right Angle Theorems & Equidistance Theorem

Theorem: If two angles are both supplementary and congruent, then they are right angles.
($\measuredangle's \cong$ & $Suppl. \rightarrow right\ angles$)

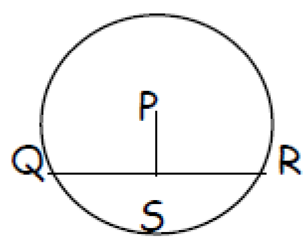
Given: $\angle 1 \cong \angle 2$



Conclusion: ______________________________

***** Proving that lines are perpendicular depends on you proving that they form ___________________.**

1. Given: $\odot P$
S *is the midpoint of* $\overline{QR}$.
Prove: $\overline{PS} \perp \overline{QR}$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

<u>EQUIDISTANCE THEOREM</u>

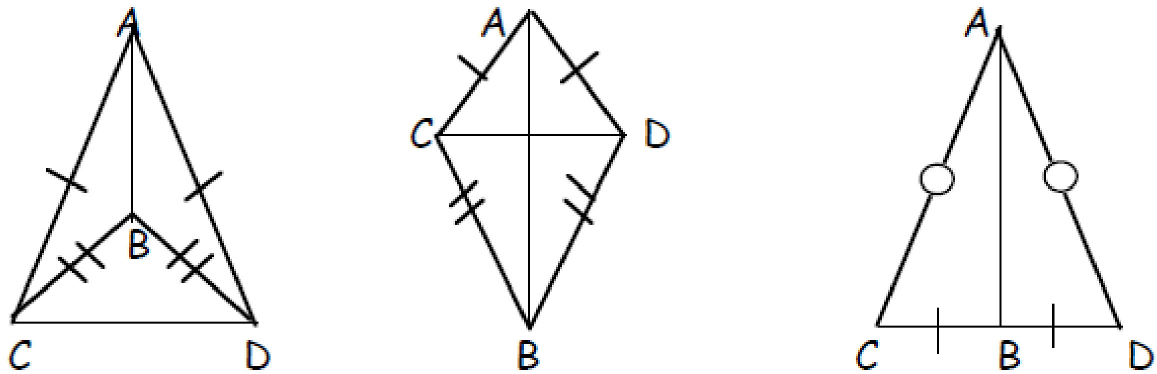
Definition: The distance between two objects is the length of the shortest path joining them.

Postulate: A line segment is the shortest path between two points.

If two points P and Q are the same distance from a third point, X, they are said to be equidistant from X.

Picture:

Statement	**Means.....**
1. $\overline{AC} \cong \overline{BC}$	
2. $\overline{MQ} \cong \overline{NQ}$	
3. $\overline{DF} \cong \overline{GF}$, and $\overline{HF} \cong \overline{EF}$	



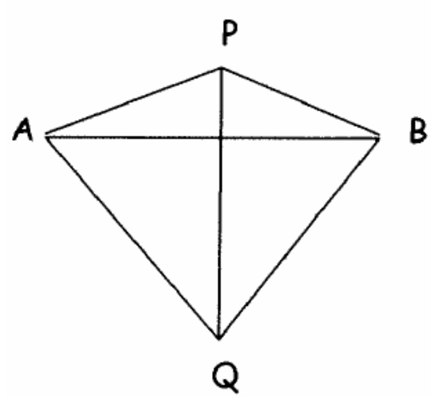
(Please highlight segment CD and put a circle around points A and B.)

These diagrams have something in common. In each, both points A and B are equidistant from the endpoints _____ and _____ of segment_____. You can prove that line AB is the **perpendicular bisector** of segment $\overline{CD}$.

Definition: **The perpendicular bisector** of a segment is the line that bisects and is perpendicular to the segment.

Equidistance Theorem –
If two points are each equidistant from the endpoints of a segment, then the two points determine the perpendicular bisector of that segment.

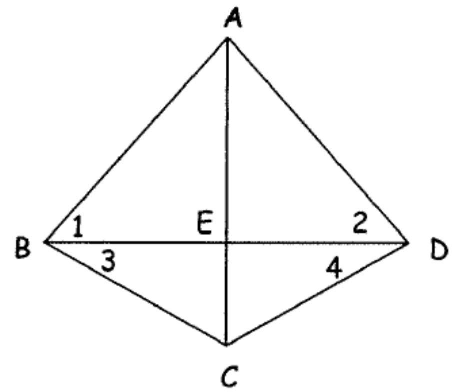
Given: $\overline{PA} \cong \overline{PB}, \overline{QA} \cong \overline{QB}$



Conclusion: ______________________________

2. Given: $\angle 1 \cong \angle 2, \angle 3 \cong \angle 4$

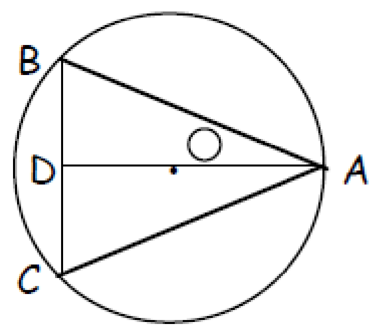
Prove: $\overleftrightarrow{AE} \perp$ bis. $\overline{BD}$



Statements	Reasons
1	1
2	2
3	3

---

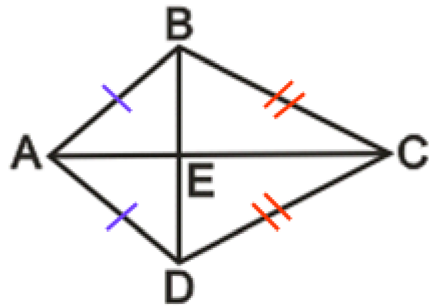
3. **Given:** $\odot O$
ΔABC *isosceles,*
Prove: $\overline{AD} \perp bis.\ \overline{BC}$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

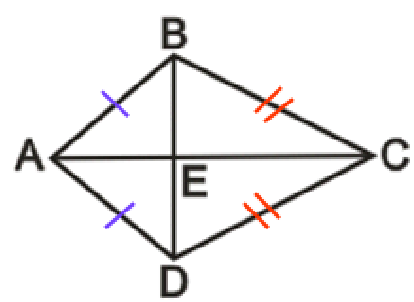
WHY the Equidistance Theorem?

Given: $\overline{AB} \cong \overline{AD}$
$\overline{BC} \cong \overline{CD}$
Prove: $\overline{AC}$ is the $\perp$ bisector of $\overline{BD}$



Statements	Reasons
1. $\overline{AB} \cong \overline{AD}$, $\overline{BC} \cong \overline{DC}$	1. Given
2. $\overline{AC} \cong \overline{AC}$	2. Reflexive
3. $\triangle ABC \cong \triangle ADC$	3. SSS
4. $\angle BAC \cong \angle DAC$	4. CPCTC
5. $\overline{AE} \cong \overline{AE}$	5. Reflexive
6. $\triangle BAE \cong \triangle DAE$	6. SAS
7. $\angle AEB \cong \angle AED$	7. CPCTC
8. $\angle AEB$ is suppl. to $\angle AED$	8. L.P.'s form suppl. $\angle$s
9. $\angle AEB$ and $\angle AED$ are right angles	9. $\angle$'s $\cong$ & *Suppl.* $\rightarrow$ *right angles*
10. $\overline{AC} \perp \overline{BD}$	10. *right* $\angle$*s* $\rightarrow$ $\perp$
11. $\overline{BE} \cong \overline{DE}$	11. CPCTC
12. E is the midpoint of $\overline{BD}$	12. Definition of Midpoint
13. $\overline{AC}$ is the $\perp$ bisector of $\overline{BD}$	13. Definition of a $\perp$ bisector

Given: $\overline{AB} \cong \overline{AD}$
$\overline{BC} \cong \overline{CD}$
Prove: $\overline{AC}$ is the $\perp$ bisector of $\overline{BD}$

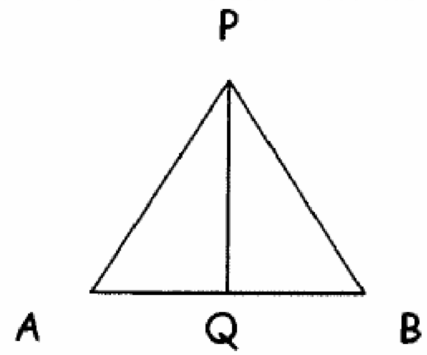


Statements	Reasons
1 $\overline{AB} \cong \overline{AD}$	1 **Given**
2 $\overline{BC} \cong \overline{CD}$	2 **Given**
3 $\overline{AC}$ is the $\perp$ bisector of $\overline{BD}$	3 Equidistance Thm(1, 2)

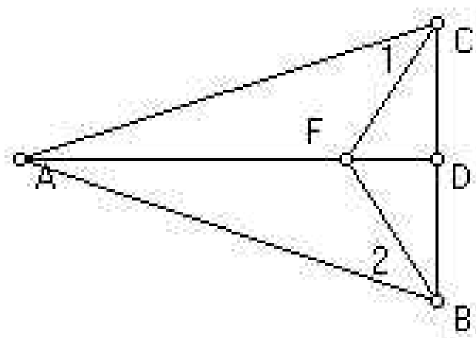
<u>Converse of the Equidistance Theorem</u> –
If a point is on the perpendicular bisector a segment, then it is equidistant from the endpoints of that segment.

Given: $\overleftrightarrow{PQ}$ is the $\perp$ bisector of $\overline{AB}$

Conclusion: ______________________________

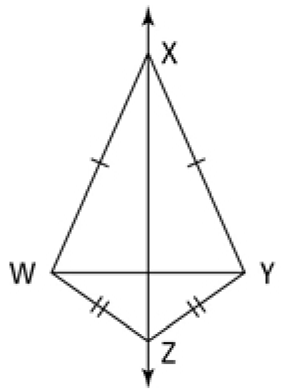


4.
Given: $\overline{AD} \perp bis.\ \overline{BC}$
Prove: $\measuredangle 1 \cong \measuredangle 2$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6

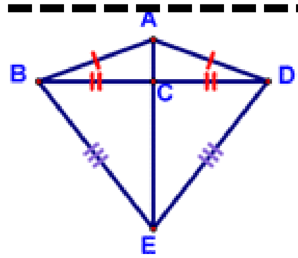
SUMMARY



If you know that $\overline{XW} \cong \overline{XY}$ and $\overline{ZW} \cong \overline{ZY}$,
then you can conclude that $\overleftrightarrow{XZ}$ is the perpendicular bisector of $\overline{WY}$.

Given: $\overline{AB} \cong \overline{AD}$
$\overline{BC} \cong \overline{CD}$

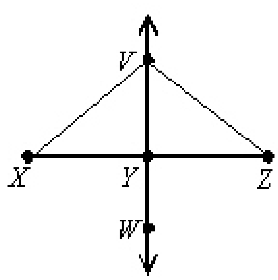
Prove: $\overline{BE} \cong \overline{ED}$



Statements	Reasons
1. $\overline{AB} \cong \overline{AD}$	1. Given
2. $\overline{BC} \cong \overline{CD}$	2. Given
3. $\overline{AE}$ is the ⊥ bisector of $\overline{BD}$	3. ET (1,2) (If two points are each equidistant from the endpoints of a segment, the the two points determine the perpendicular bisector of that segment).
4. $\overline{BE} \cong \overline{ED}$	4. Converse of ET (If a point is on the ⊥ bisector of a segment, then it is equidistant from the endpoints of the segment).

Exit Ticket

Given: $\overleftrightarrow{VW}$ is the perpendicular bisector of $\overline{XZ}$. Which statement is true?



A. Y is the midpoint of $\overline{VW}$.

B. $\overline{XY} \cong \overline{YV}$

C. $\angle YVZ$ is a right angle.

D. $\overline{XY} \cong \overline{YZ}$

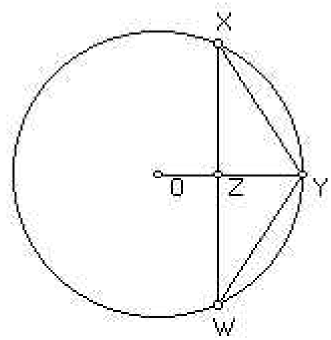
Day 9 - Detour Proofs

Warm - Up

Given: $\odot O$

$\measuredangle YXZ \cong \measuredangle YWZ$

Prove: $\overline{OY} \perp bis.\ \overline{XW}$



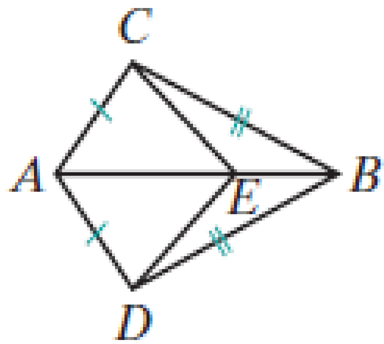
Statements	Reasons
1	1
2	2
3	3
4	4
5	5

Sometimes, it is impossible to use the *given* in order to prove immediately that a particular pair of triangles is congruent. In such cases, the *given* may contain enough information to first prove another pair of triangles congruent. Then, corresponding congruent parts in these congruent triangles may be used to prove the original pair of triangles congruent. See how this is done in the following example.

Example 1:

Given: $\overline{AEB}$, $\overline{AC} \cong \overline{AD}$, and $\overline{CB} \cong \overline{DB}$

Prove: $\Delta ACE \cong \Delta ADE$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Whenever you are asked to prove that triangles or parts of triangles are congruent and you suspect a detour may be needed, use the following procedures.

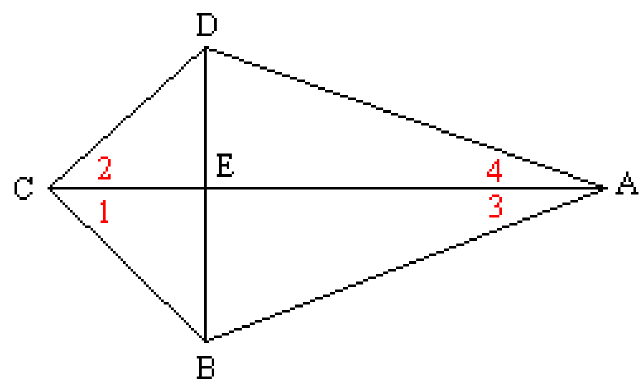
Procedure for Detour Proofs

1. Determine which triangles you must prove congruent to reach the desired conclusion
2. Attempt to prove those triangles congruent – if you cannot due to a lack of information – it's time to take a detour…
3. Find a different pair of triangles congruent based on the given information
4. Get something congruent by CPCTC
5. Use the CPCTC step to now prove the triangles you wanted congruent.

Example 2:

Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$

Prove: $\Delta CDE \cong \Delta CBE$



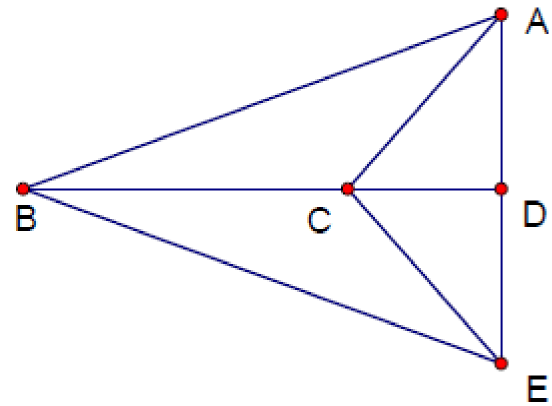
Statements	Reasons
1 $\measuredangle 1 \cong \measuredangle 2, \ \measuredangle 3 \cong \measuredangle 4$	1 *Given*
2	2 *Reflexive Property*
3 $\Delta CBA \cong \Delta CDA$	3
4	4 *CPCTC*
5	5 *Reflexive Property*
6 $\Delta CDE \cong \Delta CBE$	6

Example 3:

Given: $\Delta ABC \cong \Delta EBC$

$\overline{DB}$ is a median to $\overline{AE}$

Prove: $\Delta ACD \cong \Delta ECD$



Statements	Reasons
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Example 4:

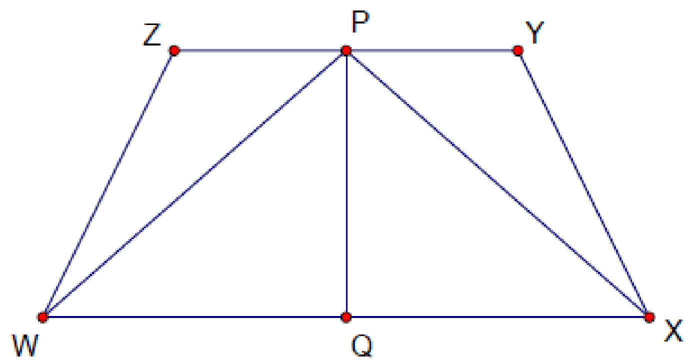
Given: $\overline{PQ}$ bisects $\overline{YZ}$

Q is the midpoint of $\overline{WX}$

$\angle Y \cong \angle Z$

$\overline{WZ} \cong \overline{XY}$

Prove: $\angle WQP \cong \angle XQP$



Statements	Reasons

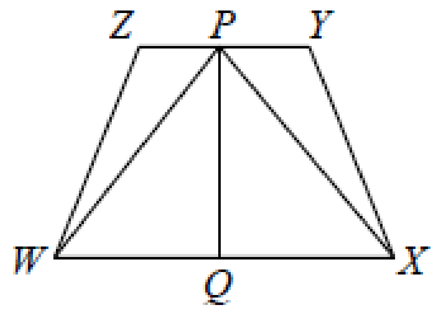
SUMMARY

Given: $\overleftrightarrow{PQ}$ bisects $\overline{YZ}$.

Q is the midpt. of $\overline{WX}$.

$\angle Y \cong \angle Z$, $\overline{WZ} \cong \overline{XY}$

Prove: $\angle WQP \cong \angle XQP$



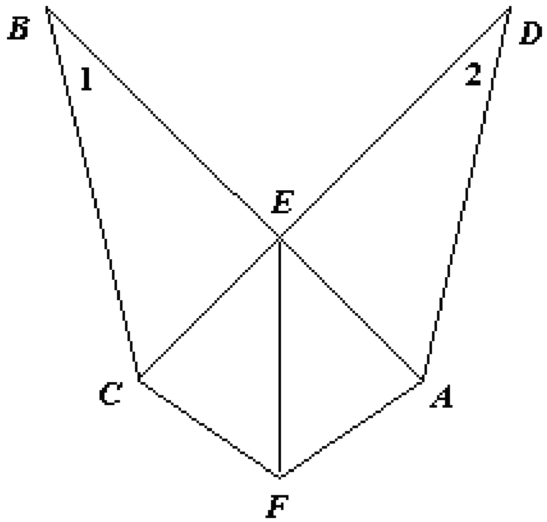
	Statements	Reasons
	1. $\overleftrightarrow{PQ}$ bisects $\overline{YZ}$.	1. Given
	2. P is the midpoint of $\overline{ZY}$	2. Def. of segment bis.
S_1	3. $\overline{ZP} \cong \overline{PY}$	3. Def. of midpt.
A_1	4. $\angle Z \cong \angle Y$	4. Given
S_1	5. $\overline{WZ} \cong \overline{XY}$	5. Given
	6. $\Delta ZWP \cong \Delta YXP$	6. SAS (3,4,5)
S_2	7. $\overline{WP} \cong \overline{PX}$	7. CPCTC
	8. Q is the midpt. of $\overline{WX}$.	8. Given
S_2	9. $\overline{WQ} \cong \overline{QX}$	9. Def. of midpt.
S_2	10. $\overline{PQ} \cong \overline{PQ}$	10. Reflexive Property
	11. $\Delta WQP \cong \Delta XQP$	11. SSS (7,9,10)
	12. $\angle WQP \cong \angle XQP$	12. CPCTC

Exit Ticket

Complete the proof.

Given: $\overline{BC} \cong \overline{DA}$, $\angle 1 \cong \angle 2$, and $\overline{CF} \cong \overline{AF}$.

Prove: $\Delta CEF \cong \Delta AEF$.



$\angle BEC \cong \angle DEA$ by vertical angles. $\Delta BEC \cong \Delta DEA$ by **(a)**______. Then by CPCTC, $\overline{CE} \cong \overline{AE}$. $\overline{EF} \cong \overline{EF}$ by the Reflexive Property. So $\Delta CEF \cong \Delta AEF$ by **(b)**______.

A. **a.** SAS; **b.** SAS

B. **a.** AAS; **b.** SSS

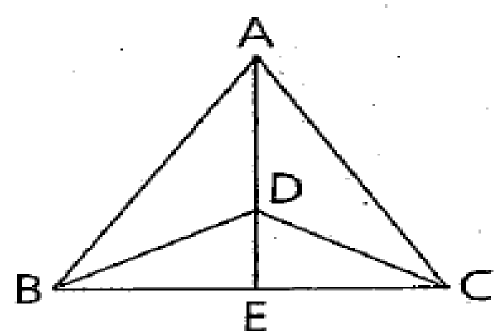
C. **a.** ASA; **b.** SSS

D. **a.** AAS; **b.** HL

Day 10 - Missing Diagram Proofs

Warm - Up

Given: $\overline{AB} \cong \overline{AC}$;
$\overrightarrow{BD}$ bisects $\angle ABE$.
$\overrightarrow{CD}$ bisects $\angle ACE$.
Conclusion: $\overline{AE}$ bisects $\overline{BC}$.



Statements	Reasons

Many proofs we encounter will not always be accompanied by a diagram or any given information. It is up to us to find the important information, set up the problem, and draw the diagram all by ourselves!!!

<u>Procedure for Missing Diagram Proofs</u>

1. Draw the shape, label everything.
2. The **"if"** part of the statement is the **"given."**
3. The **"then"** part of the statement is the **"prove."**
4. Write the givens and what you want to prove.

<u>Example 1</u>: If two altitudes of a triangle are congruent, then the triangle is isosceles.

Given:

Prove:

<u>Example 2</u>: The medians of a triangle are congruent if the triangle is equilateral.

Given:

Prove:

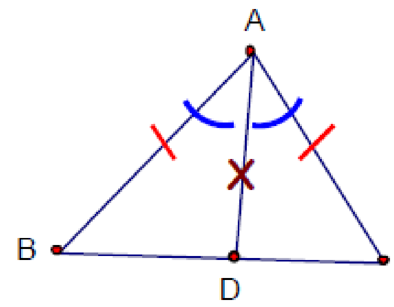
Example 3: the altitude to the base of an isosceles triangle bisects the vertex angle.

Given:

Prove:

SUMMARY

Example: Prove that the bisector of the vertex angle of an isosceles triangle is also the median to the base.



Given: $\triangle ABC$ isosceles with base $\overline{BC}$.
$\overline{AD}$ bisects $\angle BAC$

Prove: $\overline{AD}$ is a median to base $\overline{BC}$.

Statements	Reasons
1 $\triangle ABC$ is isosceles with base $\overline{BC}$.	1 Given
2 $\overline{BA} \cong \overline{CA}$	2 **Def. of Isosceles $\triangle$**
3 $\overline{AD}$ bisects $\angle BAC$	3 Given
4 $\angle BAD \cong \angle CAD$	4 **Def. of $\angle$ bisector**
5 $\overline{AD} \cong \overline{AD}$	5 Reflexive Prop
6 $\triangle BAD \cong \triangle CAD$	6 SAS (2, 4, 5)
7 $\overline{BD} \cong \overline{CD}$	7 CPCTC
8 D is the midpoint of $\overline{BC}$.	8 **Def of midpoint**
9 $\overline{AD}$ is a median to base $\overline{BC}$.	9. Def'n of a median

Exit Ticket

In $\triangle BAT$ and $\triangle CRE$, $\angle A \cong \angle R$ and $\overline{BA} \cong \overline{CR}$.
Write *one* additional statement that could be used to prove that the two triangles are congruent. State the method that would be used to prove that the triangles are congruent.

ANSWER KEYS

EXERCISES, PAGES 227–230

9. $m\angle M + m\angle N = m\angle NPQ$
$3y + 1 + 2y + 2 = 48$
$5y + 3 = 48$
$5y = 45$
$y = 9$
$m\angle M = 3y + 1 = 3(9) + 1 = 28°$

10. $m\angle K + m\angle L = m\angle HJL$
$7x + 6x - 1 = 90$
$13x = 91$
$x = 7$
$m\angle L = 6x - 1 = 6(7) - 1 = 41°$

11. $m\angle A + m\angle B = 117$
$65 + m\angle B = 117$
$m\angle B = 52°$
$m\angle A + m\angle B + m\angle BCA = 180$
$117 + m\angle BCA = 180$
$m\angle BCA = 63°$

12. $\angle C \cong \angle F$
$m\angle C = m\angle F$
$4x^2 = 3x^2 + 25$
$x^2 = 25$
$m\angle C = 4x^2 = 100°$
$m\angle F = m\angle C = 100°$

13. $\angle S \cong \angle U$
$m\angle S = m\angle U$
$5x - 11 = 4x + 9$
$x = 20$
$m\angle S = 5x - 11$
$= 5(20) - 11$
$= 89°$
$m\angle U = m\angle S = 89°$

14. $\angle C \cong \angle Z$
$m\angle C = m\angle Z$
$4x + 7 = 3(x + 5)$
$4x + 7 = 3x + 15$
$x = 8$
$m\angle C = 4x + 7 = 4(8) + 7 = 39°$
$m\angle Z = m\angle C = 39°$

19. Think: Use Ext. ∠ Thm.
$m\angle W + m\angle X = m\angle XYZ$
$5x + 2 + 8x + 4 = 15x - 18$
$13x + 6 = 15x - 18$
$24 = 2x$
$x = 12$
$m\angle XYZ = 15x - 18$
$= 15(12) - 18 = 162°$

20. Think: Use Ext. ∠ Thm and subst. $m\angle C = m\angle D$.
$m\angle C + m\angle D = m\angle ABD$
$2m\angle D = m\angle ABD$
$2(6x - 5) = 11x + 1$
$12x - 10 = 11x + 1$
$x = 11$
$m\angle C = m\angle D$
$= 6x - 5$
$= 6(11) - 5 = 61°$

21. Think: Use Third ∠s Thm.
$\angle N \cong \angle P$
$m\angle N = m\angle P$
$3y^2 = 12y^2 - 144$
$-9y^2 = -144$
$y^2 = 16$
$m\angle N = 3y^2 = 3(16) = 48°$
$m\angle P = m\angle N = 48°$

22. Think: Use Third ∠s Thm.
$\angle Q \cong \angle S$
$m\angle Q = m\angle S$
$2x^2 = 3x^2 - 64$
$64 = x^2$
$m\angle Q = 2x^2 = 2(64) = 128°$
$m\angle S = m\angle Q = 128°$

41. C
$128 = 71 + x$
$x = 57$

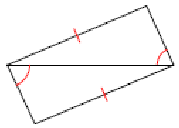
42. F
$(2s + 10) + 58 + 66 = 180$
$2s + 134 = 180$
$2s = 46$
$s = 23$

45. $117 = (2y^2 + 7) + (61 - y^2)$
$117 = y^2 + 68$
$49 = y^2$
$y = 7$ or -7

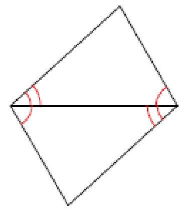
49. Let $m\angle A = x°$.
$m\angle B = 1\frac{1}{2}(x) - 5$
$m\angle C = 2\frac{1}{2}(x) - 5$
$m\angle A + m\angle B + m\angle C = 180$
$x + 1\frac{1}{2}(x) - 5 + 2\frac{1}{2}(x) - 5 = 180$
$5x - 10 = 180$
$5x = 190$
$x = 38$
$m\angle A = x° = 38°$

Day 2 Answers

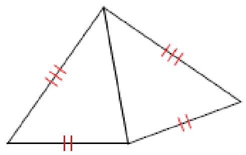
State if the two triangles are congruent. If they are, state how you know.

1) 

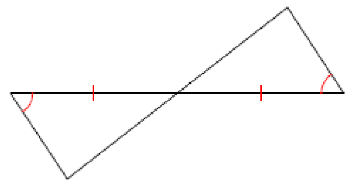
Not congruent

2) 

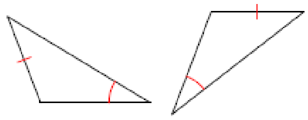
ASA

3) 

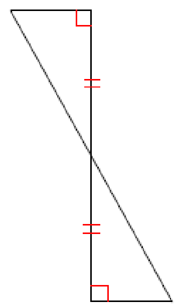
SSS

4) 

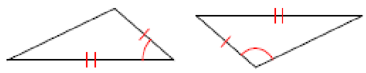
ASA

5) 

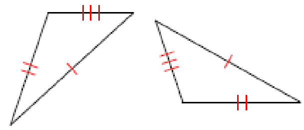
Not congruent

6) 

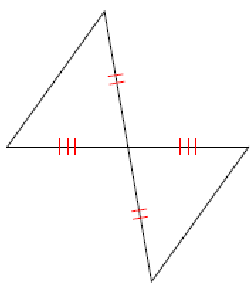
ASA

7) 

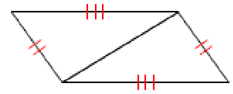
Not congruent

8) 

SSS

9) 

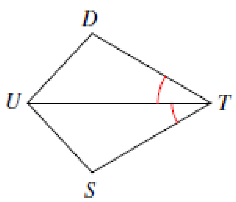
SAS

10) 

SSS

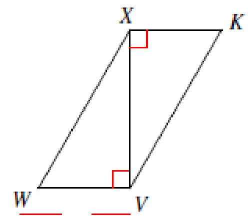
State what additional information is required in order to know that the triangles are congruent for the reason given.

11) ASA



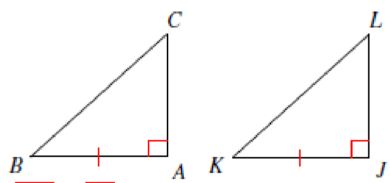
$\angle SUT \cong \angle DUT$

12) SAS



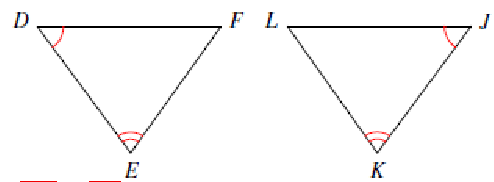
$\overline{VW} \cong \overline{XK}$

13) SAS



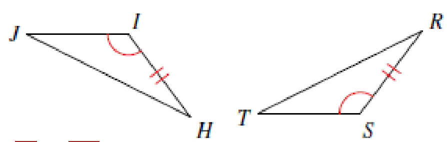
$\overline{CA} \cong \overline{LJ}$

14) ASA



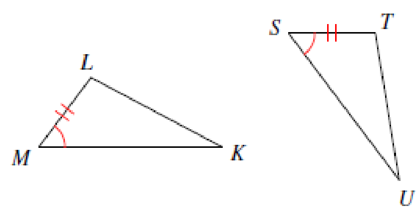
$\overline{DE} \cong \overline{JK}$

15) SAS



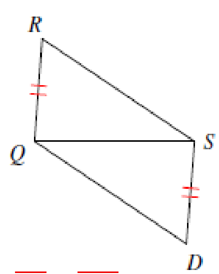
$\overline{IJ} \cong \overline{ST}$

16) ASA



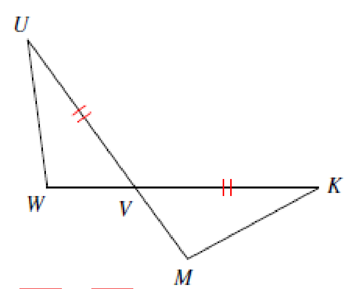
$\angle L \cong \angle T$

17) SSS



$\overline{RS} \cong \overline{DQ}$

18) SAS



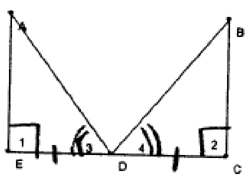
$\overline{VW} \cong \overline{VM}$

Day 3 – Answers

Key

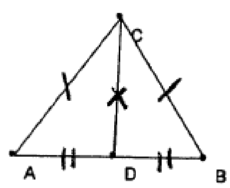
Practice with Congruent Triangles

1. Given: $\overline{AE} \perp \overline{ED}$
$\overline{BC} \perp \overline{CD}$
D is the midpoint of $\overline{EC}$.
$\angle 3 \cong \angle 4$
Prove: $\triangle AED \cong \triangle BCD$



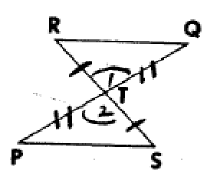
Statements	Reasons
① $\overline{AE} \perp \overline{ED}$, $\overline{BC} \perp \overline{CD}$	① given
② ∡1 and ∡2 are right ∡'s	② def. of ⊥ lines
③ ∡1 ≅ ∡2 (A)	③ all rt ∡'s ≅
④ D is the mdpt of $\overline{EC}$	④ given
⑤ $\overline{ED} \cong \overline{CD}$ (S)	⑤ def. of mdpt
⑥ ∡3 ≅ ∡4 (A)	⑥ given
⑦ △AED ≅ △BCD	⑦ ASA (3, 5, 6)

2. Given: $\overline{AC} \cong \overline{CB}$
$\overline{CD}$ **Bisects** $\overline{AB}$
Prove: $\triangle ADC \cong \triangle BDC$



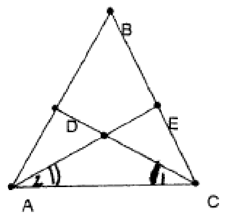
Statements	Reasons
① $\overline{AC} \cong \overline{CB}$ (S)	① given
② $\overline{CD}$ bisects $\overline{AB}$	② given
③ D is the mdpt of $\overline{AB}$	③ def. of seg bisector
④ $\overline{AD} \cong \overline{BD}$ (S)	④ def. of mdpt
⑤ $\overline{CD} \cong \overline{CD}$ (S)	⑤ Reflexive prop
⑥ △ADC ≅ △BDC	⑥ SSS (1, 4, 5)

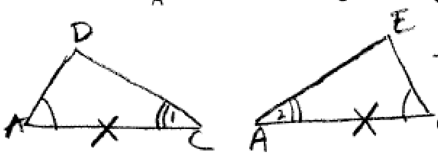
3. *Given:* $\overline{RS}$ bisects $\overline{PQ}$ at T, $\overline{PQ}$ bisects $\overline{RS}$ at T.
Prove: $\triangle PTS \cong \triangle QTR$



Statements	Reasons
① $\overline{RS}$ bisects $\overline{PQ}$ at T	① given
② T is the mdpt of $\overline{PQ}$	② def. of seg bisector
③ $\overline{PT} \cong \overline{QT}$ (S)	③ def. of mdpt
④ $\overline{PQ}$ bisects $\overline{RS}$ at T	④ given
⑤ T is the mdpt of $\overline{RS}$	⑤ def. of seg bisector
⑥ $\overline{RT} \cong \overline{ST}$ (S)	⑥ def. of mdpt
⑦ ∡1 ≅ ∡2 (A)	⑦ vertical ∡'s are ≅
⑧ △PTS ≅ △QTR	⑧ SAS (3, 7, 6)

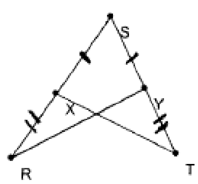
4. Given: ∡BAC ≅ ∡BCA
$\overline{CD}$ bisects ∡BCA
$\overline{AE}$ bisects ∡BAC
Prove: △ADC ≅ △CEA

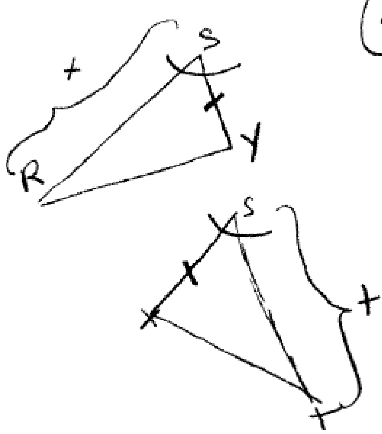




S	R
① ∡BAC ≅ ∡BCA (A) $\overline{CD}$ bisects ∡BCA $\overline{AE}$ bisects ∡BAC	① given
② ½∡BCA ≅ ∡1 ½∡BAC ≅ ∡2	② def. of ∡ bisector
③ ∡1 ≅ ∡2 (A)	③ halves of ≅ are ≅ or Division Post.
④ $\overline{AC}$ ≅ $\overline{AC}$ (S)	④ Reflexive Prop.
⑤ △ADC ≅ △CEA	⑤ ASA (1,4,3)

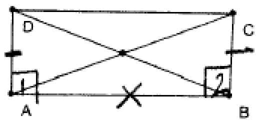
5. Given: $\overline{SR}$ and $\overline{ST}$ are straight lines.
$\overline{SX}$ ≅ $\overline{SY}$
$\overline{XR}$ ≅ $\overline{YT}$
Prove: △RSY ≅ △TSX





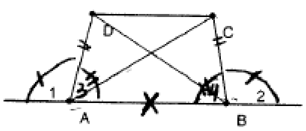
S	R
① $\overline{SX}$ ≅ $\overline{SY}$ (S), $\overline{XR}$ ≅ $\overline{YT}$	① given
② ∡S ≅ ∡S (A)	② Reflexive Prop.
③ $\overline{SR}$ ≅ $\overline{ST}$ (S)	③ Addition Prop. (1,1)
④ △RSY ≅ △TSX	④ SAS (1,2,3)

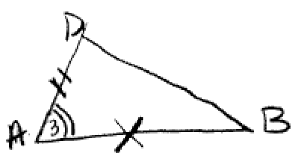
6. Given: $\overline{DA} \cong \overline{CB}$
$\overline{DA} \perp \overline{AB}$
$\overline{CB} \perp \overline{AB}$
Prove: $\triangle DAB \cong \triangle CBA$

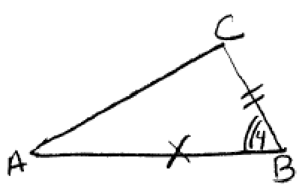


S	R
1 $\overline{DA} \cong \overline{CB}$ (S) $\overline{DA} \perp \overline{AB}$ $\overline{CB} \perp \overline{AB}$	1 given
2 ∠1 and ∠2 rt ∠'s	2 def of ⊥ lines
3 ∠1 ≅ ∠2 (A)	3 all right ∠'s ≅
4 $\overline{AB} \cong \overline{AB}$ (S)	4 Reflexive Prop.
5 $\triangle DAB \cong \triangle CBA$	5 SAS (1, 3, 4)

7. Given: $\overline{LM}$ **is a straight line**
$\overline{CB} \cong \overline{DA}$
∠1 ≅ ∠2
Prove: $\triangle ABC \cong \triangle BAD$





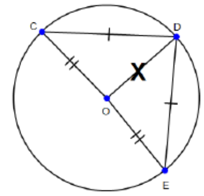


S	R
1 $\overline{CB} \cong \overline{DA}$ (S) ∠1 ≅ ∠2	1 given
2 ∠1 suppl. to ∠3 ∠2 suppl. to ∠4	2 Linear Pair thm
3 ∠3 ≅ ∠4 (A)	3 ≅ suppl. thm
4 $\overline{AB} \cong \overline{AB}$ (S)	4 Reflexive Prop.
5 $\triangle ABC \cong \triangle BAD$	5 SAS (1, 3, 4)

Answers to Day 4

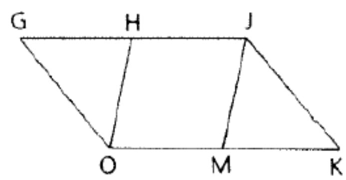
6. Given: $\odot O$, $\overline{CD} \cong \overline{DE}$

Prove: $\measuredangle COD \cong \measuredangle DOE$



Statements		Reasons
1. $\odot O$, $\overline{CD} \cong \overline{DE}$	(S)	1. Given
2. $\overline{CO} \cong \overline{EO}$	(S)	2. All radii of a $\odot$ are $\cong$
3. $\overline{DO} \cong \overline{DO}$	(S)	3. Reflexive Property
4. $\Delta COD \cong \Delta EOD$		4. SSS (1, 2, 3)
5. $\measuredangle COD \cong \measuredangle DOE$		5. CPCTC

12 Given: H is the midpt. of $\overline{GJ}$.
M is the midpt. of $\overline{OK}$.
$\overline{GO} \cong \overline{JK}$,
$\overline{GJ} \cong \overline{OK}$,
$\angle G \cong \angle K$,
OK = 27,
$m\angle GOH = x + 24$, $m\angle GHO = 2y - 7$,
$m\angle JMK = 3y - 23$, $m\angle MJK = 4x - 105$



Find: $m\angle GOH$, $m\angle GHO$, and GH

$m\measuredangle GOH = m\measuredangle KJM$

$x + 24 = 4x - 105$

$24 = 3x - 105$

$129 = 3x$

$43 = x$

$\boxed{m\measuredangle GOH = 43 + 24 = 67^\circ}$

$m\measuredangle GHO = m\measuredangle KMJ$

$2y - 7 = 3y - 23$

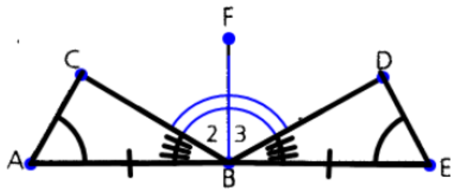
$16 = y$

$\boxed{m\measuredangle GHO = 2(16) - 7 = 25^\circ}$

$GH = \frac{1}{2} GJ$

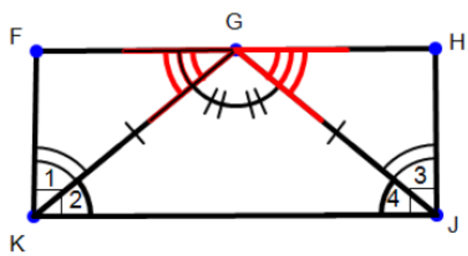
$\boxed{GH = \frac{1}{2}(27) = 13.5}$

13 Given: $\angle A \cong \angle E$,
$\overline{AB} \cong \overline{BE}$,
$\overline{FB} \perp \overline{AE}$,
$\angle 2 \cong \angle 3$
Prove: $\overline{CB} \cong \overline{DB}$



Statements	Reasons
1 $\angle A \cong \angle E$, (A) $\overline{AB} \cong \overline{BE}$, (S) $\overline{FB} \perp \overline{AE}$, $\angle 2 \cong \angle 3$	1. Given
2. $\measuredangle FBA$ and $\measuredangle FBE$ are rt $\measuredangle s$	2. $\perp$ lines $\rightarrow$ right $\measuredangle$
3. $\measuredangle 1$ compl. $\measuredangle 2$ $\measuredangle 3$ compl. $\measuredangle 4$	3. If 2 $\measuredangle s$ form a rt$\measuredangle$, $\rightarrow$ $\measuredangle s$ compl.
4. $\measuredangle 1 \cong \measuredangle 4$ (A)	4. Congruent Compl. Thm
5. $\Delta ACB \cong \Delta EDB$	5. ASA (1, 1, 4)
6. $\overline{CB} \cong \overline{DB}$	6. CPCTC

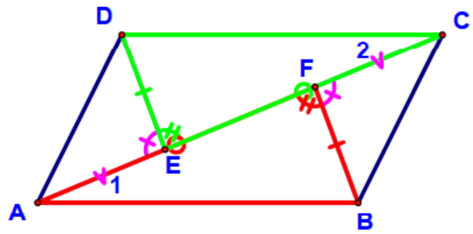
18 Given: $\overline{KG} \cong \overline{GJ}$,
$\angle 2 \cong \angle 4$,
$\angle 1$ is comp. to $\angle 2$.
$\angle 3$ is comp. to $\angle 4$.
$\angle FGJ \cong \angle HGK$
Conclusion: $\overline{FG} \cong \overline{HG}$



Statements	Reasons
1. $\overline{KG} \cong \overline{GJ}$, (S) $\angle 2 \cong \angle 4$, $\angle 1$ is comp. to $\angle 2$. $\angle 3$ is comp. to $\angle 4$. $\angle FGJ \cong \angle HGK$	1. Given
2. $\measuredangle 1 \cong \measuredangle 3$ (A)	2. Congruent Compl. Thm
3. $\measuredangle KGJ \cong \measuredangle KGJ$	3. Reflexive Property
4. $\measuredangle FGK \cong \measuredangle HGJ$ (A)	4. Subtraction Postulate (1, 3)
5. $\Delta FGK \cong \Delta HGJ$	5. ASA (2, 1, 4)
6. $\overline{FG} \cong \overline{HG}$	6. CPCTC

21 Given: $\overline{AE} \cong \overline{FC}$,
$\overline{FB} \cong \overline{DE}$,
$\angle CFB \cong \angle AED$

Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
1. $\overline{AE} \cong \overline{FC}$, $\overline{FB} \cong \overline{DE}$, (S) $\angle CFB \cong \angle AED$	1. Given
2. $\overline{EF} \cong \overline{EF}$	2. Reflexive Property
3. $\overline{AF} \cong \overline{CE}$ (S)	3. Addition Postulate (1, 2)
4. $\measuredangle CFB$ Suppl. $\measuredangle BFA$; $\measuredangle AED$ Suppl. $\measuredangle DEC$	4. Linear Pair Thm
5. $\measuredangle BFA \cong \measuredangle DEC$ (A)	5. Congruent Suppl. Thm
6. $\Delta BFA \cong \Delta DEC$	6. SAS (1, 5, 3)
7. $\measuredangle 1 \cong \measuredangle 2$	7. CPCTC

Answers to Day 5

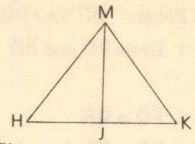
Pages 135–137 (Section 3.4)

1 **a** Median **b** Altitude **c** Altitude **d** Both

2 Given: $\overline{HJ} \cong \overline{KJ}$

$\angle MJH \cong \angle MJK$

Prove: $\overrightarrow{MJ}$ bis $\angle HMK$.

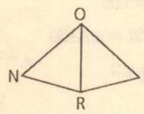


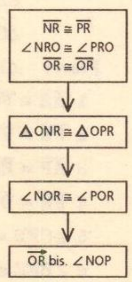
1 $\overline{HJ} \cong \overline{KJ}$	1 Given
2 $\angle MJH \cong \angle MJK$	2 Given
3 $\overline{MJ} \cong \overline{MJ}$	3 Reflexive prop
4 $\triangle MJH \cong \triangle MJK$	4 SAS
5 $\angle HMJ \cong \angle KMJ$	5 CPCTC
6 $\overrightarrow{MJ}$ bis $\angle HMK$.	6 If a ray divides an $\angle$ into 2 $\cong \angle$s, it bis the $\angle$.

3 Given: $\overline{NR} \cong \overline{PR}$

$\overrightarrow{RO}$ bis $\angle NRP$.

Prove: $\overrightarrow{OR}$ bis $\angle NOP$.



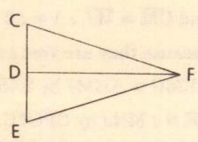


1 $\overline{NR} \cong \overline{PR}$	1 Given
2 $\overrightarrow{RO}$ bis $\angle NRP$	2 Given
3 $\angle NRO \cong \angle PRO$	3 A bis divides an $\angle$ into 2 $\cong \angle$s.
4 $\overline{OR} \cong \overline{OR}$	4 Reflexive prop
5 $\triangle ONR \cong \triangle OPR$	5 SAS
6 $\angle NOR \cong \angle POR$	6 CPCTC
7 $\overrightarrow{OR}$ bis $\angle NOP$.	7 If a ray divides an $\angle$ into 2 $\cong \angle$s, it bis the $\angle$.

4 Given: $\angle CFD \cong \angle EFD$

$\overline{FD}$ is an alt.

Prove: $\overline{FD}$ is a median.

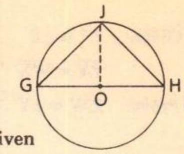


1 $\angle CFD \cong \angle EFD$	1 Given
2 $\overline{FD}$ is an alt.	2 Given
3 $\angle FDC$ and $\angle FDE$ are rt $\angle$s.	3 An alt of a $\triangle$ forms rt $\angle$s with the side to which it is drawn.
4 $\angle FDC \cong \angle FDE$	4 Rt $\angle$s are $\cong$.
5 $\overline{FD} \cong \overline{FD}$	5 Reflexive prop
6 $\triangle CDF \cong \triangle EDF$	6 ASA
7 $\overline{CD} \cong \overline{ED}$	7 CPCTC
8 $\overline{FD}$ is a median.	8 If a seg from the vertex of a $\triangle$ divides the opp side into 2 $\cong$ segs, it is the median.

5 Given: $\odot O$

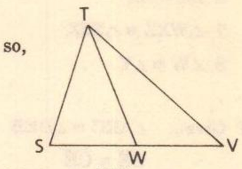
$\overline{GJ} \cong \overline{HJ}$

Prove: $\angle G \cong \angle H$



1 $\odot O$	1 Given
2 $\overline{OG} \cong \overline{OH}$	2 Radii of a $\odot$ are $\cong$.
3 $\overline{GJ} \cong \overline{HJ}$	3 Given
4 Draw $\overline{OJ}$	4 Two pts determine a seg.
5 $\overline{OJ} \cong \overline{OJ}$	5 Reflexive prop
6 $\triangle OGJ \cong \triangle OHJ$	6 SSS
7 $\angle G \cong \angle H$	7 CPCTC

6 $\overline{SW} \cong \overline{VW}$ by def of a median so,



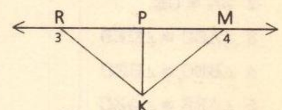
$$2x + 30 = 5x - 6$$
$$36 = 3x$$
$$12 = x$$

$\overline{SW} = 2(12) + 30$	$\overline{WV} = 5(12) - 6$	$\overline{ST} = 12 + 40$
$\overline{SW} = 24 + 30$	$\overline{WV} = 60 - 6$	$\overline{ST} = 52$
$\overline{SW} = 54$	$\overline{WV} = 54$	

7 Given: $\overline{KP}$ is a median.

$\overline{MK} \cong \overline{RK}$

Concl: $\angle 3 \cong \angle 4$



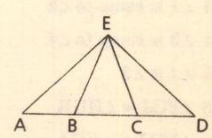
1 $\overline{KP}$ is a median.	1 Given
2 $\overline{RP} \cong \overline{MP}$	2 A median of a $\triangle$ divides one side into 2 $\cong$ segs.
3 $\overline{MK} \cong \overline{RK}$	3 Given
4 $\overline{PK} \cong \overline{PK}$	4 Reflexive prop
5 $\triangle PRK \cong \triangle PMK$	5 SSS
6 $\angle PRK \cong \angle PMK$	6 CPCTC
7 $\angle 3$ supp to $\angle PRK$	7 If 2 $\angle$s form a st $\angle$, they are supp.
8 $\angle 4$ supp to $\angle PMK$	8 Same as 7
9 $\angle 3 \cong \angle 4$	9 Supp of $\cong \angle$s are $\cong$.

8 Given: $\angle AEB \cong \angle DEC$

$\overline{AE} \cong \overline{DE}$

$\angle A \cong \angle D$

Concl: $\overline{AC} \cong \overline{BD}$

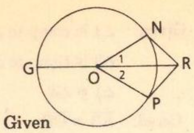


1 $\angle AEB \cong \angle DEC$	1 Given
2 $\overline{AE} \cong \overline{DE}$	2 Given
3 $\angle A \cong \angle D$	3 Given
4 $\triangle AEB \cong \triangle DEC$	4 ASA
5 $\overline{AB} \cong \overline{CD}$	5 CPCTC
6 $\overline{BC} \cong \overline{BC}$	6 Reflexive prop
7 $\overline{AC} \cong \overline{BD}$	7 Addition prop

9 Given: $\odot O$

$\angle NOG \cong \angle POG$

Concl: $\overrightarrow{RO}$ bis $\angle NRP$.



1 $\odot O$	1 Given
2 $\overline{ON} \cong \overline{OP}$	2 Radii of a $\odot$ are $\cong$.
3 $\angle NOG \cong \angle POG$	3 Given
4 $\angle 1$ is supp to $\angle NOG$.	4 If 2 $\angle$s form a st $\angle$, they are supp.
5 $\angle 2$ is supp to $\angle POG$.	5 Same as 4
6 $\angle 1 \cong \angle 2$	6 Supp of $\cong \angle$s are $\cong$.
7 $\overline{OR} \cong \overline{OR}$	7 Reflexive prop
8 $\triangle ONR \cong \triangle OPR$	8 SAS
9 $\angle NRO \cong \angle PRO$	9 CPCTC
10 $\overrightarrow{RO}$ bis $\angle NRP$.	10 If a ray divides an $\angle$ into 2 $\cong \angle$s, it bis the $\angle$.

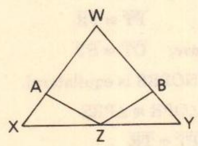
10 Given: $\overline{AZ} \cong \overline{ZB}$

Z mdpt of $\overline{XY}$

$\angle AZX \cong \angle BZY$

$\overline{XW} \cong \overline{YW}$

Prove: $\overline{AW} \cong \overline{BW}$



1 $\overline{AZ} \cong \overline{ZB}$	1 Given
2 Z is mdpt of $\overline{XY}$	2 Given
3 $\overline{XZ} \cong \overline{ZY}$	3 A mdpt divides a seg into 2 $\cong$ segs.
4 $\angle AZX \cong \angle BZY$	4 Given
5 $\triangle AZX \cong \triangle BZY$	5 SAS
6 $\overline{XW} \cong \overline{YW}$	6 Given
7 $\overline{AX} \cong \overline{BY}$	7 CPCTC
8 $\overline{AW} \cong \overline{BW}$	8 Subtraction prop

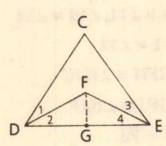
11 Given: $\overrightarrow{DF}$ bis $\angle CDE$.

$\overrightarrow{EF}$ bis $\angle CED$.

G mdpt of $\overline{DE}$

$\overline{DF} \cong \overline{EF}$

Prove: $\angle CDE \cong \angle CED$



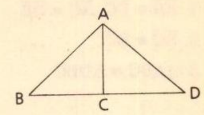
1 $\overrightarrow{DF}$ bis $\angle CDE$.	1 Given
2 $\angle 1 \cong \angle 2$	2 A bis divides an $\angle$ into 2 $\cong \angle$s.
3 $\overrightarrow{EF}$ bis $\angle CED$.	3 Given
4 $\angle 3 \cong \angle 4$	4 Same as 2
5 G mdpt of $\overline{DE}$	5 Given
6 $\overline{DG} \cong \overline{GE}$	6 A mdpt divides a seg into 2 $\cong$ segs.
7 $\overline{DF} \cong \overline{EF}$	7 Given
8 Draw $\overline{FG}$	8 Two pts determine a seg.
9 $\overline{FG} \cong \overline{FG}$	9 Reflexive prop
10 $\triangle DFG \cong \triangle EFG$	10 SSS
11 $\angle 2 \cong \angle 4$	11 CPCTC
12 $\angle 1 \cong \angle 3$	12 Substitution prop
13 $\angle CDE \cong \angle CED$	13 Addition prop

12 Given: $\overline{AC}$ is the alt to $\overline{BD}$.

$\overline{AC}$ is a median.

$\angle BAC$ comp to $\angle D$

Concl: $\angle DAC$ comp to $\angle B$



1 $\overline{AC}$ is alt to $\overline{BD}$.	1 Given
2 $\angle ACB$ and $\angle ACD$ are rt $\angle$s.	2 An alt of a $\triangle$ forms rt $\angle$s with one of the sides.
3 $\angle ACB \cong \angle ACD$	3 Rt $\angle$s are $\cong$.
4 $\overline{AC}$ is a median.	4 Given
5 $\overline{BC} \cong \overline{CD}$	5 A median of a $\triangle$ divides one side into 2 $\cong$ segs.
6 $\overline{AC} \cong \overline{AC}$	6 Reflexive prop
7 $\triangle ACB \cong \triangle ACD$	7 SAS
8 $\angle BAC \cong \angle DAC$, $\angle D \cong \angle B$	8 CPCTC
9 $\angle BAC$ comp to $\angle D$	9 Given
10 $\angle DAC$ comp to $\angle B$	10 Substitution prop

13 At any point (x, y) where y = 11 or y = 1

14 OA + AP + OC + CD + OP = Perimeter of $\triangle AOP$.

Let OC = x, DP = 16 − x, CD = x + 2

OA = OB = OD = 2x + 2, AP = CP = 18.

$(2x + 2) + (18) + (x) + (x + 2) + (16 - x) = 80$

$3x + 38 = 80$

$3x = 42$

$x = 14$

$OB = 2(14) + 2 = 30$

$BP = 18$

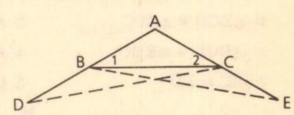
$30 + 18 = 48$

$OB + BP = 48$

15 Given: $\overline{AB} \cong \overline{AC}$

$\overline{BD} \cong \overline{CE}$

Prove: $\angle 1 \cong \angle 2$



1 $\overline{AB} \cong \overline{AC}$, $\overline{BD} \cong \overline{CE}$	1 Given
2 $\overline{AD} \cong \overline{AE}$	2 Addition prop
3 $\angle A \cong \angle A$	3 Reflexive prop
4 $\triangle ADC \cong \triangle AEB$	4 SAS
5 $\overline{DC} \cong \overline{EB}$	5 CPCTC
6 $\overline{BC} \cong \overline{BC}$	6 Reflexive prop
7 $\triangle DBC \cong \triangle ECB$	7 SSS
8 $\angle DBC \cong \angle ECB$	8 CPCTC
9 $\angle 1$ is supp to $\angle DBC$, $\angle 2$, is supp to $\angle ECB$.	9 If sum of 2 $\angle$s is st $\angle$, $\angle$s are supp.
10 $\angle 1 \cong \angle 2$	10 Supps of $\cong \angle$s are $\cong$.

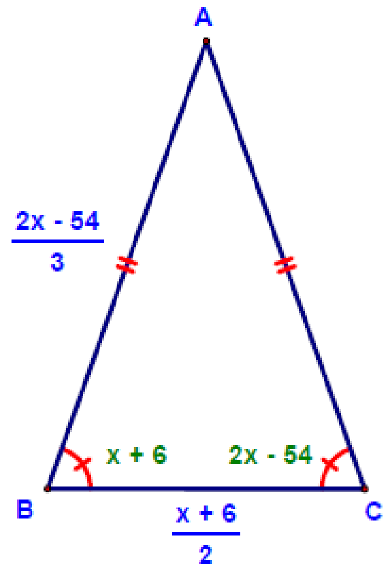
Answers to Isosceles Δ HW Day 6

20. **Given:** ∠A is the vertex of an isosceles Δ

The number of degrees in ∠B is twice the number of centimeters in $\overline{BC}$

The number of degrees in ∠C is three times the number of centimeters is $\overline{AB}$

$m\angle B = x + 6$
$m\angle C = 2x - 54$



Find: The perimeter of ΔABC

$x + 6 = 2x - 54$

$\Rightarrow x = 60$

$\therefore AB = AC = \frac{2(60) - 54}{3} = 22$

and

$BC = \frac{60 + 6}{2} = 33$

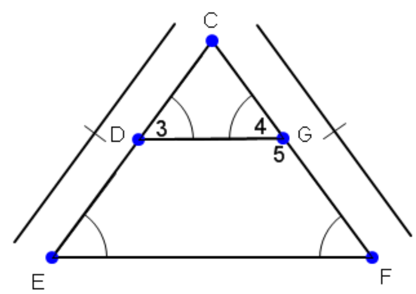
$P_{\triangle ABC} = 2(22) + 33 = 77$ cm

21. Given: $\overline{CE} \cong \overline{CF}$

$\angle F \cong \angle 3$

$\angle E$ is supp. to $\angle 5$

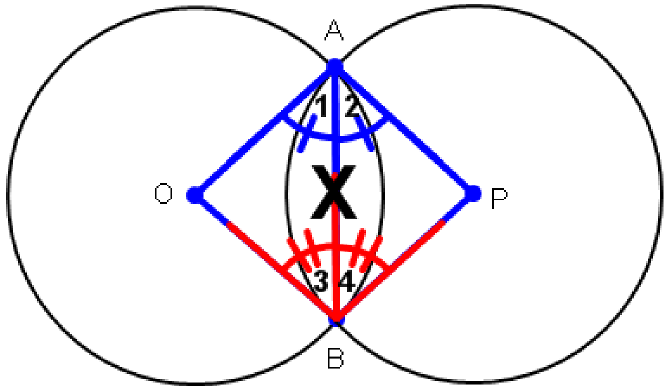
Prove: ΔCDG is isosceles



Statements	Reasons
1. $\overline{CE} \cong \overline{CF}$ $\angle F \cong \angle 3$ $\angle E$ is supp. to $\angle 5$	1. Given
2. $\angle E \cong \angle F$	2. If △, then △
3. $\angle E \cong \angle 3$	3. Transitive Prop. (1, 2)
4. $\angle 4$ is supp. to $\angle 5$	4. Linear Pair Thm
5. $\angle E \cong \angle 4$	5. Congruent Suppl. Thm
6. $\angle 3 \cong \angle 4$	6. Transitive Prop. (3, 5)
7. $\overline{CD} \cong \overline{CG}$	7. If △, then △
8. ΔCDG is Isosceles	8. Definition of *Isosceles* Δ

23. Given: $\odot O, \odot P$; $\overleftrightarrow{AB}$ *bisects* $\measuredangle s$ *OAP and OBP*.

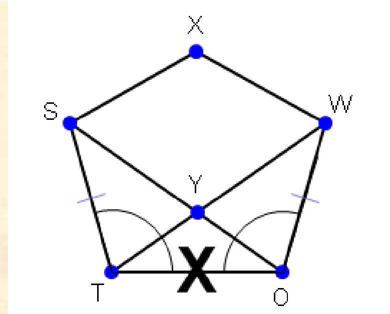
Prove: Figure AOBP is equilateral.



Statements	Reasons
1. $\odot O, \odot P$; $\overleftrightarrow{AB}$ *bisects* $\measuredangle s$ *OAP and OBP*.	1. Given
(A) 2. $\measuredangle 1 \cong \measuredangle 2$	2. Definition of angle bisector
(A) $\measuredangle 3 \cong \measuredangle 4$	
(S) 3. $\overline{AB} \cong \overline{AB}$	3. Reflexive Property
4. $\Delta AOB \cong \Delta APB$	4. ASA (2, 3, 2)
5. $\overline{AO} \cong \overline{AP}$	5. CPCTC
$\overline{BO} \cong \overline{BP}$	
6. $\overline{AO} \cong \overline{BO}$	6. All radii of a $\odot$ are $\cong$
$\overline{AP} \cong \overline{BP}$	
7. $\overline{AO} \cong \overline{BO} \cong \overline{AP} \cong \overline{BP}$	7. Transitive Prop. (5, 6)
8. Figure AOBP is equilateral	8. If a figure has all sides $\cong \rightarrow$ *equil*.

24 Given: Figure XSTOW is equilateral and equiangular.

Prove: △YTO is isos.

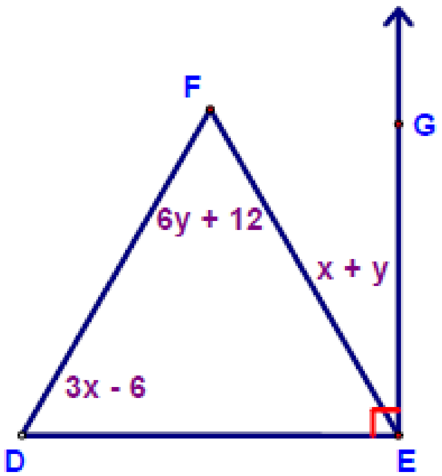


Statements	Reasons
1 XSTOW is equilateral and equiangular.	1 Given
(S) 2 $\overline{ST} \cong \overline{WO}$	2 If a figure is equilateral, all sides are ≅.
(S) 3 $\overline{TO} \cong \overline{TO}$	3 Reflexive prop
(A) 4 ∠STO ≅ ∠WOT	4 If a figure is equiangular, all ∠s are ≅.
5 △STO ≅ △WOT	5 SAS **(2, 4, 3)**
6 ∠YOT ≅ ∠YTO	6 CPCTC
7 $\overline{TY} \cong \overline{YO}$	7 If △ then △
8 △YTO is isos.	8 If a △ has at least 2 sides ≅, the △ is isos.

25.

Given: $\triangle FED$ is equilateral

Find: x, y, and $m\angle F$



$6y + 12 = 3x - 6$

$\Rightarrow 6y = 3x - 18$

$\Rightarrow y = \frac{1}{2}x - 3$

$(x + y) + (3x - 6) = 90$

$\Rightarrow 4x + y = 96$

$4x + \left(\frac{1}{2}x - 3\right) = 96$

$\Rightarrow \frac{8}{2}x + \frac{1}{2}x = 99$

$\Rightarrow \frac{9}{2}x = 99$

$\Rightarrow x = 22$

$\Rightarrow y = \frac{1}{2}(22) - 3 = 8$

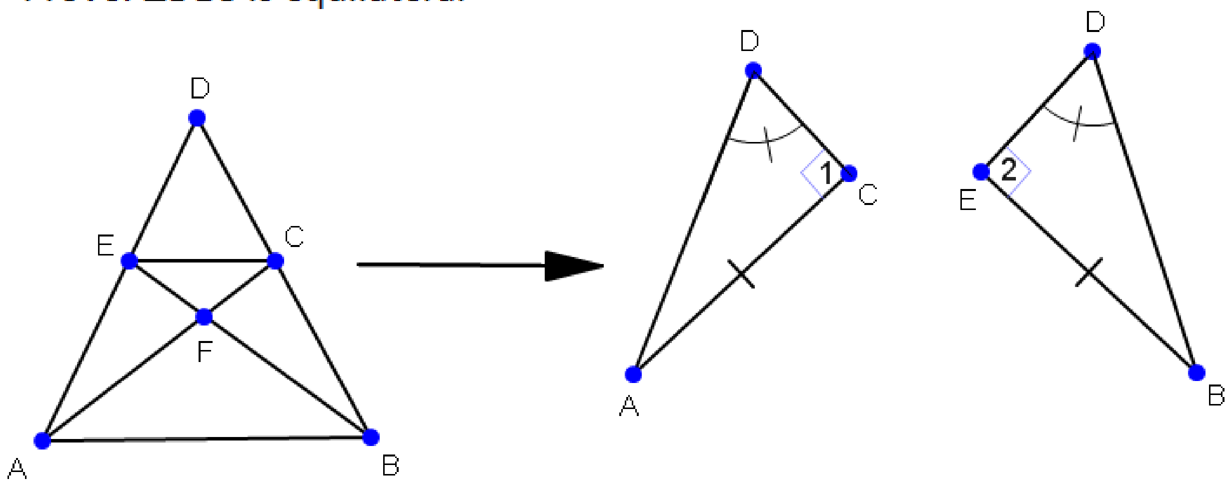
$\therefore m\angle F = 6(8) + 12 = 60°$

Page 160 #16

Given: $\overline{BE} \perp \overline{AD}$, $\overline{AC} \perp \overline{BD}$,

$\overline{AC} \cong \overline{BE}$, $\overline{DE} \cong \overline{EC}$

Prove: ΔDEC is equilateral

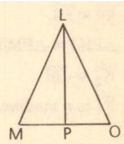


	Statements	Reasons
(S)	1. $\overline{BE} \perp \overline{AD}$, $\overline{AC} \perp \overline{BD}$, $\overline{AC} \cong \overline{BE}$, $\overline{DE} \cong \overline{EC}$	1. Given
	2. $\measuredangle 1$ *and* $\measuredangle 2$ *are rt* $\measuredangle s$	2. Def of ⊥ *lines*
(A)	3. $\measuredangle 1 \cong \measuredangle 2$	3. all right $\measuredangle s$ ≅
(A)	4. $\measuredangle D \cong \measuredangle D$	4. Reflexive Property
	5. $\Delta DAC \cong \Delta DEB$	5. AAS (3, 4, 1)
	6. $\overline{DC} \cong \overline{DE}$	6. CPCTC
	7. $\overline{DC} \cong \overline{DE} \cong \overline{EC}$	7. Transitive Prop. (1, 6)
	8. ΔDEC is equilateral	8. If a figure has all sides ≅ → *equil.*

Geometry Honors Answer Key

Proving Triangles Congruent with Hypotenuse Leg
Page 158 #'s 5 , 12 and 17

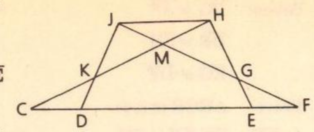
5 Given: $\triangle LMO$ is isos.
$\overline{MO}$ is base.
$\overline{LP}$ alt to $\overline{MO}$
Prove: $\triangle LMP \cong \triangle LOP$



Statements	Reasons
1 $\triangle LMO$ is isos, $\overline{MO}$ base.	1 Given
2 $\overline{LM} \cong \overline{LO}$	2 If a $\triangle$ is isos, at least 2 sides are $\cong$.
3 $\overline{LP}$ alt to $\overline{MO}$	3 Given
4 $\angle LPM$ is a rt $\angle$.	4 An alt of a $\triangle$ forms rt $\angle$s with one of the sides.
5 $\angle LPO$ is a rt $\angle$.	5 Same as 4
6 $\overline{LP} \cong \overline{LP}$	6 Reflexive prop
7 $\triangle LMP \cong \triangle LOP$	7 HL

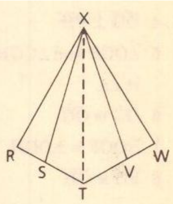
12)

Given: $\overline{CD} \cong \overline{EF}$
$\overline{JF} \perp \overline{JD}$
$\overline{CH} \perp \overline{HE}$
$\overline{CH} \cong \overline{JF}$
Prove: $\overline{JD} \cong \overline{HE}$



Statements	Reasons
1 $\overline{CD} \cong \overline{EF}$	1 Given
2 $\overline{DE} \cong \overline{DE}$	2 Reflexive prop
3 $\overline{CE} \cong \overline{DF}$	3 Addition prop
4 $\overline{JF} \perp \overline{JD}$	4 Given
5 $\angle DJF$ is a rt $\angle$.	5 If 2 segs are $\perp$, they form rt $\angle$s.
6 $\overline{CH} \perp \overline{HE}$	6 Given
7 $\angle CHE$ is a rt $\angle$.	7 Same as 5
8 $\overline{CH} \cong \overline{JF}$	8 Given
9 $\triangle JDF \cong \triangle HEC$	9 HL
10 $\overline{JD} \cong \overline{HE}$	10 CPCTC

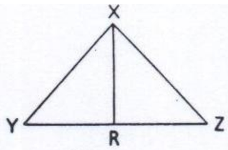
17 Given: $\angle R$ and $\angle W$ are rt $\angle$s.
$\overline{RX} \cong \overline{WX}$
W is $\frac{3}{7}$ of the way from R to T.
V is $\frac{4}{7}$ of the way from T to W.
Prove: $\overline{ST} \cong \overline{TV}$



Statements	Reasons
1 $\angle R$ and $\angle W$ are rt $\angle$s.	1 Given
2 $\overline{RX} \cong \overline{WX}$	2 Given
3 Draw $\overline{XT}$	3 Two pts determine a line.
4 $\overline{XT} \cong \overline{XT}$	4 Reflexive prop
5 $\triangle RXT \cong \triangle WXT$	5 HL
6 W is $\frac{3}{7}$ of way from R to T.	6 Given
7 V is $\frac{4}{7}$ of way from T to W.	7 Given
8 $\overline{RT} \cong \overline{WT}$	8 CPCTC
9 S is $\frac{4}{7}$ of way from T to R.	9 Subtraction prop
10 $\overline{ST} \cong \overline{TV}$	10 Multiplication prop

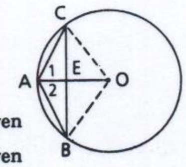
Right Angle Theorem and Equidistance Theorems
Pages 182 – 183 #'s 4, 9, 14

4 Given: $\overrightarrow{XR}$ bis $\angle YXZ$.
$\angle Y \cong \angle Z$
Concl: $\overline{XR}$ is an alt.



1 $\overrightarrow{XR}$ bis $\angle YXZ$.	1 Given
2 $\angle YXR \cong \angle ZXR$	2 A bis divides an $\angle$ into 2 $\cong$ $\angle$s.
3 $\angle Y \cong \angle Z$	3 Given
4 $\overline{XY} \cong \overline{XZ}$	4 If △ then △
5 $\triangle YXR \cong \triangle ZXR$	5 ASA
6 $\angle YRX \cong \angle ZRX$	6 CPCTC
7 $\overline{XR} \perp \overline{YZ}$	7 If 2 lines intersect to form $\cong$ adj $\angle$s, the lines are $\perp$.
8 $\overline{XR}$ is an alt.	8 If a seg is drawn from a vertex of a $\triangle$ and is $\perp$ to the opp side, it is an alt of the $\triangle$.

9 Given: $\odot O$
$\angle B \cong \angle C$
Concl: $\overline{AO} \perp \overline{BC}$



1 $\odot O$	1 Given
2 $\angle B \cong \angle C$	2 Given
3 $\overline{AC} \cong \overline{AB}$	3 If △ then △
4 Draw $\overline{CO}$ and $\overline{BO}$	4 Two pts determine a seg.
5 $\overline{CO} \cong \overline{BO}$	5 Radii of a $\odot$ are $\cong$.
6 $\overline{AO} \cong \overline{AO}$	6 Reflexive prop
7 $\triangle AOC \cong \triangle AOB$	7 SSS
8 $\angle 1 \cong \angle 2$	8 CPCTC
9 $\triangle AEC \cong \triangle AEB$	9 SAS
10 $\angle AEC \cong \angle AEB$	10 CPCTC
11 $\overline{AO} \perp \overline{BC}$	11 If 2 lines intersect to form $\cong$ adj $\angle$s, the lines are $\perp$.

14 If $b \perp a$, $(2x + 37)° = 90°$, $(2x + y)° = 90°$, and $(3y - 21)° = 90°$.

$2x + 37 + 2x + y = 180$, so $4x + y = 143$.

$2x + y + 3y - 21 = 180$, so $2x + 4y = 201$.

Solving the 2 equations gives $x = 26\frac{1}{2}$ and $y = 37$.

$2x + 37 = 2(26\frac{1}{2}) + 37 = 90$

$2x + y = 2(26\frac{1}{2}) + 37 = 90$

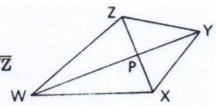
$3y - 21 = 3(37) - 21 = 90$

So $a \perp b$.

Page 189 – 190 #'s 14, 15, 16, 17, and 20

14 Given: WXYZ is a kite. $\overline{WX} \cong \overline{WZ}$, $\overline{XY} \cong \overline{YZ}$

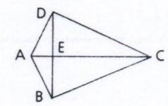
Prove: $\triangle WPZ$ is a rt $\triangle$.



1 WXYZ is a kite, $\overline{WX} \cong \overline{WZ}$, $\overline{XY} \cong \overline{YZ}$.	1 Given
2 $\overline{WY} \perp \overline{ZX}$	2 Two pts =dist from endpts of a seg determine $\perp$ bis of that seg.
3 $\angle WPZ$ is a rt $\angle$.	3 $\perp$ lines intersect to form rt $\angle$s.
4 $\triangle WPZ$ is a rt $\triangle$.	4 If a $\triangle$ contains a rt $\angle$, then it is a rt $\triangle$.

15 Given: $\angle ADC$ and $\angle ABC$ are rt $\angle$s. $\overline{AB} \cong \overline{AD}$

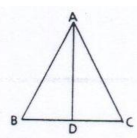
Concl: $\overleftrightarrow{AC} \perp$ bis $\overline{BD}$.



1 $\angle ADC$ and $\angle ABC$ are rt $\angle$s.	1 Given
2 $\angle ADC \cong \angle ABC$	2 Rt $\angle$s are $\cong$.
3 $\overline{AB} \cong \overline{AD}$	3 Given
4 $\overline{AC} \cong \overline{AC}$	4 Reflexive prop
5 $\triangle ADC \cong \triangle ABC$	5 HL
6 $\overline{DC} \cong \overline{BC}$	6 CPCTC
7 $\overleftrightarrow{AC} \perp$ bis $\overline{BD}$.	7 Two pts =dist from endpts of a seg determine the $\perp$ bis of the seg.

16 Given: $\triangle ABC$ is isos, base $\overline{BC}$. $\overline{AD}$ median $\overline{BC}$

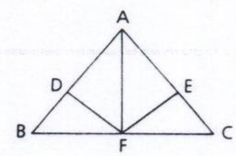
Prove: $\overline{AD}$ is alt to $\overline{BC}$.



1 $\triangle ABC$ is isos, base $\overline{BC}$.	1 Given
2 $\overline{AD}$ median $\overline{BC}$	2 Given
3 $\overline{AB} \cong \overline{AC}$	3 An isos $\triangle$ has 2 sides $\cong$.
4 $\overline{BD} \cong \overline{CD}$	4 A median divides a seg into 2 $\cong$ segs.
5 $\overline{AD} \perp$ bis $\overline{BC}$.	5 Two pts =dist from endpts of a seg determine the $\perp$ bis of that seg.
6 $\overline{AD}$ is alt to $\overline{BC}$.	6 A seg from a vertex of a $\triangle$ $\perp$ to opp side is an alt of the $\triangle$.

17 Given: F mdpt $\overline{BC}$, $\overline{DB} \cong \overline{EC}$, $\overline{DB} \perp \overline{DF}$, $\overline{EC} \perp \overline{EF}$

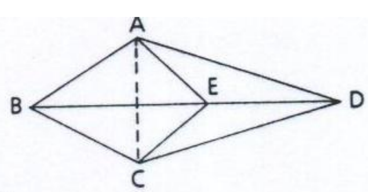
Concl: $\overleftrightarrow{AF} \perp \overline{BC}$



1 F mdpt $\overline{BC}$	1 Given
2 $\overline{BF} \cong \overline{CF}$	2 A mdpt divides a seg into 2 $\cong$ segs.
3 $\overline{DB} \cong \overline{EC}$	3 Given
4 $\overline{DB} \perp \overline{DF}$, $\overline{EC} \perp \overline{EF}$	4 Given
5 $\angle FDB$ is a rt $\angle$.	5 $\perp$ lines intersect to form rt $\angle$
6 $\angle FEC$ is a rt $\angle$.	6 Same as 5
7 $\triangle DBF \cong \triangle ECF$	7 HL
8 $\angle B \cong \angle C$	8 CPCTC
9 $\overline{AB} \cong \overline{AC}$	9 If $\triangle$ then $\triangle$
10 $\overleftrightarrow{AF} \perp \overline{BC}$	10 Two pts =dist from the endpts of a seg determine the $\perp$ bis of the seg ($\overline{BC}$).

20 Given: $\overline{AB} \cong \overline{BC}$, $\overline{AE} \cong \overline{EC}$

Concl: $\overline{AD} \cong \overline{DC}$



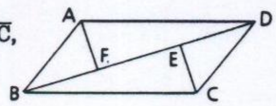
1 $\overline{AB} \cong \overline{BC}$, $\overline{AE} \cong \overline{EC}$	1 Given
2 Draw $\overline{AC}$	2 Two pts determine a line.
3 $\overleftrightarrow{BE} \perp$ bis $\overline{AC}$.	3 Two pts =dist from the endpts of a seg determine the $\perp$ bis of the seg.
4 $\overline{AD} \cong \overline{DC}$	4 A pt on the $\perp$ bis of a seg is =dist from the endpts of the seg.

Answers to Detour Proofs

Detour Proofs pages 174- 175 #'s 11, 13, 14, 17

11 Given: $\overline{AD} \cong \overline{BC}$, $\overline{AF} \cong \overline{EC}$, $\overrightarrow{BD} \perp \overleftrightarrow{AF}$ and $\overrightarrow{EC}$

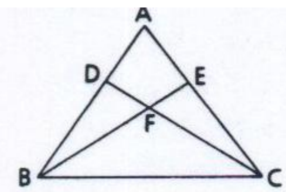
Concl: $\overline{AB} \cong \overline{DC}$



1 $\overline{AD} \cong \overline{BC}$, $\overline{AF} \cong \overline{EC}$,	1 Given
2 $\overrightarrow{BD} \perp \overleftrightarrow{AF}$ and $\overrightarrow{EC}$	2 Given
3 $\angle AFD$ and $\angle CEB$ are rt $\angle$s.	3 If 2 segs are $\perp$, they form rt $\angle$s.
4 $\triangle AFD \cong \triangle CEB$	4 HL
5 $\overline{FD} \cong \overline{BE}$	5 CPCTC
6 $\overline{FE} \cong \overline{FE}$	6 Reflexive prop
7 $\overline{BF} \cong \overline{DE}$	7 Subtraction prop
8 $\angle AFB$ supp $\angle AFD$	8 If 2 $\angle$s form a st $\angle$, the $\angle$s are supp.
9 $\angle CED$ supp $\angle CEB$	9 Same as 8
10 $\angle AFD \cong \angle CEB$	10 Rt $\angle$s are $\cong$.
11 $\angle AFB \cong \angle CED$	11 Supp of $\cong$ $\angle$s are $\cong$.
12 $\triangle ABF \cong \triangle CDE$	12 SAS
13 $\overline{AB} \cong \overline{DC}$	13 CPCTC

13 Given: $\overline{AB} \cong \overline{AC}$, $\overline{AD} \cong \overline{AE}$

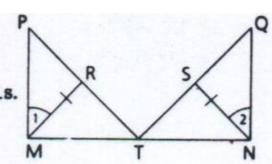
Prove: $\triangle FBC$ is isos.



1 $\overline{AB} \cong \overline{AC}$, $\overline{AD} \cong \overline{AE}$	1 Given
2 $\angle A \cong \angle A$	2 Reflexive prop
3 $\triangle BAE \cong \triangle CAD$	3 SAS
4 $\angle ABE \cong \angle ACD$	4 CPCTC
5 $\angle ABC \cong \angle ACB$	5 If $\triangle$ then $\triangle$
6 $\angle FCB \cong \angle FBC$	6 Subtraction prop
7 $\overline{BF} \cong \overline{FC}$	7 If $\triangle$ then $\triangle$
8 $\triangle FBC$ is isos.	8 If two sides of a $\triangle$ are $\cong$, then it is isos.

14 Given: T mdpt of $\overline{MN}$, $\angle PMT$, $\angle QNT$ are rt $\angle$s. $\overline{MR} \cong \overline{SN}$, $\angle 1 \cong \angle 2$

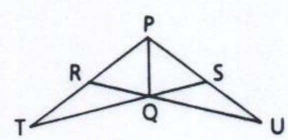
Concl: $\angle P \cong \angle Q$



1 T mdpt of $\overline{MN}$	1 Given
2 $\angle PMT$, $\angle QNT$ are rt $\angle$s.	2 Given
3 $\overline{MR} \cong \overline{SN}$, $\angle 1 \cong \angle 2$	3 Given
4 $\overline{MT} \cong \overline{TN}$	4 A mdpt divides a seg into 2 $\cong$ segs.
5 $\angle PMT \cong \angle QNT$	5 Rt $\angle$s are $\cong$.
6 $\angle RMT \cong \angle SNT$	6 Subtraction prop
7 $\triangle RMT \cong \triangle SNT$	7 SAS
8 $\angle MRT \cong \angle NST$	8 CPCTC
9 $\angle MRT$ supp $\angle MRP$	9 If 2 $\angle$s form a st $\angle$, the $\angle$s are supp.
10 $\angle NST$ supp $\angle NSQ$	10 Same as 9
11 $\angle NSQ \cong \angle MRP$	11 Supps of $\cong$ $\angle$s are $\cong$.
12 $\triangle PMR \cong \triangle QNS$	12 ASA
13 $\angle P \cong \angle Q$	13 CPCTC

17 Given: $\overline{PT} \cong \overline{PU}$, $\overline{PR} \cong \overline{PS}$

Prove: $\overrightarrow{PQ}$ bis $\angle RPS$.



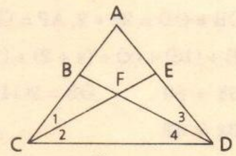
1 $\overline{PT} \cong \overline{PU}$, $\overline{PR} \cong \overline{PS}$	1 Given
2 $\angle TPS \cong \angle UPR$	2 Reflexive prop
3 $\triangle TPS \cong \triangle UPR$	3 SAS
4 $\angle PRU \cong \angle PST$	4 CPCTC
5 $\angle T \cong \angle U$	5 CPCTC
6 $\angle TRQ$ supp $\angle PRU$	6 If 2 $\angle$s form a st $\angle$, the $\angle$s are supp.
7 $\angle USQ$ supp $\angle PST$	7 Same as 6
8 $\angle TRQ \cong \angle USQ$	8 Supps of $\cong$ $\angle$s are $\cong$.
9 $\overline{TR} \cong \overline{US}$	9 Subtraction prop
10 $\triangle TRQ \cong \triangle USQ$	10 ASA
11 $\overline{RQ} \cong \overline{SQ}$	11 CPCTC
12 $\triangle PRQ \cong \triangle PSQ$	12 SAS
13 $\angle RPQ \cong \angle SPQ$	13 CPCTC
14 $\overrightarrow{PQ}$ bis $\angle RPS$.	14 If a ray divides an $\angle$ into 2 $\cong$ $\angle$s, then it bis the $\angle$.

Page 141

4 Given: $\angle 1 \cong \angle 3$

$\angle 2 \cong \angle 4$

Concl: $\overline{BC} \cong \overline{ED}$



1 $\angle 1 \cong \angle 3, \angle 2 \cong \angle 4$	1 Given
2 $\overline{CD} \cong \overline{CD}$	2 Reflexive prop
3 $\angle BCD \cong \angle EDC$	3 Addition prop
4 $\triangle BCD \cong \triangle EDC$	4 ASA
5 $\overline{BC} \cong \overline{ED}$	5 CPCTC

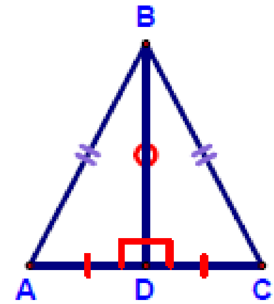
Answers to Missing Diagram Proofs
Page 179 #8, 11, 12, 14

8.

If the median to a side of a △ is also an altitude to that side, then the △ is isosceles.

Given: $\overline{BD}$ is a median
$\overline{BD}$ is an altitude

Prove: △ABC is isosceles



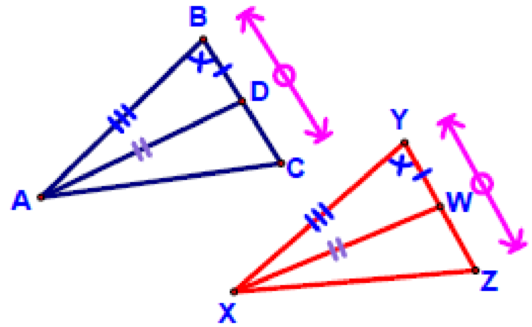
	Statements	Reasons
	1. $\overline{BD}$ is a median	1. Given
	2. D is the midpoint of $\overline{CA}$	2. Definition of Median
S	3. $\overline{AD} \cong \overline{DC}$	3. Definition of Midpoint
	4. $\overline{BD}$ is an altitude	4. Given
	5. $\overline{BD} \perp \overline{CA}$	5. Defn. of Altitude
	6. ∠BDA and ∠BDC are right ∠s	6. Defn. of ⊥ Segments
A	7. ∠BDA ≅ ∠BDC	7. All Right Angles are Congruent
S	8. $\overline{BD} \cong \overline{BD}$	8. Reflexive Property
	9. △ABD ≅ △CBD	9. SAS (2, 5, 6)
	10. $\overline{BA} \cong \overline{BC}$	10. CPCTC
	11. △ABC is isosceles	11. Definition of Isosceles △

11.

Prove that if 2 △s are ≅, then any pair of corresponding medians are ≅.

Given: $\triangle ABC \cong \triangle XYZ$
$\overline{AD}$ & $\overline{XW}$ are medians

Prove: $\overline{AD} \cong \overline{XW}$



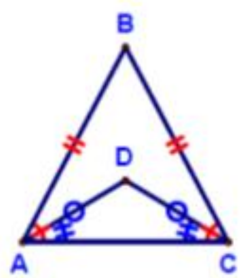
	Statements	Reasons
	Statements	Reasons
	1. $\triangle ABC \cong \triangle XYZ$	1. Given
S	2. $\overline{AB} \cong \overline{XY}$	2. CPCTC
A	3. $\angle B \cong \angle Y$	3. CPCTC
	4. $\overline{BC} \cong \overline{YZ}$	4. CPCTC
	5. $\overline{AD}$ & $\overline{XW}$ are medians	5. Given
	6. D & W are midpoints	6. Definition of Median of △
	7. $\overline{BD} \cong \frac{1}{2}\overline{BC}$, $\overline{YW} \cong \frac{1}{2}\overline{YZ}$	7. Definition of Midpoint
S	8. $\overline{BD} \cong \overline{YW}$	8. Division Property of ≅ Segments
	9. $\triangle ABD \cong \triangle XYW$	9. SAS (2, 3, 8)
	10. $\overline{AD} \cong \overline{XW}$	10. CPCTC

12.

Prove that if a △ is isosceles, then the △ formed by its base and the ∠ bisectors of its base ∠s is also isosceles.

Given: $\triangle ABC$ is isosceles with vertex $\angle ABC$
$\overline{AD}$ & $\overline{CD}$ are ∠ bisectors

Prove: $\triangle ADC$ is isosceles



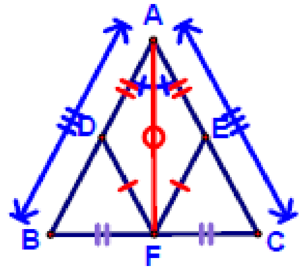
Statements	Reasons
1. $\triangle ABC$ is isos. with vertex $\angle ABC$	1. Given
2. $\overline{AB} \cong \overline{CB}$	2. Definition of Legs of Isosceles △
3. $\angle BAC \cong \angle BCA$	3. If △, then △
4. $\overline{AD}$ & $\overline{CD}$ are ∠ bisectors	4. Given
5. $\angle DAC \cong \frac{1}{2}\angle BAC$, $\angle DCA \cong \frac{1}{2}\angle BCA$	5. Definition of Angle Bisector
6. $\angle DAC \cong \angle DCA$	6. Division Property of ≅ Angles
7. $\overline{AD} \cong \overline{CD}$	7. If △, then △
8. $\triangle ADC$ is isosceles	8. Definition of Isosceles △

14.

Prove that if a point on the base of an isos. △ is equidistant from the midpoints of the legs, then that point is the midpoint of the base.

Given: △ABC is isos. with vertex ∠BAC
D & E are midpoints
F is equidistant from D & E

Prove: F is the midpt. of $\overline{BC}$



	Statements	Reasons
	1. F is equidistant from D & E	1. Given
S	2. $\overline{FD} \cong \overline{FE}$	2. Definition of Equidistant
	3. △ABC is isos. with vertex ∠BAC	3. Given
S	4. $\overline{AB} \cong \overline{AC}$	4. Definition of Isosceles △
	5. D & E are midpoints	5. Given
	6. $\overline{AD} \cong \frac{1}{2}\overline{AB}$, $\overline{AE} \cong \frac{1}{2}\overline{AC}$	6. Definition of Midpoint
S	7. $\overline{AD} \cong \overline{AE}$	7. Division Property of ≅ Segments
	8. Draw $\overline{AF}$	8. 2 points determine a line
S S	9. $\overline{AF} \cong \overline{AF}$	9. Reflexive Property
	10. △ADF ≅ △AEF	10. SSS (2, 7, 9)
A	11. ∠DAF ≅ ∠EAF	11. CPCTC (from 10)
	12. △ABF ≅ △ACF	12. SAS (4, 11 , 9)
	13. $\overline{BF} \cong \overline{FC}$	13. CPCTC (from 12).
	14. F is the midpoint of $\overline{BC}$	14. Definition of Midpoint